ARMY RESEARCH AND DEVELOPMENT

November-December 1976 —16TH ANNIVERSARY EDITION

Operations Research Stressed As Vital to Decision-Makers
Featured on page 11

Conference Stresses Critical Role of DARCOM Project Managers

Featured on page 16

Army Secretary Presents First Annual PM Award

FIRST ANNUAL AWARD for Project Management is presented to MG Robert J. Baer by Secretary of the Army Martin R. Hoffmann. Consisting of an engraved plaque and a Letter of Commendation, the Secretary of the Army Award was established by Army Regulation 672-13, Nov. 7, 1975, to provide recognition for outstanding project management within DARCOM, the Office of the Surgeon General, the Corps of Engineers and the Army Security Agency. See p. 16 for accompanying citation.

Glossary of Acronyms-p.1

AAH

COL Edward M. Brown

ASE

COL Jack L. Keaton

AWC

LTC Walter V. Pope

ACODS

COL William H. Danzeisen

ARGADS

COL Russell W. Parker

ARTADS

BG William J. Hilsman

CAWS

COL Ronald E. Philipp

CHAP/FAAR

COL Howard C. Whittaker

CH-47

COL James M. Hesson

CDIR

COL Frank A. Jones

COBRA

COL Charles F. Drenz

1¼-TON CTS

COL Fred Hissong

DCSCS

BG Emmett Paige

DRAGON

COL Arthur L. Goodall

FAMECE/UET

COL Max B. Scheider

GSRS

COL Kenneth S. Heitzke

HAWK

COL Patrick M. Roddy

HELLFIRE

COL Robert J. Feist

HELS

COL Vincent P. DeFatta

ITV

COL Charles C. Adsit

SPEAKING ON . . .

The Challenge to U.S. Army Program/Project Managers

Secretary of the Army Martin R. Hoffmann and former Under Secretary of the Army Herman R. Staudt were luncheon speakers at the recent Seventh Annual U.S. Army Project Managers Conference. A cleared version of Secretary Hoffmann's address was not available at press time. Due to space limitations, a condensed version of Mr. Staudt's address follows.

Currently he is president and chief executive officer, Borg Textile Corp., a subsidiary of Bunker Ramo Corp., in which he is corporate vice president and assistant to the president. He served five years with the U.S. Army Signal Corps Engineering Laboratory, prior to entering a career of progressively top level executive assignments in industry.

With Martin Marietta Corp., he had key roles in several Army missile systems, including director of the Pershing Ballistic Missile Program. His education includes a master's degree from Massachusetts Institute of Technology and fellowship studies at the Alfred P. Sloan School of Management.

I know you are certainly not in the military program/project management field for the money.... But as with the men who respond to another high calling - namely the chaplain or preacher - the potential rewards...in the broadest sense...are and can be among the highest in the land. Let me tell you why I believe this to be true....

I suspect that, of the three services, the Army program or project manager has by far the greatest potential Return on Investment for his tour - if one defines the ROI in terms of death or casualty or simply spilled blood avoidance, or Gross National Manpower saved per dollar, or hour invested in his program or project.

If the Air Force or the Navy were to incur a major materiel disaster - such as, for example, losing a complete wing of the latest strategic bombers in a single day's battle, or having the newest nuclear aircraft carrier lost at sea with a wing or two of aircraft aboard - an investment of several billion dollars would instantaneously be lost, but hardly more men (perhaps 5,000 to 6,000) than the number one would find in a typical Army brigade. Yet most of you are involved in providing materiel to outfit Army divisions, not just brigades.

George Washington's entire army probably could not muster the firepower of a single modern Army battalion. Still many of you are developing, producing or maintaining hardware to permit dozens of battalions to function effectively when and as needed.

On the other hand, you would have only to commit or permit one or at most a few boners to dud the utility of one of today's battalions. I suspect it would have taken an order of magnitude more boners to nullify equally the fighting effectiveness of Washington's army in those days.

Thus the dependence of victory on the battlefield has dramatically shifted, over time, from a heavy dependence on brains and brawn of the individual front-line soldier to a collective capability of the man and his machine (materiel).

Warfare is today, and will be tomorrow, increasingly conducted outside the limited range of a man's senses and physical powers. Without reasonably dependable materiel performance, the fighting soldier stands an ever greater challenge of being neutralized, if not annihilated, by forces of which he is not even aware - let alone a match for.

Let's take just a moment to look at the man part of the man plus machine combination required to spell success - to provide you with but a small appreciation of the challenge presented to those charged with that side of the problem in today's Army.

Viewed through the eyes of a businessman, one might say that the Army's work force is less than 1.4 million men. Slightly more than one-half are full-time employes; the remainder (National Guard/Reserve) are part-time workers. We have a management group (officers) of 10 to 15 percent of the full-time work force....

The quality of our work force is higher with each passing year, yet most recently stood at only 80 percent, having high school level education. Roughly 28 percent were in the top two mental categories, 59 percent in the third category and 14 percent in the bottom category.

I know how important the Army feels a line officer position is and I certainly do not want to minimize it. But let me point out to you as individuals that had you been given a responsible tactical command instead of your current assignment, you would today be faced in essence with one of the following two challenges:

- To keep a top-rated outfit at that level during your year or two of command duty during a probable peacetime environment, or
- To move heaven and earth to turn a poor outfit around in that same limited time period, utilizing extremely limited resources.

If your unit were in fact needed in an emergency, particularly in the time you were in command or within one or two years after you left it, the results of your efforts would be positive and relatively easy to measure. In either case, the net impact of your presence would fall off dramatically with time.

In sharp contrast, in a materiel development position, if your hardware comes out successfully resulting from your efforts, it will most probably be part of any Army success story for the next 10 to 20 years. Likewise, on the other side of the ledger, if you muff it, you will long have much to remember or for which to be remembered - many more years than you would care to.

You hold a unique position or responsibility as the U.S. Army's manager for a specific weapon or product system.... Whether you have just recently been given your assignment, or have been at it a while, sooner or later you will realize that you are both mentally incompetent and physically unable to handle personally *all* the areas and problems you are or will be experiencing during this tour of duty.

It would be naive, if not ridiculous, to think that you can personnally take on some of the more sophisticated corporate business managements in America in matters of finance and contract negotiation, control in detail some of the more demanding engineering and scientific decisions to be made, and supervise in detail elaborate quality, reliability and maintainability efforts on some rather sophisticated gadgetry and/or machinery.

Therefore, it is imperative that you have available to you and your personal decision-making process the resources needed for a calm, thorough, competent and reasonable decision-maker to thread his way through the rocky, fast-moving rapids of program management.

Your team is made up of full-time resources, civilian and military, as well as part-time advisers available on call from within the Army family and without. When was the last time you sat back and made an honest appraisal of what your major challenges, or problems today are, or will be in the next 12 months, and then measured your human resources deployed or available to meet them.

You might be wondering just how to do this and where to start. I would suggest you begin with an analysis of how you spend your typical week versus how you would like to spend it. Comparison of the two should suggest corrective actions.

Next you might consider your deputy. Do you have a deputy PM who serves as a strong right arm, in whom you have great trust and dependence; with whom you can exchange fundamental thoughts before they become policy; who will disagree with you during the policy formulation phase when he sees it differently than you do; whom you can count on to move out on things when you are out of the office?

- Or do you have a vintage deputy, whom the seniority system has bequeathed to you, who has long since mentally retired and is waiting for the grim reaper to catch up with reality; whom you put up

(Continued on page 18)

Glossary of Acronyms

AAH - Advanced Attack Helicopter
ASE - Aircraft Survivability Equipment
AWC - Amphibians & Watercraft
ACODS - Army Container Oriented Distribution System
ARGADS - Army Gun Air Defense Systems
ARTADS - Army Tactical Data Systems
CAWS - Cannon Artillery Weapons Systems
CHAP/FAAR - Short Range Missile Air Defense System
CH–47 - CH–47 Helicopter Modernization Program
CDIR - Chem. Demilitarization, Install. Restoration
COBRA - AH–1 Cobra Helicopter
1¼ TON CTS - 1¼-Ton Commercial Truck Systems
DCSCS - DCS (Army) Communications Systems
DRAGON - Man-Portable Antitank Weapon System
FAMECE/UET - Family of Military Engineer Construction Equipment & Universal Engineer Tractor
GSRS - General Support Rocket System
HAWK - Air Defense Guided Missile System
HELLFIRE - Heliborne Laser Fire & Forget Missile System
HELS - High Energy Laser System
ITV - Improved Tow Vehicle
IAP - Iranian Aircraft Program
KUWAIT - Kuwait Missile Systems
LANCE - Vehicle-Mounted Ballistic Missile System
M60TD - M60 Tank Development
M60TP - M60 Tank Production
M110E2 - M110E2 8" Howitzer
M113 - M113/M113A1 Family of Vehicles
MICVS - Mechanized Infantry Combat Vehicle Systems
MEP - Mobile Electric Power
FIREFINDER - Mortar Artillery Locating Radar
MSCS - Multi-Service Communications System
MPBME - Munitions Prod. Base Modernization, Expan.
NAVCON - Navigation Control Systems
NUC MUN - Nuclear Munitions
PERSHING - Surface-to-Surface Ballistic Missile System
PLD - Precision Laser Designator
2.75 RS - 2.75 Rocket System
REMBASS - Remotely Monitored Battlefield Sensor Sys.
SAFEGUARD - Safeguard Munitions
PATRIOT - Surface-to-Air Missile Defense System
SATCOM - Satellite Communications System
SANG - Saudi Arabian National Guard Modernization.
SEL AMMO - Selected Ammunition
SIGINT/EW - Signal Intelligence/Electronic Warfare Mat.
SINCGARS - Single Channel Ground & Airborne Radio
SMOKE - Smoke/Obscurants Camouflage Systems
STINGER - Man-Portable Air Defense Weapon System
SEMA - Special Electronic Mission Aircraft Materiel
TOW - Tube-launched, Optically tracked Wire-guided M.S.
TRADE - Training Devices
ROLAND - All-Weather Air Defense Missile System
UTTAS - Utility Tactical Transport Aircraft System
VIPER - Man-Portable Surface-to-Surface Missile System
C/OPM DARCOM - (Chief, Office of Project Management)

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Published bimonthly by the Development and Engineering Directorate (DRCDE), HQ U.S. Army Materiel Development and Readiness Command, Alexandria, VA, in coordination with the DARCOM Information Office, the Office of the Chief of Engineers, the Office of the Surgeon General's Medical R&D Command, and the Office of the Deputy Chief of Staff for Research, Development, and Acquisition, HQ Department of the Army, to serve all elements of the U.S. Army Research and Development community.

Grateful acknowledgement is made for the valuable assistance of Information Offices within the Army Materiel Development and Readiness Command, Office of the Surgeon General, Office of the Chief of Engineers, Army Health Services Command, Army Training and Doctrine Command, Army Forces Command, Office of the Assistant Chief of Staff for Communications-Electronics, Computer Systems Command, and related activities. Use of funds for printing of this publication has been approved by Department of Army, Jan. 1, 1976.

Purpose: To improve informal communication among all segments of the Army scientific community and other Government R&D agencies; to further understanding of Army R&D progress, problem areas and program planning; to stimulate more closely integrated and coordinated effort among Army R&D 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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Submission of Material: All articles submitted for publication must be channeled through the technical liaison or public information officer at installation or command level.

By-lined Articles: Primary responsibility for opinions of by-lined authors rests with them; their views do not necessarily reflect official policy or position of Department of the Army.

ARMY RESEARCH AND DEVELOPMENT

Vol. 17 No. 6 **November-December 1976**

FEATURES

DEPARTMENTS

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Distribution on an individual name basis is restricted to members of the U.S. Army Atomic Energy and R&D Officer Programs and to R&D Mobilization Designees. Otherwise, distribution is made only to the Army installation, office or organizational element to which the requester is assigned.

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Selective Scanner ...

$317.7 Million Awarded for AAH Engineering

Award of a $317.7 million contract for the Advanced Attack Helicopter (AAH), one of the Army's "Big 5" priority materiel R&D programs, set the stage early in December for full-scale engineering development.

Incrementally funded, the contract with Hughes Helicopter culminates the competitive airframe development phase of the program during which Hughes developed and produced two prototype aircraft and a ground test vehicle.

Competitive tests involving two contractors extended from July through September and results were reflected in proposals submitted by the two contractors during the last four months for use in making the selection.

Integral to the full-scale engineering development phase of the program, three additional prototype aircraft will be built. Associated subsystems and weapons will be integrated, tested and qualified as a complete attachment to the attack helicopter system.

The Army also will develop a Target Acquisition and Designation System (TADS) and Pilot Night Vision System (PNVS) for integration into the AAH. It will use the Hellfire Modular Missile System as primary armament with a 30mm cannon and 2.85-inch rockets for area and suppressive fire control. The TADS/PNVS will provide laser designation and range-finding for day and night operations.

The AAH is designed to provide more accurate fire, improved first-round hit capability and substantially increased survivability over existing attack helicopters.

GEN Deane, Augustine, Brownman Vacate Positions

GEN John R. Deane Jr. will retire Feb. 1 as commander of the U.S. Army Materiel Development and Readiness Command. Announcement of his intention to relinquish the command he assumed two years ago came on Dec. 15 - about the same time as Under Secretary of the Army Norman R. Augustine and Assistant Secretary of the Army (I&L) Harold L. Brownman resigned from office.

GEN Deane expressed to DARCOM employes, in his retirement message, his "lasting gratitude for the faithful and dedicated support that you have given me during the past two years.

"Your outstanding professional ability, your spirit of comradeship, and your willingness to subordinate individual interests for the common good are qualities that have made DARCOM the effective team it is today.

"You have gained the respect of the rest of the Army for your professionalism, positive attitude, and 'can do' spirit. You have won the reputation of a 'Command of Action.' You have earned your place as a 'Partner in Combat Readiness.' It has been a continuing source of pride to me to be able to say 'I am a member of DARCOM.' It has been a privilege to share in your achievements and the reputation you enjoy...."

GEN Deane did not announce his future plans and his successor had not been announced at press time.

Augustine, who served as Assistant Secretary of the Army (R&D) before he was appointed Under Secretary of the Army in May 1975, announced he will join the staff of Martin-Marietta Aerospace Co. in Bethesda, MD, as vice president for technical operations.

Effective upon his date of resignation, Dec. 31, Brownman will join the staff of Lockheed Missiles and Space Co. in Sunnydale, CA, as vice president for operations. He has served as ASA (I&L) since Oct. 9, 1974.

Army Secretary Announces UTTAS Production Contract

Production of the U.S. Army Utility Tactical Transport Aircraft System (UTTAS) will begin in 1977 under a $83.4 million contract announced Dec. 23 by Secretary of the Army Martin R. Hoffmann. Fifteen aircraft with associated hardware will be produced during Fiscal Year 1977 and 56 during FY 78, with 129 in 1979 and 168 in 1980. The Army plans to buy about 1,100 UTTAS for $3.4 billion over an 8-year period.

The contract ended the 43-month competitive basic engineering development phase of the UTTAS program. The successful contractor, Sikorsky Aircraft, and Boeing Vertol each developed and produced three prototype aircraft, a Ground Test Vehicle, and a Static Test Article that were subjected to extensive government testing from March through November 1976.

Sikorsky will provide full logistics support for further developmental and government verification testing by the Army over the next two years.

General Electric Co. will produce the UTTAS engine under a $38.3 million contract. Two T700 1,500 shaft horsepower turbine engines will power the UTTAS, which is capable of carrying a pilot, copilot, crew chief/gunner and 11 combat-equipped soldiers. When used as a medical evacuation helicopter the UTTAS can carry up to six patient litters, a medical attendant, and crew chief.

Termed the U.S. Army's first "true" squad-carrying assault helicopter, the UTTAS will provide increased troop lift capability, reduced mission costs, lower maintenance cost, and logistical support while enhancing tactical mobility. The UTTAS will replace the "workhorse" Huey at a ratio of about 15 for 23 due to increased payload, speed, range, survivability and other improved characteristics. When the 8-year acquisition cycle ends, 2,000 to 3,000 Hueys are expected to remain in the Army inventory.

Conferees Review Military Materiel Deterioration

Microbiologists representing U.S., Canadian and Australian military forces convened in November at the U.S. Army Natick (MA) Research and Development Command for the 25th Annual Conference on Microbiological Deterioration of Military Materiel.

Dr. Arthur M. Kaplan, chief of NARADCOM's Microbiology Group, chaired the 3-day sessions which were devoted to progress and programs of mutual interest. Specific topics of discussion included environmental pollutants, packaging material problems, plastics and polymers, structural materials, fuels and lubricants, electronic equipment, silicone rubbers, aircraft sealants, body armor and explosives.

Reports were also presented on studies relative to microorganisms and weathering as they affect durability and programs of the North Atlantic Treaty Organization, American Society of Testing Material and the Quadripartite groups.

WSMR Test Fires 'Copperhead' Antitank Projectile

Test firing of the first prototype of the Army's "Copperhead" antitank projectile in its engineering development (ED) configuration has been announced by White Sands Missile Range, NM.

Project officials in the WSMR Army Materiel Test and

Evaluation (ARMTE) Directorate said the successful test was conducted only for trajectory evaluation. The projectile was fired from a standard Army 155mm field artillery howitzer, but no target was used.

The firing was the first of two scheduled trajectory evaluation tests, termed "aerodynamic rounds," by the Martin Marietta Aerospace Corp. as prime contractor.

DARCOM Updates Field Safety Activity Regulation

U.S. Army Materiel Development and Readiness Command Field Safety Activity responsibilities and guidance are detailed in DARCOM Regulation 10-18, dated Aug. 24, 1976, and distributed to supersede a 1974 regulation.

FSA's primary mission is described as: "To perform safety engineering and health physics services, inspections, investigations, program evaluations, and safety training in support and implementation of the DARCOM Program.

The FSA is assigned responsibility for inspecting and conducting on-site evaluations of safety programs of DARCOM major subordinate commands, depots, project managers and other activities to assess compliance with federal regulations and program objectives.

Other major FSA functions include emergency on-site assistance in safety and health physics; upgrade command/installation safety programs; prepare accident abstract reports; distribute safety training aids; and provide safety training for DARCOM personnel.

Finance and accounting and civilian personnel services for the FSA are provided by Jefferson Proving Ground, Madison, IN, and housing and support services by the Indiana Army Ammunition Plant, Charlestown, IN.

Viper Weapon Flight Tests Termed 'Successful'

Flight tests of the first 10 rounds of Viper, the U.S. Army's new light antitank weapon undergoing engineering development, have been termed by Project Manager COL Hubert Lacquement "completely successful."

The 10 recently fired rounds were projected from a fixed launcher and carried an inert warhead. Five rounds featured fiberglass motor cases and five had steel.

Engineering design tests are being conducted at Redstone Arsenal, AL, to demonstrate and evaluate missile roll rate, velocity and trajectory capabilities. General Dynamics Corp. is Viper prime contractor.

Programed as the first MICOM system developed under the metric system, Viper is considered substantially more accurate, powerful and effective than its predecessor, the M-72 LAW. Light, compact and shoulder-fired from a disposal case, Viper weighs less than 3.2 kilograms (7 pounds). Selection of which case to use will follow completion of additional tests early next year.

Battelle Provides Guidance for AVSCOM MT Program

New initiatives and suggested guidance for improving the U.S. Army Aviation Systems Command (AVSCOM) Manufacturing Technology Program (MTP) are presented in a recently submitted 16-month study report directed to development of a 5-year implementation plan.

AVSCOM convened contractor representatives, command personnel and leaders of other major commands of the U.S. Army Materiel Development and Readiness Command to hear the Battelle Columbus Labs report.

"Drivers" of helicopter production cost were identified in the presentation along with recommendations that included "vigorous pursuit" of an Accelerated Implementation Program to take advantage of MTP advances.

One of the proposals was that AVSCOM establish a "more formal top-down" plan to develop longer-range solutions to longer-range goals, including frequent briefings for industry and better dissemination of new ideas. Major "thrust" areas also are identified in the report.

The AVSCOM Production Technology Branch monitored the Battelle report, directed to programs that will "maximize the return on investment" in U.S. Army Helicopter MTP management, design and production procedures to minimize costs without sacrificing quality, reliability and maintainability standards.

New Fabric Considered for Army Uniform Use

An improved, single-weight, year-round Army green fabric for standard uniform use by men and women is undergoing tests and evaluation by the U.S. Army Uniform Board. Other items under consideration, to improve styling and provide easier care, include:

- A new women's fatigue made of the same durable press fabric currently used in men's fatigues. It is programed for Post Exchange availability by the winter of 1978-79 and in the Army supply system by February 1979.
- A new utility (baseball) cap. The standard cap will be tested against an improved Ranger cap, both with and without earflaps.
- A new polyester-rayon or polyester-cotton wash-and-wear shirt for wear with or without the Army green coat. Tested styles will include men's long and short sleeve, women's long and short sleeve for tuck-in and women's short sleeve overblouse with convertible collar. Availability is scheduled by December 1979.
- A women's polyester gabardine Army green pant suit for wear with a gray/green turtleneck overblouse. Adoption of the turtleneck is dependent upon test results.
- An optional warp knit pant suit and a women's warp knit summer uniform with short- and long-sleeve jacket and skirt in medium green. Planned also is a more uniform policy relative to insignia on women's clothing.

Nike Boosts Black Brant Launch Capabilities

Successful launch of a Nike-boosted Black Brant rocket to an altitude of 183 miles with a 750-pound payload of scientific instrumentation was announced recently by White Sands (NM) Missile Range.

Primary purpose of the launch, the second in recent weeks, was to observe nonsolar sources of extreme ultraviolet (EUV) emissions with very high density. The Nike booster carries heavy payloads to higher altitudes.

On-board instruments were capable of detecting EUV sources 100 times fainter than previous detection limits. Five key targets of the study included the stars, Feige 24, Sirius, G191-B2B, Capella and Mirzam.

A relatively new rocket built in Canada, Black Brant is designed for upper atmospheric research. Equipped with payload and booster, it measures about 50 feet in length and is 17 inches in diameter.

White Sands Black Brant launchings are directed by the Naval Ordnance Missile Test Facility's Research Rocket Branch. Payloads have been designed by the University of California (Berkeley) and American Science and Engineering, Cambridge, MA.

Over-all sponsor of the upper atmospheric research program is the National Aeronautics and Space Administration. NASA mission chief is Wayne Montag and project manager is Richard Ott, Goddard Space Flight Center.

R&D News... Former WRAIR Officer Shares 1976 Nobel Prize

Research interest primed while he was a U.S. Army Medical Corps captain serving at Walter Reed Army Institute of Research, Washington, DC, climaxed recently for Dr. D. Carleton Gajdusek when he was selected to share the 1976 Nobel Prize in medicine.

Dr. Gajdusek initiated his award-winning studies during 1955-57 with primitive equipment in a small bamboo-walled laboratory he set up to investigate the cause of a mysterious fatal neurological disease found in an isolated cannibalistic tribe of natives in New Guinea.

The disease of kuru (so called because of shivering-like tremors) was caused, he discovered, by a virus that was being transmitted through the age-old ritual of cannibalism to others of the deceased member's family - leading to a theory of a slow virus infection.

Recognizing a similarity of the clinical signs of kuru with the neurological and pathological lesions of presenile dementia, and Creutzfeldt-Jakob diseases, Dr. Gajdusek initiated studies with Dr. C.J. Gibbs, now with the U.S. National Institutes of Health, Bethesda, MD, using filtrates of brain suspensions from kuru patients.

Results of this investigation permitted them to demonstrate the transmissibility of kuru to nonhuman primates. More recently they have shown the familial Alzheimer's dementia to be transmissible to primates.

The transmissibility of these neurological diseases has a major impact, U.S. medical authorities explain, on our knowledge of genetic diseases - suggesting other hereditary diseases may be caused by viruses. These discoveries are regarded as the first demonstration that degenerative diseases of the human central nervous system are infectious in nature.

Currently chief of the Central Nervous System Studies Laboratory at the National Institutes of Neurological Diseases and Stroke, National Institutes of Health, Dr. Gajdusek is a specialist in pediatrics, virology, immunology, neurology, and comparative child behavior and development. He is also known internationally as a geneticist and anthropologist.

Considered one of the world's leading experts on medical problems among primitive peoples, Dr. Gajdusek speaks German, French, Spanish, Slavic, Russian, Persian and a number of New Guinea and other Melanesian languages. He shares the 1976 Nobel Prize in Medicine with Dr. Baruch S. Blumberg of the University of Pennsylvania Medical School.

The Nobel awards ceremonies are scheduled Dec. 10 - the anniversary of Alfred Nobel's death - at Swedish Royal Academy of Science.

Dr. Gajdusek *was graduated from Harvard Medical School in 1946 and he received undergraduate training at the University of Rochester, NY.*

During the years 1952-53 he was a captain at Walter Reed Army Institute of Research, Washington, DC. Assigned to study hemorrahagic fevers in the near East and the Union of Soviet Socialist Republics (USSR), he participated in epidemiological surveys of developing countries with Dr. Joseph Smadel, then internationally renowned as an officer in the U.S. Army Medical Corps. Dr. Smadel made him aware of diseases peculiar to some of these countries.

When he began his study of kuru he was serving as a visiting investigator for the National Foundation for Infantile Paralysis at the Walter and Eliza Hall Institute for Medical Research in Melbourne, Australia.

During working relationships with a long list of the world's foremost investigators in scientific research, Dr. Gajdusek has had the benefit of association with three Nobel Prize Laureates - Dr. Linus Pauling, California Institute of Technology, who shares with Madame Currie the distinction of being a 2-time Nobel Prize selectee; Dr. John F. Enders, Harvard Medical School; and Sir MacFarland Burnet, University of Melbourne School of Microbiology.

MICOM Metal Fibers Composite Wins Industrial Acclaim

Tiny metal fibers spaced up to 100 million per square inch in a composite base have earned the U.S. Army Missile Command recognition by the *Industrial Research* magazine for developing one of the "100 most significant new products" in 1976 - offering "great potential" for military and civilian applications.

Development of metal oxide-metal eutectic for commercial production was sponsored by the Defense Advanced Research Projects Agency (DARPA) Support Office at Huntsville, AL. Accredited with possessing "unique structural properites" of strength and toughness, the material is creating wide interest.

Among the envisioned applications are in components for turbines, an electron-emitting gun, and in cold emitters. The latter are solid-state devices capable of handling power requirements far beyond the range of vacuum tubes or transistors; also, suited to extreme temperatures and rough usage, as in missiles and military materiel. Electrons flow instantaneously from the tip of each fiber when the material is subjected to an electric field.

DARPA's role in the development cycle was that of sponsoring refinement of the first crude material produced under a MICOM contract to the point where it is available for commercial applications. MICOM reports that the process - "growing" the material in an induction furnace - is similar to that used for growing crystals. Placement of the uniformly sized fibers strengthens the material, much as concrete reinforced by steel rods.

Actually, the application of the tiny fibers in the new composite is parallel in time framing to the use of steel fibers in fibrous concrete, a process initiated as a U.S. Army development in the mid-1960s. Experimentation with fibrous concrete for numerous structural requirements is still active in the Construction Engineering Research Laboratory (CERL) at Champaign, IL, and the Army Corps of Engineers Waterways Experiment Station, Vicksburg, MS.

Metal oxide-metal eutectic composite technology had its beginning in 1967 when a Georgia Institute of Technology first grew the material at Oak Ridge (TN) National Laboratory. In 1970 the Army established and financed an R&D program which enabled GIT to demonstrate the material could be structured for uniform growth in an induction furnace.

MICOM then set up another program to develop production procedures which resulted in technology transfer for current commercial production. Since 1970 more than $1 million has been expended in the developmental program, sustained by scientists' confidence in success.

Georgia Institute of Technology and Oak Ridge National Laboratory joined in submitting the new material to *Industrial Research*. This magazine sponsors the new products competition to identify significant advances of interest to scientists and engineers, and to recognize innovators and organizations for outstanding technical achievement.

$196.2 Million Contract Climaxes XM1 Validation

Award of a $196.2 million U.S. Army XM1 Main Battle Tank contract, culminating the competitive validation phase of the development program, was announced by Secretary of the Army Martin R. Hoffmann Nov. 12.

Chrysler Corp. won the right to continue the next phase of the program, extending over a 36-month period, by developing and producing a prototype XM1 tank, a mobility test rig and a ballistic hull and turret subjected to comprehensive government testing February-April 1976.

Test data and proposal information data developed by each of the competitors for the contract during the past four months were considered in the selection of the Chrysler Corp. to provide full logistic support for further development and operational testing by the Army. Eleven pilot tanks with associated hardware will be produced.

Powered by a 1,500 horsepower turbine engine, the XM1 will incorporate a dual-capable turret design to accept a 120mm or 105mm gun, and stabilized fire control including a laser rangefinder, computer and day-night sight.

The Army announcement said the XM1 will be "vastly superior in all respects to current tanks...(will have) greater first-round hit fire-on-the-move capability...and greatly improved protection for the 4-man crew."

During the engineering development and test programs for the two competitive XM1 prototypes, major emphasis was on reliability, availability, maintainability and durability in addition to firepower, high mobility and other specifications.

A Memorandum of Understanding signed by the U.S. Army and the Federal Republic of Germany requires, during early FY 1977, a thorough evaluation of the German Leopard 2 tank, in comparison with the XM1 - to achieve "maximum standardization" of U.S. and German tanks by date of introduction into service.

FMC Corp. received a contract in July 1975 to investigate producibility of the Leopard 2 in the U.S. during 1976 and "evaluate results against the same criteria and constraints as the XM1 prototype by March 1977."

'Event Dice Throw' Climaxes DNA Nuclear Simulation Tests

How well do weapon systems, related military hardware and test structures withstand a 500-ton TNT-equivalent simulated nuclear blast environment? Answers to that question were of interest to all U.S. Armed Forces, six allied nations and more than 30 U.S. Government and support agencies in "Event Dice Throw."

Labeled Main Event, the recent tests at White Sands (NM) Missile Range were the climactic windup to the Defense Nuclear Agency's "Middle North" series of five largescale high-explosives experiments, simulating nuclear airblast effects, since the spring of 1964.

Staged at Giant Patriot Site, Dice Throw was detonated about three miles from the historic Trinity Site where the "Atomic Age" was ushered in July 16, 1945, with a nuclear detonation gauged at near 20 kilotons. Dice Throw was a much more limited test (1-kiloton equivalent).

The stated purpose of Dice Throw was: 1) provide a simulated nuclear blast and shock environment for target response experiments vitally needed by the military services and defense agencies concerned with nuclear weapons effects; 2) confirm empirical predictions and theoretical calculations for shock response to military structures, equipment and weapons.

Crater assessment experiments were conducted by Strategic Air Command B-52 bombers flying over the site 2 minutes later.

Foreign nations involved in evaluation of Dice Throw data relative to specific interests, using their own weapons and hardware, are Canada, Federal Republic of Germany, Norway, the Netherlands, Sweden and the United Kingdom.

Dice Throw was conducted because nuclear detonations are prohibited by provisions of the Limited Test Ban Treaty. Involved in the experiment were field fortifications, wired dummies in fighting bunkers, about 40 soldiers from 7th Special Forces Group positioned well outside damage range, prefabricated shelters, naval attack aircraft, combat vehicles including tanks, a tactical communications center, and an in-flight UB-1H tethered near the explosion and remotely controlled.

Data collected from the numerous individual tests will "take weeks, even months to evaluate," a Defense Nuclear Agency official said.

The November-December 1975 15th anniversary edition of the *Army Research and Development Newsmagazine* featured, on the inside back cover, a report on another weapons effect test called Project ESSEX, conducted jointly by DNA and the U.S. Army Corps of Engineers.

AWESOME SPREAD of airblast is shown just as peak of charge detonates.

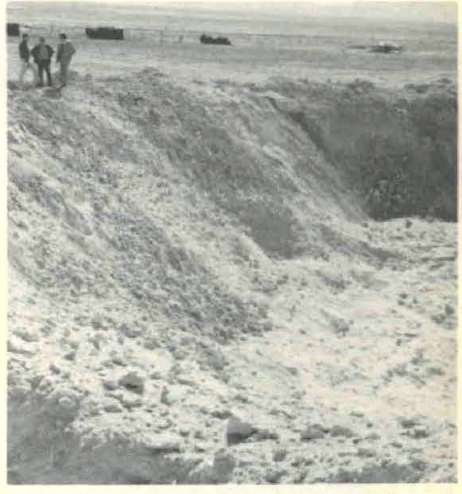
DICE THROW CHARGE, resembling a Goliath-size beehive, is formed with 50-pound bags of ammonium nitrate impregnated with fuel oil. The stack is 37 feet high, 30 wide, 600 tons, equals 500 pounds TNT.

Dice Throw was an above-ground experiment, separate from eight Project ESSEX experiments, each carefully designed and using TNT or varying volume near-equivalent explosive charges of varying composition to collect data in widely different areas of interest.

In Project Essex (denoting Effects of Subsurface EXplosions), experiments were directed to numerous physical determinations. Holes of varying width and depths were drilled. Questions to which answers were sought included:

How large a crater would be created by varying the depth and stemming configuration for a charge of nitromethane? How much air blast by variations of charge quantity and fuel mixture? How much ejecta (quantity of rock and dirt) blasted out to form the crater?

How was the pattern of simulated fall-out dispersion varied by differing charge configurations? What were the particle velocities and accelerations. How much shock was transmitted through the ground to various types of underground structures? How was mobility of ground vehicles restricted by the resulting crater when limiting access to an area was the objective? How long would it take to fill varying craters to restore mobility across them?



PART OF THE RESULT of detonation of the charge is an "apparent size" crater 165 feet in diameter and roughly 25 feet deep.

ONE DICE THROW PURPOSE was to verify overpressure analysis techniques used for aircraft vulnerability studies. Three A4 naval aircraft oriented side-on to the shock effect were used to determine damage and structural response. Forty-six channels of strain, 3 of deflection and 3 of airblast data were recorded during shock front.

AIRBLAST WHEELED and tracked vehicle effects also were recorded for study, including physical and functional damage. Shown overturned is one of 20 jeep ¼-ton trucks, used along with 15 2½-ton (6x6) trucks and 2 vans. Vehicles were exposed to side-on, front-on and 45-degrees angle to blast wave shock front passage effects.

XV-15 V/STOL Aircraft Roll-Out

Initiates Proof-of-Concept 2-Year Test

XV-15 V/STOL Tilt-Rotor Research Prototype

Proof-of-concept testing of tilt-rotor aircraft technology, a radical innovation embodying desirable features of helicopters and the high speed and long range of the turbo-prop airplanes, is scheduled over a 2-year period following recent roll-out ceremonies for the first of two XV-15 experimental research prototypes.

The ground and flight test program will begin early in 1977 as a joint effort of the National Aeronautics and Space Administration and the U.S. Army Air Mobility Research and Development Laboratory. The objective is to demonstrate practicability for military and commercial applications.

Designed to transition in flight from the helicopter to the high-speed mode, or vice versa, in about 12 seconds, the XV-15 V/STOL (vertical and short takeoff) test vehicle is representative of a design that calls for a maximum cruise speed of 303 knots (about 349 miles) an hour. Estimated maximum speed is 332 knots and dive speed, at 3.5 degrees, 364 knots.

Designed at a gross weight of 13,000 pounds, the prototype is engineered for a research payload of 3,300 pounds. It is estimated that in the short take-off mode at a gross weight of 15,000 pounds, about 1,400 feet will be needed for lift-off over a 50-foot-high obstacle.

During the roll-out flight show by Bell Helicopter Textron at Fort Worth, TX, the tilt-rotor capability was exhibited. The prototype is capable of demonstrating this capability in various flight conditions. Flight tests will exploreless takeoff and landing area requirements, dynamic stability, handling qualities and potential for noise reduction compared to a conventional helicopter or turboprop aircraft of comparable size.

The XV-15 also can fly and make a safe landing using one of its two engines, with interconnected transmissions.

Speakers at the roll-out ceremony included Hans Weichsel, senior vice president, Bell Helicopter Textron; MG Jerry B. Lauer, director of Weapons Systems, Office of the Deputy Chief of Staff for Research, Development, and Acquisition, Department of the Army; Representative Dale Milford, chairman, House Sub-Committee on Aviation and Transportation Research and Development; Representative Olin Teague, chairman House Committee on Science and Technology; Dr. Hans Mark, director, Ames Research Center, NASA; and Robert Smylie, acting NASA Associate Administrator for Aeronautics and Space Technology.

Following initial tests, including extensive systems integration checkout, ground run and hover tests at Bell's research and development facilities at Arlington, TX, the first XV-15 will be delivered to NASA's Ames Research Center at Moffett Field, CA, for testing in a 40 x 80-foot wind tunnel.

Scheduled to begin in mid-1977, wind tunnel testing has been assigned highest priority, with a block of four to six weeks assigned to the project.

The second XV-15 will be rolled out in February 1977, and a ground test program by the manufacturer will lead to the start of flight testing in mid-1977. The wind tunnel testing will open the flight test envelope for the No. 2 vehicle, with an extensive flight evaluation of aircraft performance, stability and handling qualities, to be carried out by Bell.

An Advanced Aircraft Flight Simulator, which includes an XV-15 cockpit, also will be used to pace the wind tunnel and flight test programs. The No. 2 XV-15 is scheduled to join the first aircraft at Ames Research Center in mid-1978 after contractor flight tests.

Army evaluations will include mission suitability flight testing to study the tilt-rotor concept for applications to reconnaissance, rescue and other military and commercial roles that may develop. The XV-15 design is a 42-foot-long, 32-foot-wingspan aircraft incorporating wing-tip-mounted engines, interconnected transmissions and 25-foot prop rotors.

Bell Helicopter initiated research on the tilt-rotor concept in 1951 under a joint Army/Air Force contract to build a "convertiplane." This demonstrated successfully the feasibility of the concept. Rotors and transmissions like those in the XV-15 were produced in the early 1970s.

Developmental planning includes consideration of fly-by-wire control systems, advanced rotor blade systems, and use of composite materials.

MERADCOM Engineers Invent Zero-Current Circuit Breaker

Invention of a zero-current circuit breaker to eliminate arcing, increase life and reliability of contacts, and eliminate cumbersome control equipment is reported by two engineers at the U.S. Army Mobility Equipment R&D Command (MERADCOM), Fort Belvoir, Va.

When a circuit breaker's contacts - connecting a load to a power source - are opened, an electric arc is created across the contacts. No matter how small, the arcing is detrimental to the contacts. In addition, a large arc may be dangerous shockwise and as a fire hazard, since the arcing is proportional to amount of current flowing.

Inventors George M. Lange (retired) and Walter C. Pierce reasoned that there would be no arc if the circuit breaker contacts of an alternating current are opened at zero-load crossing.

They explain: "Our device provides control circuitry to assure that circuit breaker contacts are opened at the zero-load current crossing."

A sensing circuit senses the phase relationship of the load current with respect to time, and provides a square-wave voltage in phase with the load current. The device was developed for use on high-power generators but can be used on any alternating current power supply.

Army Armament Command Produces First M188 Super-Propelled Charge

Production of the first super-propelling charge for the M188 8-inch howitzer projectile, intended to provide substantially extended range, was completed recently at the U.S. Army Armament Command (ARMCOM) Indiana Ammunition Plant (IAP), Charlestown, IN.

Designed to supplement current 8-inch propelling charges, the new charge incorporates center-core ignition, a triple-base propellant and additives to reduce coppering, wear and flash.

Rock Island (IL) Arsenal and Picatinny Arsenal, Dover, NJ, joined in design and development of the M188 charge during 1971. The charge was assigned to the product manager for the M110E2 weapon system in June 1975, following testing at the U.S. Army Test and Evaluation (USATECOM), and the Artillery School at Fort Sill, OK. LTC Benjamin A. Huggin is the M110E2 product manager.

PASGT Tests Continue at Tropic, Cold Regions, Other Test Centers

Durability, cold weather, compatibility with the user, operational and after-use ballistic testing of the Personnel Armor System for Ground Troops (PASGT) developed by the Army Natick Research and Development Command is programed to extend to February 1978.

The U.S Army Tropic Test Center, Fort Clayton, Panama Canal Zone, is conducting durability testing of 50 units each of the fragmentation protective vest and the new experimental design helmet. The ATTC is an element of the Army Test and Evaluation Command (TECOM), a part of the U.S. Army Materiel Development and Readiness Command (DARCOM).

ATTC testing also will include human factors compatibility, vulnerability to detection, value engineering and safety - all in comparison with equipment type-classified as standard.

Described in detail in the September-October 1976 edition of the *Army Research and Development Newsmagazine*, the new helmet will be tested when fabricated from kevlar, the same material used for the protective vest, and also when made from fiberglass.

Cold weather tests began Oct. 1 at the Cold Regions Test Center in northern Alaska, 25 units each of the vest and the helmet, and are scheduled to end in May 1977. Operational tests are programmed at Fort Benning, GA, under purview of the U.S. Army Infantry Board. Compatibility tests of the vest and the helmet will be made at Aberdeen Proving Ground through mid-July 1977. After-use tests will be performed at the Ballistic Research Laboratories.

All tests reports will be submitted to HQ TECOM by March 1978.

Personnel Armor and New Helmet

Explosives Technology Precision . . .

Likened to Scalpel Use in Study to Divert Lava Flow From City of Hilo in Hawaii

Using U.S. Army Corps of Engineers advanced explosives blasting technology with the scalpel precision of a skilled surgeon in a delicate operation, where a slip might be disastrous - that may be the task of averting a possible lava-flow destruction of Hilo, a city of 30,000 at the base of Mauna Loa.

Mauna Loa on the Island of Hawaii is the world's largest active volcano. Readers of the *Army Research and Development Newsmagazine,* July-August 1976 edition, were informed of the Corps of Engineers' consideration of ways of thwarting the normal course of lava flow on Mauna Loa if an eruption occurs as predicted, possibly in mid-1978.

Dr. Benjamin E. Cummings, a mechanical engineer with the U.S. Army Ballistic Research Laboratories, Aberdeen Proving Ground, MD, offered the scalpel degree of difficulty comparison, as coordinator of the Army's role with 14 other government agencies concerned with rescue plans for Hilo inhabitants.

Commenting on the planned use of high explosives, Dr. Cummings termed it "extremely dangerous - we are not sure it can be done." The hope behind the plan, however, is soundly based in the high-precision technology the Army Corps of Engineers has demonstrated repeatedly in its excavation blasting.

An outstanding example of this advanced technology was reported in the *Army Reaearch and Development Newsmagazine* September 1972 edition (page 18), headlined *"Controlled Destruction:* Army's New Explosives Technology Blasts Part of Flood-Damaged Dam to Divert Water Safely." The article described the action that saved the town of Sturgis, population about 6,000, near Rapid City, SD.

Coincidentally, Hilo is almost precisely the same distance of 30 miles from the peak of Mauna Loa as the town of Sturgis was from the damaged dam. Hawaiian Volcano Observatory scientists are anticipating a northeast rift zone eruption on Mauna Loa within less than two years. Hilo is at the base of the zone.

MAUNA LOA, world's largest active volcano, is expected to erupt within the next two years, threatening the city of Hilo, in Hawaii.

DR. BENJAMIN E. CUMMINGS, a special projects team leader at the .S. Army Ballistic Research Laboratories, is coordinator of the Army's role with 14 other government agencies concerned with rescue plans for Hilo inhabitants. He holds a doctorate and three other degrees from California Institute of Technology, and is a former assistant professor of engineering at the University of California (L.A.).

"Selective disruption" is the term applied to the plan to channel the anticipated lava flow away from Hilo. Dr. Cummings explained: "During an eruption a molten mass of lava rolls down the side of the volcano and its outer surface cools and hardens. The inner flow remains hot, causing a natural lava pipeline through which the stream continues.

"In the diversion plan, the Army expects to use helicopters to transport Special Forces demolition experts to the 7,000-foot level of the volcano to plug the pipeline with explosives and change its course." Repeated blasts may be necessary if the first explosion fails to divert the lava flow away from Hilo.

Cummings described the policy of the operation as "minimum intervention to get the job done. The idea is to help nature decide not to destroy the city of Hilo." Reassuring to Hilo inhabitants is that the U.S. Army has successfully tested feasibility of the diversion concept at its Pohakuloa Training Area, less than 10 miles from Mauna Loa.

Problems remaining to be solved include protective gear for the soldiers to shield them from volcanic gases, if the direction of the wind should change, and insulating the explosives from 200-degree temperatures at the surface of the solidified lava. In its molten state, lava may attain a temperature over 1,800 degrees.

One more problem: Safely getting the soldiers who emplant the explosives out of the area before the charge is detonated. Soldiers scheduled to participate in the operation if the problems are solved will come from the 7th Special Forces Group, Fort Bragg, NC, and from the 65th Combat Engineer Battalion, Schofield Barracks, Hawaii.

An alternative proposal is to build a barrier around Hilo, about 30 feet thick, 100 feet high and 12 miles long. Estimated cost: $20 million.

MICOM Awards $66.7 Million for Hellfire Engineering

Engineering development of the Hellfire missile system, planned as the primary armament of the Army's new Advanced Attack Helicopter (AAH) for use against hardpoint targets, is being conducted under a $66.7 million contract.

The U.S. Army Missile Command (MICOM), Redstone Arsenal, AL, awarded the contract calling for Rockwell International to perform most of the work at Columbus, OH. The Cost Plus Incentive Fee contract will be funded over five years. Propellant loading and final assembly will be performed at Redstone Arsenal under subcontract with Thiokol Chemical Co.

Hellfire is a modular missile system that will provide the Army with a family of terminal-homing seeker modules and a common airframe, with initial configuration utilizing semi-active laser guidance. Modular design will enable future terminal-homing seekers to be accommodated without completely redesigning the system as technology matures.

Two years of Hellfire advanced development ended recently under competitive contracts with Rockwell and Hughes Aircraft Co. Project Manager COL Robert J. Feist said: "We demonstrated Hellfire's technical feasibility, accomplished all major test objectives established for advanced development, and brought the user into the program early in development."

The Hellfire Project Office requested competitive contractors in April to detail an approach to full-scale development of the Hellfire system. The Army evaluated the engineering development proposals and selected Rockwell on the basis of cost, management, technical proposals and performance considerations.

During engineering development, Rockwell will design, build, test and evaluate Hellfire equipment, including the missile, launcher, ground and logistics support equipment. The company also will provide documentation to support production plans.

"Hellfire is perhaps one of the Army's most tested missile systems at this stage of development," Feist said. "MICOM has demonstrated Hellfire's accuracy and versatility with direct and indirect launches from the ground and helicopters, on stationary and moving targets."

Combat soldiers from the Armor and Aviation Schools have fired several missiles. Normally, soldiers don't get their hands on new equipment until much later in the development cycle, usually during operational tests, just prior to a production decision.

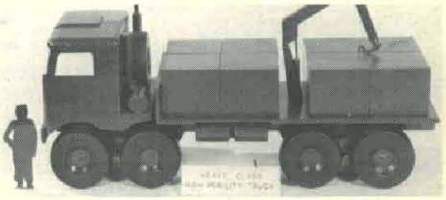
High-Mobility Tactical Truck Joining Goer Vehicle Family

A "Big Brother" member is being added to the U.S. Army's family of Goer vehicles, an 8 to 10-ton high-mobility tactical truck that will complement the M520 cargo truck, the M553 wrecker, and the M559 fuel tanker.

Under development by the U.S. Army Tank-Automotive Research and Development Command by contract with the Pacific Car and Foundry Co., Renton, WA, the 8x8 vehicle is designed to carry a 10-ton payload.

Under the $700,000 contract, the company also will determine the feasibility of using the same basic truck chassis to build wrecker and fuel tanker version of the new vehicle. With a gross weight of 45,000 pounds, it will be 27 feet long, 8 feet wide and 10 feet 8 inches high.

The power-to-weight ratio is 20 horsepower per ton and the vehicle will have a maximum highway speed of 55 mph, with a Detroit Diesel 8V-92TA engine coupled to an Allison HT740 automatic transmission. The first vehicles are scheduled for August 1978 delivery.



WSMR Installs DOAMS Telescope Prototype

Installation of a new twin-barreled tracking telescope prototype at White Sands (NM) Missile Range is termed an initial step to improve test programs relative to obtaining attitude, "event" and target miss data.

Distant Object Attitude Measurement System (DOAMS) was delivered to WSMR following four years of development. It was manufactured at a cost of $1.5 million by the Contraves-Goerz Corp.

Approval to produce nine additional DOAMS, the first scheduled for delivery within 18 months, was granted following initial "highly successful" acceptance tests. Lowell D. Yates, DOAMS task manager in the WSMR Instrumentation Directorate, said the detection range for small missiles exceeded 100 miles, about 50 more than anticipated.

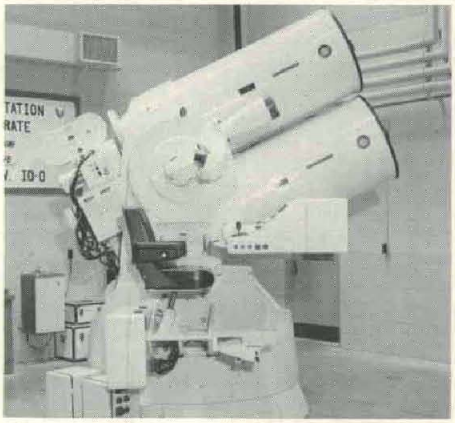
Equipped with high-speed 70mm motion picture cameras, the system had a design goal for attitude measurements of plus or minus five degrees at a slant range of 150,000 feet. Image quality was adequate for precision at a SR of more than 200,000 feet.

The lens system features an athermalized design which employs only spherical surfaces. The absence of aspheric surfaces is expected to reduce over-all production costs.

An automatic focusing system, operative from the radar net, or programed slant-range data, ensures a focused image throughout a missile's trajectory. The high-precision mount operates from radar net data or automatically from an external sensor.

DOAMS weighs 17,000 pounds, features an f/4, 2500mm (100-inch) focal length objective with a 360-frame-per-second prism camera, and an f/8 5000 (200-inch) focal length objective with a 125-fps pin-registered camera. The mount is designed to prevent image degradation from camera vibrations or high-speed tracking. Atmosphere turbulence effects are expected to be reduced by mounting the systems on 20-foot towers.

Designed to replace the IGOR (Intercept Ground Optical Recorder) telescope systems, the former "work horses" of tracking telescopes, DOAMS will be delivered at a rate of about one every two months until contract completion during 1979. Since retiring the 16 previously used IGORs in 1974, WSMR has used Cinetheodolite metric telescopes and the mobile catadioptric quartz (athermalized) family of 180-inch optical instruments.



Distant Object Attitude Measuring System

Army STRATCOM Program Analyzes Ultraviolet, Infrared Radiation

Data from two balloon-launched experiments, including recovery of instrumentation payloads of 1,000 pounds carried up to 134,000 feet altitude over Holloman Air Force Base and White Sands Missile Range (WSMR), NM, are being analyzed as part of the Army's STRATospheric COMposition (STRATCOM) Program.

Purpose of the experiments is to study the composition, ultraviolet and infrared radiation and thermodynamics of the atmosphere - especially data on freons (man-made fluorocarbons) and hydrochloric acid during sunset hours.

Dr. Harold Ballard, WSMR Atmospheric Sciences Laboratory (ASL) STRATCOM Program Director, said all instruments worked perfectly during both flights. The first balloon (16,000-cubic-foot, helium-filled) was recovered after a 26½-hour flight. The payload of a 12,000-cubic-foot balloon was parachuted to earth after a 4½-hour data-gathering flight.

STRATCOM has been sponsored since 1968 by the U.S. Army Electronics Command's ASL at WSMR. National concern with possible environmental problems has broadened use of the data for study of the effects of nitric oxide, fluorocarbon chemicals and other potential pollutants.

Wilson Joins White Sands Missile Range As Deput for Technical Operations

COL Patrick W. Wilson, former chief of the Defense Nuclear Agency's Test Directorate, Kirtland Air Force Base, NM, recently became deputy commander for Technical Operations, White Sands (NM) Missile Range.

Graduated from the U.S. Military Academy in 1950, COL Wilson has a master's degree in physics from the U.S. Naval Postgraduate School, and has graduated from the Armed Forces Staff College, and has completed the Ordnance Advance Course.

Key assignments in recent years have included chief, Army Field Office, Vandenberg Air Force Base, CA; staff officer, U.S. Atomic Energy Commission, Germantown, MD; commander, 63d Maintenance Battalion, Vietnam; and nuclear staff officer, Office, Chief of Research and Development, Washington, DC.

9 Astronaut-Pilots Learning Simulated Landing Techniques

Nine astronaut-pilots are learning simulated space landing techniques by flying two Shuttle Training Aircraft from Ellington Air Force Base, near Houston, TX, to Northrup Strip at White Sands Missile Range (WSMR), NM.

The two STAs are modified Grumman Gulfstream-II jet aircraft equipped with shuttle orbiter controls and instruments. Included are a computer and thrust-reversing systems for the engines and large vertical stabilizers under the STA wings. The STA can simulate a shuttlecraft's landing approach pattern from 40,000 feet altitude, gliding to within 30 feet of the ground at Northrup Strip.

Easily visible from earth orbit, Northrup Strip is in a dry lake bed area about five miles wide and seven miles long. Special landing strip markings are 300 feet wide, 20,000 feet long.

The actual 122-foot-long shuttle orbiter, "Enterprise," is being completed by Rockwell International at Palmdale, CA. Initial flight tests are programmed early in 1977 at Edwards Air Force Base, CA. Enterprise is scheduled to go into earth orbit in March 1979 from Kennedy Space Center, Cap Canaveral, FL.

Space shuttle flights are planned into the 1990s and the Enterprise orbiter, designed for use at least 100 times before requiring overhaul, will replace more than a score of separate launch systems now being used. NASA officials view shuttle craft test operations as a means of making future space flights considerably more economical.

WSMR Reports Exceptional Accuracy With ALT System

Exceptional accuracy in tracking targets to an altitude of 60,000 feet, unaffected by ground clutter, is reported achievable with an Aided Laser Tracking System (ALTS) delivered recently to White Sands (NM) Missile Range.

Six ALTS are being procured at a cost of $402,000 each and the second unit delivery to WSMR is scheduled early in December. Other recipients will be the Army's Yuma (AZ) Proving Ground, the national Aeronautics and Space Administration at Edwards Air Force Base, CA, and Naval Air Station, Patuxent River, MD.

ALTS housed in 30- foot trailer

ALTS was developed and funded through the WSMR Improvement and Modernization Program for Range Instrumentation. Acceptance tests are in progress and operators have been trained for development of operating procedures.

Housed in 30-foot trailers, the mobile units are usable at many sites. An infrared beam transmitted from the laser is invisible and, for protection against eye injury, requires protective glasses for anyone standing closer than 4,600 (600 feet short of a mile) from the operating sites. Warning signs will be posted and roads blocked in the area during test operations.

WSMR Task Manager for ALTS, T. C. Crosby, assisted by Bruce Galloway, said the system is designed to track and determine the position of any target that can be affixed with a reflector. ALTS will measure azimuth, elevation and the range to the target, returning a signal detectable in sunlight. Data are recorded on magnetic tape for post-mission computer processing.

Immune to ground clutter, as mentioned earlier, the ALTS will not interfere with electronic control or tracking devices. Accuracy is reported comparable to that of metric data obtained by the Cinetheodolite telescope systems.

Test Program Will Examine Structure of Army Divisions

Reorganization of U.S. Army divisions, including a "radical increase" in artillery firepower and more but smaller, more mobile units, is being considered for tests early in 1977.

Planned restructuring was announced at a press conference by COL John Foss, director of the Division Restructuring Study Group (DRSG), U.S. Army Training and Doctrine Command (TRADOC), Fort Monroe, VA.

The number of 155mm howitzers in a division would be increased from 54 to 90 and tank battalions would have 36 tanks instead of the present 54. However, there would be parity of tanks in the new and current divisions because of the increase in the number of units. Each division would get six CH-47 helicopters to increase air resupply capabilitites.

COL Foss said the focal point of the proposed division's maneuver elements would shift from company to the battalion where combat actions would be coordinated by the commander and his staff. Many administrative functions presently handled in the company would be shifted to the battalion, to enable the company commander to concentrate on troops, as already has been started under the Consolidation Above Battalion Level (CABL) System.

Mechanized infantry battalions would have a basic structure common to that of tank battalions, which would simplify the cross-attachment of units for specific combat tasks. The planned infantry battalion also would have "pure" rifle companies, without mortars and TOW antitank weapons.

The TOW units would be in an antitank company coordinated and contolled at battalion level. The increase in artillery tubes is seen by Army planners as making mortars unnecessary in the rifle companies.

Army planners see several trends influencing development of the new division concept, COL Foss said. Pointing to the dramatic increase in firepower, he explained that "The battlefield of the future will have fewer men forward but more firepower per man.... Modern firepower has greater range, accuracy and lethality. The trend is to precise firepower from the rear."

Three CSC Projects Transferred To ARTADS Project Manager

Transfer of 42 military and 81 civilian positions from the U.S. Army Computer Systems Command to the Office of the Project Manager for Army Tactical Data Systems (ARTADS) was announced in October by the USACSC.

The announcement stated the main physical impact of the action is relocation of 22 civilian and 15 military positions from the area of Fort Belvoir, VA, with four military and 18 civilian personnel moved to Fort Monmouth, NJ.

Improvement of Army control over tactical data systems by consolidation of hardware and software responsibilities under one manager is the objective. The action clarifies organizational responsibilities, is designed to eliminate duplication of effort, and by better command and control is expected to decrease complexity of ARTADS design, installation and maintenance.

Systems support involved in the consolidation includes the Army Air Defense Command and Control System (Missile Minder); the Tactical Fire Direction System (TACFIRE), designed to support field artillery units; and the Tactical Operation System (TOS), set up to assist division commanders and their staffs in the decision-making process by providing timely, accurate and more complete information.

8 AMRDL Helicopter Contracts Total More Than $2.6 Million

Eight companies involved with helicopter R&D shared in $2,606,946 in contracts awarded recently by the U.S. Army Air Mobility R&D Laboratory (AMRDL), Ames Research Center, Moffett Field, CA.

Boeing Vertol Co. will evaluate load and stability characteristics of a Bearingless Main Rotor system under a $1,554,737 contract.

Bell Helicopter Textron received four contracts totaling $393,708 to test "fly-by-wire" tail rotor control system for the AH-1S Cobra ($99,991); to design high-survivability flight control for the AH-1G/Q Cobra ($99,992); develop and test concepts to reduce vulnerability of helicopter tail booms in combat ($97,200); and conduct research on Guidelines for Rotor Blade Flapping Limits ($96,525).

Kaman Aerospace Corp. will develop design criteria for dry lubricated bearings for helicopter flight control systems ($99,000), and conduct research on an advanced drive shaft alignment indicator ($51,200).

The Aircraft Division, Northrop Corp. will receive $93,729 to develop computer methods to analyze and predict the radar cross-section of aircraft using radar-absorbing materials.

Sikorsky Aircraft Division, United Technologies Corp. will be paid $99,500 to conduct a preliminary design investigation and evaluate an integrated tail rotor servo and hydraulic power supply to react tail rotor steady and vibratory loads into the tail rotor gearbox.

AiResearch Manufacturing Co. of Arizona will get $103,000 for concept formulation and for selection and design of an advanced ground power unit for Army aircraft.

Lockheed California Co. will receive $150,000 for support of simulated and natural icing tests on Army aircraft. Franklin Institute will be paid $62,000 to develop techniques for analyzing helicopter lubricating oil by examining metal abrasions collected by the filter.

Reverse Osmosis Water Purifying Unit Enters Development Phase

Designed to replace four field support water purification systems in service, a 600-gallon-an-hour reverse osmosis (RO) unit capable of supplying water for 2,000 users daily is undergoing development tests at HQ U.S. Army Mobility Equipment R&D Command.

Scheduled for type classification in FY 1978, the system is the smallest in a family of multipurpose units. It is intended to replace the Erdlater, the 150-gph distillation unit, a chemical-biological warfare decontamination system, and the mobile ion exchange unit.

The system being tested can produce potable water from polluted fresh water, sea water and brackish water; remove chemical and radiological contaminants, and filter certain viruses and bacteria when aided by chlorination.

RO is the process of pressurizing raw water above its osmotic pressure, and forcing it through a thin cellulose acetate or polyamide membrane fabricated into a spiral-wound element. Twenty elements are used in the unit.

Development of a dry membrane is described as an advancement in the state-of-the-art in RO membrane technology. The dry membranes can be stored dry and are wet/dry reversible.

Incoming water is pretreated with calcium hypochlorite for disinfection and a polymer to aid filtration prior to final RO processing.

Project Engineer Allen Ford said "It should be highly effective, providing water of high quality wherever troops may be located." The test unit can be air-dropped to forward units.

Multipurpose Water Purification Unit

Edgewood Arsenal Pesticide Monitor Wins IR Magazine Acclaim

Warning against potentially hazardous enzymes is provided by a pesticide monitoring system developed through U.S. Army/contractor effort and termed a "significant new technical product" by *Industrial Research Magazine*.

The award ceremonies were held at the Museum of Science and Industry, Chicago, IL, and the monitoring system was one of 99 other products labeled as "significant."

Developed cooperatively by Edgewood Arsenal, MD, and the Midwest Research Institute, Kansas City, MO, the system can be applied in manufacturing facilities and for safety checks at plants and warehouses. Immobilized cholinesterase collects and identifies organophosphate or carbonate pesticide vapors or aerosols.

Activity of the immobilized cholinesterase is determined automatically every three minutes, triggering a warning if preset safety levels are exceeded. Current wet sampling methods often require more than two hours warning time.

Lee Appel

Army programs for demilitarization of obsolete chemicals are credited as a major factor in development of a real-time monitor capable of detecting toxins tolerable by man for over eight hours.

Lee Appel, an engineer assigned to Edgewood's Detection and Alarms Branch, Directorate of Development and Engineering, was project manager for the Army's portion of the effort.

Midwest Research Institute key personnel on the system development included John McKelvey, MRI president, William B. Jacobs, senior chemist, and Dr. William B. House, director of Biological Sciences.

CRREL Team Participating in 10-Nation Glacial Ice Probe

CRREL staff members discuss Antarctic ice drilling project with COL Robert L. Crosby, commander and director, and Dr. D. R. Freitag, technical director, prior to departure from Hanover. From left are Robert A. Bigl, Dr. Freitag, COL Crosby, John H. Rand, J. S. Morse.

Glacial ice composition in Antarctica is being probed and studies made of marine organisms in the surrounding sea by scientists representing the United States, Australia, Denmark, England, Japan, New Zealand, Norway, Soviet Union, Switzerland and West Germany.

United States representatives will include five scientists and engineers from the Army Cold Regions Research and Engineering Laboratory (CRREL), Hanover, NH. Their mission, funded by the National Science Foundation, is to drill three holes in the Ross Ice Shelf, using a wire-line mechanical drill developed by CRREL.

The first hole will go about three-quarters of the way through the 1,375-foot ice shelf. The purpose of extracting ice cores is to make age measurements. Ice will be melted at different levels and radioactive techniques will be used for measurements.

An ice core 2⅜ inches in diameter will be extracted from a second hole as a continuation of studies dating back to the International Geophysical Year (1958-59). In 1968 CRREL recovered a 7,101-foot ice core from Byrd Station in Antarctica, probing to bed rock below the ice. A 4,560-foot core was recovered in 1966 at Camp Century in Greenland.

Extensive studies of the ice cores yield clues to evolutionary geological changes dating to the Pleistocene ice ages, giving man an insight into the cataclysmic forces of change.

The third drilling planned by the CRREL team is a 12-inch hole to study sea water below the ice and to analyze the ocean bottom. Nets, traps and baited lines will be lowered to sample life beneath the ice and a TV camera will be used to view the ice bottom and the sea floor. Measurements of conditions at various depth, temperature, inclination and closure of the hole will be included in data collection.

The CRREL team also will attempt to drill 90 feet into the sea floor, 780 feet beneath the ice shelf bottom.

Army's RAG Viewed as Humane Civilian Riot Control Aid

Civilan law authorities seeking methods of riot control "without bloodshed" may find that a "spin-off benefit" of U.S. Army research and development known as the RAG offers a practicable answer to their problem.

RAG denotes Ring Airfoil Grenade, which comes in experimental "soft" and "sting" types as a development at Edgewood Arsenal, credited to Abraham Flatau and colleagues Don Olson and Miles Miller. RAG was conceived as a military police weapon for controlling disturbances without close-up confrontation.

Termed a "low-hazard" projectile system, RAG has been under development since 1972 in the Systems Concepts Office, an aerodynamics research and engineering unit in the Edgewood area of Aberdeen Proving Ground, MD.

Shaped like a streamlined doughnut, the RAG is constructed of a soft rubber material and is launched from a special projector assembled to the muzzle of a standard M-16 rifle. It may be fired to strike a target point-blank or up to distances half the length of a football field, that is, 150 feet, with a near-zero probability of causing serious injury. It may be projected into small groups at a maximum range of 200 yards.

The "sting" and the "soft" versions have the same weight and dimensions and are launched to spin at 5,000 revolutions a minute to provide gyroscope stability in flight, traveling a relatively flat trajectory.

The soft RAG may carry a small quantity of CS powder that causes sneezing and watering of the eyes - thereby decreasing a rioter's desire and ability to continue the disturbance. When necessary to quell rioters who ignore the pain caused by sting's impact, the soft RAG may be fired interchangeably to carry a small cloud of tear gas.

Flatau stressed that the soft RAG contaminates only individuals in the immediate vicinity of the disturbance - that it does not affect innocent bystanders beyond the point of rioting.

Dr. Dennis T. Brennan, author of a noted police report, "Riot Control Without Bloodshed," corroborated Flatau's statement by calling either the soft or sting RAG a "humanitarian weapon system."

Military type classification as Standard is expected for the XM234 launcher and the XM743 sting RAG in the spring of 1977. Similar action for the soft RAG is anticipated in late 1978.

Alaska NWTC Building Designed For Temperature to 75 Below F.

Alaska's Northern Warfare Training Center, located with the Cold Regions Test Center at Fort Greely to provide a capability of subjecting materiel and soldiers to the most rigorous winter conditions, is erecting a $3,341,000 building designed for up to 75 below zero F. operational requirements.

Engineered by the Corps of Engineers Alaska District staff, the structure is termed "the first for the military to meet the rigors of winter in Central Alaska." One of the innovations is an outer shell that has a "complete thermal break with the inside structural members." A vapor barrier exists between the floor and outer walls, between abutting partitions and the walls, and from the roof to the basement below ground.

Building columns also have been offset to give space between walls and columns, thereby allowing complete circulation inside the insulating panels. Windows are designed and specially fabricated to permit inside frost-free glass at 75 degrees below zero outside temperature. Triple-glazed, the windows have been laboratory tested to satisfy this specification.

The outside veneer is ferro-cement, a tough material such as is used in constructing "cement ships." Long used in Alaska's civilian buildings, the material is finding its first application in a modern military structure. The material is a special kind of stucco.

Expected to be turned over to the post commander before the end of the year, the building includes temporary quarters for students of northern warfare, mountain operations, and survival in intense cold conditions. The 200-man barracks also will house the training cadre for the center.

MICOM $8 Million Contract Orders MQM-107A Second-Year Production

Second-year production and operation of the MQM-107A "Streaker" variable speed training target is ordered in an $8 million contract awarded recently by the U.S. Army Missile Command, Redstone Arsenal, AL.

Raye Stanley, Streaker project engineer, announced that Beech Aircraft Corp., will deliver an additional 114 targets, provide technical crews during air-defense training exercises, and supply technical data and spare parts.

Multi-year contract value for Streaker, programed to become the Army's primary target for air-defense missiles, is estimated at more than $18 million.

Capable of operating at altitudes ranging from 300 to 40,000 feet, at speeds up to 500 knots, Streaker targets will serve numerous air defense systems. COL A.A. Busck of MICOM's Targets Special Management Office has program responsibility.

AORS XV LEADING PARTICIPANTS (from left) Presiding Chairman Dr. Wilbur B. Payne, director, TRADOC SAA, WSMR; LTG Donn Starry, V Corps commander, U.S. Army Europe; David C. Hardison, Deputy Under Secretary of the Army (OR); COL Max W. Noah, HQ TRADOC; David Dare, Defence Operational Analysis Establishment, England; John Kramar, assistant director, Systems Effectiveness & Joint Service Activities, USAMSAA; LTG (USA, Ret.) Julian J. Ewell.

15th Annual Army Operations Research Symposium...

Attention Directed to Data for Decisions in Simpler Format

Operations research and systems analysis (OR/SA) technology has come to the time of maturity where it must cope successfully with exceedingly complex problems of structuring the nation's defense posture - not by extremely sophisticated mathematical modeling but in better form for decision-makers.

That message was clearly and repeatedly stated by speakers when more than 300 practitioners in the OR/SA profession attended the 15th annual U.S. Army Operations Research Symposium (AORS XV) at Fort Lee, VA. The theme was: The Complexity Crisis and How to Avoid It.

Commander of the U.S. Army Training and

GEN William E. DePuy

Doctrine Command GEN William E. DePuy defined the challenge in his foreword to the conference program:

"...I am often the recipient of the analytical products which many of you develop. I fully appreciate the value of this 'arm' of the decision-maker. We must continue to utilize operations research techniques to make the analysis process faster and more economical.... We must neither sacrifice simplicity to attain sophistication nor disregard the creative ability of the human mind...."

GEN DePuy's schedule prevented him from attending the conference, as he has done in recent years, but he sent a message presented by COL Max W. Noah, chief of the HQ TRADOC Analysis Office, as follows:

"I have asked COL Noah to pass on to you my apologies for being unable to attend your most important conference. I am delighted that General Starry is able to speak to you because I count him to be one of three senior officers in the Army who understands your business thoroughly and uses your talents effectively.

"Having been the consumer of OR/SA for 7½ straight years, I do have some strong opinions on the subject. I will not try to elaborate or even defend my point of view but pass on my judgment on several major issues.

"First, I believe we are just emerging - thank God - from a period in which the process of weapons systems acquisition was regarded as more important than the product. The analytical community must share the responsibility for that tragic state of affairs.

"We have institutionalized the development, testing, evaluation and analysis aspects of weapons systems acquisition until there is an institutional bias toward prolonging and complicating the process, rather than changing and simplifying it. As a consequence, the Soviets are running circles around us in development time and thus in the fielding of modern weapons.

"Secondly, and stemming from the first, we must only use complex, expensive, time-consuming analysis when really tough choices confront us which are not obvious on simple inspection and the use of eighth grade arithmetic.

"Before we resort to full-scale analysis, we should strip out all of the obvious conclusions and be strong enough and courageous enough to assert the obvious. When we do go to analysis, we should only go to that level of complexity which is absolutely required. If a simple model or stimulation or equation will do the job, let us use it. I say this knowing that institutionalized, analytical agencies have some reason to go in the opposite direction for institutional reasons.

"Thirdly, it seems to me, we spend more time and money on the manipulation of bad data than the accumulation of good data. This is explainable organizationally. The collection of data through tests or other measurement procedures lies outside the authority of many analytical agencies.

"This is where TRADOC should weigh in heavily. I confess that it is not easy because of the cost in time, troops, and test facilities to acquire data needed under realistic conditions.

"Lastly, we have not yet surmounted the formidable problem of representing the effects of night, poor visibility, smoke, or (fire) suppression in our models, although some progress has been made on suppression.

"For example, the analytical community has pressed the Army to multiply the TOW weapons on the battlefield, but models used did not adequately reflect realistic attack tactics, use of smoke, night operation or suppression.

"We are now engaged in a crash program to put armor protection around the TOW. Proliferating soft TOW systems is probably not cost-effective. And now, as we look into the future, with thermal sights which can see through most kinds of smoke and bad weather, we realize that the trackers cannot do so. I have to say that this state of affairs is the combined responsibility of combat developers, decision-makers and the analytical community.

"To the extent the ORSA community can cope with these problems and produce results in less time, at less cost - to that extent will the analytical community remain healthy and productive. To the extent it cannot cope with these problems, to the extent that it extends and complicates weapons systems acquisition - to that extent will it lose support and credibility. This is a good arena in which to address all of these enormously important aspects of your business. Have a good conference"

SYMPOSIUM CHAIRMAN Dr. Wilbur B. Payne, director of the TRADOC Systems Analysis Activity (SAA) at White Sands (NM) Missile

(Continued on page 12)

PARTICIPANTS (L to r.) Dr. Alvin D. Coox, Department of History, San Diego State University; Dr. Clinton J. Ancker, Department of Industrial & Systems Engineering, University of Southern California; David H. Meier, symposium chairman of arrangements, TRADOC SAA, WSMR; Diana Massengale, AORS XV coordinator, TRADOC SAA; Dr. James G. Taylor, Department of OR & Administrative Sciences, Naval Post Graduate School; Phil Karber, director of Strategic Studies, BDM Corp.; Dr. Robert Machol, Graduate School of Management, Northwestern University.

15th Annual U.S. Army Operations Research Symposium

Range, introduced MG Erwin M. Graham Jr., commander, U.S. Army Logistics Center at Fort Lee, for welcoming remarks. MG Graham and MG Dean Van Lydegraf, commander of the Army Quartermaster Center, were cohosts of the symposium for the third straight year. Cosponsors were TRADOC, the SAA and USA Logistics Management Center.

LTG DONN STARRY, commander, V Corps, U.S. Army Europe, gave the audience a broad understanding of the organizational problems (the numerous options in the mix of strategic forces and materiel) he must consider in mapping the European defense area of the V Corps.

Replete with many pictorial slides depicting the potential combat area, including the critical composition of terrain defensibility, LTG Starry's address dealt with theoretical considerations of what tactics the potential aggressor might employ. The defense problem, he stated, is that of using terrain factors with the proper mix of combat forces and materiel to turn back vastly superior numerical (quantitative) manpower and weapons.

Complicating any defense plan, he explained, are the possible variable weather conditions, the critical communications complexities in a combat situation often requiring extremely precise mobility of materiel and manpower, and numerous other decisive factors contributory to victory or defeat. In modern warfare, he emphasized, the outcome of a major battle may be decided quickly—perhaps in less than an hour.

Operations research and systems analysis experts, LTG Starry stressed, must deal with "real-world" combat factors in their efforts to collect and consider in-depth the data essential to prepare commanders with a conceptually sound basis for important decisions. He concluded by stating:

"We have to be honest in appraising all potentially critical factors in order to develop tactics and the mix of weapons and manpower essential to victory."

KEYNOTE ADDRESS. Under Secretary of the Army for Operations Research David C. Hardison, successor to Dr. Payne in that position, presented a 45-minute address dealing with the symposium theme, The Complexity Crisis and How to Avoid It, terming it "one that warrants our best collective thoughts to find new answers.... There is no doubt as to where I stand on the question of complexity - I am against it!

"I can recall only a few cases where long, involved, complex studies have proved more fruitful than shorter, more narrowly focused, simpler analyses.... So I want to damn and bury needless complexity in our Army analytic studies and to praise and encourage simplicity in them.

"The push in this direction does not mean that we should reject use of powerful analytical tools, but it certainly does mean that, more than in the past, our sophistication must be challenged to continue all the way to the usefully simple. Simplicity can be the result of maturation of our art. Now - if not before - simplicity is sophistication is simplicity...."

Under Secretary Hardison then turned to a series of searching questions: "Do we indeed have a complexity problem in our Army analytic studies? Is the problem reaching crisis proportions? Who thinks that our studies are becoming to complex?:. Are there examples where simpler approaches clearly would have been better?

"How can we, at the outset of a study, select a simple but adequate approach? How can we better determine what to leave out and what to put in? Would our study results be as credible if they were generated by less complex methods? Are we not in an age where complex systems and complex issues are commonplace, and do these not result in complex studies?

"Do we not deal with sophisticated managers who demand nothing less than study products that are the best money can buy and computers can compute? Is the concern for complexity narrow or broad? Do the concerns mainly reflect disillusionment from past failures, or could it be pique from past successes where our work proved right but painful?"

Efforts to answer many of these questions consumed the remainder of Under Secretary Hardison's programed time allotment. Many military and civilian leaders, he conceded, are convinced that Army analytic studies are too complex....

"I detect this feeling to be not far below the surface of a clear majority of our senior military and defense managers. To the extent that these feelings are present, and due to some of the reasons I have stated, they concern me and cause me to ask: How can we improve? ...Now is the time for us to give greater emphasis to simpler approaches."

Analytical studies concerned with virtually every phase of military requirements and operational capabilities, Hardison said, are currently costing the Department of Defense an estimated $376 million annually (as of 1975-76).

In using this statistic, he made the reservation: "It is fairly difficult to get an accurate measure of the resources that are spent on Defense Studies. But I think you would not find much argument that we are spending well over 1/3 billion dollars per year. You can quickly calculate that this is only a fraction of one percent of the defense budget. But any way you slice it, $376 million is a lot of money. And there are people who think they have a use for that money that would have a payoff greater than that which will result from the studies...."

Even though the cost of Army OR/SA is "only one-fifth to one-fourth" of the Department of Defense total, Hardison said this cost must be of concern. But he said the cost can be validated by the need for services of competent OR/SA specialists who are thinking deeply about how to solve the complex problems related to the national defense posture - if the results aid decision-makers to achieve the purpose to which studies are directed.

Relative to the broad scope of Army OR/SA studies, Hardison stated: "Our program...deals with a full spectrum of objects. We study hardware systems such as tanks, helicopters and missiles. We analyze tactical units such as the mechanized infantry battalion and seek to improve its tactics, its organization and its equipment mix.

"We conceptualize such functional entities as the logistics systems and the intelligence systems. We build and exercise enormously com-

Army Research Institute (ARI) representatives included Dr. John E. Germas and Dr. Joyce L. Shields, who presented technical papers, and James D. Baker, chairman of Working Group J and chief, ARI Educational Technology, Training Simulation.

USMA representation - Front row (l. to r.): COL Allen F. Grum, associate professor of Systems & Decision Analysis, Department of Engineering; Cadets Michael R. Chritton, Clarence R. Kohs, Thomas M. Perrin, Joseph F. Wartski, Stephen Morrow. Back row: MAJ David R. E. Hale, Department of Engineering; Cadets Walter V. Horstman, James R. Kline, Wesley F. Walters, Stuart B. Alleman. COL Grum and USMA officers and some cadets presented papers.

COL James G. Ton, OCE; Arthur C. Christman, scientific adviser, TRADOC; Dr. Marion R. Bryson, scientific adviser, CDEC; Dr. Joseph Bruner, Institute of Defense Analysis; Floyd I. Hill, OTEA.

Robert A. Cameron, ALC; Frank B. May III, ALC; John C. Sjoberg, ALEA; COL Reed E. Davis, CACDA; Elwood C. Hurford, Army Logistics Management Center; Max Massengill, Missile Command.

SOCIAL HOUR GROUPS Keith A. Myers, USAMSAA; Lynne Taylor, USAMMAA; LTC Kenneth E. Halleran, HQ DARCOM; Patricia J. Randall, USAMSAA; Johnnie J. Shaw, USACC; Mary E. Minor, USACC.

Arthur C. Christman, TRADOC; LTC Robert H. Lipinski, XM-1 OPM; MAJ Karl S. Crosey, C&GSC; MAJ John A. DeReu; W. Allan Chavet, HQ U.S. Army Materiel Development and Readiness Command.

plex computer models of theater forces and tell our authorities just how many additional hectares of real estate would be lost in the first three fortnights of the next war if we were to subtract a billion dollars from procurement accounts.

Hardison concluded his address with a discussion of "Seven Prerequisites to Admission to the Movement to Eradicate Needless Complexity in Army Analytic Studies," a movement he said he had joined because he has "full faith in the formula."

LESSONS OF VIETNAM in an Analytic Sense was the title of an address by LTG (USA, Ret.) Julian J. Ewell, currently a military consultant to organizations concerned with problems related to Army tactics and operations.

Regimental commander of the 101st Airborne Division during the Battle of Bastogne in World War II, and an Infantry officer in Korea, as well as commander of the 9th Infantry Division and II Field Force in Vietnam, LTG Ewell is the author of numerous publications.

Judged by applause, conferees considered LTG Ewell's address outstandingly informative and interesting with respect to the doctrine, tactics, operations and analytic techniques involved in the Vietnam conflict.

Much of his talk was drawn from a book in the Army's Vietnam studies series: Sharpening the Combat Edge, the Use of Analysis to Reinforce Military Judgment, which he coauthored with General James Hunt.

LTG Ewell discussed in detail his views of lessons learned, including as a "primary lesson" in an operational sense the use of helicopters in tactical situations as well as in the great success of medical evacuation.

He also listed other innovative advances in treatment that resulted in "a war in the tropics in which medical problems were kept well under control for the first time." Mentioned also was the introduction of such advanced weapons systems as the laser-guided "smart" bomb and the TOW missile.

STATE OF THE ART SUMMARY (Stochastic Duels), a presentation by Dr. Clinton J. Ancker, Department of Industrial and Systems Engineering, University of Southern California, was a highly technical discussion of a technique rated among the more sophisticated employed by OR/SA professionals. The presentation featured a large number of slides depicting stochastic theory applications.

Similarly sophisticated was a presentation by *Dr. James G. Taylor,* since 1968 associate professor of operations research, Department of Industrial and Systems Engineering, Naval Postgraduate School, Monterey, CA. Much of his research has been with the U.S. Army Combat Developments Experimentation Command, Fort Ord, CA.

Dr. Taylor is known for expertise in combat models, systems effectiveness evaluation, computer simulation applications to military OR, field experimentation, applied statistics, quantitative analysis of strategy and tactics, resource allocation and optimization theory (nonlinear and dynamic programing and optimal control).

The title of his presentation was: A Tutorial on Lanchester-Type Models of Warfare. The subject material, including many vugraphs depicting stochastic models pertinent to military problems, was based on a reprint from one of his publications in proceedings of another Army OR symposium.

BANQUET SPEAKER Dr. Robert Machol, Graduate School of Management, Northwestern University, recounted many of his personal experiences in an address titled Unforgettable Moments in Operations Research. The address was prepared to be laugh provoking, which it was as indicated by audience reaction, rather than to convey information. It provided an appropriate "light touch" to an otherwise serious conference.

David Dare of the Defence Operational Analysis Establishment in England discussed NATO Operations Research Establishment, a comparison of differences in methodology and areas of accent as well as types of organization and the staffing strength for OR activities among the NATO nations. His presentation made liberal use of vugraphs to depict the differences.

LESSONS LEARNED IN KOREA, A presentation by Prof. Alvin D. Coox, Department of History, San Diego (CA) State University, was based on documented studies of facts pertaining to the Japanese attack on Pearl Harbor. Similar elements of surprise were involved, he stated, in the North Korean invasion of the south nine years later, despite numerous intelligence reports that such an invasion was being planned.

Prof. Coox reviewed in great detail the viewpoints of many of the top leaders of the U.S. Government and the military establishment regarding the possibility of war in Southeast Asia. The hour-long address was a fascinating historical account of the evolution and the reasons for the policy judgments that resulted in a limited escalation of the conflict.

Included in the address were numerous comparisons, based on documented data from analytical studies, of the effectiveness of various types of weapons and tactics and various mixes of combat forces and materiel. Studies were made of Air Force and Navy as well as Army combat operations.

Prof. Coox also reported, in considerable detail, the reasoning and the differing viewpoints of U.S. leaders that resulted in a decision not to use nuclear bombing to bring an early decisive blow to bear in Vietnam, such as was made on Hiroshima and Nagasaki to bring an abrupt end to World War II in Japan.

SOVIET LESSONS OF MIDDLE EAST WAR: *A Tactical Revolution in Ground Warfare.* Phillip A. Karber, vice president for the National Security Program and director of strategic studies, BDM (Braddoc, Dunn and McDonald) Corp., spoke on this topic.

Soviet lessons of the 1973 Middle East War resulted in a "major reorientation of Soviet ground force tactical and operational concepts," he said. "Results have significantly destabilized the European balance and portend a qualitative new threat to the U.S. and NATO forces deployed in Europe...."

Karber divided Soviet response into three sequential stages, the first being political - "a psychological victory demonstrating that the Israelis were not infallible." An extensive discussion of the implication of antitank weapons followed in 1974-75, based on extensive operational testing of what they believed to be "the real lessons" of the war.

The third stage, Karber said, has moved during the past six months from analysis and testing to implementation, involving "a major shift in...tactical operational concepts, including introduction of advanced technology, new organizational concepts and a change in their training emphasis...."

The remainder of the address was devoted to discussion of the portent of the changes now in progress, including "considerable interest in artillery-delivered mini-nuclear warheads for the first time in 15 years.

"However, in conventional operations, an option the Soviets wish to preserve, they are visibly concerned over their ability to make a rapid penetration of a prepared defense...(and) increasing consideration of the merits of a preemptive conventional attack launched before the defender has had time to mobilize and reinforce with sufficient strength to establish a linear, prepared defense...."

LESSONS LEARNED in the Yom Kippur War (Blue Viewpoint). The Honorable Chaim Herzog, Israeli Permanent Representative to the United Nations, was scheduled to address this topic as one of the concluding highlights of AORS XV, but an important UN debate altered his plans. John Kramar, assistant director, Systems Effectiveness and Joint Services Activities, Army Materiel Systems Analysis Activity, Aberdeen PG, MD, spoke on his behalf.

Kramar's presentation complemented Karber's address on the "Red Viewpoint" of the same topic, and was based substantially on Chaim Herzog's book. The address described the ground, air and naval engagements of the 6-day war in 1967, manpower and weapons "mix" changes that were made based on analyses, and the results as tested in the 1973 war.

Using statistics on Arab and Israeli aircraft, tank and other materiel losses during the 1973 war, Kramar discussed the impact these losses has had in U.S. and Israeli thinking about changes that must be made in preparation for success in warfare that breaks out suddenly.

"In summary," he stated, "we of the materiel analysis community have learned some lessons from the 1973 Mid East War and have had some of our thoughts crystalized. We are endeavoring to put as many of those lessons to use as we can in our analysis of military materiel."

CONCURRENT WORKING GROUPS

Chairmen of the 12 concurrent sessions are pictured, along with titles of presentations and authors. The chairmen were: Frank B. May III, deputy director, Operations Analysis Directorate, U.S. Army Logistics Center; O. P. Bruno, U.S. Army Materiel Systems Analysis Activity (USAMSAA);

Wayne Allen, director of Cost Analysis, Comptroller of the Army, Pentagon; MAJ John R. Statz, U.S. Army Combined Arms Combat Developments Activity; COL R. I. Wiles, U.S. Army Concepts Analysis Agency (CAA); Walter Hollis, U.S. Army Operational Test and Evaluation Agency;

Alvan J. Hoffman, U.S. Army Ballistic Research Laboratories; David Prichard, CAA; Warren Olson, U.S. Army TRADOC Systems Analysis Activity; James Baker, U.S. Army Research Institute for the Behavioral and Social Sciences; Roger Willis, U.S. Army TRADOC Systems Analysis Activity; and Keith Myers, USAMSAA.

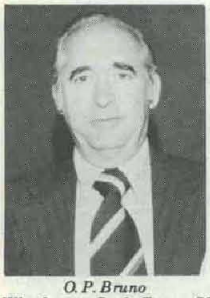
Session A: Logistics.

Frank B. May III

A Macroscopic Model for Logistic Policy Guideline of an Air-Mobile Combat System, Harold Y. H. Law, U.S. Army Air Mobility R&D Laboratory (AMRDL); The Relation of Logistic Support Operations to Combat Effectiveness (Panel-No Abstract), COL (Ret.) Trevor Dupuy, Washington, DC; The Relation of Threat to Logistics Support (Panel-no Abstract), Anthony Cordesman, Washington, DC; Logistics Support Analysis Model (LOGSAM), Thomas P. Huczek, John E. Phillips and Lester G. Jones Jr., MICV Systems PMO;

An Heuristic Approach to an Air/Ocean-Vessel Unit Assignment Problem, Dr. Joe W. Knickmeyer and MAJ Theodore W. Makarewicz, Military Traffic Management Command (MTMC); Transportability Analysis Reports Generator (TARGET), Dr. Joe W. Knickmeyer, MTMC; Hawk Operational Readiness Float (ORF) Usage Study, MAJ Stephen J. Paek, U.S. Army Air Defense School.

Session B: Reliability, Availability, and Maintainability.



O. P. Bruno

Procedures for Estimating Expected Kill Probabilities From Small Sample Sizes, Dr. Larry H. Crow, U.S. Army Materiel Systems Analysis Activity (USAMSAA); Quantitative Assessment of Residual Software Programing Errors Through Application of the Jelinski/Moranda Model, Edward L Keezer, ARTADS PMO;

A Technique for Monitoring the Analytical Results of Reliability Data for Deciding Whether to Scale Down OT&E Test Requirements, Leslie Lancaster, OTEA; Cost Optimizing System to Evaluate Reliability (COSTER), John P. Solomond and Ms. Grace A. Marseglia, U.S. Army Electronics Command (ECOM);

Application of RAM Concepts to Production Base Modernization, LTC D. Dice and S. Karlin, OPM for Munitions Production Base Modernization and Expansion; The Effect of Weapon Reliability and Maintainability on Artillery Force Availability and Effectiveness, Robert Chandler, USAMSAA.

Session C: Resource Analysis.

Wayne Allen

An Analysis of Interrelationships Among Various FYDP Expenditures, Dr. Daniel A. Nussbaum, Carl Bates and Jerry Thomas, U.S. Army Concepts Analysis Agency (ACAA); Alternatives for Meeting Mobilization Requirements, Dr. John G. Barmby, U.S. General Accounting Office (GAO); Computer Graphics Funding Analyzer, Daniel J. Shedlowski, George T. Hawkins, ACAA;

ADP Resource Estimating: A MACRO-Level Forecasting Methodology for Software Development, COL Lawrence A. Putnam, U.S. Army Computer Systems Command (ACSC); Officer Dual Specialty Allocation System, MAJ Joseph D. Thomas, ACAA; Economic Aspects of Solar Energy Utilization at U.S. Army Yuma Proving Ground (YPG) for Water Heating, Harry A. Greveris and Willard C. Robinson, YPG;

A Technique to Develop Independent Costs for Equipment Within a Genetic Series, COL Kermit Gates and MAJ Anthony Holtry, ACAA; Evaluating the Impact of Reliability, Availability and Maintainability (RAM) Complexities in Operating and Support Cost Analysis of Army Aircraft Systems, Guntis Sraders and MAJ August L. Keyes, Office of the Comptroller of the Army (OCA);

Design to Cost Optimal Trade-Off Methodology (DOTM), David Fermaglich, ECOM; Life Cycle Cost Procurement Without Complexity, Lyman Sessen, U.S. Army Communications System Agency (ACSA); Weapon System Cost Estimating and Price Indices, Truman W. Howard III, U.S. Army Logistics Management Center (ALMC).

Session D: Micro-Combat Analysis.

MAJ John R. Statz

War Games and Combat Models-Can We Have the Best of Both Worlds?, COL Reed E. Davis Jr., Ronald G. Magee and Dr. Lawrence G. Pfortmiller, U.S. Army Combined Arms Combat Development Activity (CACDA); Some Bounds on Optimal Target Maneuvers, Harry L. Reed Jr., U.S. Army Ballistic Research Laboratories (BRL); Operational Effects on Antitank Guided Missiles, CPT Robert J. Lenz and Michael R. Anderson, CACDA;

STAGS Intervisibility Study, Jack Low Jr. and Susan J. Wright, CACDA; The Application of Graphical Display Techniques to the Analysis of Small Unit Combat, MAJ John R. Statz and Don Patterson, CACDA;

A Simple Vulnerability Analysis of Combat Vehicles, Dr. Ceslovas Masaitis, George C. Francis and Viola Woodward, BRL; The Use of Small Arms in Air Defense, P. J. Short, U.S. Army White Sands Missile Range (WSMR); Survival Distributions in Crossing Fields Containing Clusters of Absorption Points With Possible Detection and Uncertain Activation or Absorption, Prof. Shelemyahu Zacks, Case Western Reserve University.

Session E: Macro-Combat Analysis.

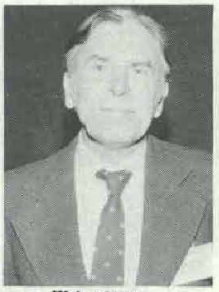
COL R. I. Wiles

Complexity Equals Realism: The Dangerous Myth, CPT Paul J. Bross, Naval Post Graduate School/Field Artillery School; Combined Army Simulation Model (CASM), R. F. Robinson, LTC R. M. Jensen and CPT H. C. Anderson, Office of the Assistant Chief of Staff, HQ USAF; DYNTACS-X: Is It Worth the Price, C. A. Burnham, TRADOC Systems Analysis Activity (TSAA);

Visual Data Representation as an Aid in Analyzing DYNTACS-X Results, Dennis Bechtlofft and Robert Wiley, TSAA; Army Force Design: The Multi-Attribute Problem, COL Allen F. Grum, MAJ David R. E. Hale, and Cadet David W. Hutchison, U.S. Military Academy (USMA); Analysis of Combat Under Reduced Visibility Using AMSWAG Gaming Model, Berthold Zarwyn, HDL, Joseph Hawkins, Herbert Fallin, AMSAA; A Method for Quantification of Morale, Leadership and Training, MAJ David R. E. Hale and MAJ David M. McClellan, USMA;

The Utilization of an Historical Base in the Examination of Military Operations in Built-Up Areas, Ellsworth B. Shank, U.S. Army Human Engineering Laboratory (HEL), Aberdeen Proving Ground, MD; Direct Fire Engagement Assessments in a Manual Land Force War Game, Dr. A. C. Lauriston, Directorate of Land Operational Research (Canada).

Session F: Testing and Evaluation.



Walter Hollis

Prescription for the Crisis: Prepare for Complexity, Weldon A. Findley, WSMR; Computer Simulation Utility in Development Phase Test Planning, E. L. Morrison Jr., U.S. Department of Commerce; Concept for Testing and Evaluating the Patriot System, Garry W. Barnard and Dr. William D. Bunting, WSMR;

Control Elements in Analysis and Testing, F. I. Hill, U.S. Army Operational Test and Evaluation Agency (OTEA); Simulation Aided Field Experimentation, Howard M. Bratt, AMRDL; Interface: Computer Simulation With Field Testing, James W. Brown, USAMSAA;

Field Experiments in Support of the Hellfire COEA, John J. McKinney, CACDA; Designing a Field Experiment Within Constraints, Dr. Marion R. Bryson, U.S. Army Combat Developments Experimentation Command.

Session G: Lethality and Vulnerability.

Alvan J. Hoffman

Combat Vehicle Analysis of 1973 Yom Kippur War, Philip J. Murphy, U.S. Army Tank-Automotive R&D Command (TARADCOM); The Survivability of Antitank Positions to Preparatory Artillery Fire, D. P. Kirk, USAMSAA; Use of Synthetic Materials for Protection Against Fragments, Mark Reches and Robert Bailey, USAMSAA;

The Use of Simple Models to Avoid Complexity in Human Lethality and Vulnerability Studies, Larry Sturdivan, U.S. Army Chemical Systems Laboratory (ACSL); Personnel Vulnerability Modeling, CPT Walter R. Cooper, William J. Bruchey Jr. and William Kokinakis, BRL; A Comparison of Grid Cell Versus Exponential-Decay (Diffuse Target) Effectiveness Models, William J. Nicholson, USAMSAA.

Session H: Intelligence, Communications, Command and Control.

David Prichard

On the Design of a Worldwide Military Command and Control System (WWMCCS) Entry Network, MAJ David W. LeJeune and George C. Monser, U.S. Army Communications Command (ACC); Design and Analysis of the U.S. Army Telecommunications Management Data Base, Lawrence W. Auchard Sr., Ms. Mary E. Minor, ACC.

On the Application of the Case Model to Large-Scale Communications Networks, MAJ David LeJeune, ACC; Target Acquisition Study (TAS), MAJ Allan D. Graham and MAJ Frank Smor, Army Concepts Analysis Activity (ACAA); Command and Control Performance Modeling With Test Validation, Jerry Lyman, Joe Provenzano and Timothy Linn, TRADOC Systems Analysis Activity (TSAA).

Session I: Natural Environment.

Warren Olson

Environmental Characterization for Simulation Studies, J. R. Lundien, U.S. Army Engineer Waterways Experiment Station (WES); Modeling of Terrain in Manual Board Games, Thomas J. Thompson and Trueman R. Tremble Jr., U.S. Army Research Institute.

An Application of Computer Graphics to the Preparation of Inputs to the TRASANA-AMSAA Combat Model (TRACOM), Gilberto Zuniga, TSAA; Recent Advances in Relating Terrain Exposure Characteristics to Predicted Combat Outcomes, Robert L. Farrell, Vector Research, Inc.; Target-Background Luminance Contrast Measurement Methodology: A Diagrametric Interpretation, Gary G. Love, and Dr. Nelson J. Irvine, USACDEC;

Report on TETAM Intervisibility Data Effect of ATM Positions on Intervisibility Parameters, Dr. Ray Marchi, BDM Corp.; A Method for Estimating the Continuous Distribution of Visible Path Segments From Discrete Data and the Effect of Visibility, Dr. H. Fallin, USAMSAA, H. McCoy, TSAA;

Parameterization of Terrain in Army Combat Analysis, Dr. Samuel H. Parry, MAJ Christopher J. Needels, Naval Post Graduate School (NPGS); An Approach to Terrain Representation (Synthetic Terrain) for Application to Combat Simulation Models, Dr. Helmut M. Sassenfeld, TSAA;

A Quantification of Mobility and Agility, Dr. Samuel H. Parry, CPT M. Selvitelle and W. D. Hahn, NPGS; The Effect of Vegetative Environments on the Lethality of Fragmentation Munitions: A Summary of the Degradation Effects Program (DEP), George M. Gaydos, U.S. Army Picatinny Arsenal.

(Continued on page 15)

Annual Listing of Highlight Articles in Army R&D Newsmagazine

The following headline list of articles published in the *Army Research and Development Newsmagazine* during the past year is believed to represent subjects of broadest interest.

NOVEMBER-DECEMBER 1975 - 15th Anniversary Edition

Army-Industry Missiles Meet Opens Drive for Materiel Manufacturing Cost Savings.

Deputy Secretary of Defense Speaks on Manufacturing Technology Gains: Teamwork Viewed Vital to Materiel Goals.

Army Research Office Building Dedicated as Weiss Memorial.

Night Vision Laboratory Awards Contract for Development Test/Operational Test II Sights.

Army Expanding Blast Suppressive Shielding Technology

AN/TPQ-36, AN/TPQ-37 Tests Termed 'Spectacular.'

Harry Diamond Labs Seek to Upgrade Rocket Lethality.

Analysis of Rocket-Assist Infantry Antitank Weapons.

Natick FY75 Posture Report Lists R&D Achievements.

Air Mobility R&D Laboratory Issues FY75 Annual Report.

14th Annual AORS: Leaders Stress Role of Operations Research, Systems Analysis in Decisions.

Data for Critical Decisions: Operations Research and the Next War.

Materiel Command Creates International Logistics Command.

LTG George Sammet Jr. Details Materiel Cost-Cutting Goals.

ECOM-Developed EQUATE Electronic Test System Proves Tri-Service Capabilities.

Ammunition Systems for Future Tanks.

Natick Development Center Hosts International Food Meet.

Directive Assigns Army as Conventional Ammunition Manager.

Army 5-Year Program: $14 Million for Antipollution.

Walter Reed Army Institute of Research Selected as 'Laboratory of the Year.'

AUSA Annual Meeting Focuses on Changing Staus of Army.

Nuclear Effects Knowledge Advances in Project ESSEX.

JANUARY-FEBRUARY 1976

U.S. Army Engineer Topographic Laboratories Serve Defense, Civil Works Needs.

Speaking On: Budget: Materiel Acquisition Cost Reduction.

Organizational Changes Continue as Materiel Development and Readiness Command Succeeds AMC.

Department of Defense Budget Report Goes to Congress.

Braille Calculator Invention Earns Human Engineering Lab Engineer 'Outstanding Young Men' Selection.

96 Papers Selected From Over 400 Proposals for Presentation at Biennial Army Science Conference.

Army Air Mobility R&D Laboratory Studying Composites.

Army Research Institute Reports Achievements of Women.

Army Scientific Advisory Panel Reviews Aviation R&D.

Working Conditions of Soviet Scientists.

National Science Foundation RANN Parley Gives Small Businessmen View of 15 Agencies.

Army Issues Procedures to Stimulate Product Improvement.

Single Contractor Selection Set for Full-Scale Engineering of XM-1 Main Battle Tank Prototypes.

Edgewood Arsenal Reports on Productivity of Scientific and Engineering Assistants.

DARCOM Establishes Materiel Acquisition and Readiness Executive Development Program.

MARCH-APRIL 1976

CRREL Past, Present and Future: Mission Related to Far North Strategic Defense, Many Civil Programs.

Secretary of the Army Speaks on Army Readiness Posture: Requirements to Meet Foreseeable Threat.

Development and Readiness Command Office of Manufacturing Technology Created to Cut Costs.

CH-47 Flight Simulator Tests Impress Dignitaries.

Utility Tactical Transport Aircraft System Competitors Begin 9 Months of Testing Prototype Models.

ACCORD: A New Dimension in Information Systems.

Test and Evaluation Command Realignments Keyed to Progressive Return on Investment.

Simulating Vehicle Operations at Aberdeen Proving Ground.

Biological Studies of Electromagnetic Pulse.

Automation in Ballistic Munition Testing.

Tank-Automotive Command's Land Mobility Technology Base Development Program.

Army Announces Selectees for 4 Top Senior Service Colleges.

Research Philosophy of Ballistic Research Laboratories.

MICOM Dedicates $40 Million Advanced Simulation Center.

Army Science Conference Principal Speakers, Panel Members.

Bicentennial Science Exposition Scheduled for John F. Kennedy Space Center.

Army Type Classifies M732 Proximity Fuze for Artillery.

MAY-JUNE 1976

Army Materials and Mechanics Research Center's Lead Laboratory Role.

Speaking On . . . Defense Advanced Research Projects Agency Mission: Investment Strategy, Advanced R&D Programs.

White Sands Missile Range Group Views Solar Energy.

Guide for Military Standardization: ABCA Armies' Operational Concept, 1986-95.

Air Mobility R&D Laboratory Sets Cost-Cutting Example.

Surface Launched Unit Fuel Air Explosive Minefield Neutralization System Tested.

Effects of ACV: Army Studies Ecological Impact.

Analytical Photogrammetric Positioning System Enhances Aerial Photography Mapping.

Ballistic Research Laboratories Provide Analysis Model for Amy Suppressive Shielding Program;

Soviet Fiber-Reinforced Metal Matrix Composite Technology.

Stimulating Speakers Address 14th National JSHS.

Defense Advanced Research Projects Agency Report to Senate Unit List FY76 Achievements.

Atlanta III Conference Continues Army-Industry Effort.

BRL Pulse Radiation Facility Transferred to TECOM.

Cold Regions Research and Engineering Laboratory Constructing $5 Million Ice Engineering Lab.

Air Navigation Systems Undergo Developmental Tests.

Solar Photovoltaic Military Applications Studied.

Aberdeen Proving Ground Conducting Improved UET Test.

Representatives of 6 Nations View LANDFAE Capabilities for LandMinc Neutralization.

JULY-AUGUST 1976

Army Armament Command Mission: Providing Superior Firepower for All Combat Conditions.

Speaking On . . . The Export of Technology: A 'Handle With Care' Commodity.

10th Army Science Conference: 52 Researchers Earn Awards, Panel Views Technology Transfer.

Annual R&D Achievement Awards Recognize 78 Army In-House Scientists Engineers.

Geographic Applications of Multiband Aerial Photography.

In-House Peer Review: An Effective Mechanism for Scientific Research Management.

Interactive Graphics Techniques for Structural Analysis.

Near Real-Time Generation of 3-D Terrain Displays.

27th Power Sources Symposium Draws More Than 600 Participants for Reports on Electrochemical Developments.

Waterways Experiment Station Researchers Study Explosives Technology to Protect Hilo From Threat of Volcano.

Development and Readiness Command Creates Office of Project Manager for Smoke.

54 Project Manager Development Program Majors Selected for Promotion.

Fort Bragg Testing 160-Foot-Long Medium Girder Bridge.

Ballistic Nylon Adds Protection for Tube-Launched Optically Tracked Wire-Guided Missile Operators.

13 DARCOM Employes Complete Computer-Aided Design and Engineering Course.

Morris Succeeds Gribble as Chief, Army Corps of Engineers.

94 Selected for DARCOM Materiel Acquisition and Readiness Executive Development Program.

Army Engineer Waterways Experiment Station Convenes Ground Sensor Technology Meeting.

Spring Technical Conference Participants Review BRL Response to U.S. Army Requirements.

Picatinny Fuzing Concept May Increase Projectile Firing Rate.

Army Deactivates 'Super Dog' Cross-Breeding Program.

$28 Million Contract Orders AN/TPQ Limited Production.

Department of Defense Safety Board Approves 5 Ammunition Plant Suppressive Shields.

Yuma Proving Ground Unveils "Recoil Device for Tube tests.

SEPTEMBER-OCTOBER 1976

U.S. Army Tank-Automotive Command Realignment Separates Research and Development From Logistics Functions.

Speaking On: 1976 Army Science Conference Panel Discusses Technology Transfer.

U.S. Army Research Office Sponsors Bicentennial of American Science Program.

Army Delays Activation of Armament R&D Command.

Ballistic Research Labs Simulate Nuclear Burst Thermal Layer.

Soviet Advances in Ionospheric and Magnetospheric R&D.

Laboratory Cross Section Measurement and Imaging Radar.

Army Materials and Mechanics Research Center Expands Fracture Mechanics Technology Applications.

Deputy Secretary of Defense Selects Army as Single Manager for Conventional Ammunition.

DCSRDA, Development and Readiness Command Leaders Address Reserve R&D Update.

Cold Regions Research and Engineering Laboratory Lays Cornerstone for $5 Million Ice Engineering Facility.

$425 Million Contract Orders Patriot Missile Engineering.

Cannon Artillery Weapons Systems Project Manager's Office.

White Phosphorus Loading Method May Ease Munitions Handling.

Environmental Protection Agency, Corps of Engineers Sign Interagency Wastewater Agreement.

Combat Developments Experimentation Command Examines Options of Improved Foxhole Protection.

Corps of Engineers' Civil Works Budgeted at $2.47 Billion.

Coast Guard Adopts Army's Explosive Ordnance Disposal Protective Clothing.

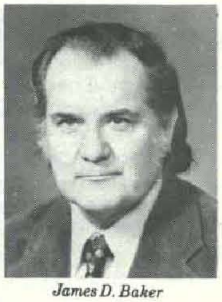
2 LACV 30s Undergo Operational/Development Testing.

Mobility Equipment Research and Development Command Works to Improve M60A1 Tank Concealment.

AORS XV Working Group Sessions

(Continued from page 14)

Session J: Training Analysis.



James D. Baker

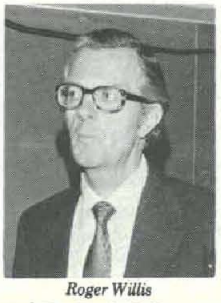
Training Delivery Systems, MAJ Richard Ladd, MAJ Jared East and CPT Michael Clayton, TRADOC Combined Arms Testing Activities (TCATA); Cost Training Effectiveness Analysis for Army Training System: The Process, Dr. Gilbert L. Neal, TSAA;

Application of Cost Training Effectiveness Analysis Study Procedures, Dr. Lindsay Phillips and Dr. G. Neal, TSAA; Training Technology Transfer, Dr. Joyce Shields, ARI; Constrained Readiness Optimization, LTC James P. McCloy, U.S. Army Command and General Staff College (C&GSC);

Some Demographic Variables Which Should be Considered in Field Tests of Training Systems, Dr. Thomas J. Tierney, Dr. John A. Cartner and CPT Michael Clayton, ARI; Analysis of Tank Crew Training, Virgil A. Henson, TCATA; Embedded Training Utilization of Tactical Computers to Train Tactical Computer Operators, Dr. John E. Germas, ARI;

Developing a Set of Learning Objectives for UTTAS Pilot: A Study in Instructional Systems Development, Gary G. Bunting, U.S. Army Aviation Center and Fort Rucker, AL; The Development of a Map Interpretation and Terrain Analysis Course to Support Nap-of-the-Earth Navigation, Dr. Garvin L. Holman, ARI Field Unit, Fort Rucker.

Session K: New OR/SA Techniques.



Roger Willis

An Application of Multivariate Statistical Techniques to the Analysis of the Operational Effectiveness of a Military Force, CPT James T. Baird and Dr. Russell G. Heikes, U.S. Army Infantry Command, Fort Benning, GA; Description of a Shortest-Path Algorithm for a Sparse Assignment Matrix, Robert L. McMullen, ARI Field Unit, Fort Benning.

New Optimal Design and Analysis Techniques Using Variational Principles of Nonequilibrium Thermodynamics, Dr. Berthold Zarwyn, Harry Diamond Laboratories (HDL); Study of Weapon Worth Concepts for Determining the Value of Diverse Weapon Systems in Combined Arms Battles, Herbert N. Cohen, ACAA;

A Decomposed Goal Programing Model of Weapon Systems Affordability, David V. Strimling, U.S. Army Armor Center and Fort Knox, KY; Applications of the Fundamental Theorum of Multidimensional Contingency Table Analysis to Operational Test Data, Langhorne P. Withers, OTEA; Differential Models of Combat and Alternative Measures of Effectiveness, Roger F. Willis, TSAA.

Session L: OR/SA Applications.

Keith Myers

Integrated Data Base Concepts and Structures for Combat Models, William A. Bayse, Charles S. Matheny and CPT Dean P. Risseeuw, ACAA; A Systems Approach for TOMSS Study, MAJ Rizwan M. Nomani, Academy of Health Sciences; Validation of an Air Defense Gun Simulation Model, Bradley Lufkin, USAMSAA; A Methodology for the Assessment of the Military Worth of Camouflage in an Indirect Fire Environment, Gary L. Page, BDM Corp; The Complexity Crisis and Applications Software, Clinton B. Petry II, ACSC.

Seventh Annual U.S. Army Project Managers Conference . . .

Speakers Stress Key Roles of PMs in National Defense Materiel Development

Essentiality of superlatively competent and totally dedicated performance in one of the most challenging assignments to aid in structuring an adequate national defense readiness for any emergency was stressed at the U.S. Army Project Managers' Conference.

Secretary of the Army Martin R. Hoffmann and former Under Secretary of the Army Herman R. Staudt were the principal speakers in emphasizing importance of responsibilities of U.S. Army Materiel Development and Readiness Command (DARCOM) PMs - *charged with projects budgeted in FY 1976 at $3.3 billion.*

One of the conference highlights was Hoffmann's presentation, as dinner speaker, of the Secretary of Army's first annual Project Manager Award to MG Robert J. Baer. The Certificate of Commendation engraved on the large wall plaque reads:

MAJOR GENERAL ROBERT J. BAER *is cited for outstanding performance as project manager of the XM1 tank development program during the critical period July 1975 through June 1976. Through his initiative, technical competence, excellent judgment, astute managerial ability, thoroughness and professionalism, the XM1 project completed the advanced development phase within cost and schedule constraints, an achievement of great distinction. General Baer's performance reflects great credit upon himself, the XM1 project, and the United States Army.*

DARCOM Deputy Commander for Materiel Development LTG George Sammet Jr., DARCOM DC for Materiel Readiness LTG Eugene J. D'Ambrosio and Director for Materiel Plans and Programs MG Ernest D. Peixotto, Office of the Deputy Chief of Staff for Research, Development, and Acquisition, DA, joined with MG Jerry B. Lauer, the dinner speaker, in paying tribute to and discussing competence and dedication to duty requirements of material development PMs. COL Lauris M. Eek Jr., chief, Office of Project Management, DARCOM, was presiding chairman for all sessions and cohost of the conference, with COL Leland Wilson, PM for TRADE, in Orlando, FL.

SECRETARY HOFFMANN indicated his pride in the highly professional qualifications of DARCOM PMs when he stated early in his address: " . . .The project managers that we have in the Army I consider competent for similarly demanding duties anywhere in the Department of Defense or in industry . . . ."

PM CONFEREES and wifes during social hour activities include (from left) Viper PM Col Hubert W. Lacquement and Mrs. Lacquement; GSRS PM COL Kenneth S. Heitzke and Mrs. Heitzke; M60TD PM COL Robert E. Butler and Mrs. Butler; COL James F. Bleeker, DARCOM Directorate of Development and Engineering; REMBASS PM, COL L.C. & Mrs. Friedersdorff.

One of the requirements of a competent project manager, Secretary Hoffmann stated, is to "exercise exceptional initiative and enterprise, including decisiveness in taking carefully calculated risks to perform his function within time and cost constraints." He also stated, in part:

LTG George Sammet Jr.
DARCOM Deputy Commander Materiel Development

". . .One of the things we are all interested in doing is to increase the degree of speculation (risk taking) that we can afford in the materiel development and acquisition process . . . Without using competent judgment in decision risks to meet requirements, we would not be able to maintain our technological edge against an adversary who is outspending us and has the time-saving advantage of centralized control of materiel development . . ."

Secretary Hoffmann devoted much of his address to the difficulties a project manager often experiences in distinguishing between the responsibilities his mission involves as an "ombudsman at times and as an advocate in some situations." Despite the need for serving as an advocate in the competition for necessary resources, both human and material, he cautioned that PMs should be careful to avoid the pitfalls of advocacy.

Amplifying on the advocacy problem for PMs, he explained that too much advocacy may tend to decrease flexibility in adjusting to essential innovations in the materiel development process. Flexibility is necessary if we are to shorten the time it takes to develop weapon systems, he said.

With respect to Army relations with Congress in materiel development budgetary considerations, Secretary Hoffmann said PM advocacy must relate properly to integrity of the developmental process . . .(and) for the right solution to project problems.

"I am not sure that we have arrived at the point where the project manager has the degree of freedom in risk-taking that he ought to have.

"We should address ourselves very seriously to the question of how we can take more risk, how we live with it, how we accommodate it, and leverage we get from it to save time."

HERMAN R. STAUDT's address is carried in condensed form, beginning on the inside front cover, under the heading: SPEAKING ON . . .The Challenge to U.S. Army Program/Project Managers (with his biographical information).

DARCOM Deputy Commander for Materiel

INFORMAL social gatherings were prevalent at PM conference. Pictured above (l. to r.) are COL Henry R. Shelton, PM Smoke; Dr. Richard L. Haley, deputy director, Development and Engineering, DARCOM; Walter W. Hollis, scientific adviser, U.S. Army Operational Test and Evaluation Agency; COL Edward M. Browne, PM for AAH; Sally Clements, acting deputy for Materiel Acquisition, OASA (I&L); COL Robert W. Huntzinger, PM for TOW missile system.

Development LTG George Sammet Jr. presented welcoming remarks following COL Eek's introductory comments as presiding chairman. LTG Sammet commended DARCOM's 56 project managers as a "selectively elite corps of highly qualified professionals," stating that they have "come a long way during the past two years in improving management policies" in the materiel development and acquisition process.

Program managers of general rank are now selected by the Army Chief of Staff, he pointed out, to assure the desired standards of qualification. A Department of the Army Board selects PMs in the grade of colonel. LTG Sammet also discussed the intensive training program that has been established for early development of potential PMs and continual upgrading the qualifications of PM selectees, including year-long industrial assignments for experience.

COL Robert W. Huntzinger was singled out by LTG Sammet as an outstanding example to continuous career development in PM offices, a total of 9½ years experience as PM for a major system. Currently he is PM for the TOW (*Tube-launched, Optically-tracked, Wire-guided*) missile system.

One of the reasons for selecting Orlando, FL, as the site for the Seventh Annual Project Manager's Meeting, Sammet explained, was to visit the U.S. Naval Equipment Training Center. The NETC is now in its 27th year of operation in developing sophisticated training systems, including an advanced Synthetic Flight Training System (SFTS) credited with huge economies in training pilots.

Another device that project managers had an opportunity to try out during a series of briefings on capabilities of NETC is a laser marksmanship rifle trainer which fires a laser beam recorded on a target to indicate accuracy of fire, again at a big saving in cost. Numerous other training devices were viewed by PMs.

LTG Sammet concluded his initial presentation (he spoke on a number of topics related to improvement of project management at subsequent sessions) by conveying a message from DARCOM Commander GEN John R. Deane Jr.

PMs are regarded by GEN Deane, Sammet said, as the vital interface between the Army and industry to produce the best possible materiel for all military requirements at the lowest practicable cost. He puts continuing emphasis on update reports on the progress of PMs' efforts; also, on achieving maximum combat effectiveness of materiel designed for continual readiness through consideration of reliability, availability and maintainability requirements.

An hour-long presentation on the Army Organizational Effectiveness Program was given by LTC Carl E. Tolbert, a chaplain assigned to the Organizational Effectiveness Division, Combat Development Directorate, U.S. Army Administrative Center, Fort Benjamin Harrison, IN.

Much of the address reported on various studies, including several in progress, to determine maximum effectiveness factors based on a continuing series of surveys; also, motivation and morale considerations.

Gordon N. Kellett, chief of the Civilian Personnel Division, HQ DARCOM, closed the opening session with a discussion of Personnel Issues, Trends and Policies, a topic that prompted a lively questions and answers aftermath.

Project managers had numerous queries regarding effects on their operations - particularly in maintaining progress schedules - resulting from reductions in force, reductions in grade, and changes in functions that require rewriting of job descriptions. Much of the discussion pertained to regulatory restriction that may hamper top quality personnel recruitment.

DARCOM Deputy Commander for Materiel Readiness LTG Eugene D'Ambrosio offered comments from the floor, along with DARCOM Deputy Director for Development and Engineering Dr. Richard L. Haley, on how industry copes with similar personnel problems incident to major reorganizational changes - or transition problems related to phasing out one project and starting another.

LTG D'Ambrosio later addressed an executive session on materiel readiness problems.

Other opening day speakers. MG Ernest D. Peixotto discussed TRACE (Total Risk Assessing Cost Estimate) Management and Dispersement, a topic of major concern to PMs continually trying to cope with avoiding cost overruns on their projects despite changes in inflation of cost factors.

TRACE, he explained, can be used effectively only on a project for which it is properly programed. The objective is better program and problem visibility, improved credibility of cost estimates, and a sound basis for affordability decisions on materiel systems. Project managers, he stressed, must redouble their efforts to guarantee that systems development progresses within TRACE constraints.

Seymour J. Lorber, head of the DARCOM Directorate for Quality Assurance, joined with COL Edward M. Browne, PM for the Advanced Attack Helicopter, in a presentation titled Metrication - Trends, Policies and Considerations for Implementation. This topic involved problems of PMs in the changeover now in progress to the metric system of weights and measures used in most countries.

COL James F. Bleecker, chief of the Systems Evaluation and Test Office, Directorate of Development and Engineering, HQ DARCOM, discussed the impact of conversion to the metric system as related to testing of materiel.

COL John F. Wassenberg, HQ DARCOM, spoke on Department of Defense Directive 5000.29, Management of Computer Resources in Major Defense Systems. His presentation dealt with problems of implementation of the directive throughout U.S. Army Materiel Development and Readiness Command elements.

James F. Maclin, DARCOM assistant deputy for Materiel Readiness, presented The Materiel Readiness Role of the Project Manager. This presentation covered many of the progressive actions and major policy and procedural changes being implemented to achieve constant readiness of materiel.

Dinner Speaker MG Jerry B. Lauer, director of Weapons Systems, Office of the Deputy Chief of Staff for Research, Development, and Acquisition, spoke amusingly of some of his early "trials and tribulations" as a PM. Spiced with anecdotes, the talk reviewed some of his experiences including his first briefing to and interrogation by a subcommittee of the Senate Armed Forces Committee, schedule slippages, "flak" reports, over-run and termination costs and many other problems.

"Finally, as you are about to leave your assignment," he said, "you feel very gratified by what you have been able to accomplish. The PM business is one of the toughest assignments a military man can get, but it is also one of the most challenging and, eventually, gratifying to your pride."

Four Working Group sessions opened the second day of the conference. Grady H. Banister Jr., ARTADS deputy PM, chaired a group discussion of Testing, a Lessons Learned Approach. COL Charles F. Drenz, PM for COBRA, led a group discussion of Materiel Fielding Plans, Theory and Practices. COL Wassenberg headed a group that considered Computer Resource Management and W. Allan Chavet, deputy chief, DARCOM Cost Analysis Division, was the leader of a group discussion of Life Cycle Cost Estimating, Theory and Practice.

Congressional Interface with Project Managers, as discussed by Anthony R. Battista, professional staff member of the House Armed Services Committee, provided one of the conference highlights. Following his presentation, he engaged in a free-wheeling questions and answers session that churned up a considerable amount of laughter despite some penetrating questions and straightforward response.

How to Avoid Contract Protest, a presentation by DARCOM General Counsel Francis X. McKenna, also was followed by spirited discussion. Charles T. Patterson, deputy executive director, Procurement and Production, Defense Supply Agency, followed with a talk on DCAS-Support of PMs, Capabilities and Limitations.

The final second-day presentation was on Innovative Program Contracting Techniques, by COL Leland A. Wilson who was host the next morning for briefings and the tour of the U.S. Naval Equipment Training Center.

LTG Sammet concluded the conference with an hour-long executive session with Development and Readiness Project Managers. He stated strongly his confidence in their competence, his understanding of their problems, his desire to be kept advised of requirements for aid in shortening development time, the demanding urgency for successful completion of their assignments, and his pride in their accomplishments.

Promotion List Accents Caliber Of DARCOM Project Managers

Just as this issue was going to press, the Department of the Army released names of officers selected for promotion to General Officer grades. DARCOM project managers selected for promotion to Brigadier General are:

COL Patrick H. Roddy, PM Hawk, COL Edward M. Browne, PM AAH, and COL Donald R. Lasher, PM MSCS. Also selected for promotion are COL Philip L. Bolte, assistant PM for Tank Gun Development, XM-1 Tank System. BG William J. Hilsman, PM ARTADS, is selected for promotion to 2-star rank.

Noteworthy also is the fact that six brigadier generals selected for promotion to major general are graduates of the DARCOM PM system, namely: BG Sampson H. Bass, Jr., former PM for CDIR; BG Robert L. Bergquist, former PM for Gama Goat; BG Donald M. Babers, former PM for M-60 tank production; BG Alan A. Nord, former PM for Safeguard ABM System; BG Tom H. Brain, former PM for VRFWS; and BG Jere W. Sharp, former PM for GOER vehicles.

(Turn to top of page 1 for glossary of acronyms used to designate the materiel development projects here listed.)

Speaking On . . . *(Continued from inside front cover)*

with because it's so difficult and/or unpleasant to get the problem corrected?

• Or do you have a budding young or older competent executive whom you have hobbled into impotence via the absence of a meaningful charter, thereby reducing him to little more than a glorified horseholder? How does he spend his time, versus how he should? Why?

In a similar manner, examine and appraise objectively what type of engineering support you have, or your procurement support, or your logistics support, or your program management team, etc., etc.

Have you, within the last 6 to 12 months, taken the time to prepare formal summaries of strengths and weaknesses of each of the key members of your team, using some of their peers for inputs?

Have you received the summaries with each principal personally, and constructively, using a mutually agreed upon scope of authority and responsibility as the yardstick for subjective measurement?

What kind of interface and relationship do you have with the industrial counterparts on your team? Is it polite, remote but proper relationship or a deep, broad and close human as well as professional relationship conducted with full, mutual and open communication - with respect for the fact that you both labor toward a common objective, but for two different masters?

There is little doubt in my mind that each of the good-sized companies working with you has better and poorer people available for assignment to your program. Are you cultivating, growing, maturing all of you colleagues properly, by recognizing their strengths and weaknesses on a continuing, fair and unemotional basis?

Do you praise in writing as well as criticize? Do you seek constructive criticism and feedback from colleagues about your operation? Are you among colleagues as a partner or the fickle tyrant among the oppressed?

What part-time but highly skilled resources have you developed and arranged to be brought in as a check and balance at key mileposts on your program. Do you have periodic and in-depth reviews of the design, quality, production disciplines, reliability, maintainability and financial aspects of your evolving product by others than those responsible for its evolution?

You owe it to yourself to audit periodically your operation, evaluate your resources and plan the strategy needed to strengthen areas which are deficient.

If after careful consideration you conclude you don't have the right team, you must take corrective action. No one else will. Do not suffer a poor team. But do remember that most teams are made up of 5 foot 10-inch type "sinners," and that 8-foot "saints" are few and far between here on earth, and even harder to come by. You could be amazed by what a good coach can get out of a truly integrated team of "average" players.

In-House vs. Contract Capabilities. Achieving the most effective blend of these capabilities is an age-old problem that has and will continue to beset some of you and your programs. If the Army is to have competent in-house technically oriented personnel, they must get their hands dirty in the hardware design effort of their technical disciplines, now and then, to avoid becoming sterile.

In-house money alone is usually inadequate or fails to provide a useful vehicle to meet these needs. In-house developments will, on occasion, reach out for program support for mainstream effort.

Should this occur during your assignment, I would urge that you be sympathetic and supportive with certain cautions which, if ignored, can create great dangers for your career and your program.

The commodity commands, with headquarters approval, really need to carefully choose those in-house program elements wherein internal developments will be utilized, either as the primary or back-up approach to a correlated industry approach early in the game.

Should your program be the maturing ground for any prior in-house development effort, you will have to go to great lengths to separate the internal group responsible for the developmental efforts - those who must be considered as proponents of their "baby" engaged in the normal "tender loving care" typically associated with giving birth to a new product subsystem or hardware design - from your internal program management technical support group, which must serve the program and your best interests first and foremost.

Separating weakness in these groups clearly, and providing arm's length checks and balances, is a clear invitation to the fox to enter the chicken coop. The record is full of programs that have run afoul of the difficulties, technical "hangnails," delays and even total failures that can result.

Major programs frequently become the vehicle for procuring expensive baubles for the laboratories to play technical "catch up ball" with the rest of the field. This practice I have seen grow expensive and frustrating to both the military program management team and the industrial team involved, with very marginal, if in fact reasonable, return on the investment from a program point of view.

Consequently, I would suggest that this type of objective could be far better achieved by working out with the industrial team involved an open and honest on-the-job training or educational program in which government engineers are integrated at operating levels of the contractor's team.

This integration would be under the contractor's middle management supervision - rather than trying to accomplish the same objective while government engineers are serving ostensibly as the contractor's technical supervisors and customers. This leads to masterful buffoonery on both sides.

As a general rule, I would suggest that you start out on your assignment, assuming that the members of both your in-house and the industry team are basically honest, competent and hard working, and share your objectives (assuming you have spelled them out carefully with all, clearly and convincingly).

A contractor who does not have adequate time, talent or treasure to do a given assignment is no more or no less vulnerable than an internal laboratory whose gun control, guidance system, or fuzing and arming scheme is not performing to the long-standing advertised claims. Both require the same determined, objective analysis of the real problem and application of meaningful corrective action.

Simply put, trust all or trust none until you have data to modify your position, individual by individual. But play no favorites!

Remember that your primary purpose is to produce and successfully field a useful weapon system necessary to the defense of this country - and/or in support of its foreign policy where, when, or as needed. It is *not* to:

- Provide a source of continuing employment for in-house or contractor personnel.
- Strengthen the economic well-being of certain sections.
- Help keep a strong small business base viable in the U.S.
- Keep a major aerospace contractor from going under.
- Generate increased respectability for your program by raising the investment level in your program from the $50 to $100 million "minor leagues" to the billion dollar "major leagues" status.

The Army and the nation anxiously await the emergence of more and more program and project management teams which produce merely that which was agreed to, approximately on time for the resources projected, with relatively dependable products that perform as expected in the hands of representative troops for a reasonable period of time, without undue downtime or maintenance cost - a relatively rare occurance today.

User-Developer Relationship. Within the Army this is one of our most difficult and most vulnerable challenges and relationships to define, understand and satisfactorily implement. Many fine minds have directed major efforts to strengthen, improve, integrate, separate, refine and correct this relationship - and I'm certain many more efforts will come in the future.

While your principal concern is the development of your weapon system, you simply cannot produce an effective product without a deep concern for and a continuing effort to understand the needs, viewpoints and attitudes of the ever-changing user.

Just as the state-of-the-art is constantly evolving in the disciplines,thinking and approaches to the solution of sensing, guidance, propulsion, communication and mobility types of technical problems, so the state-of-the-art is also constantly evolving on what should be the tactical doctrine, operational and maintenance philosophies to be followed.

Flexibility within reason is always a most desirable continuing trait to have in the man-machine operational relationship. But just as you must be tightly plugged into the technical world of the engineer, and aware of what is evolving in design state-of-the-art during materiel development, so you must stay tightly plugged into the thinking of the tactical user in that same time period.

A design cut-off point must naturally occur if production hardware is ever to emerge, but the closer developer-user thinking is at

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the moment of cut-off, the higher is the probability of success.

Thinking that either you (as a former user perhaps) or the commodity command personnel (who have been involved in a given area for many years) can serve as substitute for an ever-current user exchange and input is naive and can often lead to disaster.

Openly inviting and encouraging realistic user participation from the beginning, as a full-fledged partner, will bear early and continuing dividends throughout any program.

It is recognized that often there appear to be as many "official user viewpoints" as there are tactical officers to be interviewed. Nevertheless, striving to develop, consolidate and relate frequently to "the user view" during the development cycle will pay off.

I would also parenthetically suggest that "as ye sow" during the development phase, "so shall ye reap" during the user test evaluation, and the subsequent production decision-support phases.

I have always been somewhat disappointed at the relative isolation and insularity that exists between the various military/industrial program management teams and their respective efforts. Consequently one finds some programs continuing to experience avoidable problems for which expensive solutions were previously developed.

I believe that there is too little management transfusion of experiences encountered and handed down from one generation of program management to the next, both the Army and in industry. Hence, we relive, over and over again, that which has been foretold - that those who will not examine, ponder and try to understand history are doomed to repeat it.

In our case it may be at tremendous and wasteful costs that we can ill afford. The need for corrective action in this area is self apparent but goes neglected due to being "too busy."

Finally, I come to one of the greatest and as yet unsolved mysteries of program management - namely the art or science of bringing your program to an end.

Far too often programs have been spawned to meet a given set of objectives. After respectable time periods have passed, and significant investments accomplished, it appears, for one reason or another, that many programs evolve into at least a second or third developmental and/or production evolutionary phase. On occasion these may become necessary because of a change in the threat, or a breakout in the state-of-the-art, or a revision of tactical doctrine.

Too often, I would suggest, the perceived need for a "second generation" materiel development can best be described, in retrospect, as the second attempt to do the original job correctly - albeit some improvement in capabilities typically can and is demonstrated. It is often these evolutions that contribute so mightily to overruns in time or funds and lead to onerous control, checks and balances by higher commands, "fly before buy" type policies, etc.

I would close by leaving you with this thought. If you succeed in obtaining significantly more resources for your program than those originally contracted for when the program began, it is little more than a hollow, pyrrhic victory for the Army. It is more than likely, as a result, that one or more other Army program management efforts will be terminated or die aborning, and the Army denied the fruits of those efforts to accommodate your excesses.

The charm and challenge of successful program management is:

• To develop, understand and articulate properly a challenge to be undertaken. • Marshall the *minimum* resources needed to implement properly the program thus developed. • Continuously audit and monitor progress. • When problems appear, to develop alternatives available. • Provide corrective action on a timely basis until the capability sought is in being in the Army in the field.

To labor in this vineyard at all is in my view an opportunity offered to few. To manage such an effort successfully is as rare and as rewarding to a program manager as the taste of a rare vintage wine is to the palate of the connoisseur.

Sheridan Product Improvement . . .

Places Strong Emphasis on RAM Criteria

By Robert Kaczmarek and MAJ David Baron

Management improvement goals consonant with the U.S. Army Materiel Development and Readiness Command "new way of doing business" under reorganization objectives have placed strong emphasis on materiel reliability, availability and maintainability (RAM).

One of the modernization programs of considerable magnitude currently being pursued is the RAM Product Improvement Program for the M551 General Sheridan vehicle, first issued to the field in 1967. The last of 1,662 vehicles produced was fielded in 1970. After nearly a decade of field use, numerous improvements have been suggested.

One of the first improvements made to the Sheridan vehicle was to outfit it with a Laser Rangefinder. This new configuration in 1975 resulted in a nomenclature change, making it the M551A1.

The consolidated Product Improvement Program (PIP) for the Sheridan vehicle was developed in 1975 in conjunction with HQ DARCOM and users in the field. Between February and July 1976, the Cooling PIP was tested at Yuma (AZ) Proving Ground. The purpose was to separate engine cooling from transmission cooling.

When the concept for the Sheridan vehicle was first approved, program management was assigned to the U.S. Army Tank-Automotive Command (USATACOM). The U.S. Army Materiel Command (now DARCOM) was designated project manager when it was activated in August 1962. Deprojectized in 1971 and placed under the Army Weapon Command (now USARRADCOM), the program returned to TACOM for management in 1972.

Since July 1, 1976, TARADCOM (Tank-Automotive Research and Development Command), Warren, MI, has established the System Project Office M551 PIP for consolidation of program management. MAJ David Baron heads this office, charged with following the project through field application of automotive and turret-related improvements.

The Product Improvement Program is directed at making the Sheridan a sturdier system and RAM improvement to increase user confidence is the primary goal within realistic constraints of time and money.

Current PIPs included in the consolidated PIP program will be tested in Phases I and II at Aberdeen (MD) Proving Ground, Phase III tests will be performed at HQ Army Missile Command (MICOM), Redstone, AL.

During Phase I testing scheduled for completion in November 1976, 31 sub-PIPs will be tested. Nineteen - items are automotive-related (TARADCOM) improvements and 12 are turret (ARMCOM) efforts.

The Phase II program at APG will test 15 additional sub-PIPs, plus whatever items are selected during the Test Integrated Work Group (TIWG) to remain on vehicles for test from Phase I. Eight items are automotive related sub-pips and seven are turret (ARMCOM) improvements.

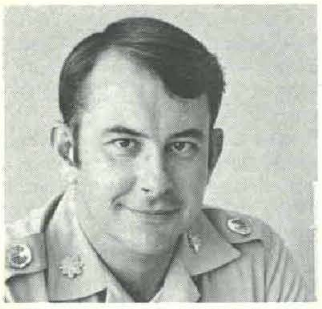
Phase III testing at MICOM will test and evaluate the Missile and Guidance Control System for the Sheridan vehicle. The Missile Guidance and Control system application is the highest priority item and one from which we expect the single biggest payoff in improved reliability.

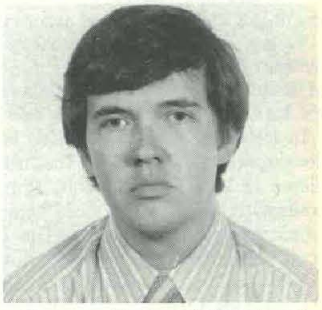
Current plans require that application of all PIPs be made by depot teams in the field or by introducing improved parts in the system though supply attrition. Using units are not expected to modify the vehicle.

As we overview the total M551 PIP, what return can we anticipate upon completion? Above all, the program will upgrade approximately 1,550 M551 Sheridan vehicles with highly desired improvements.

The M551 was procured originally at about a $313,000 unit cost. It is roughly estimated that acquisition of upgraded new vehicles in today's highly inflated market could almost double this figure. Total PIP cost, including research, development, test and evaluation, along with procurement and use of modification kits, is estimated at $81,300, a vehicle.

The end product is expected to be a vehicle exemplary of RAM (Reliability, Availability and Maintainability) objectives of the U.S. Army Materiel Development and Readiness Command (DARCOM).





MAJ DAVID BARON is chief of the Systems Project Office for the M551 Product Improvement Program. He has a BS degree in industrial engineering from Western Michigan University and an MA degree in psychology from the University of Detroit.

ROBERT KACZMAREK, deputy to MAJ Baron, received his BS degree in mechanical engineering from Western Michigan University and his MA degree in industrial management from Central Michigan University.

Army Computer Systems Commander . . .

Discusses Computer Technology Progress to Meet User Needs

When MG (recently promoted) Jack L. Hancock, commander of the U.S. Army Computer Systems Command, was invited to give the opening address at the fourth annual Computer Aided Technology Seminar at the United States Military Academy (USMA), his selection was based on a long association with the problems of management in implementing the Army's computer systems network. MG Hancock has served in the Management Information Systems Directorate, Office of the Army Assistant Vice Chief of Staff; as commander, U.S. Army Computer Systems Support and Evaluation Command; and commander, Joint Technical Support Activity, Defense Communications Agency.

Sponsored by the U.S. Army Materiel Development and Readiness Command and the USMA, the seminar was concerned with advanced computer technology, including interactive processors, software programs, data distribution problems, and computer assistance geared to needs of individual managers and engineers.

* * *

I was particularly pleased to be invited as the first speaker for this seminar, dealing with the new computer technologies—hardware and software, micro and mini computers, networks, structured programing, and many other progressive innovations.

The seminar will also deal with the problems which will be created by these new technologies, and it will explore the management control necessary for their effective exploitation. I hope that the meeting will raise warning flags in those areas where the promised opportunities are likely to be greater than realizable.

In discussing "Exploitation of Computer Technology as an Engineering and Management Tool," I hope to set the stage for the presentations and demonstrations that will follow.

I have always been impressed by the way historians, particularly economic historians, are able to explain their points of view of past events and to facilitate an understanding of probable future events by neatly, often too neatly, dividing time into ages, or phases, or periods, or stages.

Think for a moment about Karl Marx's division of history and the future into seven stages of economic growth. It did not add to his theory, but simply facilitated the explanation of his theories. It provided a rationale for his projection of the future economy of the world. W.W. Rostow divided history into five stages for the same pedantic purposes.

You are all familiar with the way that history texts divide civilization into such periods as the stone age, the bronze age, the iron age, the age of the industrial revolution, the atomic age, and now the age of the post-industrial society.

We did the same with computer hardware when we divided the periods of growth by generations of equipment—the first generation, the second, the third, and now the fourth. BG Bill Hilsman (project manager, Army Tactical Data Systems) and I, in seminars we used to conduct a number of years ago, divided software development into the periods of machine language, assembly language and compiler language. Now, I would say, we are in the age of the higher order language . . . .

Today, I will divide the modern history of computer sciences into four distinct periods, the first being *the age of the technician.* This beginning of modern computer science dates around the early 1940s with Dr. Akin's work at Harvard on automatic calculating machines.

In 1944 Dr. John W. Mauchly and J. Presper Eckert Jr. pioneered the development of ENIAC as the first large-scale electronic computer, completed in 1945, under a U.S. Army Ballistic Research Laboratories contract with the University of Pennsylvania. The first stored-program electronic computer was finished in 1949. A lot happened in the 40s—the computer industry's embryonic development period.

Why do I call this the age of the technician? Because those who drove the computer sciences efforts were truly technicians. They were building a new and revolutionary machine. In general, they had no users other than themselves in mind. It was an era of designing and building equipment which was intended for use by the technician.

Then there was no management involved except project management. There was no ADP industry. There was no marketing. It was simply a technical era—a very blissful time, indeed.

That evolutionary era changed rapidly. In 1950 we witnessed the greatly accelerated beginning of an industry which was to grow and exceed anything beyond the wildest dreams of the technicians. This period, which I will call *the age of snake oil,* began in the early 1950s and continued through about 1968 or 1969.

In retrospect, it is difficult now to imagine the kinds of promises that were made by the emerging ADP industry, by bright young computerologists, consultants, and by the surrogate users of what ADP would do. A very large group of young, aggressive college graduates assure managers there was virtually nothing that was impossible—if you just had a computer!

Who do you think "peopled" the age of snake oil? They were truly the "prima donnas." For the most part, unfortunately, they had not yet learned to dance through the maze of early complexities, Still management was dazzled by fancy footwork and fantastic fast talk.

Vast sums of money were spent, as a result, in trying to accomplish impossible objectives with impractical approaches. In fact, during this period, the whole of computer sciences could be defined as a "bottomless pit into which millions of dollars were poured."

This age can be characterized as a time during which "nothing succeeds like excess." It was a time when the best way was always the enemy of the good. We had massive starts and restarts—but rarely a finished product which looked anything like the original blueprint.

I recently attended a presentation by Dr. Fred Brooks, who was the senior architect for the IBM (International Business Machines) 360 software effort. He made the statement that any large software development during the period of 1960-65, if flow-charted, would look like: start, reorganize, increase budget, get more people, branch to step one.

Art Buchwald, syndicated columnist for the *Washington Post*, in one of his columns, said that he once began a book on pornography but got so excited he never finished. I think that summarizes very well most of the systems efforts during the age of the snake oil.

That age rose like a rocket and fell like a plummet. We went into *the age of frustration* in the late 1960s. This was a period in which management and the senior, more experienced computer scientists began to ask: "How do we get out of the mess into which we have put ourselves?"

There was, as you can imagine, a lot of hand wringing and finger pointing and the like, but, over-all, I think that cooler heads prevailed, resulting in a rather concentrated, though certainly not organized, effort to review the entire field of computer sciences.

The review is proving to be effective, because of lessons learned during the age of snake oil and, let's face it, because of business conditions. Budgets have been cut and ADP people have been made to begin to produce as they have promised. Industry has been pared down by a tremendous shakeup. Many of the smaller companies are out of business.

We began to experience a period in which rational thinking was brought into the equation. The term of cost-effectiveness was taken seriously. Above all, the user began to make himself felt. The user, of course, had learned from his experiences that ADP was no longer a mystery.

In fact, at this United States Military Academy, in the early 1960s, COL Bill Luebbert (head of the USMA Computer Science Department), BG Bill Hilsman, myself and some others conducted a seminar for senior managers in the Army during which we talked of subjects that are today considered so basic that all managers know them.

I often hear people (the ADP people) say that management doesn't understand ADP. Well, it is all relative. I submit to you that as a result of the periods through which management has progressed, senior managers in industry and in the Federal Government (specifically the military) now do understand ADP, theoretically and practicably. In fact, they usually understand far better than the computer experts would like them to understand.

Senior management took us through *the age of frustration.* In 1973-74 we began *the age of engineering.* We are certainly not there yet, but it is beginning. This period, into which we are now entering, might also be called *the age of the user.*

We are, for the first time, beginning to see an indication that ADP computer systems are being engineered for users. We are beginning to have tools, software tools, which have been engineered (and I stress that), engineered for the user. Many of these tools will be discussed with you during the remainder of this conference.

People are beginning to understand the terms "user and systems interface." We are, for the first time, seeing computer languages designed with the real user in mind.

During the age of snake oil, we undertook mammoth systems projects.

We wrote "great" specifications citing user "final" requirements. We spent millions of dollars trying to program those systems. We found that they were far too large and would take years to complete. Much more serious, we found that, even if completed, the computer system would not meet the user's real requirements.

The user community now recognizes what one ADP futurologist has called "the myth of optimally designed software systems." This myth holds that we cannot, in fact, design at the beginning the optimum system. The truth is that systems design is an inductive process. It is an iterative process in which software products are never completed in one cycle of development.

Instead of the traditional "build, find it doesn't meet requirements, and patch," our new tools—such as structured programing, modular design, and user-designed languages—permit us to take small bytes of a package, program it, test it, let the user try it, and then make additions to that system based on user opinion.

For 20 years, I have heard ADP people and computer systems designers complain that the problem is that the user "can't define his requirements." In my view, that is too often a true statement. The user historically could not, cannot, and will not define his requirements as well as we ADP people would like. I say that for 20 years this has been a fact of life and it probably will not change much.

While we obviously need to help the user understand and express his requirements better, we need to concentrate on the development of tools which will facilitate systems design in the absence of firm user needs. This means flexible design tools of all sorts and many types are available.

We now have data base management systems which permit the user to maintain files in a very orderly and useful way. We have query languages which are simple enough for anyone to use. Of great importance, I think, is the concept of structured programing—top-down design, in which the user becomes intimately involved with the requirements very early in the development cycle - something he was never able to do in the past.

The snake oil age, or era, has had many serious, deleterious effects on us. Perhaps most critical was during that time we advertised capability that was not producible. Thus, managers and users became soured on many of the techniques which are available today.

As an example, during the 1960s it became very fashionable (a true status symboll) to have cathode ray tube terminals in manager's offices for use in information systems—something new for engineers to design. When installed, however, the computers and the displays were simply not capable of meeting the requirements, or meeting descriptions of what had been sold. Usually the terminals were soon removed. Virtually no managers had terminals in their offices by 1970.

Now we are in the age of engineering. We do have products, tools and software that permit us to use, effectively, interactive computer display capabilities. These tools permit you engineers to use computerized design techniques in your daily operations. By time-pressure necessity, it is incumbent upon you to use such systems.

However, as a result of frustrating "lessons learned" in the age of snake oil, managers are much better informed and are almost certain to be realistic in what they will buy from the computer salesman—whether he comes from within the organization or from outside. Nothing could be healthier for all of us.

This is my message. We have come a long way by a tortuous route. We now have capabilities to provide many of the kinds of tools and the capabilities that were promised in the 1960s. They are now deliverable and will become increasingly deliverable. We are truly in the age of engineering—the age of the user.

I will close by characterizing this age in a way that I recently read in a technical report from Europe. We are in the age of soundly based user confidence in systems that will do the job they are designed to do.

Computer-Aided Design Engineering (CAD-E), supported by many related new technologies, has opened up a potential for achieving user satisfaction to a degree impossible only a few short years ago. You now have the potential of having ADP work for you rather than the reverse. You must exploit that potential, but in a wise and cautious way.

Combat Development's Experimentation Command...

Adds Reliability to Collection of Field Data

Electrical instrumentation, in the form of viscous dampened mercury switches attached to several parts of the body, can now indicate to a remote observer the soldier's posture for simulated combat in field tests.

The U.S. Army Combat Developments Experimentation Command (CDEC), headquartered at Fort Ord, CA, announced development of the system in mid-November. Research and engineering was performed under contract by Georgia Tech University. Use of the system is scheduled in upcoming experiments.

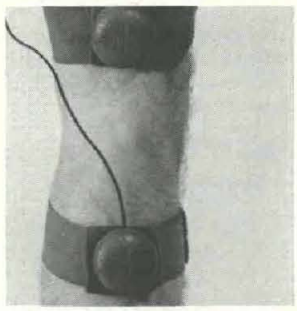
CDEC scientists said the system is expected to prove "an extremely useful addition" to capabilities of the Fort Hunter Ligget field laboratory during collection of exposure and fire-suppression data.

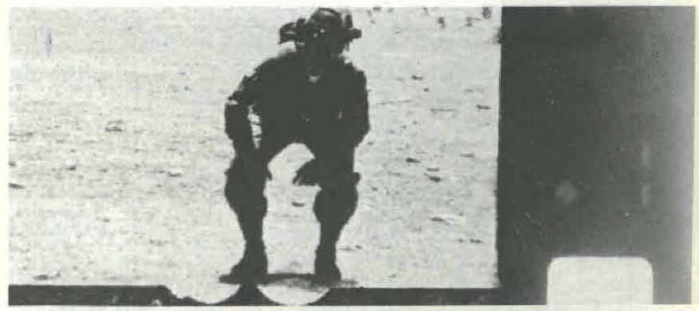
The current method of collecting data by use of observers at various points of field experimentation has had the inherent weakness of reliability in correlating subjective with other forms of empirical data.

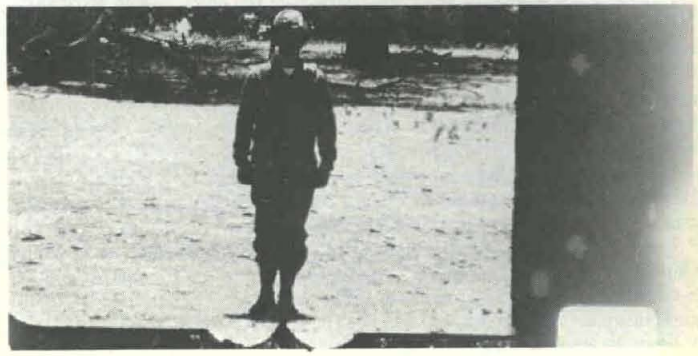
The new device's electrical states will be monitored and transmitted via a digital signal through a radio link-back to a central computer. Results will indicate whether a soldier is standing, is in a prone position with his head up, has one-third of the body exposed with the head up, or has two-thirds of the body exposed.

Scheduled for integration into CDEC's "Instrumented Man" program for collection of data during simulated combat in field experimentation, the system also will indicate if the soldier-player has been "hit" and, through a random number probability application, when he becomes a casualty.

The computer will record the number of shots fired by the soldier. Employed in the total Instrumented Man package are laser sensors mounted on the soldier's body and helmet. Posture indication pads are placed on the soldier's clothing and the calves of legs, thighs and back.







PHOTOS show viscous-damped mercury switches, fastened under the soldier's clothing at various points of his body, and three frames of motion picture film recording the soldier's computer-coded posture changes transmitted through a telemetry link. Code numbers shown near the bottom of film data block, at right, indicate posture as two-thirds exposed, prone, and standing.

Picatinny Receives 1976 GIDEP Achievement Award

1976 GIDEP ACHIEVEMENT AWARD is presented to Picatinny Arsenal Commander COL Peter B. Kenyon (left) by CPT William B. Walker, U.S. Navy GIDEP program manager. Participating in the ceremonies are (center left) Ismail Haznedari, Anthony Moscicki.

GIDEP, a U.S. Government and industry cooperative data exchange program composed of more than 500 participants, has presented Picatinny Arsenal its 1976 Achievement Award for government agencies.

Picatinny Arsenal Commander COL Peter B. Kenyon accepted the award at the annual GIDEP dinner in Hartford, CT. Two such awards, one to government, one to industry, have been presented since 1967.

Picatinny was cited specifically for "outstanding GIDEP support through voluntary and timely exchange of test, reliability and other technical data, effective use of GIDEP data and active participation . . ."

GIDEP provides for the exchange of technical information in order to maximize use of available knowledge and avoid needless, costly duplication of research and engineering effort.

The data includes test reports and engineering data on parts and materials, calibration procedures, failure and rate data experience. The GIDEP Operations Center distributes the data on microfilm to each participant so that the information is readily available to the user.

Centrally managed and funded by the U.S. Government, GIDEP participants include the U.S. Army, Navy, Air Force, Marine Corps, National Aeronautics and Space Administration, Canadian Department of Defense, other government agencies and numerous industrial firms.

Picatinny Arsenal has participated since 1960 in GIDEP and its forerunner, the Interagency Data Exchange Program (IDEP), and has been recognized as deeply involved in all aspects of the program.

Conferences & Symposia . . .

R&D ASSOCIATES FOR MILITARY FOOD and Packaging Systems principal conferees at the Nov. 9-11 fall meeting at HQ U.S. Army Natick (MA) R&D Command included (left to right) BG Emmett W. Bowers, commander, U.S. Army Troop Support Agency, Fort Lee, VA; Dr. Dale Sieling, NARADCOM technical director; keynote speaker MG Harry A. Griffith, director for Development and Engineering, HQ U.S. Army Materiel Development and Readiness Command, Alexandria, VA; COL Rufus E. Lester Jr., NARADCOM commander and conference host; RAdm John C. Shepard, commander, Defense Personnel Support Center, Philadelphia; Dr. Edward E. Anderson, special assistant to DoD Food Program, NARADCOM; and Dr. Frank R. Fisher, executive, National Research Council.

More than 300 military and civilian scientists and technologists engaged in food and food packaging research, attended a workshop conference, Nov. 9-11, at HQ U.S. Army Natick Research and Development Command (NARADCOM), Natick, MA.

The semi-annual conference was sponsored jointly by the Research and Development Associates for Military Food and Packaging Systems Inc., a nonprofit organization, and NARADCOM.

Among the many representative firms attending were General Mills, General Foods, Campbell Soup Co., Morrell and Co., Stouffer Foods, Swift and Co., as well as members of the American Frozen Food Institute and National Canners Association.

Keynote speaker was MG Harry A. Griffith, director, Development and Engineering, HQ U.S. Army Materiel Development and Readiness Command, Alexandria, VA. He discussed "problems that are going to have to be solved to make the progress we expect to make in food service.

"The Army, he said," has led industry in food research because we have to work to get to the individual soldier the food he needs in a form that he will eat. It isn't always economical to do that but our work in food R&D is based on urgency and mission, and not economys. . . . Freeze drying and reversible compression processes, for example, were developed for military use and are used right now by the military for a variety of foods . . . . Some of these foods are found in campers and hikers specialty stores.

"The reason you don't see a great variety of freeze-dried or compressed foods on supermarket shelves is that processing is expensive and no company can invest a lot of capital in equipment unless there is a proven market for the product. . . . What we in the military would like is for industry to find those markets so that it will be profitable to develop a more efficient and less costly freeze-drying process. That will benefit industry and it will benefit us."

MG Griffith concluded by stating: "Adequate food service is going to be as vital to the soldier in 1990 or in the year 2000 as it is now. Some of the problem solutions you identify during this meeting will help us toward keeping up the progress by Department of Defense in food service."

Future needs and objectives of the individual services were expressed in presentations by CPT Thomas Piazza, commander, Navy Food Systems Office; Roger Merwin, chief, Food Service Branch, U.S. Air Force; BG Emmett W. Bowers, commander, U.S. Army Troop Support Agency, Fort Lee, VA, who concentrated on R&D progress achieved and envisioned in food for combat conditions and garrison feeding; MAJ E. V. Cox, HQ U.S. Marine Corps, Washington, DC; and RAdm John C. Shepard, commander, Defense Personnel Support Center, Philadelphia.

Eight concurrent workshops and panel discussions and presentations were targeted on eight phases of research endeavor and progress being made by the Armed Forces. Speakers and panelists were top ranking industrial and academic leaders and Department of Defense agencies.

ASAP Considers Infantry Soldier's Requirements

Requirements of "The Modern Soldier in the Infantry Environment" with respect to training, equipment, motivation and related considerations were discussed during the U.S. Army Scientific Advisory Panel fall meeting, hosted by the U.S. Army Infantry Center, Fort Benning, GA.

USAIC Commander MG Willard Latham presented welcoming remarks to more than 50 ASAP members, consultants and invited guests.

Attending dignitaries included Assistant Secretary of the Army (R&D) Edward A. Miller; Deputy Chief of Staff for Research, Development, and Acquisition LTG Howard H. Cooksey; Dr. Bruce Reese and Dr. Harry Delaney, ASAP chairman and vice chairman; Dr. K. C. Emerson, deputy for Science and Technology on ASA (R&D) Miller's staff; and Dr. Marvin E. Lasser, U.S. Army chief scientist, director of Army Research, and ASAP executive director.

Presentations included ASAP Summer Study 1976, reports by chairmen of ASAP ad hoc groups at a business meeting, and three briefings: Infantry Tactics; Infantry Doctrine and Training; Tactical Threat.

Other highlights included demonstrations of the use of weapons systems and combat tactics by U.S. Army Airborne and advanced infantry trainees and Ranger School presentations, along with a luncheon in the field with Infantry troops.

Representatives From 5 Countries . . .

Consider Army Mesometeorology Research Efforts

FOREIGN METEOROLOGISTS at ASL, seated from left, Prof. J. Neumann, Israel; Dr. F. H. Bushby, England; Prof. W. Klug, Germany; Dr. N. E. Busch, Denmark; Prof. R. P. Pearce, England. Standing are H. Rachele, Dr. H. Lemons, P. Carlson, F. Horning.

Military, industrial and university meteorologists from five countries participated in a recent 2-day conference that focused on Army-supported

basic and applied research in mesometeorology and small-scale atmospheric processes.

Army research in mesometeorology is directed to military weapons systems and activities affected by atmospheric conditions on the mesoscale, which is much smaller than that used for normal weather forecasts.

Held at New Mexico State University, Las Cruces, NM, the conference was cosponsored by the Army Atmospheric Sciences Laboratory (ASL) at White Sands Missile Range (WSMR), NM, the Army Research Office (ARO), Research Triangle Park, NC, and the U.S. Army Research and Standardization Group-Europe (USARSG-E), London, England.

Participants had the opportunity to visit the ASL for conducted tours of facilities and to hold special meetings for discussion of programs of mutual interest. They also observed a helium-filled atmospheric probe balloon rising to a peak altitude of about 40 kilometers (25 miles). Balloons are used to measure constituents of the stratosphere and troposphere.

ASL Commander/Director COL W. C. Petty welcomed participants and ASL Deputy Director Henry Rachele presided as chairman at the opening session. Overviews of sponsoring activities' atmospheric sciences programs were presented by ASL's Dr. E. Howard Holt, Dr. Leo Alpert of the ARO Geo-sciences Division, and Dr. Hoyt Lemons, USARSG-E.

The ASL Mesometeorology Program was discussed by F. L. Horning of the ASL Meteorological Systems Technical Area. Current Research in Mesoscale Meteorology conducted through the United Kingdom (UK) Meteorological Office was reported by F. H. Bushby. Wind Structure in the Surface Layer Over Nonuniform Terrain was the title of a presentation by Dr. E. W. Peterson, Oregon State University, with comments by Dr. Niels Busch, Danish Atomic Energy Commission (AEC).

The *second session,* chaired by Dr. Lemons, offered presentations on Diagnostic Analysis of Terrain Effects in Atmospheric Phenomena, Dr. W. D. Ohmstede, ASL; The Response of the Planetary Boundary Layer to Diabatic Heating Over Variable Terrain, Dr. R. A. Anthes, Pennsylvania State University; Theoretical Study of 3-Dimensional Slope and Valley Wind Systems, Dr. Wen Tang, Ecological Enterprises Inc.

Other presentations included Difficulties and Results of a Mesometeorological Model With Topography, Drs. E. Doran and J. Neumann, The Hebrew University, Jerusalem, Israel; and Sound Ranging Revisited, Dr. M. G. Wurtele, University of California, Los Angeles.

Third Session, Dr. Alpert, chairman. Results of the Prototype Artillery Subsystem Experiment in Ballistic Meteorology, A. J. Blanco and L. E. Traylor, ASL; Reanalysis of Prognostic Fields for Use in Improving Artillery Accuracy, R. L. Mancuso, Stanford Research Institute; and

Mesoscale Wind Variability Utilizing METRAC, W. H. Jasperson, Control Data Corp.; Objective Analysis of Mesoscale Wind Field Data I, Dr. M. A. Pedder, University of Reading, UK; Objective Analysis of Mesoscale Wind Field Data II; Dr. R. P. Pearce, University of Reading; and Temperature Profiles as Boundary Layer Indicators, with comments on Viking boundary layer research, J. E. Tillman, University of Washington.

Fourth session, Dr. Morton Barad, Air Force Geophysics Laboratory, chairman. Presentations included Index Values for Canopies of Different Densities, Dr. R. M. Cionco, ASL; Measured and Simulation Model Estimates of Turbulent Exchange Between a Forested Surface and the Atmosphere, Dr. Ken Knoerr, Duke University; and

Mixing Layer Analysis Routine and Transport/Diffusion Application Routine for EPAMS, Dr. R. K. Dumbauld, H. E. Cramer Co. Inc.; A Statistical Model Applied to Mesoscale Diffusion, Dr. W. Klug, Technische Hochschule, Darmstadt, Germany.

In addition to summarizing basic and applied research in mesometeorology and small-scale atmospheric processes supported by ASL and ARO, the meeting encouraged a broad discussion of the future of the program, to benefit from the expertise of foreign scientists, and to acquaint other military services with details of the Army program.

16 ECOM Employes Input to GOMAC 76 Discussions

Sixteen employes of HQ U.S. Army Electronics Command, Fort Monmouth, NJ, participated in discussions and presentation of 84 technical papers at the 9th annual Government Microcircuit Applications conference in Orlando, FL, Nov. 9-11.

GOMAC 76 was sponsored by the Department of Defense (Army, Navy and Air Force), National Aeronautics and Space Administration, Department of Commerce, National Bureau of Standards, Postal Service, and the National Security Agency.

GOMAC 76 presentations reported on innovative skills of government, industry and university scientists, engineers and educators. Microcircuit technology progress was detailed in the areas of reliability, microprocessor/microcomputer design and applications, device modeling and process evaluation, packaging and hybrid technology.

Other topics included nuclear radiation effects, memory and logic technology, systems applications, signal processing, large-scale integration design and applications, microwave devices and amplifiers, electro/optical components and techniques, and microwave integrated circuits and modules.

Electronics Command (an element of the U.S. Army Materiel Development and Readiness Command) representation included Konrad H. Fischer, chairman, and Robert A. Weck, secretary, Steering Committee. Bruce Beard, Edwin T. Hunter and Vincent J. Organic served on the Program Committee.

David Haratz served on the Technical Program Committee and James Kesperis was chairman for the session on Device Modeling and Process Evaluation. CPT Dwight H. Sawin III participated in Government Exploitation of Microprocessors/Microcomputers Application.

ECOM authors and papers included CPT Sawin and David R. Hadden Jr., An Application of Standard Electronic Modules; Owen P. Layden and Joseph F. Murdock, Hybrid Microcircuit Design Techniques for High-G Shock Environment; Vincent Organic, A Portable CW Radar Signal Processor for Foliage Penetration Applications; and

Dr. Dirk R. Klose, Tom Baird, D. Hampel and J. H. Rothweiler, An LSI FFT Signal Detection and Demodulation Processor; Ed A. Karcher, A Digital-to-Video Converter for Airborne TV Displays; Russell A. Gilson and Octavius Pitzalis, A Direct Reading Impedance Tuner for Load-Pull Characterization of Microwave Power Transistors.

ECOM Calls for Frequency Control Meet Tech Papers

The U.S. Army Electronics Command (ECOM) has issued a call for papers intended for presentation at the 31st Annual Frequency Control Symposium, June 1-3, 1977, at Atlantic City, NJ.

Dealing with progress reports on frequency control and precision timekeeping, the meeting normally attracts more than 700 representatives of industry, universities and government laboratories throughout the world.

Authors are invited to submit papers detailing advances in research and development, and applications in fundamental properties of natural and synthetic piezoelectric crystals, theory and design of piezoelectric resonators, and resonator processing techniques.

Papers also may report on filters, surface wave devices, quartz crystal oscillators and frequency control circuitry, atomic and molecular frequency standards, laser frequency standards, frequency and time coordination and distribution, radio and systems applications of frequency control devices, specifications and measurements.

Summaries of proposed papers (at least 50 words) must be submitted to arrive by Jan. 21, 1977. Four copies with the author's name, address and telephone number should be sent to the Commander, U.S. Army Electronics Command, ATTN: DRSEL-TL-MF (Dr. J. R. Vig), Fort Monmouth, NJ 07703. Authors will be notified of acceptance of papers by Feb. 28, and photoready manuscripts are required by June 17 for publication in the symposium proceedings.

Army/Industry Meet Focuses on Materiel Testing

Approaches to materiel testing in accordance with U.S. Army/industry integrated effort based on HQ DARCOM'S widely publicized "new way of doing business," were explained and discussed at a recent symposium sponsored by the HQ U.S. Army Test and Evaluation Command.

More than 100 engineers, government contract administrators, test managers and marketing representatives participated in the meeting at HQ U.S. Army Test and Evaluation Command, Aberdeen (MD) Proving Ground

Presentations included: The New Philosophy in Army Materiel Testing; Integration of Contractor and Government Testing; New Techniques in Instrumentation; Human Factors Engineering Test Requirements; Testing in the Natural Environment; Environmental Quality Considerations in Testing; and Reliability and Maintainability Goals.

Detailed in presentation and discussed in depth was the Single Integrated Development Test Cycle (SIDTC), a critical part of the over-all concept of the U.S. Army Materiel Development and Readiness Command's New Way of Doing Business.

Geared to reductions in test time and costs, SIDTC is an attempt to eliminate identical or similarly repetitive tests by the Army and the contractor. Independent U.S. Government agency tests will be made only to supplement valid contractor test data or provide data unavailable through contract effort.

Significant savings in time and resources are anticipated by providing the contractor with government capabilities and use of government test sites, with reimbursement calculated on a direct-cost basis.

R&D Associates Meet Cites 8 'High-Priority' Issues

Military food processing objectives, problems and technological progress were considered recently by about 350 representatives of the U.S. Armed Forces, industry and educational institutions at a 3-day conference at HQ U.S. Army Natick Research and Development Command.

Many of the nation's leading authorities in food processing technology submitted reports and participated in panel discussions during the Nov. 9-11 sessions. Sponsored jointly by the Natick R&D Command and the R&D Associates for Military Food and Packaging Systems, Inc., the meeting offered eight "high-priority" workshops and panel discussions along with formal presentations and tours of NARADCOM laboratories.

NARADCOM Commander COL Rufus E. Lester Jr. welcomed the conferees and introduced Army Materiel Development and Readiness Command Deputy Commander for Materiel Development LTG George Sammet Jr., who spoke on DARCOM's "Current Programs, Progress and Problems."

Featured addresses on Future Needs and Objectives in Food Service R&D were presented by: BG Emmett W. Bowers, commander, U.S. Army Troop Support Agency, Fort Lee, VA; BG George R. Bartless, U.S. Marine Corps, director, Facilities and Services, Installations and Logistics, HQ USMC, Washington, DC; and

RAdm John C. Shepard, U.S. Navy, commander, Defense Personnel Support Center, Philadelphia, PA; CPT Thomas Piazza, Supply Corps, USN, commander, Navy Food Service Systems Office, Washington, DC; and Roger Merwin, chief, Food Service Branch, Air Force Service Office, Philadelphia, PA.

Chairman, cochairman and subject areas of the eight workshop sessions were: Dr. Edward A. Nebsky, Food Engineering Lab (FEL), NARADCOM and Dr. Mark Karel, Massachusetts Institute of Technology, *Packaging Systems;* Dr. Herbert A. Hollender, FEL and James Brooks, General Foods Corp., *What New Foods and Food Systems Can Be Expected;* Dr. Donald E. Wescott, FEL and William A. Brittin, Strange Co., *Improving Shelf Life of Rations;* Dr. Walter Giffee, Food Sciences Lab (FSL), NARADCOM and T. V. Kueper, Swift and Co., *New Technology to Enhance Quality in End Item Tests;* and

Dr. Ron Lampi, FEL and J. Harrison Holeman, Market Forge, *Food Service Equipment;* Dr. Herbert Meiselman, FEL and Elaine Skinner, General Foods, *Consumer Factors in Food Service;* Dr. Robert Smith, Operations Research Office (ORO), NARADCOM and Joel Stoneham, Wesson Memorial Hospital, *Hospital Food Service;* and Ronald Bustead, ORO and Guy Livingston, Food Service Assn, *Mass Feeding in Remote Areas.*

Workshop panelists included Dr. Edward E. Anderson, special assistant for the Department of Defense Food Program, NARADCOM; Dr. Abdul R. Rahman, head, Plant Products R&D Group, NARADCOM, and many top industrial executives, educators and federal agency representatives.

Research and Development Associates President B. J. McKernan presented the conference summary of results.

Career Programs . . .

Choices Accent PMDP Members' Quality Standards

Superior career advancement qualifications of officers enrolled in the U.S. Army Project Manager Development Program (PMDP) are again recognized by recent selection lists for promotion to higher rank.

Thirty PMDP members were eligible for (first-time) promotion to colonel from the primary zone of consideration and 22 were selected which equates to a 73.3 selection rate. Seven were chosen from the secondary zone.

Twenty-nine PMDP members were eligible in the primary zone for first time selection to major and 25 were selected - an average of 86.2 percent. Five program members were selected for major from the secondary zone.

Built upon the framework of the new Officer Personnel Management System (OPMS), the PMDP provides materiel acquisition training and experience within an officer's primary and alternate specialty.

PMDP officers are selected by a U.S. Army Military Personnel Center (MILPERCEN) Selection Board.

PMDP opportunities for officer development are found in Project Manager Offices; HQ U.S. Army Materiel Development and Readiness Command and its subordinate commands; on the Department of the Army staff; and other materiel acquisition management activities.

Officers serve in positions relative to operation and maintenance of equipment at unit level, to gain knowledge of potential problems of users.

PMDP lieutenant colonels selected for promotion are: Charles H. Bay, Paul C. Bayruns, Robert G. Bening, Herman R. Betke, Clinton H. Black, Thomas F. Cameron, George Christensen, August M. Cianciolo, William P. Farmer, William Fiorentino, Theodore Grant, Monte J. Hatchett, Joseph L. Hunter, Anthony M. Jezior, Thomas P. Kehoe, Charles R. Kottich, Ralph A. Luther, Leonard S. Marrella, Charles C. Moses, John J. Ramsden, Ivar W. Rungren, Guy L. Schmidt, Joseph L. Stone, Harold E. Stubbs, Edward Valence Jr., Edmund Vandervort, William L. Webster, Aaron E. Wilkins and John F. Hoffman.

PMDP selectees for promotion to major are Robert J. Ament, Frank H. Anderson, Larry G. Bennett, Brendan Blackwell, Joseph C. Borst, James C. Britton, Jerry L. Buckley, Steven J. Caldwell, John C. Carrow, Michael F. Delleo, David M. Drinkwater, John L. Eggers, Edward H. Ely, Richard J. Fousek, Jeffery B. Frey, Donald J. Funk, Frederick K. Gorgas, Steven L. Hanau, John K. Joseph, Mario G. Perez, Paul M. Root, John J. Saikowski, Samuel R. Schwartz, Robert D. Shadley, Joe A. Sims Jr., Thomas Stauffacher, Gary M. Stewart, Richard W. Thoden, Aubrey White, Kenny W. Whitley, Hugh N. Williams and John G. Zierdt.

Seigh Selected for TD's Executive Training Program

John Seigh

Exemplified potential for managerial responsibility is cited in the justification statement for selection of John Seigh, an Edgewood (MD) Arsenal employe, for six months of training under the technical director's executive development program.

A mathematician and operations research analyst, Seigh began his Civil Service career at Edgewood in 1963 after serving more than two years on active military duty, as an enlisted man in the Army's Scientific and Engineering Assistants Program.

Assigned to the arsenal's Plans Office since 1972, he is the 20th employe chosen for the TD's program since it was initiated in 1971. He will spend three months at Edgewood and a similar period at HQ Army Materiel Development and Readiness Command, Alexandria, VA.

Seigh has a BS degree in mathematics from West Virginia Wesleyan College and an MS degree from George Washington University. He has received a Sustained Superior Performance Award (SSPA) and a Special Act or Service Award under the Army's Civilian Employes' Incentive Awards Program.

He has authored numerous technical papers relative to mathematical studies, including a presentation at the 1974 U.S. Army Numerical Analysis Conference.

Tropic Test Center TD Completes AWC CS Program

COL Frank S. Mendez

Army Reserve COL Frank S. Mendez, civilian technical director of the U.S. Army Tropic Test Center, Fort Clayton, CZ, recently added to his background of career development by completing the U.S. Army War College (AWC) Corresponding Studies Program.

The CSP, which parallels the AWC 10-month residence course at Carlisle Barracks, PA, is programed for two years. It consists of a correspondence phase containing 16 subcourses, 2 elective courses, two 2-week resident phases and a student research program.

The course focuses on developing an understanding of the nature and operation of the economic, political, sociological, scientific-technological and military elements of national power as they are operative in internal and external affairs; also, increasing professional knowledge, skills, and perceptions in command, management, force capabilities development.

COL Mendez has bachelor's and master's degrees from Bowling Green State University, is a graduate of the U.S. Army Command and General Staff College, and has completed the Ordnance and Military Intelligence Center career extension courses.

Currently he is a Mobilization Designee in the Office of the Deputy Chief of Staff for Research, Development and Acquisition, HQ DA, where he performs his annual Reserve training. He has been awarded the Army

Commendation Medal for performance of Reserve duties, and has commanded a Military Intelligence Reserve unit.

Other commendations and awards include the DA Decoration for Meritorious Civilian Service (1971), and the Panama Canal Public Service Award (1973). In 1971 he was selected by the Secretary of the Army as nominee for the National Civil Service League Career Service Award.

In 1970 and in 1975, he was appointed by the Governor of the Canal Zone to a 5-year term on the Canal Zone Board of Registration for Architects and Professional Engineers on which he has served as chairman.

Other professional affiliations include trustee and vice president of the Canal Zone United Way, Inc.; the National Society of Professional Engineers; Canal Zone Society of Professional Engineers; National Council of Engineering Examiners and Society of Automotive Engineers.

Col Mendez was selected in 1964 as one of 11 Army scientists and engineers to participate in the defense science seminars conducted by the University of California at Los Angeles. In 1976 he was selected for participation in the Materiel Acquisition and Readiness Executive Development (MARED) Program.

Gavlinski Completes Executive Training Program

Under the technical director's executive development program, Robert R. Gavlinski recently completed three months of intensive training at Edgewood Arsenal, MD, where he is a chemical engineer in the Defense Systems Division, Development and Engineering Directorate.

Gavlinski has been an arsenal employe since 1960 and he started in 1958 as an enlisted man under the Army's Scientific and Engineering Assistants Program. The 19th employe to complete the TDED Program, initiated in 1971, he is working on chemical and biological research.

Earlier assignments involved studies of pilot plant chemical processes. Following three months of TDED Program assignments at Edgewood, Gavlinski concluded his managerial training in the Manufacturing Technology Office, HQ U.S. Army Materiel Development and Readiness Command, Alexandria, VA.

Robert R. Gavlinski

A certified professional engineer, Gavlinski has a 1958 BS degree in chemical engineering from Virginia Polytechnic Institute. He has received two sustained superior performance awards, two Special Act or Service awards, a quality in-grade salary increase and numerous suggestion awards in the Civilian Employes Incentive Awards Program.

WSMR Soldiers Certified as Solar Furnace Operators

Certification of two U.S. Army enlisted personnel as military solar furnace operators, believed to be the first U.S. Armed Forces members to gain this distinction, is announced by White Sands (NM) Missile Range.

SP5 Donald G. Sharp Jr., pictured below, and SP5 Douglas V. Cook, (seated), both former Pershing Missile guidance and control repairmen, earned their new titles by volunteering for on-the-job training and passing written and practical tests devised by the Nuclear Effects Branch.

Richard Hays, WSMR chief of Solar Furnace Operations and an electronic engineer, said the titles are unofficial since the U.S. Armed Forces do not offer a military occupational specialty (MOS) in this field. He said the two men join 15 other certified solar furnace operators in the entire Free World.

White Sand's solar furnace is known as the largest in the United States and the second largest in the Free World. Civilian and military agencies are using it for a variety of tests, including studies of oxide coatings by the University of Arizona and a U.S. Air Force effort to determine heat-resistance limits of the B-1 bomber windshield.

SP5 Cook expressed his enthusiasm by stating that "solar energy is the wave of the future" and that he feels good about working with people studying the sun as a power source.

People in Perspective . . .

Army Handicapped Employe of Year . . .

Forgets Sight Impairment in Helping Others

"Helping people is what life is all about," says Charles H. Groom, the Department of the Army's 1976 Handicapped Employe of the Year, assigned to the U.S. Army Armament Command's Frankford Arsenal.

Selected also as one of 10 Outstanding Handicapped Federal Employes of the Year, as well as U.S. Army Materiel Development and Readiness Command handicapped honoree of 1976, Groom was acclaimed for his work at Department of the Army Pentagon ceremonies and by representatives at the White House.

Totally blinded during a bombing raid off Cape Glouchester, New Britain, in 1942 while serving with the U.S. Navy, Groom is a supply clerk in Frankford's Technical Support Directorate where he maintains a running inventory of all supplies.

His "100 percent on-the-job efficiency," attested by coworkers, is achieved with the aid of an Optacon, a device obtained from the Veterans Administration which aids the blind in reading speed and accuracy. His award citation credits him with being instrumental in securing the device and teaching its operation to others.

Much of his efforts in helping others was accomplished during free time, often using personal finances, according to documentation included in his nomination. In 1974 he received the Philadelphia Human Rights Award for activities on behalf of youth and neighborhood betterment.

Loyal assistance from his seeing eye dog Sheba, a radiant smile and a "delightful personality" have contributed to comments that his handicap is "truly unnoticable."

Charles H. Groom & Sheba

Federally employed for 24 years, he is a skilled photographer, father of eight children, grandfather of two, and a member of Frankford Arsenal's MARS Radio Station and the Toastmasters Club.

He was credited by the Pennsylvania Bicentennial Program Committee for his efforts in helping to raise $2,500 for the Blind Veterans National Association Inc.

Additionally, he is a member of the National Center for Voluntary Action, an honorary society for handicapped employes, and is currently completing courses in basic mathematics under the Upward Mobility Program.

DARCOM Gains High Rating for Handicapped Employes

"Hire the Handicapped" is more a way of life than just a slogan for personnel selection in the U.S. Army Materiel Development and Readiness Command. DARCOM's civilian workforce of 110,000 includes almost 6,000 handicapped employes, 5.2 percent of the total work force.

The government-wide average is 2.7 percent and the Department of the Army average is 2.9 percent. DARCOM employes less than one-third the total of Department of the Army civilians but employs 53 percent of the handicapped personnel. One of 77 federal agencies reporting to the U.S. Civil Service Commission, DARCOM ranked fifth among employers of the handicapped in 1975. Fifty-four percent of the Army's handicapped are white-collar workers.

Although the majority of DARCOM's handicapped are blue-collar workers, they represent a broad spectrum of skills. Letterkenny Army Depot, PA, for example, employs the handicapped in 17 job categories, ranging from electronic systems mechanic to painter. Almost every type of disability is represented at Letterkenny. Twenty-six employes have had one amputation and one worker has had two limbs amputated.

Headquarters U.S. Army Armament Command, Rock Island Arsenal, IL, employs 181 disabled persons, the largest number of any DARCOM subcommand headquarters. All are white-collar professionals, representing 39 skills.

DARCOM installation percentage leaders employing the handicapped are Letterkenny, 18.4 percent; Sacramento (CA) Army Depot, 13 percent; Pueblo (CO) Army Depot, 12 percent; Lexington (KY) Blue Grass Army Depot, 10 percent; Watervliet (NY) Arsenal, 10 percent; Rock Island Arsenal, 10 percent; and Frankford (PA) Arsenal 10 percent.

Army NV Goggles Aid Rescue . . .

Crashed Plane Located Quickly in Night Search

RESCUE crewmen, l. to r., are CPT John Pratt, Tim Neel and Bill Basye, holding Night Vision Goggles, CPT Mich Potter, Ken Bly.

Life-saving cooperation between the Army and the civilian community was demonstrated when Night Vision Goggles, designed to aid the soldier on battlefields at night, were used recently to locate and rescue passengers of a private plane that crashed near Manassas, VA.

When air traffic controllers at Dulles International Airport lost contact with the small aircraft Oct. 27, they contacted Davison U.S. Army Airfield at Fort Belvoir, VA, to seek any assistance the Army could offer.

Coincidentally, two helicopters from the U.S. Army Electronics Command's Night Vision Laboratory (NVL), at Fort Belvoir, had just taken off from Davison on a mission to test effectiveness of the NV goggles.

When crewmen of the NVL contacted Dulles to determine if they could help, air traffic controllers vectored the helicopters to the location where the private plane was last seen on radar. Using the Night-Vision Goggles, the Army pilots located the plane about 15 minutes after it crashed.

One helicopter piloted by civilian Tim Neel and copilot CPT Micky Potter hovered over the area and illuminated the crash site with a searchlight. The second helicopter, piloted by Kenneth Bly and copilot CPT John Pratt, landed and removed the injured victims from the crashed plane and transported them to Dulles where an ambulance transported them to a Loudon County hospital. Neel's aircraft remained over the crash sight until Virginia state police arrived to secure the area.

APG Small Arms Expert . . .

Believes Firing Pin Collection Is World's Largest

Dodson Brown

Talk about firing pins and you are involved in the hobby of Dodson Brown, a small arms expert of some 30 years standing at Aberdeen Proving Ground, MD, who believes his collection may be the most complete in the world.

Included in the exhibit that is his pride and joy are more than 70 varieties of firing pins of weapons of all sizes and weights, ranging from pistols to hand-held rocket launchers, as well as rifles, shotguns, machineguns, grenade launchers and cannons.

Stored in APG's industrial area where Brown works, the collection often aids in solving on-the-job problems. About 60 of the pins are displayed on a finished board for safekeeping, ready analysis and comparison by visitors.

The oldest pin on display is from a 1903 Springfield rifle, the weapon most commonly used by the U.S. Army prior to introduction of the M-1 rifle. His current interest in collecting firing pins stemmed largely from a desire to centralize the numerous types he had amassed over the years, and to show others an array that "provides an interesting perspective to the evolution of small arms weaponry."

Assigned primarily to testing small arms of the U.S. inventory, Brown has worked with weapons of Israeli, Chinese, Italian, Japanese, Soviet, French, Vietnamese and Canadian origin. Many are one-of-a-kind types.

ARI's Growing Renown Shown by Visitors List

International as well as national recognition of the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) is growing, if the guest list of foreign visitors in recent weeks is a valid indication.

One of the distinguished visitors was Prof. Brian Shackel of England's Loughborough University. He presided as chairman of the NATO Advanced Study Institute on Man-Computer Interaction in September in Greece.

Dr. Bernard Metz, a professor of the University of Strasbourg in France and director of the Centre de Bioclimatique, and Dr. R. B. Bernotat, who heads a group similar to the U.S. Army Research Institute for the West German Government at the capital city of Bonn, also were briefed on ARI ongoing programs and capabilities.

ARI's guest list for psychologists and sociologists who visited while attending the Sixth Congress of the International Ergonomics Association at the University of Maryland, shows representatives from Norway, Israel, France and Luxembourg. Dr. J. E. Uhlaner, ARI technical director and chief psychologist of the U.S. Army, coordinated their visit.

Convened for the first time outside of Europe, the Congress was held in conjunction with the annual meeting of the U.S. Human Factors Society. Prof. Alphonse Chapanis of Johns Hopkins University was elected president - the first time an American gained this honor. ARI's Dr. Edgar M. Johnson, Dr. John E. Germas, Dr. Michael Fineberg, and James D. Baker participated in the program.

Operating under guidance from the Office of the Deputy Chief of Staff for Personnel, ARI has staff capabilities at Headquarters in Rosslyn, VA, enhanced by 10 field units throughout the United States, Europe and the Far East. COL William C. Maus is the ARI commander.

Army Flight Surgeon . . .

Terms Friendly Knowledge of Patients 'Definite Plus'

"South Pacific," famed Broadway musical, produced many a memorable moment, including the hit song which might be termed the credo of MAJ (Dr.) Dalton Diamond-"Getting to Know You."

A flight surgeon at the U.S. Army Medical Department Activity, Fort Polk, LA, MAJ Diamond believes that getting to know the men he treats and their families is a definite plus.

"The smallest of maladies," he says, "can affect a pilot's performance, so I need to know the man. One way to do it is to provide care for his whole family. I am a family doctor at heart..."

MAJ Diamond's "professional excellence and enthusiastic support of family practice" recently earned him distinction as the U.S. Army's Flight Surgeon of the Year." He sees about 100 patients a week and also teaches a class in aviation medicine and safety.

Much of MAJ Diamond's leisure time, that is when he isn't caring for his eight children (four adopted), is spent with his wife Mary soaring or glider flying. Both are members in Fort Polk's flying and parachute clubs.

Intent on earning his license for family medical practice, MAJ Diamond is studying courses offered by the American Academy of Family Practice. He earned his MD in 1971 from Tulane University's School of Medicine.

An honor graduate of the Army's Flight Surgeon School, his long-range plans include learning to fly hot-air balloons. His sights are set on learning to pilot as many types of aircraft as possible, which probably accounts for the two to four hours he spends each week in the air.

FLIGHT SURGEON MAJ (Dr.) Dalton Diamond, in addition to giving medical care to pilots, other aviation personnel and their families, also teaches aeromedical techniques and aviation to enlisted personnel. Here, he shows SP5 Michael Frank, SSG Matthew Boyd and SP4 Debra Hyder how to use a portable body splint.

Dr. Hans K. Ziegler

Dr. Rauno A. Lampi

John J. Obren

Edward M. Sedlak

Frank J. Crispo

9 Exceptional Service Awards Top List of Honors

Nine Decorations for Exceptional Civilian Service (DECS), the highest Department of the Army standard award for civilian employes, are among honors presented recently for prestigious achievements.

John J. Obren, director of the Product Assurance Directorate, HQ U.S. Army Armament Command, was awarded the DECS for "dynamic leadership, personal drive and outstanding managerial talents (which) produced significant and noteworthy contributions to the establishment and operation of the U.S. Army Armament Command."

In attesting to his performance, MG Bennett L. Lewis, then the ARMCOM commander, stated: "I anticipate continued exceptional performance and highly creditable contributions from Mr. Obren in the future as the establishment of the U.S. Army Armament Materiel Readiness Command and the U.S. Army Armament Research and Development Command progresses."

Obren began his Civil Service career with the Army Ordnance Ammunition Center, Joliet, IL, as a GS-7 and achieved GS-15 rating in July 1973.

Edward M. Sedlak, a supervisory general engineer in the Directorate for Development and Engineering, HQ U.S. Army Materiel Development and Readiness Command, received the DECS for achievements relative to missile technology programs. Sedlak was praised for "exceptional contributions to the fulfillment of all phases of the Army's missile, rocket and air-defense weapons systems in the very complex, high-cost, high-visibility research, development and engineering technical areas."

After initiating his Civil Service career with 11 months of on-the-job training in proximity fuzing in 1950 with the National Bureau of Standards, Sedlak served 26 years in Army scientific and engineering fields, specializing in guidance and control, terminal homing, simulation systems and missile research and development.

Dr. Hans K. Ziegler, director of the U.S. Army Electronics Technology and Devices Laboratory, U.S. Army Electronics Command, was cited for 1971-76 achievements which "profoundly and positively influenced the quality, efficiency and productivity of the technology base effort at the ECOM R&D complex."

A Fellow of the Institute of Electrical and Electronics Engineers and the American Astronautical Society, Dr. Ziegler is listed in *Who's Who in America, Who's Who in the East, Who's Who in the World,* and holds two U.S. and six Federal Republic of Germany patents.

He has served as a U.S. and Department of Defense delegate on national and international conferences involving the National Academy of Sciences, National Research Council and as a member of the DoD Technical Advisory Panel on Electronics.

Dr. Rauno A. Lampi, a research physical scientist at the U.S. Army Natick (MA) Research and Development Command, received the DECS for contributions leading to development of a flexible packaging system for thermoprocessed foods. Type classification of the Meal, Ready-to-Eat, Individual has been termed "a major advance in troop feeding."

Dr. Lampi joined NARADCOM as a packaging technologist in 1966, has BS, MS and his PhD degrees in food technology from the University of Massachusetts, and is a 1973 recipient of a Department of the Army Meritorious Civilian Service Award.

Dr. Ralph F. Goldman, director, Military Ergonomics Division, U.S. Army Research Institute of Environmental Medicine, Natick, MA, was recognized for outstanding scientific leadership and accomplishments.

His citation reads in part: "Dr. Goldman's leadership and planning acumen, knowledge of line unit operations, and integration of a multidisciplinary staff of widely varied experience led to a system evaluation of important military environmental problems."

Dr. Goldman has served as the DA's principal consultant on Military Environmental Physiology since 1971. He holds an AB degree from the University of Denver, an MS degree from Northeastern University and AM and PhD degrees from Boston University.

Charles E. Richardson Jr. was recognized for outstanding leadership, managerial ability and professional competence as chief engineer and later deputy commander, Ballistic Missile Defense Systems Command.

Cited specifically for contributions leading to successful completion and deployment of the Safeguard Missile System, he received his first DECS in 1968. He was honored with a 1973 Meritorious Civilian Service Award.

Graduated from Auburn University (BSEE degree), he has completed the Harvard University Advanced Management Program. He was a principal member, the 1975 BMD Program Review Task Force.

Dr. Oswald H. Lange, chief scientist at the U.S. Army Ballistic Missile Defense Systems Command, received the DECS for resolving technical and managerial challenges in the ballistic missile defense programs, principally the Safeguard System.

He has invention awards for detonation reaction engines, a 1973 MCS Award and in 1965 was presented a Certificate of Merit as assistant director for Systems Analysis, George C. Marshall Flight Center.

A former consultant and adviser to the Roland weapon system program under the Short Range Air Defense System, he has an MS degree from the University of Breslau, Germany, and PhD degree from the U. of Berlin.

Matthew E. Murray, civilian personnel officer, U.S. Army Quartermaster Center, Fort Lee, VA, was honored with the DECS for planning, organizing and directing Fort Lee's Civilian Personnel Management Program. "His exceptional leadership," the citation states, "was a significant factor in insuring the stability, morale and proper utilization of workforce to achieve the mission of the Army Quartermaster Corps...."

Murray is a graduate of the Industrial College of the Armed Forces, the U.S. Army School of Civilian Personnel Administration and has served as chairman of a U.S. Civil Service Board of Examiners.

Frank J. Crispo, a supervisory sales store clerk at the U.S. Army Electronics Command, was awarded the DECS and $1,000 for bravery and dedication to duty during an attempted robbery in which his armed military escort was injured. He prevented an assailant from gaining possession of two depository bags containing government funds.

Employed at ECOM for more than 20 years, Crispo is a previous recipient of an Outstanding Performance Award/with Quality Step Increase, a Sustained Superior Performance Award, and a Letter of Commendation.

MERITORIOUS CIVILIAN SERVICE. *Dr. Howard S. Jones Jr.,* chief, Microwave Branch, U.S. Army Harry Diamond Laboratories, received the MCSA, the Army's second highest award for civilians, for "numerous contributions which advanced the antenna state-of-the-art while providing solutions to critical antenna problems of modern weapons."

Dr. Phillip C. Dickinson, former adviser to the commander, U.S. Army Training and Doctrine Command Combined Arms Test Activity, Fort Hood, TX, was awarded an MCSA for contributions to intelligence procedures. He recently became deputy director, Battlefield Systems Integration Directorate, HQ DARCOM.

EQUAL EMPLOYMENT OPPORTUNITY. *Antonio C. Mendoza* received a Secretary of the Army EEO Award for implementation of the EEO program at the U.S. Army Test and Evaluation Command, White Sands (NM) Missile Range, and for contributions to community, state and federal programs to assist hardcore unemployed men and women and educationally disadvantaged youths.

Anne T. Barron, a program analyst, was presented an EEO Award for her efforts at the U.S. Army Natick (MA) R&D Command. She was praised for her work with federal women's programs and minority groups.

Ruthe O. Guyton, general transportation supervisor, U.S. Army Finance and Accounting Center, Indianapolis, IN, was cited for efforts with Upward Mobility and Youth Summer Employment programs.

Joseph C. Cell, financial manager, U.S. Army Engineer District, Fort Worth, TX, received an EEO Award for contributions to the employment of minorities and other "special need" groups.

COL De Reef A. Greene, director of Human Relations, U.S. Army Air Defense Center and Fort Bliss, TX, was presented an EEO Award and praised for "leadership, dedication and devotion to the spirit of EEO."

MERADCOM Cites 1976 Achievements . . .

4 Personnel Win 19th Annual Commander's Awards

Presentation of the 19th annual Commander's Awards at the U.S. Army Mobility Equipment Research and Development Command, Fort Belvoir, VA, recently recognized outstanding achievements in science, technology, leadership, and technical administrative support.

Selected from 28 nominees, each of the four winners received a certificate, a plaque-mounted medal and a $50 cash honorarium. All nominees received Certificates of Achievement and cash awards through the Army Incentive Awards Program.

Scientific Achievement. Grayson W. Walker, a research chemist in the Electrochemical Division of Lab 3000, is the winner in this category for his work in fuel cells electrolyte research. Results are expected to prolong fuel cell life and decrease costs for pretreatment of fuels.

Walker has a BS degree in chemistry from Virginia Polytechnic Institute, and is doing thesis research for an MS degree in chemistry from American University. He became a research scientist with the Mobility Equipment R&D Center, forerunner to MERADCOM, in 1967.

Technological Achievement. Stanley S. Kurpit, a chemical engineer in the Electrochemical Division, was cited for development, design and successful demonstration of a low-temperature methanol steam reformer for use in fuel cell power plants.

The award citation states that his work contributed to methanol reforming currently being considered the leading method for meeting the Army's Silent Lightweight Electric Energy Plants (SLEEP) requirements. The system is termined nonpolluting, with negligible thermal signature.

Kurpit has a 1951 BS degree in chemical engineering from Pratt Institute and is a member of the American Institute of Chemical Engineers, American Chemical Society, and the Society of American Military Engineers. He joined the staff of what is now MERADCOM in 1971.

Leadership. MAJ William K. Emerson, R&D coordinator for Lab 4000, was honored for his leadership as special project officer in conducting the U.S. Army Materiel Development and Readiness Command's (DARCOM) pilot program for camouflage of the M60-A1 tank.

He was cited for identifying problems in the camouflage program, providing high visibility for the effort within the Department of the Army, generating U.S. Marine Corps interest, and keeping on schedule.

Commissioned in 1965, MAJ Emerson has BS and MS degrees in mechanical engineering from Oklahoma State University and is working toward an MS degree in American history at George Mason University.

Gelini Medal. Presented in recognition of technical/administrative support, this award went to SSG Samuel D. Brooks, the first enlisted man ever selected for this honor. Now assigned to Ford Benning, GA, he served formerly in MERADCOM's Lab 5000.

SSG Brooks was credited for his work as an operator, trouble-shooter and personnel trainer in development of the Army's Ribbon Bridge System. He was cited for saving considerable "downtime" of the system during tests at Aberdeen (MD) Proving Ground.

Participating Dignitaries. MG Ira A. Hunt Jr., director for Battlefield Systems Integration, HQ U.S. Army Materiel Development and Readiness Command, was featured speaker at the awards ceremonies, conducted by MERADCOM Commander COL Bernard C. Hughes.

The awards were presented by James E. Spates, assistant director for Laboratory Activities, Office of the Deputy Chief of Staff for Research, Development, and Acquisition (ODCSRDA), DA; Dr. Henry J. Smith, scientific adviser for Combat Support Systems, ODCSRDA; and MG James A. Johnson, Fort Belvoir commander.

MERADCOM Commander's Awards winners and program participants: Front row, l. to rl, SSG Samuel D. Brooks, Grayson W. Walker, Stanley S. Kurpit, MAJ William K. Emerson. Back row, l. to r., COL Bernard C. Hughes, MERADCOM commander; MG Ira A. Hunt Jr., director for Battlefield Systems Integration, DARCOM; Dr. Henry J. Smith, scientific adviser for Combat Support Systems, DCSRDA; James E. Spates, assistant director for Laboratory Activities, DCSRDA; MG James A. Johnson, Fort Belvoir Commander.

Volkheimer Wins NMA's 6th Annual Special Award

The National Micrographics Association's (NMA) sixth annual special award was presented recently to Leo Volkheimer, chief of Picatinny Arsenal's Engineering Data Systems/Documentation Requirements Div., "in recognition of perseverance in solving a significant industry problem."

Volkheimer served as chairman of an American National Standards Institute Task Group which in 1970 began development of standards for 16mm microfilm containers. Representatives of microfilm manufacturers also served on the task group.

Presented by Henry Frey, NMA past president in the office of COL Peter B. Kenyon, Picatinny commander, the award citation reads in part: "Micrographic standards for containers (cartridge and cassette) for 16mm roll microfilm have long been needed in the micrographic field, since lack of such standards has inhibited interchangeability and compatibility in use of roll microfilm equipment....

"Through his determination and dedication, the task group has standardized configurations for 16mm roll film cartridges and cassettes which will mean considerable time and cost savings for both industry and government applications."

Leo Volkheimer

Former DARCOM Surgeon Receives Legion of Merit

Former Chief of Staff MG R. L. Kirwan, Materiel Development and Readiness Command (DARCOM), presented the Legion of Merit and a Letter of Commendation to COL Ignacio Hernandez-Fragoso prior to his departure for duty in Korea.

The commendation cited COL Hernandez-Fragoso for outstanding service during his tenure as DARCOM surgeon, a position now filled by COL R. T. Cutting. COL Hernandez-Fragoso's new assignment is chief of Preventive Medicine and Staff Preventive Medicine Officer, U.S. Eighth Army Headquarters.

Signed by DARCOM Director of Development and Engineering MG Harry A. Griffith, the Letter of Commendation acclaims accomplishments of COL Hernandwz-Fragoso for his efforts on "medical aspects of important projects such as smoke, diving equipment, camouflage paint, the Gama Goat vehicle, TOW missile and Laser technology. . . ."

The letter also notes his "personal contribution to the Army's Independent Research and Development (IR&D) programs, especially in those efforts oriented toward medical, biological and biochemical research. . . ."

Since entering the U.S. Army in 1960, COL Hernandez-Fragoso has served in Thailand, with Walter Reed Army Institute of Research, at Brooke Army Medical Center (Fort Sam Houston, TX), chief of the Preventive Medicine Unit at Fort Knox, KY, and three years at HQ DARCOM and the former Army Materiel Command.

He served his residency in Public Health while attending Tulane University, receiving a master's degree, and studied at John Hopkins University (1971-73) toward a doctorate in Public Health.

3 Watervliet Arsenal Personnel Granted Patents

Patents for inventions to minimize gun-tube wear, eliminate gauge calibration errors, and improve an electroplating process were issued recently to three Watervliet (NY) Arsenal employes.

Dr. Robert S. Montgomery, chemist, received a patent for "Sleeve Bearing for Supporting Reciprocating Members." The application explains:

"Excessive wear of the sleeve bearings utilized to support a reciprocating gun tube can be minimized by the inclusion of a unique shallow pocket located within the hollow interior of the bearing, in the particular position at which peak surface loading is anticipated during the high-acceleration forces encountered in the initial portion of the recoil travel of the gun tube. "Such pocket communicates with a supply of oil and is designed to provide a continuous lubricating film between the contact surfaces of the bearing and the gun tube throughout the entire recoil and countercoil travel thereof."

Benjamin R. Taylor's patent is for "a device designed to eliminate inaccuracies encountered in using a laser beam interferometer to measure the length of a conventional gauging standard to an accuracy within several millionths of an inch. The device exerts an unchanging force on the gauging probe which is not affected by the force needed to move the probe into contact with the part to be measured, thus preventing inaccuracies."

William C. Sullivan's patent is for "an improved system of electroplating gun tubes by use of a simple power source. The system makes use of existing alternating current line-power by taking strips out of the a.c.

half-cycle and applying them periodically to a plating system.

"The prototype pulse-plating system is capable of delivering current pulses up to 40 amperes with a pulse duration of 60 microseconds to 6 milliseconds, and a minimum pulse repetition time of every 8 milliseconds on standard-line frequency with one-half cycle mode. With slight modifications, pulse current in excess of 100 amperes can be anticipated."

Edgewood Engineer Earns SAVE Certification

Proficiency in value engineering has earned specialist certification from the Society of American Value Engineers, a rating achieved by less than 300 persons worldwide, for R. Warren Miller, an industrial engineer at Edgewood Arsenal, Aberdeen (MD) Proving Ground.

Assigned to the Manufacturing Technology Directorate, Miller was cited for VE achievements resulting in fiscal year savings over $3 million.

Requirements for VE certification include a specific period of training followed by satisfactory completion of a written test. VE is termed "a systematic means of reducing operational costs without sacrificing material function or quality."

Army Employes Receive Aviation Safety Awards

Individual Aviator Safety Awards were presented recently to 10 personnel of the U.S. Army Bell Plant Activity, Fort Worth, TX, for achievement of more than 30,000 accident-free flight hours.

Commander of the U.S. Army Aviation Systems Command MG Eivind H. Johansen presented the awards to the group which has a combined total of 130 years of flight experience.

Herschel E. Reynolds, activity aviation safety officer, tops the list of recipients with more than 26 years of service and 8,400 hours of flying.

Other recipients are CW4 Duane M. Jackson, CPT Samuel G. Bracken, CPT Michael D. Doyle, COL Franklyn C. Goode (Bell Plant commander), LTC Donald R. West, MAJ Karl R. Griffin, CW3 Robert R. Taylor, CW4 Maurice G. Meyers, and CPT John W. Grow.

All of the aviators are currently engaged in acceptance flight testing.

Women in Army Science...

Katharine Mather Reports on Analysis of Concrete

Mrs. Katharine Mather's renown as one of the leading women in U.S. Army science was enhanced when she presented a technical paper and chaired a session at the recent annual international X-ray conference sponsored at the University of Denver, CO. She is chief of the Engineering Sciences Division, Concrete Laboratory, Army Engineer Waterways Experiment Station.

Mrs. Katharine Mather

Cosponsored by the University, the Denver Research Institute, and the Joint Committee on Power Diffraction Standards, this meeting is recognized as the most important yearly gathering of scientists working with X-rays for structural analysis of materials.

Mrs. Mather's paper was one of five invited papers presented at the opening session. Results of her work in X-ray diffraction examination in expansive cements, a research effort in which she pioneered effort at WES, were reported for the first time at the international conference.

Papers were presented by scientists representing groups involved in X-ray analysis in the United States, Poland, France, Germany, Belgium, Italy, Finland, England and Canada.

Mrs. Mather earned an AB degree in geology from Bryn Mawr College and was a graduate student at John Hopkins University where she also served as a research assistant in geology. She later was a research associate at the Field Museum of Natural History in Chicago.

She has served with distinction at the American Concrete Institute and received its Medal for Research, served as a member of the Board of Directors, and was elected a Fellow in 1973. She was president of the Clay Mineral Society and chaired several technical committees in the American Society for Testing Materials.

Mrs. Mather has been honored with the ASTM's Sanford E. Thompson Award for a paper of outstanding merit in concrete research. She is chairman of the committee on basic research of cement and concrete for the Transportation Research Board of the National Academy of Sciences-National Research Council.

She is a Fellow of the Mineralogical Society of America and a life member of the Mineralogical Society in London. She served as a delegate to the International Symposia on the Chemistry of Cement in Washington and Tokyo, and to the International Congress on Nondestructive Testing.

Mrs. Mather's honorary awards include the Decoration for Exceptional Civilian Service presented by the Secretary of the Army; the Distinguished Civilian Service Award presented by the Secretary of Defense; and the Federal Woman's Award. She was recognized as the Woman of Achievement by the Business and Professional Women's Club in the Jackson, MS, area and received the Distinguished Alumna Award from St. Catherine's School in Richmond, VA.

Mrs. Mather has been associated with the Corps of Engineers since 1942 as a geologist at the U.S. Military Academy, and has been with WES at Vicksburg, MS, since 1946. She and her husband, Bryant, a world authority in the field of concrete and chief of the Concrete Laboratory at WES, reside in Clinton, MS.

Reader's Guide . . .

New Reference Reports on Biodegradation Phases

All known major phases of biodegradation and biodeterioration, as reported at the Third International Biodegradation Symposium and other meetings, are covered in a recently published comprehensive reference volume edited by Dr. Arthur M. Kaplan and Dr. J. Miles Sharpley.

More than 20 nations were represented at the symposium held at Kingston, RI, under joint sponsorship of the U.S. Army Research Office, Office of Naval Research, National Bureau of Standards, Society for Industrial Microbiology, Rhode Island Agricultural Experimental Station and the Biodeterioration Information Center in England.

The new reference volume reports on more than 125 technical reports dealing with all known major research since 1971. It will serve as a supplement to the yearly reports of the Biotechnology Group, U.S. Army Natick Research and Development Command.

NARADCOM annually sponsors 3-day conferences, chaired and organized by Dr. Kaplan, to review research in the prevention of deterioration of material and microbial pollution control. Dr. Kaplan is head of the NARADCOM Biotechnology Group. Coauthor Dr. Sharpley heads Sharpley Laboratories, Fredericksburg, VA.

Attended by representatives of the U.S. Department of Defense, Canada, United Kingdom and Australia, the meetings are regarded as the most thorough update of research conducted by the four countries.

HumRRO Reports on Model Job Performance Tests

Development of a Model Job Performance Test for a Combat Occupational Specialty is the title of a 2-volume report published by the Human Resources Research Organization (HumRRO). Identified as FR-CD (L)-75-6, the first volume deals with "Test Development." The second volume is titled Instructions and Procedures for Conducting a Functional Integrated Performance Test.

Prepared under contract for the U.S. Army Research Institute for the Behavioral and Social Sciences, this study was directed to performance tests less costly, easier to administer and more reliable than those in use.

HumRRO indicated that development of model performance tests which elicit stimuli similar to those encountered on the job would be the best approach. Such a test could be constructed by use of modules which include several tasks.

Results indicated that the concept of functionally integrated performance tests is feasible, with revisions required prior to implementation of field testing. Correspondence relative to distribution of this report may be addressed to: Human Resources Research Organization, 300 North Washington Street, Alexandria, VA 22314.

ARI Examines Surveillance Team Effectiveness

Elements of a Battalion Integrated Sensor System: Operator and Team Effectiveness is a new publication issued by the U.S. Army Research Institute for the Behavioral and Social Sciences.

Research Report 1187 examines operational effectiveness of company and battalion ground surveillance teams using radars and NV devices.

The study extends previous findings that showed optimal effectiveness with 4-man teams using an AN/PPS-5A radar and an AN/TV-4 night-observation device (NOD) in support of a battalion in a static defense.

Results indicated that the highest quality of radar detection was achieved by teams consisting of one AN/PPS-5A ground surveillance radar operator, NOD operator, team chief and radio-telephone operator.

Correspondence relative to this report may be addressed to: U.S. Army Research Institute for the Behavioral and Social Sciences, ATTN: PERI-P, 1300 Wilson Boulevard, Arlington, VA 22209.

Personnel Actions . . .

FORSCOM Commander Gets 4th Star

GEN Frederick J. Kroesen

Promotion to 4-star rank and reassignment as commander, U.S. Army Forces Command, Fort McPherson, GA, came recently to GEN Frederick J. Kroesen, former commander VII Corps in Germany.

Commissioned through the U.S. Army Infantry Officer Candidate School, Fort Benning, GA, in 1944, GEN Kroesen holds bachelor's and master's degrees in international affairs from George Washington University. He has completed the Officer Advanced Course at the Army Armor School, Army Command and General Staff College, Armed Forces Staff College and the Army War College military career requirements.

During 1974-75, GEN Kroesen served as deputy commander, V Corps, Germany, following an assignment as commander, 82d Airborne Division, Fort Bragg, NC. He commanded the 1st Regional Assistance Command, Vietnam, in 1972.

GEN Kroesen was the last commander of the 23d Infantry Division (Americal) in Vietnam during 1971, following tours in the Office, Assistant Chief of Staff, Force Development, Washington, DC, as director of Manpower and Forces and as chief, Information and Data Systems.

Other assignments have included commander, 196th Light Infantry Brigade, Americal Division, Vietnam; deputy to the chief, Force Programing Division, OACSFOR, Washington, DC; faculty, Army War College.

An honorary member of the Infantry Officer Candidate Hall of Fame, GEN Kroesen is a recipient of the Distinguished Service Medal, Silver Star with Oak Leaf Cluster (OLC), Legion of Merit with two OLC, Distinguished Flying Cross, Bronze Star Medal with "V" device and two OLC, Air Medal w/ 29 OLC, Army C M w/ 2 OLC and Purple Heart w/OLC.

BG Augerson Heads Army Medical R&D Command

BG William S. Augerson

BG William S. Augerson, commander of the U.S. Army Medical Research and Development Command, succeeded MG Kenneth R. Dirks upon his recent promotion to 2-star rank and reassignment as commander, Fitzsimons Army Medical Center, Denver, CO.

Graduated (cum laude) from Bowdoin College in 1949, BG Augerson earned his M.D. degree from Cornell University in 1955. He has completed residence courses at the Command and General Staff College, the Industrial College of the Armed Forces, Army Aviation School, and the Air Force School of Aviation Medicine.

Following completion of his residency training in internal medicine at Walter Reed Army Medical Center, Washington, DC, he served as Americal Division surgeon and commander, 23d Medical Battalion, Vietnam. He also has completed tours of duty as flight surgeons of the 4th Infantry Division, the National Aeronautics and Space Administration's Space Task Group (Project Mercury), and the 101st Airborne Division/and surgeon to the 82d Airborne Division.

Listed among other key assignments are: director, Military Medicine and Allied Life Sciences Course, Walter Reed Army Institute of Research; military assistant, Medical and Life Sciences, Office of the Director of Defense Research and Engineering (ODDR&E), Office of the Secretary of Defense; and commander, 2d General Hospital, U.S. Army in Germany.

BG Augerson has authored 16 technical publications, is a recipient of the Jacobius Prize in Pathology from Cornell University Medical School, and has received the Special American Medical Association Honor Citation in Aerospace Medicine. He is a member of numerous medical and aerospace medical societies.

His military awards and decorations include the Silver Star, Legion of Merit, Meritorious Service Medal, Air Medal with four Oak Leaf Clusters, Commendation Medal, Parachutist Badge, and Combat Medical Badge.

Gibson Takes Over as Chief of Staff at HQ DARCOM

MG Harold B. Gibson Jr.

MG Harold B. Gibson Jr. is the new chief of staff, HQ U.S. Army Materiel Development and Readiness Command, after serving since January 1976 as DARCOM Director of Readiness. He succeeds MG Robert L. Kirwan, reassigned as commander, 7th Infantry Division and Fort Ord, CA.

A veteran of more than 33 years active service, MG Gibson has a BS degree in military science from the University of Maryland (Paris Center) and a master's degree in business administration from Syracuse University.

Commissioned following graduation from the Corps of Engineers Officers Candidate School in 1943, he has completed courses at the Army Command and General Staff College, Industrial College of the Armed Forces and University of Pittsburgh Management Program for Executives.

During 1974-75, MG Gibson was deputy chief of staff for Logistics, HQ, U.S. Army Europe and Seventh Army, following tours as deputy commander, U.S. Theater Army Support Command, Europe (TASC), and commander, Army Materiel Command, Europe.

Earlier assignments included director of Plans, Office, Deputy Chief of Staff for Logistics, Department of the Army, Washington, DC; commander, 29th General Support Group and Saigon Support Command, RVN; chief of staff, Tank-Automotive Command; and company commander, 1st Regiment, Ordnance Training Center, Aberdeen (MD) Proving Ground.

MG Gibson wears the Distinguished Service Medal, Legion of Merit, Bronze Star Medal, Meritorious Service Medal, Air Medal, Joint Service Commendation Medal, Army Commendation Medal, and Purple Heart.

Brain Succeeds Fix as DARCOM IL Commander

BG Tom H. Brain

Retirement of MG Joseph E. Fix III recently set the stage for BG Tom H. Brain to succeed him as commander, U.S. Army International Logistics Command and director of International Logistics, HQ U.S. Army Materiel Development and Readiness Command (DARCOM).

BG Brain was director, International Logistics, Office of the Deputy Chief of Staff for Logistics (ODSLOG), HQ DA. He has served as chief, Munitions Division, Office of the Deputy Chief of Staff for Research, Development, and Acquisition; and as deputy director, Supply and Maintenance and Materiel Acquisition, ODCSLOG.

He also has served as project manager, Vehicle Rapid Fire Weapon System, HQ Army Weapons Command; and commander, Division Support Command, 101st Airborne Division, Fort Campbell, KY.

Graduated from the U.S. Military Academy in 1953, BG Brain has an MS degree in engineering from Purdue University, has completed the Command and General Staff College course, and has a doctorate in mechanical engineering from Columbia University. He has completed courses at the Industrial College of the Armed Forces, U.S. Army Ordnance School, and the U.S. Army Artillery School.

Listed among his military awards and decorations are the Legion of Merit with Oak Leaf Cluster (OLC), Bronze Star Medal with OLC, Meritorious Service Medal with two OLC, Air Medal (two awards) and Army Commendation Medal with "V" device and OLC.

Wells Commands Engineers' Middle East Division

BG Richard M. Wells, recent commander of the 4th Advanced Individual Training Brigade, Army Training Center, Fort Leonard Wood, MO, has assumed command of the U.S. Army Corps of Engineers new Middle East Division, Saudi Arabia.

BG Wells graduated from the U.S. Military Academy in 1951 and has MS degrees in civil engineering from Iowa State College and in international affairs from George Washington University. He has completed courses at the Naval War College and the National War College.

His record shows assignments as combat engineer unit commander in four Korean War campaigns; project engineer, Army Construction Agency, Worms, Germany; instructor, U.S. Naval Academy; staff officer, Engineer Strategic Studies Group, Office, Chief of Engineers, Washington, DC, and with the Office of the Army Assistant Vice Chief of Staff, Washington, DC; commander, 84th Engineer Battalion, Vietnam; and Chicago District engineer.

Registered as a professional engineer in Chicago, BG Wells wears the Legion of Merit w/ OLC, Bronze Star Medal, and the Air Medal (OLC).

Matthews Assumes Watervliet Arsenal Command

COL Church M. Matthews Jr., until recently deputy coordinator for Army Assistance, Office of the Chief of Staff, Department of the Army, has assumed command of the U.S. Army Watervliet (NY) Arsenal.

Graduated from the U.S. Military Academy in 1957, COL Matthews has a master's degree in engineering from New Mexico State University. He has completed student requirements at the Command and General Staff College, Industrial College of the Armed Forces and in the Ordnance School Officer Career Course.

During 1966-67 he served at Watervliet Arsenal as chief of its Benet Weapons Laboratory. Earlier career assignments were with the 11th Airborne Division in Germany; ordnance supply adviser, Vietnam; and White Sands (NM) Missile Range.

COL Matthews has served also as chief, Pacific/Southeast Asia Division, Directorate for International Logistics, HQ DA; commander, 197th Support Battalion, Fort Benning, GA; and Joint Logistics Review Board.

COL Church M. Matthews

Hissong Selected as M880 Commercial Truck PM

COL Fred Hissong Jr., graduated recently from the U.S. Army War College, has been assigned as product manager, M880 1¼-Ton Commercial Truck System, Tank Automotive Materiel Readiness Command.

COL Hissong is a former commander of the Indiana Army Ammunition Plant, Charleston, IN, and has served duty tours in Vietnam, Germany, and with the Office of the Deputy Chief of Staff for Logistics, HQ DA.

Graduated with a BS degree in personnel management from Ohio State University and an MS degree in industrial management from Babson College, he has completed course requirements at the Army Command and General Staff College, Military Nuclear Weapons School, Ordnance Officers Career School, Guided Missile Maintenance School, the Fire Control Maintenance course, and Ordnance officers basic training.

His military decorations include the Bronze Star, Meritorious Service Medal, Army Commendation Medal.

COL Fred Hissong Jr.

Juvenal Assumes TECOM Chief of Staff Duties

COL Michael P. Juvenal was recently assigned as the new chief of staff, U.S. Army Test and Evaluation Command, Aberdeen (MD) Proving Ground, following the retirement of COL William H. Tucker.

A career Infantry officer with 24 years of active military service, COL Juvenal has served as secretary of the General Staff, HQ Allied Forces, Southern Europe, Naples, Italy; combat tactics instructor, U.S. Military Academy (USMA); and as a battalion commander in Vietnam.

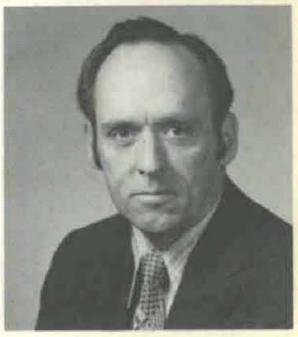
Graduated from the USMA, he has a master's degree in electrical engineering from Georgia Institute of Technology. He has completed the Army Command and General Staff College (resident course) and the Army War College. He has received the Silver Star, Legion of Merit with Oak Leaf Cluster (OLC), Distinguished Flying Cross, Bronze Star Medal with Device for Valor (4 OLC), Army Commendation Medal (w/OLC).

Starrett Takes Over as DCAA Deputy Director

Appointment of Charles O. Starrett Jr., former assistant director for Policy and Plans, Defense Contract Audit Agency, as DCAA deputy director, was announced recently by Assistant Secretary of Defense (Comptroller) Fred P. Wacker. A member of the planning group which organized DCAA in 1965, Starrett served during 1956-64 as an auditor, field office chief and headquarters staff adviser with the Air Force auditor general.

A graduate of the University of Florida, he is a certified public accountant in Virginia and a member of the American Institue of Certified Public Accountants and Association of Government Accountants.

Graduated from the DCAA Director's Fellowship Program at Central Michigan University, he is a recipient of the Distinguished Civilian Service Award and the Meritorious Civilian Service Award.



Charles O. Starrett Jr.

Rapmund Chosen as WRAIR Director/Commandant

COL Garrison Rapmund, MC, moved up recently from deputy director to director/commandant of Walter Reed Army Institute of Research, following reassignment of COL J. T. Joy to the Uniformed Services University of the Health Sciences as professor and chairman, Department of Military Medicine and History.

Graduated from Harvard University with a BA degree in American history in 1949, COL Rapmund earned his MD in 1953 from the College of Physicians and Surgeons, Columbia University, where he was awarded the William Perry Watson Prize in pediatrics. He later studied microbiology at Columbia Presbyterian Medical Center in New York City, supported by a National Institutes of Health postdoctoral Fellowship.

He interned at Bellevue Hospital in New York City and received pediatric training at the Babies Hospital. After serving as chief resident in 1956, he volunteered for Active Army duty in 1957 and was assigned to WRAIR's Department of Virus Diseases.

COL Rapmund conducted studies of virus and rickettsial dieases at the US. Army Medical Research Unit (USAMRU), Kuala Lumpur, Malaysia (1958-60), returned there in 1964 as chief, department of Rickettsial Diseases, and in 1965 became USAMRU commander. He also earned recognition for research on scrub typhus, and was elected president of the Malaysian Society of Tropical Medicine and Parasitology.

Other assignments have included chief, Life Sciences Division, U.S. Army Research Office, Office of the Chief of Research and Development, HQ DA; and deputy commander, Army Medical R&D Command.

COL Rapmund holds the Legion of Merit, Army Commendation Medal and in 1969 received a Certificate of Appreciation from the Prime Minister of Malaysia for aid.

COL Garrison Rapmund

Ramsay Directs USCSC Recruiting, Examining

Arch S. Ramsay, former director of the U.S. Civil Service Commission's Bureau of Policies and Standards, is now director of Recruiting and Examining. He succeeds Wendell G. Mickle, reassigned as assistant executive director for Field Operations. The Bureau is responsible for staffing all competitive civil service jobs. It is comprised of 10 regional offices, 65 area offices and 110 Federal Job Information Centers.

A World War II U.S. Navy veteran, Ramsay joined the Commission in 1951 as a management intern. In 1967 he transferred to the Department of Health, Education and Welfare and later the Treasury Department before returning to the CSC in 1975.

Fitch Assumes Duties as AMRDL Deputy Director

COL John B. Fitch has succeeded COL Norman L. Robinson, recently retired, as deputy director of the U.S. Army Air Mobility R&D Laboratory, headquartered at NASA-Ames Research Center, Moffett Field, CA.

COL Fitch served formerly as chief, Combat Air Systems and chief, Maneuver Division, Combat Developments, U.S. Army training and Doctrine Command, Fort Monroe, VA.

A qualified parachutist and senior Army aviator, he was graduated from the U.S. Military Academy in 1953, has an MS degree in aerospace engineering from Georgia Institute of Technology, has completed the residence course at the Army Command and General Staff College.

COL John B. Fitch

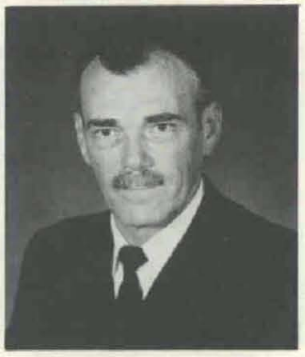
Listed among his key assignments are Office, Chief of Staff for Force Development, Department of the Army; Army Combat Developments Command; commander, 3d Squadron, 17th Air Cavalry, Vietnam; and 2d Armored Division, Germany.

COL Fitch wears the Legion of Merit, Distinguished Flying Cross, Air Medal with six Oak Leaf Clusters and Army Commendation Medal.

Navy CPT Cowart Selected as AFIP Director

CPT Elgin C. Cowart Jr., Medical Corps, U.S. Navy, formerly one of two deputy directors of the Armed Forces Institute of Pathology, Washington, DC, took over in October as AFIP director, following the retirement of COL James L. Hansen.

COL William R. Dwyre, MC, U.S. Army, was named to fill the position vacated by CPT Cowart, following an assignment as director of Medical Activities and commander, U.S. Army Hospital, Fort Polk, LA.



CPT Elgin C. Cowart

A U.S. Navy medical officer for 24 years, CPT Cowart has served as commander, Naval hospital, Port Hueneme, CA; AFIP curator; chief of Pathology and executive officer, Naval Medical Research Unit, Cairo, Egypt; commander, *USS Sanctuary*.

He is coauthor of the *Billings Microscope Collection of the Armed Forces Institute of Pathology*, a graduate of the Tulane University School of Medicine, and holds the Legion of Merit with Combat "V" and the Army Commendation Medal.

Hughes Named WES Deputy Commander/Director

Deputy commander and director, U.S. Army Engineer Waterways Experiment Station (WES), Vicksburg, MS, became the responsibility of LTC Douglas A. Hughes, succeeding LTC Robert K. Hughes (no relation).

LTC Douglas Hughes has served at WES as a program manager and R&D project coordinator in the Weapons Effects Laboratory. He has a BS degree from Washington State University and an MS degree from the Naval Postgraduate School, both in physics. He has also completed the Engineer Officer Advanced Course and is an Infantry School graduate.

LTC Douglas A. Hughes

Key assignments have included deputy director, U.S. Army Aberdeen (MD) R&D Center; nuclear weapons effects officer, Military Engineering Topography Directorate, Office, Chief of Engineers; R&D coordinator, National Naval Medical Center, MD.

LTC Hughes is a recipient of the Bronze Star Medal, Meritorious Service Medal, Joint Service Commendation Medal, Army Commendation Medal, National Defense Medal and Vietnam Service Medal.

Army R&D — 15 Years Ago

The Army R&D Newsmagazine reported on...

AR 11-25 Directs Drive to Reduce Lead Time

Procedures directed toward solution of one of the nation's urgent problems, "the reduction of lead time to insure that superior armaments and men trained to use them are ever ready for any emergency," are prescribed in a new Army Regulation 11-25 titled "Reduction of Lead Time."

The regulation implements recommendations of a voluminous report on a wide-ranging study conducted from February to August 1961 by a permanent Army General Staff Materiel Requirements Review Committee established by the Chief of Staff.

Chaired by MG H. H. Fisher, Assistant Deputy Chief of Staff for Military Operations, the committee included MG Samuel L. Myers, Assistant Deputy Chief of Staff for Logistics, and MG Dwight E. Beach, Deputy Chief of R&D. Nonvoting members were MG Louis T. Heath, U.S. Continental Army Command, and BG R.N. Tyson, Office Army Comptroller.

ARO-D Spurs In-House Research by Grants

Stimulation of creative research through financial aid to small-scale investigators desiring to explore novel scientific concepts is the purpose of a new program announced by the Army Research Office in Durham, NC.

Any Army scientist or engineer may apply, through his Commanding Officer, for a small amount of funds to finance research of possible value to the Army. Proposals are desired in the areas of chemistry, physics, mathematics, metallurgy, ceramics, and basic engineering, all of which are in the mission range of ARO-D (redesignated early in 1972 as the U.S. Army Research Office, Research Triangle Park, N.C.).

Fluid Amplifier Pulses Flow of Heart Pump

Principles of fluid dynamics, permitting control of energy sources without use of moving parts, are unveiling exciting possibilities in the Army's search for a greatly improved low-cost heart pump.

Research initiated at the Army Diamond Ordnance Fuze Laboratories and now pursued jointly with the Walter Reed Army Institute of Research in Washington, DC, has produced an experimental prototype heart pump controlled by a fluid amplifier block.

Inventor Kenneth E. Woodward, 33, commented during a demonstration that the machine has functioned satisfactorily in tests since it was placed in operation in February 1961. He was quick to emphasize, however, that research still is in the early phase and certain problems may not be easy to solve. (Woodward climaxed 13 years of night school and Army Graduate School Program study in 1973 when he earned his doctorate at American University. He has 12 patent awards, has received the Army Decoration for Exceptional Civilian Service, and is now retired.

Defense Supply Chief Gets Procurement Authority

LTG Andrew T. McNamara, former Army Quartermaster General and now Director of the new Defense Supply Agency (DSA), has been authorized to operate and control supply and service organizations, activities and facilities. Secretary of Defense Robert S. McNamara signed a directive defining DSA responsibilities to centralize management.

When it becomes fully operational, DSA will procure annually more than $2,500,000,000 worth of supplies and material and will manage a multibillion dollar inventory for peacetime and mobilization requirements. More than 1,200,000 line items will be managed by the agency.

MWDP Strengthens Defense by Integrating R&D

Strengthening of Free World defenses through integrated R&D effort, directed toward significant armament and materiel advances at less cost, is demonstrating the soundness of the Mutual Weapons Development Program (MWDP).

U.S. Armed Forces have participated in the MWDP since it was established by the U.S. Congress through a provision of the Mutual Security Act of 1953. The function of the MWDP provides for increasing cost-sharing support between the U.S. and its NATO allies in selective areas of military R&D, exclusive of nuclear weapons.

Aside from helping NATO nations develop their own weapon ideas, and getting better mutual defense for less money, the U.S. Army has encouraged another aspect of the program - private industry's interest in technical Data Exchange Agreements.

Under these Data Exchange Agreements, the MWDP mobilizes the scientific and technological skills of the western world community towards solving common R&D problems through the release of selected technical information.

MARED Seminar Serves Goals of DARCOM Executive Development

Opportunities for career advancement to high-level managerial positions in the U.S. Army Materiel Development and Readiness Command (DARCOM) were explained, and discussed in detail at workshop sessions, in the recent MARED Program first general seminar.

MARED denotes Materiel Acquisition and Readiness Executive Development Program, initiated in January 1976 by direction of GEN John R. Deane Jr., DARCOM commander and keynote speaker at the week-long seminar in Atlanta, GA. DARCOM Director of Personnel Training and Force Development BG Lawrence S. Wright gave the welcoming address.

Assistant Secretary of the Army (Manpower and Reserve Affairs) Donald G. Brotzman, dinner speaker, discussed "Executive Development in the Army." In assuring full Department of the Army support of the MARED Program, he lauded DARCOM initiative in implementing this management improvement effort.

Assistant Secretary of the Army (Research and Development) Edward A. Miller, principal speaker at another dinner, presented his views on some of the complex aspects of technology transfer between the United States and North Atlantic Treaty Organization (NATO) nations. He also discussed aspects of DARCOM's role in international weapons systems.

Another well-received address dealing with international economic problems was presented by Harald B. Malmgren, a Fellow of the Woodrow Wilson International Center for Scholars, Smithsonian Institution, and a former ambassador and White House Deputy Special Representative for Trade Negotiations.

"Motivation" was discussed by Dr. William D. Reif, Arizona State University associate professor of management. "Ethics for Executives" was presented by Dr. Thomas Stanton, vice president, Madison College, Harrisonburg, VA, and Dr. Anthony J. Wiener, professor of management and director of policy studies, Polytechnic Institute of New York, spoke on "The Future and the Executive."

"The Department of Defense Budget Process" was explained by Laurence Olewine, Office of the Assistant Secretary of Defense (Comptroller). Assistant President Gus Tyler, International Ladies Garment Workers' Union, discussed "The Expanding Labor Movement" and its impact on negotiations with management.

U.S. Civil Service Commission representation included Raymond Borntraeger, director, Management Sciences Training Center, who spoke on "The Nature of Management," and Elsa Porter, Bureau of Personnel Management Evaluation, whose subject was "Productivity and Organizational Effectiveness." They also conducted workshops.

BG James Donovan, deputy chief, Office of Legislative Liaison, Office of the Secretary of the Army, spoke on "The Department of the Army Executive and the Congress."

Other featured speakers included Dr. Richard L. Haley, deputy director for Development and Engineering, HQ DARCOM, whose subject was "Life Cycle Materiel Management" under DARCOM's "new way of doing business." Assistant Deputy for Materiel Development John D. Blanchard described DARCOM "Concepts of Materiel Development and Readiness." Assistant Deputy for Materiel Readiness James F. Maclin detailed objectives of the Reliability, Availability and Maintainability (RAM) Program, and procedures to achieve this goal.

DARCOM Assistant Deputy for Science and Technology Norman L. Klein made a presentation on the mission and policies for his office, and also served as a leader of the workshop session on science and engineering. Director for Quality Assurance Seymour J. Lorber similarly described his duties, prior to leading a workshop on this subject.

Director for Readiness MG H. B. Gibson Jr. spoke with Seymour Gordon on "Materiel Maintenance Management" and headed a workshop on this topic. BG William J. Hilsman, project manager for Army Tactical Data Systems, detailed his functional responsibilities and chaired the workshop on ARTADS, as well as a workshop on Project Management.

DARCOM Commander GEN John R. Deane Jr., with MARED Program participants Beverly D. Briggs, physical scientist, MERADCOM; and Francesca Conners, TROSCOM, St. Louis, MO.

Assistant Secretary of the Army (M&RA) Donald G. Brotzman and Pat Gallagher, chief, MARED Program Administration.

Assistant Secretary of the Army (R&D) Edward A. Miller; DARCOM director, PTFD, BG Lawrence S. Wright, Henry J. Valadez.

Importance of taking proper action to assure physical fitness for the demanding pressures of top management responsibilities was discussed by Command Surgeon COL Philip O. Carey, U.S. Army Forces Command.

Other workshops and leaders included: Procurement, Valcris O. Ewell, HQ DARCOM; Supply, M. I. Hinson, deputy director, Materiel Management, DARCOM; Department of Defense Management, Dr. M. Z. Thompson, U.S. Army Management, Engineering, Training Agency (AMETA); Value Engineering, Gil Siegel, AMETA; Supply Career Program, G. C. Cox, HQ DARCOM; The Changing Workforce, Lyman D. Ketchum, L. D. Ketchum Associates Inc.; Managerial Self Assessment, Dr. M.Z. Thompson; Communications, D.Garrison, AMETA.

The concluding general session included a "Seminar Recapitulation" by Gordon N. Kellett, chief of the DARCOM Civilian Personnel Division, and executive secretary of the MARED Board; a rundown on planned MARED Operations in 1977 by Mrs. Pat Gallagher, chief, MARED Program Administration Unit; and BG Lawrence S. Wright, closing comments.

MARED 1977 Selection Process Opens for Applicants

Seventy-eight selectees for the MARED Program in 1976 participated in the MARED first general seminar. Ninety-seven of the original selectees were representative of about 9,000 estimated eligibles in DARCOM.

Approximately 900 applicants were considered in 1976, with 525 nominated by commanders of the agencies in which they are employed. The expectation is that as many as 2,000 to 3,000 may apply for the 1977 program, which will open Dec. 1 and close Feb. 25. Submissions must be made through supervisory channels to HQ DARCOM, ATTN: DRXMM-AM, 5001 Eisenhower Ave., Alexandria, VA.

Selection criteria include employment in positions classified GS-13 through GS-15 as scientists, engineers, procurement personnel, or in quality assurance, supply, and materiel management. Seminar participants included 39 GS-13s, 32 GS-14s and 7 GS-15s, ranging in age from 30 to 60. One of the criteria is that applicants must commit themselves to five years of additional U.S. Government service. Selectees in 1976 averaged age 43.

Qualifications of applicants are competitively reviewed at field command level and are further reviewed by a DARCOM Career program panel. The program is operated by a high-level MARED Board which makes the final selection.

The MARED Program statement of purpose is: To develop individuals to fill key positions in the DARCOM materiel acquisition and materiel readiness functions by providing them both formal training and on-the-job assignments which will increase their occupational and organizational perspective. An Individualized Development Program is designed for each selectee.

Important for each potential applicant to consider is the required commitment to a high degree of mobility during the career development program in order to give participants a broad variety of training assignments.

IAP

COL Edwin M Aguanno

KUWAIT

COL Martin J. Small

LANCE

COL Donald P. Whalen

M60TD

COL Robert E. Butler

M60TP

COL Richard H. Sawyer

M110E2

LTC Benjamin Huggin

M113

COL Roy A. Cunniff

MICVS

BG Stan R. Sheridan

MEP

COL Ralph H. Sievers

FIREFINDER

COL William J. Harrison

MSCS

COL Donald L. Lasher

MPBME

BG John S. Egbert

NAVCON

COL LeRoy White

NUC MUN

COL James H. Sloan

PERSHING

COL Larry H. Hunt

PLD

COL John Reeve

2.75" RS

COL James L. Tow

REMBASS

COL Louis C. Friedersdorff

SAFEGUARD

Moe M. Goldy

PATRIOT

MG Charles F. Means

SATCOM

COL Fred M. Knipp

SANG

BG Richard D. Lawrence

SEL AMMO

COL Ralph J. Cook

SIGINT/EW

COL William D. Clingempeel

SINCGARS

COL James E. Wyatt

SMOKE

COL Henry R. Shelton

STINGER

COL David E. Green

SEMA

COL John J. Top

TOW

COL Robert W. Huntzinger

TRADE

COL Leland A. Wilson

ROLAND

BG Frank P. Ragano

UTTAS

COL Richard D. Kenyon

VIPER

COL Hubert W. Lacquement

C/OPM DARCOM

COL Lauris M. Eek