ARMY RESEARCH AND DEVELOPMENT

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1968 R&D Achievement Awards Won by 18 Individuals, 5 Teams

Army Research and Development Achievement Award winners for 1968, selected by judges representative of major fields of effort, number 18 individuals and 17 members of five teams indicative of the diverse capabilities of 15 in-house laboratories.

Based on criteria established in Army Regulations, winners were selected for their contributions of a significant scientific or engineering achievement that "establishes a scientific basis for subsequent technical improvement of military importance and/or materially improves the Army's technical capability and/or contributes materially to national welfare."

Caliber of the 1968 contributions overall among competitors for the R&D Achievement Awards is indicated by the difficulty the judges had in narrowing the field of 38 nominations

(Continued on page 3)

APG Dedicates Pulse Radiation Facility

Dedication of a $5 million Army Pulse Radiation Facility June 6 at Aberdeen (Md.) Proving Ground served to announce officially that the most powerful nuclear reactor of its type in the U.S. is in full-scale readiness for materiel testing. Operated by the APG Army Ballistics Research Laboratories, the facility is an advanced version of the Atomic Energy Commission reactor for health physics research which has been in operation since 1962 at Oak Ridge (Tenn.) National Laboratory.

Dr. Hubert P. Yockey, APRF supervisor, a veteran of more than 20 years in nuclear physics research, said the Army Materiel Command facility will serve the Army primarily. When no interference with this mission is involved, it may be used by other U.S. Government, industry and academic investigators on a space-available, time-reimbursable basis, subject to AMC approval.

Army experiments at the APG facility will be concerned with a broad range of investigations on nuclear irradiation effects on both small and large weapons systems and components. It will have a staff of 15 employes and will support research of all East Coast Army laboratories.

Dr. Yockey explained that the reactor facility, in addition to being the

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ASC Banquet Speaker

General Harold K. Johnson
(See story on page 11)

Edgewood Arsenal Marks 50 Years Progress

Golden Anniversary ceremonies May 4 at Edgewood (Md.) Arsenal prompted numerous congratulatory messages commending 50 years of growth and progress as a major Army in-house research installation.

Under General Order No. 7, dated May 4, 1918, a 3,400-acre part of the Army's Aberdeen (Md.) Proving Ground—known as Gunpowder Reservation—and government-leased gas manufacturing plants in five states were officially designated Edgewood Arsenal.

Spawned as a top-priority response to World War I requirements, the Edgewood facilities represented a $19 million investment. The arsenal consisted of two shell- and grenade-filling plants and four manufacturing plants, with enlisted men providing most of the labor force. Currently it has 1,700 military and 3,800 civilian employes.

Golden Anniversary tours enabled more than 1,300 high-ranking civil and military officials, former arsenal

(Continued on page 6)

WSO Members of 4 Nations Attend Reception

WASHINGTON STANDARDIZATION OFFICE (WSO) members, representing the United States, United Kingdom, Canada and Australia, attended the ABCA 19th annual reception May 6 at Fort McNair, Washington, D.C. Representatives are (from left) Brig Gen Kenneth F. Dawalt, U.S. Army member; Brigadier Sir F. G. L. Coates, United Kingdom; Brig Gen E. D. Danby, Canada; Brigadier W. G. Henderson, Australia. WSO members' wives are (from left) Lady Coates, Mrs. Danby and Mrs. Henderson. (See page 26 for another picture of participating dignitaries.)

Featured in This Issue . . .

Army R&D Newsmagazine

Vol. 9 No. 6 • June 1968

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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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CHANGES OF ADDRESS for AE and R&D Officer Special Career Program enrollees should be addressed to: Specialist Branch, OPXC, Department of the Army, Stop 106 Washington, D.C. 20315. Reserve R&D Unit members should contact: Special Assistant for Reserve Affairs, OCRD, Department of the Army, Washington, D.C. 20310.

OTHER GOVERNMENT AGENCIES' requirements should be submitted directly to the Army Research Office, OCRD, Department of the Army, Washington, D.C. 20310, ATTN: Scientific and Technical Information Division.

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AE, R&D Programs Prove Rewarding

Promotion-minded officers with special interests or qualifications in nuclear and research and development assignments may be missing one of the best pay-off possibilities if they are not members of the Army AE and R&D Officer Programs. Promotion statistics support the statement.

Increasingly, however, it is evident that ambitious young officers are recognizing the opportunities presented by these programs. Total enrollment has increased about 25 percent in the past five years. As of Apr. 30, 1968, there were 207 members in the Atomic Energy Program and 604 in the R&D Program.

Until Sept. 18, 1967, when AR 614-131 became effective in governing the AE Program and AR 614-135 prescribed for the R&D Program, the programs were so closely related that a single Army Regulation controlled both. The AE Program, initiated in 1953, preceded the R&D Program by two years. That makes them two of the oldest of the Army's 11 special career programs.

Policies governing all officer special career programs are established by the Deputy Chief of Staff for Personnel, HQ Department of the Army. Operation of the programs is the responsibility of the chief, Office of Personnel Operations (OPO), HQ DA.

The Assistant Chief of Staff for Force Development assists with the management of the AE Program and the Chief of Research and Development similarly supports the R&D Program.

Essentially, the AE and R&D Officer Programs are designed to satisfy the increasing needs of the Army for officers possessing special qualifications in the "hard" sciences, that is, engineering and physical sciences.

Program participants have the opportunity to serve in a wide variety of jobs at the highest levels of the Department of Defense. Assignments include service in civilian laboratories, military research facilities, military development and test boards, and in technical supervisory jobs.

Participants retain their branch (Arm of Service) identity while expanding their capabilities in the areas of atomic energy and research and development. Alternately, they receive increasingly important branch and AE or R&D assignments to assure progression in each. This dual capability improves potential for further service and, of course, promotion.

Approximately 95 percent of the officers in each of the programs have at least an undergraduate degree. More than 69 percent of the AE Program and 74.2 percent of the R&D Program participants have graduate degrees.

Compared to the overall Army officer average for undergraduate degrees of approximately 76 percent and the 8.7 percent with advanced (nonprofessional) degrees, these statistics attest to the exceptionally high caliber of AE and R&D Program participants.

Statistics also indicate clearly the payoff. Promotion rates for AE and R&D officers continue to be considerably higher than the average for Army Promotion List (APL) officers.

Illustrating this fact is that on the recent temporary colonels list, the selection rate for all APL officers on first consideration was 47.4 percent, as compared to 63.3 for all special career program officers.

Similarly, the lieutenant colonels recommended list reflected a selection rate of 85.8 percent among APL officers on first consideration, as compared to 95.7 percent for career program officers. Among those considered for promotion to major, APL officers rated 87.3 percent, as compared to 98.7 percent for career program members.

Favorable promotion rates for special career program participants are attributed to two basic factors. Potential members are carefully screened and accepted on a very selective basis. Careers of participants are monitored carefully to ensure that opportunities

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Notice to AE, R&D Officers On Newsmagazine Distribution

If you happen to be one of that select group of some 800 members of the U.S. Army Atomic Energy and Research and Development Officer Special Career Programs, *you are again reminded* of the need to send a change of address for the *Army R&D Newsmagazine* when you move.

This reminder is important to you if you are interested in continuing to receive the *Army R&D Newsmagazine*. The administrative workload in the Specialist Branch, Office of Personnel Operations, requires discontinuance of individual distribution if copies of the Newsmagazine are returned for improper or invalid address.

To insure continued delivery, program members are requested to use DA Form 1175 and forward promptly, or in advance if possible, any reassignment change of address. Notices should be mailed to the Specialist Branch, Executive for Career Planning, Office of Personnel Operations, Department of the Army, Washington, D.C. 20315.

R&D Achievement Awards Won by 18 Individuals, 5 Teams

(Continued from page 1)

to the 23 awards. Nominations were screened carefully by the major commands before they were submitted.

Winners are representative of laboratories of the U.S. Army Materiel Command, Office of The Surgeon General, Office of the Chief of Engineers, the U.S. Army Limited War Laboratory, and the Army Security Agency.

The range of R&D effort represented by the 1968 achievement award winners is impressive, reflecting accelerated response to many of the critical problems in the Southeast Asia conflict. The results are adjudged as substantially improving the U.S. Army's capability to accomplish its overall mission.

Chief of Research and Development Lt Gen Austin W. Betts is expected to continue the policy he initiated in 1967 of personally presenting the R&D Achievement Awards, consisting of a lapel pin and a suitably engraved plaque, to the winners during a tour of R&D activities later this year.

Dr. Richard A. Weiss, Deputy and Scientific Director of Army Research, headed the ad hoc panel of judges, representative of the four directorates of the Office of the Chief of Research and Development, namely: Col Alphus R. Clark and Lt Col William J. Harrison, Directorate of Developments; Lt Col Marcus W. Hansen, Directorate of Plans and Programs; Dr. I. R. Hershner, Directorate of Army Research; and Lt Col Floyd H. Henk and Lt Col Eugene M. Simonson, Directorate of Missiles and Space.

Award winners and a synopsis of the research, engineering or developmental work upon which selection was based are as follows:

HUGH T. REILLY, U.S. Army Limited War Laboratory, Aberdeen (Md.) Proving Ground, performed effective technical direction, contribution to and coordination of the Personnel Detector Project, compressing the R&D cycle time from task initiation to time equipment was delivered to Southeast Asia.

Assigned as a chemical engineer with the Applied Chemistry Branch, Reilly was project engineer for research and development of the E-63 Manpack Detector, the Airborne Personnel Detector, the Advanced Airborne Personnel Detector and other personnel detection devices. These tasks were of highest priority and major significance in advancing missions of the U.S. Army in the field from September 1965 to January 1968.

RONALD J. GOLDSTEIN, U.S. Army Security Agency, Arlington Hall Station, Va., performed as project engineer for the development of the Sugar Tree System, including establishment of a data-collection network, communications, operating doctrine and criteria, and the development of the data analysis and evaluation capability.

Goldstein, an electronic engineer, serves as project engineer for specific equipment and/or systems development projects which are designed to meet the operational requirements of the U.S. Army Security Agency. His achievements are said to have accounted for what is probably the most cost-effective breakthrough in the history of U.S. Intelligence systems.

AARON ISMACH, assistant technical director of the U.S. Army Medical Equipment R&D Laboratory, Fort Totten, N.Y., was cited for development of a portable field-type resuscitator.

While employed as chief of the Engineering Division, he produced a machine suitable for treatment of chemical warfare casualties as well as for general medical resuscitation in either contaminated or uncontaminated atmospheres. In a more sophisticated form, the unit promises to be extremely valuable in hospital operating and recovery rooms.

Ismach received the Exceptional Civilian Service Award in 1964 at the Eighth Annual Secretary of the Army Awards ceremonies for his invention of an intradermal tip as an accessory to a foot-controlled injection device for high-speed immunization.

ARTIFICIAL HAND. A 3-man team from the U.S. Army Medical Biomechanical Research Laboratory, Walter Reed Army Medical Center, Washington, D.C., developed an electromechanical artificial hand. It provides an amputee with automatic control of grasp and is considered a major breakthrough in hand design.

Credited with developing the prosthetic device are *Lloyd L. Salisbury, Jr.*, chief of the Biomechanical Devices Division, *Albert B. Colman*, chief of the Design Branch, and *Leonard F. Marcus*, electronic development technician with the Test and Evaluation Branch.

JAMES T. BALLARD, Waterways Experiment Station (WES), Vicksburg, Miss., project manager and chief of the Operations Group, Nuclear Weapons Effects Division, was recognized for providing leadership in developing data for design and construction techniques for a reinforced concrete arch structure.

He also was cited for his part in the selection and procurement of a flexible metal pipe arch structure, and for a combat bunker made from concrete logs—all in support of the high-priority Southeast Asia requirement for protective shelter systems.

WES CIVIL ENGINEERS *Richard G. Ahlvin, Donald N. Brown, Harry H. Ulery Jr.* and *Donald M. Ladd* developed new technology in Aircraft Ground-Flotation Criteria which improved the Army's technical capability for efficient design of aircraft landing gears and airfields.

This technology enables aircraft designers and manufacturers to minimize the severe loadings on airfields; also, permits new, heavier aircraft to be designed for unstrengthened existing airfields. Consequently, the technology widens the use of existing airfields by new, heavy aircraft.

BRUCE M. HALL, Extraterrestrial Research Agency, Office of the Chief of Engineers, Washington, D.C., was selected for his leadership in advancing scientific and technical knowledge of the moon and its environment, and for significant contributions to effective coordination of related research.

As chief of the Space Sciences Section, Hall was credited with development of a hypothetical lunar model that made possible other important research up to two years in advance of confirming data from U.S. and Russian lunar probes. He was cited for exceptionally effective coordination of research on lunar resources, both in and outside the U.S. Goverment.

WILLIAM J. SKUDERA JR., a physicist with the Microwave Materials Section, Electronic Components Laboratory, U.S. Army Electronics Command (ECOM), Fort Monmouth, N.J., developed a new technique for more efficient conversion of microwave energy into magnetoelastic waves. The method will find application in surveillance and electronic equipment.

DR. DONALD A. SMITH, an electronic engineer with ECOM's Wide-Band Propagation Team, Transmission Technical Area, Communications/ADP Laboratory, developed a new optical modulation and detection technique as a result of investigations of methods of digital modulation, transmission and detection in the optical region.

ATHENA PROJECT TEAM. Five ECOM employes (one since deceased), recognized for differing and highly specialized skills, pooled their talents in contributing to the Athena Project

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Aberdeen Proving Ground Dedicates Pulse Radiation Facility

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most powerful of its type in the United States, is uniquely designed in several other respects.

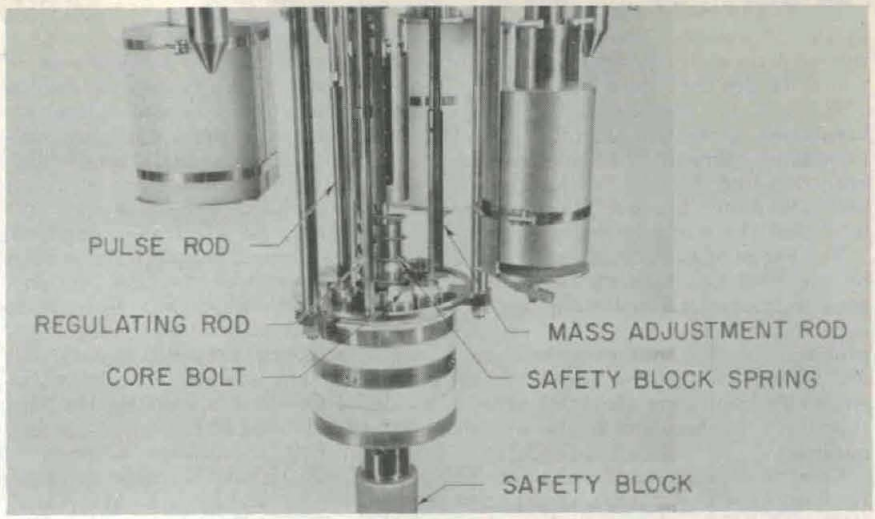
For example, in anticipation of projected user requirements, designers incorporated in the facility the dual capability of high-dose irradiations of small objects and a reactor transporter for outdoor testing of large objects by low-radiation pulses. Operating officials stressed that tests risk no danger of atmospheric contamination.

Small-object experiments will be conducted in the environment of a 1½-inch OD "glory hole" running through the center of the core and providing a fast neutron fluence and pulse width equivalent to that of high-yield fission-type weapons at ranges where equipment can be expected to survive blast and heat effects of the weapon.

Since no blast and heat effects are associated with the APRF pulse, Army experimenters can isolate the effects of nuclear radiation, neutrons and gamma rays upon the equipment.

Army research interests make this fast-pulse radiation capability necessary for determination of the transient responses of materiel in nuclear environments. Neutron and gamma radiation doses can be provided within microseconds.

Movement of the core for exposure both within and outside the low-radiation, low-volume backscatter reactor building serves the Army's requirement for a point source for radiation detector studies as well as for irradiation of bulk objects.



APRF Reactor Showing Control Elements

The reactor is supported from above by a mechanical transporter. The core can be positioned by remote control anywhere within the range of travel of the transporter, which may ride any of six pairs of rails extending radially from a turntable in the center of the building. One pair of rails extends 90 feet to an outdoor test site.

Dr. Yockey explained that each pair of rails defines one experimental location where semipermanent equipment and shielding can be set up without tying up the entire reactor operation.

The reactor core is an unmoderated cylindrical assembly containing about 130 kilograms of uranium 10 weight % molybdenum alloy. In pulse operation, the power level may rise on periods as short as 10 microseconds.

Reliable safety is assured by a self-limiting feature of design, depending almost entirely on the thermal expansion of the fuel alloy. Following a pulse, additional reactor shutdown capability is provided by a safety block which, when ejected from the core, reduces the reactivity to about 20 dollars below delayed-critical. The block is ejected at lower-yield pulses in a fifth of a second after pulse.

Ejection of the block at higher-yield pulses is much more rapid, due to the thermo-mechanical shock forces which cause it to bounce out. The large shutdown margin thus provided is also the primary design device for preventing accidental criticalities in shutdown.

The reactor was produced by the United Nuclear Corp. under contract with the Atomic Energy Commission. Built by the Security Construction Co., Inc., Richmond, Va., the research complex consists of the reactor building, control building and a secondary lab-

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Dr. Hubert P. Yockey, Army Pulse Radiation Facility supervisor, has served as chief of the Reactor Branch, Terminal Ballistics Laboratory, Army Ballistics Research Laboratories, Aberdeen (Md.) Proving Ground, since 1964.

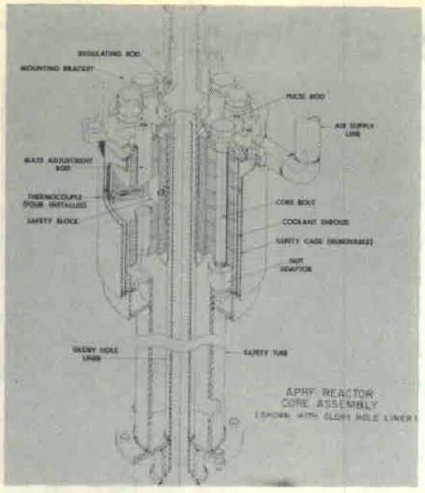
Graduated from the University of California at Berkeley with an AB degree in physics in 1938, he continued studies there to earn a PhD in 1942 and remained as a physicist with the Radiation Laboratory until 1944. After two years as a senior physicist with the Tennessee Eastman Corp. at Oak Ridge, he worked six years with North American Aviation, Inc., as group leader for irradiation physics.

Following a year with Convair Aircraft Corp. as chief of nuclear physics, he served as assistant director, Health Physics Division, Oak Ridge National Laboratory (ORNL). Three years with Aerojet-General Nucleonics as assistant technical director preceded a senior scientist assisgnment with Hughes Research Laboratories (1962-64).

While at ORNL as a member of the Reactor Operations Review Committee, he suggested and directed establishment of a comprehensive program in radioactive waste disposal involving geology, hydrology, soil chemistry, fuel chemical processing and ecology. He also directed conceptual design of a fast-burst reactor facility at ORNL and prepared the official proposal. In 1958, he participated in Project Sherwood and in the Hardtack II atomic bomb test.

With Convair, he directed the shielding program and established nuclear design concepts for the Aircraft Shield Test Reactor. At North American Aviation, he was the founder of the Special Research Department (later Atomics International); also established and directed the radiation damage project which used the 60-inch cyclotron at the Crocker Radiation Laboratory.

Dr. Yockey is the author or coauthor of a score of professional publications, holds a number of patents, and is prominent in numerous professional societies.



oratory at the edge of the required exclusion area, about one mile from the reactor.

Windowless, circular in construction, with aluminum siding, the reactor is 100 feet in diameter and 65 feet high. A roll-up door is used for the passage of the reactor transporter outside the building to the remote test site.

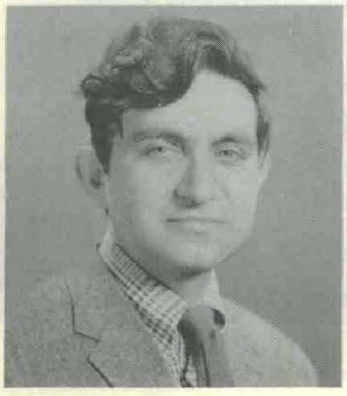
Adjacent is the underground control building which provides shielding for the personnel and controls associated with operation of the reactor and conduct of experiments.

The laboratory building at the outer edge of the restricted area, where access to the Army Pulse Reactor Facility is controlled, is used by administrative and support personnel. A 10-foot-high antipersonnel fence surrounds the reactor building at a 450-yard radius. An outer boundary barbed-wire warning fence is 1,500 yards from the reactor building.

Dr. A. Halim Kazi is chief of the Radiation Operations Section, Army Pulse Reactor Facility at APG, a position he has held since October 1966, when he became affiliated with the U.S. Army Ballistic Research Labs.

In 1954 he received a BS degree in liberal arts from the American University at Cairo, Egypt, followed in 1956 by an MS degree in physics from Rensselaer Polytechnic Institute, in 1959 by an SM degree in nuclear engineering from Massachusetts Institute of Technology and in 1961 by a PhD from MIT in the same field.

While at MIT he was involved in start-up and operation of the research reactor, taught laboratory classes in neutron and reactor physics, and as a thesis project constructed and used a high-precision bent crystal gamma ray spectrograph.



From 1961 to 1963, he was with the R&D staff of General Atomic Corp., engaged in the design, installation and operation of pulsing reactors, including TRIGA reactors at Torrey Pines, the Diamond Ordnance Fuze Laboratories (now the Harry Diamond Laboratories), and the Armed Forces Radiobiology Institute, Washington, D.C.

Three years with the Research and Engineering Center, United Nuclear Corp., preceded his present assignment. He was manager of the Advanced Reactor Analysis Section and worked on a number of large fast-breeder reactor concepts and fuel development projects.

DDC to Charge for Hard Copies of Technical Reports

Requesters of hard-copy, full-size research and development reports furnished by the Defense Documentation Center will be required to pay publication costs effective July 1. Microfilm copies will continue to be provided at no charge, as will other DDC services.

Dr. Robert B. Stegmaier Jr., administrator of the DDC, announced the change of policy. The service charge, he explained, has become necessary "despite operational cost reductions and improved effectiveness of DDC products and services."

Increasing use of R&D reports has doubled the requests for copies of documents during the period from 1962 to 1967, and indications are that this trend will continue.

Under the new policy, the Department of Commerce Clearinghouse for Federal Scientific and Technical Information (CFSTI) will be the agent for collecting and handling all financial transactions with DDC users.

Procedures related to the service charge on hard copies of technical reports will be detailed in a DDC Digest. The CFSTI is preparing an information packet on methods of payment for distribution to users.

Dr. Stegmaier stressed that in pursuance of the DDC mission to support Department of Defense R&D programs, the center will "continue to improve the speed and quality of service.

"I wish to thank all of our users for their support and their suggestions for improved DDC services and products, and hope that our good relationships will continue, even though it is necessary for us to apply service charges to hard copies of technical reports."

Edgewood 'Graduates' 30 in Management Seminar

Thirty key military and civilian managers at Edgewood Arsenal, Md., "graduated" from a week-long "Installation Management Seminar conducted May 6-10 at the U.S. Army Environmental Hygiene Agency.

The executive seminar touched on a wide range of top-level installation management matters, ranging from the basic concepts of Army management to decision-making processes, communicating, planning, programing and forecasting.

Fred Hamden and William Smith of the Army Logistic Management Center, Fort Lee, Va., conducted a series of lectures, films and case studies in these areas during the 40-hour seminar.

Additional topics were budgeting, organizing, directing, evaluating, coordinating, and controlling at the installation level. Edward McCabe, of the training and development division of the Arsenal's Civilian Personnel Office, coordinated the seminar.

Among the guest speakers was J. Lewis Powell, a nationally known management consultant, author and speaker, who discussed "From Cave Man to Space Man."

A presentation on the topic "The Theory of Learning" was offered by Dr. George R. Partin, of the Logistic Management Center. Brig Gen Bernard S. Waterman (USA, Ret.) spoke on "Managerial Environment."

Springfield Museum, Institute Replace Armory After Phaseout

With the final phaseout of Springfield Armory Apr. 30, after 174 years as "dean of U.S. Army arsenals," portions of the site were sold to industrial organizations and a technical institute was established on a 55-acre tract of the armory complex.

The main arsenal will house a gun collection of the Springfield Museum, a newly developed, private, nonprofit organization.

Most of the Springfield Armory employes who did not transfer to Rock Island (Ill.) Arsenal, U.S. Army Weapons Command, went to work with the new industrial complex or obtained new federal positions within commuting distances of their homes.

Edgewood Arsenal Marks 50 Years of Progress

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commanders and retired employes to visit the Research Laboratories—a part of the arsenal that alone consists of a multimillion-dollar complex of 80-odd research and support facilities.

Included are the recently dedicated $3.5 million Amos A. Fries Building, which houses 53 separate laboratories for advanced studies of chemical compounds and materials, and the $3 million John R. Wood Building for clinical research expected to be dedicated late this year.

More than 500 highly trained civilians and military personnel man the chemical, physical, medical and biophysics research laboratories.

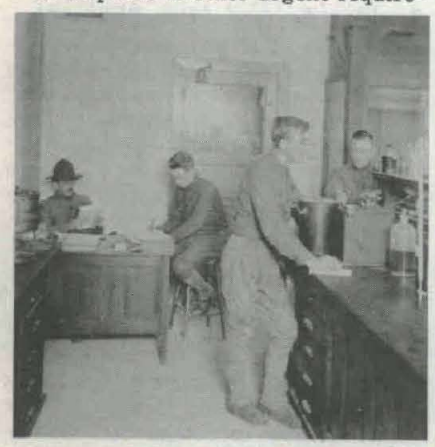
Col Paul R. Cerar became the 25th commanding officer of Edgewood Arsenal in October 1967 when he succeeded Brig Gen William W. Stone Jr. Dr. Seymour D. Silver, who joined the arsenal staff as a toxicologist in 1933, heads the Research Laboratories.

Responsibilities and goals of the Research Laboratories encompass Department of Defense objectives for all the Armed Forces, including broad research projects in antipersonnel chemical agents and the prevention and therapy of chemical casualties.

Other current research programs include flame and incendiary agents, physical defense against chemical agents, dissemination and dispersion of chemical agents, development of wound ballistics mechanisms, and therapeutic research.

The arsenal has been called upon to develop numerous materiel items urgently needed in the Vietnam war and elsewhere in Southeast Asia. Four months after a requirement for lightweight, compact, water-resistant, protective masks was levied on Edgewood, the first XM28s were delivered to the combat area.

In response to other urgent requirements, Edgewood developed three munitions using the riot control agent CS that are being used in Vietnam, with very good results. These include the 40mm cartridge (XM651), a 4.2-inch mortar projectile (XM630) and EL58 canister cluster for aerial release.



SOLDIER CHEMISTS conduct tests in Edgewood Arsenal's first research lab.

Col Paul R. Cerar
25th CO of Edgewood

Construction of Edgewood Arsenal started Apr. 7, 1918, to provide "a suitable chemical laboratory, properly equipped and manned to solve the many problems constantly arising in the operation of a chemical manufacturing plant."

Exactly 71 days later, the first chemical research was carried out in a 2-story, 21-room, hollow-tile building. Still standing today, next to the arsenal's headquarters building, it is used for chemical testing by the Quality Assurance Directorate. Within a year, the arsenal had 558 buildings, 15 miles of improved roads, 36 miles of railway and various other supporting facilities.

3 Army Representatives Give Cardiopulmonary Meet Papers

When the first national meeting of the Society of Cardiopulmonary Technologists (SCT) convened recently in Boston, Mass., only three military representatives—all U.S. Army, including two enlisted men—gave interpretive papers.

Sfc Ronald W. Walters, Sp/6 John M. Hartsock and Wayne M. Hughes, all from the Walter Reed Army Medical Center and members of the Greater Washington, D.C., Chapter incorporated in August 1967, presented three of the 34 papers.

Sgt Walters discussed a simplified method for using hydrogen in the detection of left-to-right shunts in congenital shunt lesions in the heart. Hartsock discussed indicator-dilution curves utilizing ascorbic acid. Hughes explained the use of earpiece cuvette in obtaining indicator curves.

Col William H. Walker
1st CO of Edgewood

Col William H. Walker, a professor of chemistry at the Massachusetts Institute of Technology, was the first commanding officer of Edgewood Arsenal. For his outstanding leadership in directing the establishment until March 1919, he was awarded the Distinguished Service Medal, the nation's third highest military decoration. He was succeeded by Lt Col Amos A. Fries, who in 1920 became chief of the Chemical Warfare Service, and served nine years, rising to brigadier general.

Governor Spiro T. Agnew of Maryland and the commissioners of Harford County issued proclamations designating May 4, 1968, as "Edgewood Arsenal Day," citing its long contribution to the growth of the surrounding area.

Congratulatory messages were received from General Frank S. Besson Jr., CG of the Army Materiel Command, and Maj Gen Frank G. White, CG of the Munitions Command. Additional congratulations were received by Pine Bluff (Ark.) Arsenal, and Rocky Mountain Arsenal, Denver, Colo., special mission centers of Edgewood Arsenal.

AMOS A. FRIES Building houses 53 separate laboratories at Edgewood.

Magnetic Scope Detects Cannon Faults

A magnetic recording borescope (MRB) is providing a nondestructive testing means of monitoring progressive cannon tube deterioration, particularly fatigue cracking, during life-cycle firing tests conducted by the Army Materials and Mechanics Research Center (AMMRC) in Watertown Mass., at the Yuma (Ariz.) Test Station.

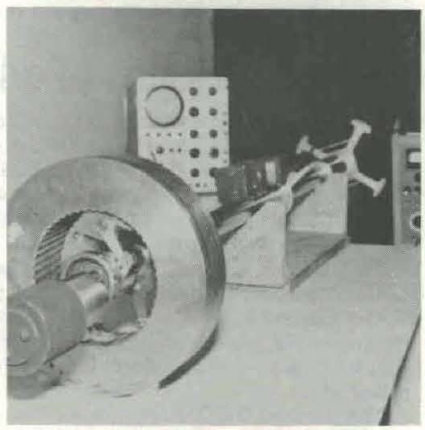
The MRB operates on the principle of electronic detection of the magnetic leakage associated with cracks in a circumferentially magnetized tube. It produces (see illustration) a permanent facsimile record, or map, of the contour of the bore of the test cannon tube at selected periods during the life-cycle firing tests.

The facsimiles show graphically the progressive damage sustained by the cannon tubes during firing. Initiation and propagation of fatigue cracks also are detected and monitored. By coupling the MRB to a recording oscilloscope, and accurately measuring crack-signal amplitude response, it is further possible to estimate crack depth.

The AMMRC development of the MRB represents one more step in continuing efforts to establish realistic criteria for accurately predicting cannon tube service life. Possibility of cannon failures in service has always posed problems to the military. Stringent, costly and time-consuming inspection procedures have often been imposed to minimize the possibility of such failures.

A "limited-service" policy was formulated for each of the many classes of cannon tubes, resulting at times in serious logistics problems. To provide relief for some of the inspection problems and improve certain aspects of the limited-service policy picture, it was considered necessary that an adequate and accurate means of nondestructively measuring progressive service-induced fatigue damage be established.

The basic technological principles and techniques associated with the MRB are not new. They were tested and demonstrated at Watertown Arsenal (an antecedent of the AMMRC) during the latter days of World War II, through the Korean Conflict, to about 1955.



MRB Operating in 175mm Test Piece

Refinement and precise application of MRB technology, however, remained dormant until January 1967. Then a priority Army Materiel Command (AMC) program for the 175mm, M113 cannon was initiated for the purpose of establishing more technically-realistic criteria for extending the service life of the cannon tube.

The criteria were to be dependent, in part, on the effectiveness of the AMMRC MRB device adapted (1) to monitor progressive fatigue damage in 175mm tubes, in general; and (2) to record, if possible, the location, length and depth of cracks occuring in the critical zone of the tube. This zone extends from 55 to 95 inches from the rear face (breech end) of the tube.

In response to AMC requirements, AMMRC assigned a team of nondestructive testing experts to the task of advancing MRB technology to meet the considerable challenge of the problems posed.

Results of these specific efforts have been detailed in an AMMRC Letter Report, "Preliminary Results of Magnetic Recording Borescope Inspection of the M113, 175mm Gun Tube for Fatigue Cracks," July 25, 1967. A summary of the improved technology and applications was given in September 1967 at the Sixteenth Defense Conference on Nondestructive Testing by K. A. Fowler, titled "Detection of Fatigue Cracks in the M113, 175mm Gun Tube."

MERDC Orders 45 Sets To Produce Potable Water

The U.S. Army Mobility Equipment Research and Development Center, Fort Belvoir, Va., has announced the award of a $251,827 contract for the fabrication of 45 air-mobile water purification sets.

Delivery of the 420 gph units, produced by Litton Systems, Inc., is scheduled for September.

Latest and smallest in a family of water purifiers developed by the R&D Center, the 5-component set can be transported in the cargo compartment of a combat helicopter. On the ground it can be carried in a ¾-ton truck or trailer. The entire set, along with 100 hours of operating chemical supplies, weighs 1,000 pounds.

It is capable of producing drinking water from highly polluted nonsaline water sources such as lakes, rivers and streams, using chemical coagulation, diatomite filtration and chlorination.

APG Tests 175mm Gun Produced by Auto-Frettage

Tests of a new gun tube designed to give longer life to the U.S. Army's largest conventional weapon, the 175mm gun which played an important role in the recent defense of Khe Sanh in South Vietnam, are being conducted at Aberdeen (Md.) Proving Ground. Tests will continue four to six months.

Auto-frettage manufacturing methods, involving the application of extremely high pressure to the gun tube's interior surface, have been used in the six experimental 15-inch, 35-foot-long gun tubes being tested.

The tubes were produced at the U.S. Army Weapons Command's Watervliet (N.Y.) Arsenal, where Army researchers have worked for a number of years to perfect the methods of auto-frettaging for smaller weapons.

With a range of more than 20 miles, the 175mm gun has gained a reputation as the artillery workhorse of combat forces in South Vietnam.

Every 175mm gun tube and breech mechanism in the Army's inventory is tested at Aberdeen Proving Ground to insure reliability prior to acceptance. The Test and Evaluation Command is headquartered at APG and is the Army's primary testing agency for items produced by the U. S. Army Materiel Command.

Because of APG's combination of land and water uses, specialized testing facilities and technical staff, it is the only installation in the United States where certain tests can be conducted.

M107 175mm Self-Propelled Gun

Fluidics Report Tells of U.S. Role in Growing Technology

Establishment of fluidics as an important industrial technology, largely through the research and development role played by U.S. Government agencies, is described in an historical document by the 4-year-old Government Fluidics Coordinating Group (GFCG).

A companion paper, being prepared by the GFCG to provide a comprehensive, more technical description of fluidics state-of-the-art, is projected for completion this fall.

The fluidics group includes representatives of more than 30 U.S. Government agencies and was created informally in July 1964 as a "clearing house" to exchange information and minimize duplication of effort.

Present chairman is Douglas Garner of the National Aeronautics and Space Administration, Langley Station, Va. Chairmen rotate as representatives of the host agency. The next meeting will be held at NASA-Langley Oct. 8-9.

The U.S. Government-role document is based on replies to questionnaires from some 20 miscellaneous agencies, contract listings and government funding reports, original in-house reports from the U.S. Army Harry Diamond Laboratories (Washington, D.C.), papers appearing in "open literature" and conversations with individuals directy involved in fluidics.

Fluidics is defined as a more applicable term than the original "root" word, fluerics—the technology of sensing, computation and control using fluids and no moving parts. Fluidics more properly not only includes no-moving-parts devices, but other types of fluid elements as well as peripheral equipment.

The term also applies to hybrid fluid circuits containing both conventional devices and those with no moving parts.

The report points out that fluidics is a technological outgrowth of concepts and inventions of government employes. More than 200 patents were issued for new and improved fluidic components and devices during the first six years of the revolutionary technology; 100 of them were awarded in 1966.

Invention of the first flueric devices was announced Mar. 2, 1960, after more than a year's in-house research at Harry Diamond Laboratories (HDL). HDL Director Billy M. Horton has been much honored for the invention. Despite widespread publicity, industry reacted only temporarily. Several small programs were begun then dropped when difficulties inherent in the original components arose.

Other government agencies did see possibilities in fluid amplification—as HDL earlier dubbed the technology. Among them was the U.S. Army Missile Command (MICOM), Redstone (Ala.) Arsenal, which began investigation of application of the technique to missile control systems.

By the end of 1961, at least six industrial concerns and several academic institutions were approaching the technology in depth. The U.S. Air Force interest in the possibility of using fluid amplifiers to obtain compact jet engine controls with high reliability gave more impetus to the new field.

The Army continued to fund R&D on fluidic components and systems. Meanwhile the Air Force increased its allocations to include studies of other components in flight control systems. The Navy looked into steam turbine and boiler control. Private industry stepped up fluidics investigations.

When the second HDL Fluid Amplification Symposium was held in May 1964, the number of technical paper presentations more than doubled. Most of them were reported on government-funded projects, in-house or on contract.

Starting in 1964 and 1965, there was a pronounced increase in fluidics research by educational institutions and the government. Interest spread also to Europe where specific programs were begun in England, France and Italy, and is now worldwide in scope.

Research Scientists Review Meteorological Program

Top national experts in atmospheric sciences recently joined Chief Scientist Dr. Hans K. Ziegler of the U.S. Army Electronics Command in a "bench level" review of the Army meteorological research program.

The ECOM Atmospheric Sciences Laboratories at Fort Monmouth, N.J.; White Sands, N. Mex.; and Fort Huachuca, Ariz., were visited by Dr. Ziegler and eight other research scientists.

The annual ECOM evaluation was combined with a review by visitors eminent in the environmental sciences. Dr. Ziegler reported that results "will assist in the continuous ECOM effort to fulfill the Army's needs in the atmospheric and meteorological sciences field."

Dr. Ziegler was accompanied by Dr. Jerome Spar, professor of the Meteorology and Oceanography Department, New York University; Dr. Albert Miller, professor of the Meteorology Department, San Jose (Calif.) State College; Dr. Stanley M. Greenfield, Rand Corp., Santa Monica, Calif.; Dr. William Kellogg, director of the Laboratory for Atmospheric Sciences, National Center for Atmospheric Research (NCAR), Boulder, Colo.; and Mrs. Frances L. Whedon of the Geophysical Sciences Branch, Environmental Sciences Division, Office of the Chief of Research and Development, Department of the Army; and Clarence E. Morrison of the R&D Directorate, HQ Army Materiel Command, Washington, D.C.

Scientists from Fort Monmouth included Kenneth M. Barnett, acting director of the ECOM ASL, and Robert Lauttman, ECOM director of R&D.

RESEARCH SCIENTISTS who met recently to discuss meteorology research in 1970 include (from left) Dr. Albert Miller, C. E. Erickson, chief of the U.S. Atmospheric Research Technical Area, Fort Huachuca, Ariz., Dr. William Kellogg, Kenneth M. Barnett, Mrs. Frances L. Whedon, Clarence E. Morrison, Dr. Stanley Greenfield, Dr. Jerome Spar, and Dr. Hans K. Ziegler.

The technology has developed in the past two years to the point where the original difficult-to-stage components have been replaced by families of devices and systems containing hundreds of units. Modular and miniaturized circuit elements are being used by many organizations.

Successful devices and systems built by and for the government as fluidics technology progressed include:

- A temperature sensor which can be used at high temperatures, is very rugged and has a response-time considerably shorter than that of a shielded thermocouple.
- A turbojet control system first demonstrated in an engine in 1964.
- Missile control systems flown in 1965 and 1966.
- A flight control system first flown in 1966.
- Devices demonstrated to operate at temperatures as high as 5,000° Rankine and as low as almost absolute zero.

As a result of information disseminated by the U.S. Government, improved components becoming available, and know-how gained on fulfilling federal contracts, industrial use of fluidics includes:

- Removing "flash" from aluminum die-castings.
- Operation of a high-speed glass press.
- Control of a semiautomatic crimping machine.
- Liquid-level control at a sewage-pumping station.
- Bottle-casing machines and other practical applications.

Interfaces were being offered in 1967 to convert from fluidics to pneumatics and to hydraulics as well as such items as a test stand for fluidic controls, and a fluidic drum programer.

Firms expanded their commercial fluidics effort and today more than 50 companies are active in the field. Others are studying possible applications of fluidics to their operations.

An official of a Peoria, Ill., manufacturer of mobile equipment, reported at a Milwaukee School of Engineering Mobile Hydraulics Seminar that his firm had established 64 potential applications for fluidics in equipment for mining and construction.

Although government agencies have led R&D in fluidics, the GFCG report states that use in operational items is considered to be lagging behind. This is due to some extent, it was stated, to stricter requirements necessary for many items used by the government, thus requiring more R&D than often is necessary for industrial applications.

Authors of the report also feel that this lag is due somewhat to lack of full realization that "fluidics has indeed come of age and can perform many tasks at less cost with more reliability than any other type of control equipment."

Fluidics feasibility has been shown for various flight and turbojet control systems, arming, safing and fuzing, boiler combustion control, temperature measurement and control, diverter valves, yaw dampers, and biomedical applications. As a result, many U.S. Government agencies have begun to consider fluidic devices for their needs.

Although fluidics state-of-the-art has progressed considerably in nine years, and numerous applications have been accepted by industry, many improvements are necessary, the Government Fluidics Coordinating Group contends. Fabrication is one area of GFCG concern. Members believe further reductions in cost are possible in view of consistent improvements in quality and component-cost decreases in the past few years.

Availability of reasonably good components and the success of applications presently in use, report authors predict, will bring about a sharp upsurge in commercial uses of fluidics during the next two years.

WES Scientists Accept Bid Of Canadian Defence Board

Canada's Defence Research Board has successfully invited the U.S. Army Engineers Waterways Experiment Station (WES), Vicksburg, Miss., to assist in a terrain evaluation exercise in Canada during July and August.

Expected to last three to four weeks, the field studies are designed to check further the utility of a new terrain evaluation system developed by Dr. John Parry of McGill University, Montreal.

The Camp Gagetown, New Brunswick, area has been selected as terrain for evaluation in terms of the environmental factors required by the United States mathematical model for prediction of cross-country vehicle performance.

WES also will support the Canadian effort with an environmental data-collection field team and instruments for measuring vehicle performance.

The Gagetown program will supplement findings of the exercise conducted during the summer of 1967 at Camp Petawawa, Ontario. WES also participated in that preliminary version of the Defence Research Board/Terrain Evaluation System.

Alabama Leaders Promote Army Science Fair Program

Top Army and Alabama Academy of Science leaders joined recently in asking for industrial support in promoting a program which encourages young people to seek careers in the scientific and engineering fields.

Maj Gen Charles W. Eifler, CG of the Missile Command, told representatives from major industries throughout North Alabama that:

"Both you in industry and we at Redstone Arsenal have a need for scientists and engineers. We can encourage more young people at the high school level to go into these fields by supporting the Army Junior Science and Humanities Program . . . [which] helps to foster a scientific environment for young people."

James J. Fagan, scientific and engineering adviser of the Missile Command's Research and Development Directorate, accompanied General Eifler.

Representing the Alabama Academy of Science at the luncheon were Dr. Ruric E. Wheeler, Academy president from Samford University, and Dr. W. B. DeVall, president-elect of the Academy from Auburn University.

STRATCOM Moves Two Units to Arizona Headquarters

HQ Strategic Communications Command has announced relocation of two major activities from Suitland, Md., and Fort Bragg, N.C., to Fort Huachuca, Ariz., effective this month.

The transfer involves the worldwide Installation and Construction and the Radio Propagation activities. The main movement is programed to begin about June 15 and relocation is expected to be completed by July 31. A majority of the personnel involved are highly trained military and civilian telecommunications specialists. Approximately 320 personnel are affected.

The reassignment is being made to take advantage of increased efficiency and improved control measures provided by the elements being located at the command headquarters.

The I&C element's job is to improve and expand the communications program of STRATCOM through installation and construction activities, including radio transmitter and receiver stations, teletype and data relays, communications centers and antennas of all types.

Radio Propagation elements provide a link between the complex theories of radio communications systems and application of the theories as they relate to STRATCOM's engineering, installation and operational radio problems.

Power Sources Conference Views High-Energy State-of-the-Art

High-energy power sources developmental progress considered potentially important as linked to specialized future requirements was reported at the 22nd annual Power Sources Conference, May 14-16, Atlantic City, N.J.

The largest annual meeting of its kind was sponsored jointly by the U.S. Army Electronics Command and the governmental Interagency Advanced Power Group. More than 500 participants represented industry, military and other government agencies, universities and foreign countries.

Dr. Galen R. Frysinger, director of the Electronics Command Power Sources Division, a part of the Electric Components Laboratory headed by Dr. Eduard A. Gerber, served as conference chairman.

Banquet speaker Dr. John P. Craven, chief scientist, Special Projects Office, Naval Materiel Command, and chairman of the Interagency Committee on Oceanography, discussed "Deep Ocean Development and Power Sources." He cited the tremendous opportunity land under the oceans offers in terms of billions of tons of food and numerous resources of vast significance.

Opening day presentations focused on air-breathing fuel cell systems. Feasibility of these systems has been satisfactorily demonstrated, various researchers reported, and future emphasis will be on engineering refinements leading to simplification of design, fabrication, operation and maintenance.

A series of papers by Union Carbide, Monsanto Chemical Corp. and the Navy described sensitive fuel feed controllers for the hydrazine-air fuel cell. The controllers automatically feed the proper amount of hydrazine into the cells to assure continuous operation at the desired power level.

Pratt & Whitney Co. researchers reported great strides in automating the operation of a hydrocarbon-air system which utilizes JP-4 fuel and a hydrogen generator. Automatic start-up has been developed, which requires only pressing a single activation switch. An exploratory development model has been fabricated and is ready for Army evaluation.

American Cyanamid scientists described progress on a conceptual design of a self-sustaining direct hydrocarbon-air fuel cell battery to serve as a low-level power source capable of operation for long periods of time.

Operating on propane or LPG (liquid petroleum gas), which would insure self-pressurization of the fuel supply system at relatively low temperatures, the system has no moving parts and operates with naturally convected air. Problems now being resolved are the inadequate gas distribution and the slow flooding of the electrodes with electrolyte.

New hybrid fuel cell-battery combinations to power variable load communications systems were explained in two presentations by Army Electronics Command (ECOM) scientists. The fuel is a simple battery charger which can handle the normal load as well as the battery-charging activity during nonpeak periods.

Such systems can give instantaneous power from the battery, not being dependent on the longer fuel cell start-up. By proper mating of the fuel cell with the battery, hybrid assemblies can handle a wide range of Army applications with increased versatility and decreased cost.

Frank Malaspina of ECOM reported on developmental work on a new metal-hydride-air 30-watt static fuel cell. Developed in dimensions to mate with all standard Army batteries, it weighs 11½ pounds when fully fueled.

The system is silent and capable of operating either in combination with a battery or as a separate power source. Fueling is accomplished by inserting a solid lithium hydride cylinder into a Kipp-type hydrogen generator. Active hydrogen is released on contact with water.

Two new uses of hydrazine fuel cells were discussed. A 28-volt direct-current hybrid system (hydrazine fuel cell-Ni-Cd battery) in manpack configuration has an approximate 3:1 saving in weight compared to the use of a secondary battery system for powering a typical radio. Two pounds of fuel can give 12 hours of operation at an average power of 60 watts. A single switch activates the fuel cell.

A unitized bicell structure, with each cell having its own electrolyte reservoir, was described by John Perry of ECOM. This advanced design can simplify hydrazine cell systems by reducing the number of moving parts, and decreasing maintenance and cost. Early experimental models show encouraging performance with low-cost electrodes.

High-temperature hybrid systems with increased efficiency and high-pulse power density were discussed by ECOM's Dr. Frysinger and B. S. Baker of the Institute of Gas Technology. Such systems are based on high-temperature fuel cells using an inexpensive and readily available fuel, such as natural gas or JP-4, and high-energy, density-molten electrolyte batteries.

To support secondary batteries, new charging equipment and circuitry must be developed for automatic charging of batteries and to make

Self-Propelled Hawk Undergoes Production Tests

Initial production tests of the Self-Propelled Hawk Air Defense Missile System will be conducted at Fort Devens, Mass., Aberdeen Proving Ground, Md., and White Sands (N. Mex.) Missile Range.

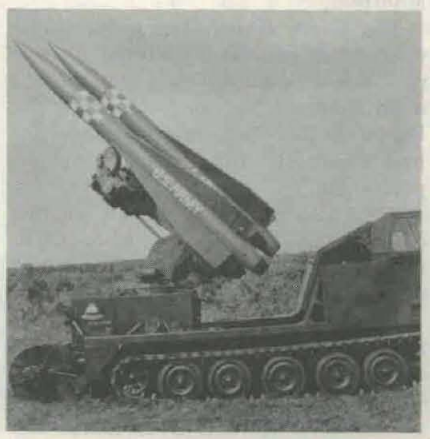
The tests are designed to confirm quality, reliability and performance of an item for initial release. Included in the program will be road, environmental, system integration, reliability and maintainability, and technical manual validation tests.

The highly mobile Hawk air defense missile system, developed under the Army Missile Command can traverse rough terrain, travel over improved roads at high speeds, be quickly emplaced, and has the fire power to successfully counter the low-altitude air threat to combat divisions.

Firing units can operate in the forward field Army areas and inhibit low-altitude aircraft penetration to rear areas. Like Hawk, its parent system, the Self-Propelled Hawk uses a Continuous Wave Radar semiactive homing guidance system to achieve effective intercepts against the full spectrum of attacking aircraft.

Raytheon Co. is prime contractor for the program and maintains overall technical direction under the guidance of Hawk Project Manager Col John G. Redmon at the Missile Command, Redstone Arsenal, Ala.

The FMC Corp. is prime contractor for the self-propelled vehicle under the guidance of the U.S. Army Tank Automotive Command, Warren, Mich.



Self-Propelled Hawk

charging foolproof from an operator's standpoint, the speakers stated.

Louis Pilla of ECOM reported on development of a highly sophisticated battery charger, PP-4127, for the 6-volt, 60-ampere-hour zinc-silver-oxide battery used to power the AN/PPS-5 radar set.

This charger has completed the engineering test phase and is presently supporting the AN/PPS-5 in South Vietnam. A family of silent, static battery chargers containing a flame-heated thermoelectric generator as the prime power module was described by Joe Angello of ECOM. Ten-, 20-, and 30-ampere units are being developed.

Exploratory development models of the 10-ampere, 28-volt unit (13" diameter x 21" high, weighing 25 pounds) and a 20-ampere unit are undergoing Army Field Qualification Tests at Fort Monmouth. They have multifuel capability and can be remotely operated from user equipment.

Secondary batteries were emphasized in papers reporting various methods of overcharge protection, new nickel-iron oxide cells, zinc-silver oxide batteries and a new cadmium-air cell.

General Electric Co. speakers reported overcharge capability of nickel-cadmium cells is improved by designing for accelerated recombination of oxygen at cadmium hydroxide plate. A Sonotone Co. researcher indicated that the high-rate charge capability and temperature range of operation can be increased by improving cell design and materials.

Charge control devices for nickel-cadmium batteries, such as the coulometer and auxiliary electrodes, were discussed, with emphasis on their possible applicability to military systems.

Experimental results on a promising cadmium-air secondary cell show more than 300 cycles of operation at energy densities of 40-45 watt-hours per pound. Otto Wagner of ECOM reported on this work which has indicated feasibility of long-life battery designs.

Two types of iron electrode in nickel-oxide-iron cells, one a sintered and the other of pocket-type construction, were described. Another new fuel cell can give energy densities approximating that of nickel-cadmium cells and is less expensive due to the use of iron instead of cadmium. Problems still exist with self-discharge and limited temperature range of operation.

Recent effort on zinc-silver oxide secondary batteries has shown significant improvements in rate capability, depth of discharge and cycle life. Improvements have been gained by redesign of the zinc electrode and the use of new separators. Operation life exceeding 500 cycles is reported.

Improved preparative procedures for activating dry-stored electrolyte in batteries in a very short time also were described. The performance of a new Army standard line of zinc-silver oxide secondary batteries offers high military promise for this system.

Presentations on the third day emphasized new high-energy primary systems. Three papers devoted to the use of organic materials as cathodes indicated higher-energy (greater than 60 watt-hours/pound) primary batteries are possible. Energy output will depend on rate and extent of the organic materials reduction.

Prof. Leonard Wikstrom of New York University and T. A. Reilly of Union Carbide Co. discussed the mechanism of the electrochemical reduction of organic cathode materials in aqueous solutions.

James Doe of ECOM presented performance data on magnesium-m-dinitrobenzene cells, showing up to 60-watt-hours per pound at the 25-hour rate for "A" size cells developed by ECOM.

A preliminary screening of high-oxidation-state fluoride compounds as cathodes in thermal batteries was reported by the Navy. Based on limited experimental data, silver fluoride and potassium copper fluoride look like the best cathodes, it was stated.

Recent advances in solid electrolyte batteries were reported by Dr. B. Owens of Atomics International and Dr. Michael Hull of ECOM. Dr Owens' research has centered around use of double halides as electrolytes, e.g., silver iodide and rubidium iodide combined to form $RbAg_4I_5$.

Conductivities approaching those of aqueous potassium hydroxide solutions were reported. Construction and performance of silver/solid electrolyte rubidium/triodide cells also were discussed. Complete 5-cell batteries (3.3-volt-5.5 ampere-hour) have been constructed and their performance characterized at 72-hour rate over a wide temperature range.

Results of the developmental work to date indicate the system is limited to low-energy density applications where wide temperature range of operation and flexibility of configuration are required.

The final conference session was devoted to new developments in the field of zinc-air batteries. The importance of these has greatly expanded over the past year and they are presently favored for powering key new equipments presently under development. They offer energy densities up to 100-watt-hours/pound and operation over a wide temperature range.

A family of standard line mechanically rechargeable zinc-air batteries is being developed by Leesona Moos Laboratories.

Battery recharging can be accomplished in minutes, using a fresh anode composite and water as the activating agent. This eliminates the need for external power generators and minimizes logistic problems.

Batteries with 48-ampere-hour, 24-volt capability have been fabricated and are undergoing military potential tests. These batteries will give 80-watt-hours per pound. A 20-ampere-hour battery is being designed and 32-ampere-hour and 150-ampere-hour batteries are planned to complete the family of standard line batteries.

The most serious problem of these batteries, as outlined by Howard Knapp of ECOM, is the fabrication of highly reliable low-cost replacement anodes which will insure continued operation of the batteries. Each battery requires 20 anodes per recharge.

Another zinc-air concept employs completely disposable structures. One by Yardney is similar to a conventional-type reserve cell. The other by Leesona is a nonreserve structure which is likened to a dry cell. Both companies report methods for making inexpensive structures.

Energy densities of up to 100-watt-hours/pound are reported for complete batteries when discharged at a 10- to 50-hour rate. Shelf life obtained with fully activated units is under study.

Dr. J. Voorhies of American Cyanamid Corp reported on an unmetallized carbon-air cathode for a zinc-air cell.

Proceedings of the conference will be published and distributed (tentatively in October) by the PSC Publications Committee, P.O. Box 891, Red Bank, N.J. 07701.

Chief of Staff Accepts Bid To Army Science Conference

Army Chief of Staff General Harold K. Johnson has accepted an invitation to speak at the sixth Army Science Conference, June 18-21, at the United States Military Academy, West Point, N.Y.

When General Johnson addresses an expected record of nearly 500 conferees and their wives at the banquet June 20, he will make history as the first Army Chief of Staff to speak at the Army Science Conference since the biennial series was initiated in 1957.

General Johnson is expected to speak generally on the challenge to Army scientists, engineers and scientific administrators of responding successfully to some of the urgent requirements of modern warfare.

Dr. Ralph G. H. Siu, whose continuous record as toastmaster at the banquet was interrupted in 1966 by an emergency assignment in his role as deputy director of developments for the Army Materiel Command, will again contribute his sprightly humor to the occasion.

Highlights of the conference will include a keynote address by Dr. William G. McMillan, scientific adviser to General William C. Westmoreland, CG, U.S. Army and U.S. Military Assistance Command Vietnam (MACV), and two panel discussions at general sessions. One panel of experts will consider the pacification program in South Vietnam; another will discuss survivability and casualty evacuation.

Ninety-six technical papers will be presented and roughly 20 will be selected for honorariums totaling about $4,000.

ATAC Using Ultrasonic Interferometer in Liquids Studies

Physical properties of the liquid state are being determined by a new procedure developed at the United States Army Tank-Automotive Command (USATACOM) Physical Science Laboratory in Warren, Mich.

The technique utilizes an ultrasonic interferometer (a device for measuring velocity and absorption of sound waves in a gas or liquid) of special design and a program for data correlation analysis. Dr. Jack G. Parks, who recently joined the laboratory staff, developed the device and procedures.

Dr. Parks received a PhD degree in physics from the University of Washington in 1961. He has been associated with the Lawrence Radiation Laboratory, Livermore, Calif., and the University of Idaho. Prior to the start of his Federal Civil Service career in 1967, Dr. Parks was a visiting professor at the USATACOM from the University of Idaho in 1966.

Knowledge of the physical properties of liquids has immediate military value in the design of recoil mechanisms, suspensions and high-speed hydraulic systems. A research project in fluid properties was initiated in 1967 at the USATACOM Physical Science Laboratory to determine the effects of fluid additives on transmission efficiences.

Dr. Parks believes one of the major unsolved problems of contemporary physics and chemistry is the development of a practical description of the liquid state in terms of the presumed known intermolecular forces and intermolecular geometry. "Practical" is emphasized, he said, because it is easy to write "a formal and exact theory so general and magnificent that no predictions can be made."

Similarly, it is easy to construct a variety of simple models of a liquid which, by the use of adjustable parameters (often poorly defined) can be made to fit the observed properties. Models of problems representing particular parameters presently are largely inaccurate, he said, and must be considered unsatisfactory.

Structure on the molecular scale is determined by the balance between the order imposed by the intermolecular forces and the disorder of thermal motion. At low temperatures, the intermolecular forces predominate. This produces the completely ordered structure characteristic of the crystalline lattice. At high temperatures, thermal motion predominates to give the random and featureless structure of a gas.

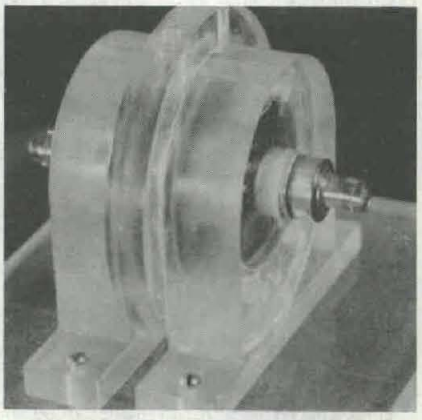


Figure 1. Fixed-geometry, dual-crystal, ultrasonic interferometer.

Dr. Jack G. Parks

Dr. Parks said the structure of liquids corresponds to a degree of order intermediate between that of the crystalline solid, which can be described by the theory of space lattices, and the featureless structure of gases, characterized by kinetic theory and statistical mechanics.

When a crystalline solid melts, the long-range order of the crystal is destroyed. However, a vestige of local order persists in the liquid state with a range less than several molecular diameters.

The local order of the liquid state is described by a radial distribution function. This function, to a large extent, can be experimentally determined by examining the elastic and viscous responses of the fluid to sound waves of various wave forms, frequencies and intensities.

The standard, continuous-wave, ultrasonic interferometer consists of a source of longitudinal sound waves (normally a piezoelectric crystal), mounted at one end of a fluid or gas column, and a flat, metallic reflector at the other end.

Using suitable electronic circuitry, one may observe the variation of the circuit parameters as the standing wave pattern within the chamber is altered. This pattern change can be affected by either moving the reflector along the principal axis of the column, or by varying the frequency at which the transducer oscillates. In both cases, the ratio of the path length to the wavelength of sound in the fluid is changed.

The variable-path interferometer, when applied to liquids, requires ade-

39-Year Career Ends for OCE Dam Expert

Internationally known as an expert in soil mechanics, George E. Bertram recently retired from the Office of the Army Chief of Engineers after 39 years of federal service.

For the past 14 years, he was chief of the Soil Mechanics Branch of the Civil Works Directorate and served as assistant chief for 14 years previously. A 1929 graduate of Oregon State College, Bertram gained early experience on Mississippi River levees. He was soil mechanics engineer for the Conchas Dam, N. Mex., one of the first flood-control dams built by the Corps of Engineers.

He was chief technical adviser to the Chief of Engineers on design and construction of all earth and rockfill dams as well as for soil mechanics features of other projects. During his tenure, the Corps of Engineers built some 200 dams.

Bertram is a Fellow of the American Society of Civil Engineers (ASCE) and has served as chairman of various committees of the ASCE and the U.S. Committee on Large Dams (USCOLD). He represents the U.S. on the Committee on Measurements of Dams and Models, International Commission of Large Dams.

In 1961 he was the general reporter at the International Congress on Large Dams in Rome. At the International Congress on Large Dams in 1964 at Edinburgh, Scotland, he was a member of the panel of experts.

He is a lecturer at the annual Soil Mechanics Program for Teachers and Practicing Engineers, Graduate School of Engineering, Harvard University, and author of professional papers in soil mechanics aspects of airfield and earth dam design.

quate seals, accurate linear motion for the reflecting plate and sensitive displacement measurements — conditions which complicate an already difficult measurement problem.

Physical configuration of an ultrasonic interferometer, however, can be simplified greatly by making the applied signal frequency itself the variable of interest. The chamber-crystal system can then be accurately positioned in a permanent configuration, and the displacement measurements replaced by frequency determinations.

Increased sensitivity, especially in fluids with large absorption coefficients, can be obtained by replacing the reflecting plate with a second crystal identical to the transmitting crystal. Changes are then detected in the circuits of the second crystal.

Several fixed-geometry, dual-crystal, ultrasonic interferometers have been constructed at the Physical Science Laboratory. Figure 1 shows a recent model. Separation between transducers is approximately one centimeter.

Two kinds of physical data were extracted from a recent experiment. First, the amplitude of the signal transmitted through the liquid showed a semiregular variation with frequency change. The frequency spacing between amplitude extremes was proportional directly to the velocity of sound propagation in the liquid, and inversely proportional to the intracrystal spacing.

(A determination of the spacing enables the experimenter to measure the speed of sound in the liquid. This spacing can be measured directly or by using a standard liquid as a calibration medium.)

Second, a measurement of the phase difference between the initial and transmitted signal exhibited a periodicity similar to the amplitude data. Due to reflections from the walls of the chamber, however, it showed less irregularity than did the first technique.

A significant innovation incorporated in this experiment is the correlation analysis of the amplitude and phase-angle data. Preliminary studies indicate that the velocity data obtained from the interferometer responses will be accurate to one part in ten thousand. Attenuation studies using Park's correlation techniques show an error of less than 0.1 percent.

Much of the success of the reliability is attributed to the automatic data acquisition that Dr. Parks has incorporated into the experiment. Extremes of amplitude, position in the frequency domain, and phase angle data are electronically recorded to minimize observer error.

Results of this experiment will be presented by Dr. Parks at the 1968 Army Science Conference at West Point, N.Y., in June. Detailed publication of the technique will appear soon in the *Journal of the Acoustical Society of America.*

AFIP Sets Up Traffic Accident Registry

Information on all factors incident to traffic accidents nationwide will be correlated in a new Registry of Accident Pathology in the Armed Forces Institute of Pathology (AFIP), established with the cooperation of the National Highway Safety Bureau, Department of Transportation.

Senator Alan Bible (D-Nev.) announced establishment of the registry at recent groundbreaking ceremonies for a $7.5 million wing to the AFIP, on the grounds of Walter Reed Army Medical Center, Washington, D.C. Very little has been done, he said, to analyze large groups of accidents.

Correlation of traffic-accident data will include all the human elements involved, including psychological state of drivers, preexistent physical conditions such as heart disease, effects of alcohol and drugs, and nature of injuries received.

Mechanical aspects to be correlated include the structural design of automobiles, the influence of the environment, design of highways and the placement and readability of highways signs. Two approaches will be used to gather the large amounts of data that will be fed into the AFIP computer, the largest in America devoted exclusively to pathology.

First, cooperating military and civilian pathologists in all parts of the country will be asked to provide full information on fatal accidents. Second, a project is planned for the Washington area to study a limited number of accidents, involving as many factors as possible in each case.

The AFIP repository of 1.2 million cases of various diseases and injuries will provide references of potential value to the project, as will the staff which has gained extensive experience through its involvement in the study of aviation accidents for the Federal Aviation Administration.

Work of the Registry of Accident Pathology will be of broad interest to U.S. Armed Forces leaders for clues on possible measures to alleviate accidents involving military personnel.

Pentagon records reveal that traffic accidents in the Armed Forces during 1961-66 caused 8,366 deaths, in comparison to 6,644 deaths in combat during this period. More than 1,500 Armed Forces members were killed in 1967 traffic accidents.

STRATCOM Chiefs Convene in Hawaii

Commanders of major U.S. Army Strategic Communications Commands (STRATCOM) in the Pacific Theater discussed major problem areas and developments impacting on future communications activities of the Army when they met recently for three days in Hawaii at Schofield Barracks.

Lt Gen Edgar C. Doleman, Deputy Commander-in-Chief, U.S. Army, Pacific, pointed out important technological advances in communications that have taken place in the Pacific Theater during the past year.

Briefings were presented by members of the U.S. Army Pacific General Staff to include: Intelligence (G2)—Cols Christopher R. Keegan and Paul A. Baldy; Operations (G3)—Lt Col James S. Sibley, Maj James J. Flynn and Capt Charles L. Boss Sr.; Logistics (G4)—Howard Gustavus; Communications-Electronics (C-E)-Col William E. Hames Jr. and Lt Col William J. Gleason; Army Security Agency (ASA)-Lt Col George M. Best.

Other featured speakers included Brig Gen Harry A. French, J-6, Commander-in-Chief, Pacific; Col Glenn M. Vinquist, Defense Communications Agency—Pacific; Col Gardner Pierce, deputy chief of staff, Personnel, U.S. Army Strategic Communications Command, Fort Huachuca, Ariz.; Comdr George B. Stadter, Defense Communications Agency—Pacific; Lt Comdr Howard L. Gottfried, Communications Division, Commander-in-Chief, Pacific Fleet, and Lt Col Frank A. Wall, U.S. Air Force, Pacific Communications Area.

Commanders present included Brig Gen Robert D. Terry, CG, STRATCOM-Pacific; Col James A. Evans Jr., Signal Group, Hawaii; Col Jack N. Cole, Signal Brigade, Korea; Col Paul Greksa, Signal Group, Japan; Col Gerald Carlisle, Signal Group, Okinawa, and Col George F. Clare, Signal Group, Taiwan.

Col David C. Baatz, Communication System Engineering and Management Agency, and Lt Col Lynn W. Wiegand, Plans and Programs Directorate, 1st Signal Brigade (STRATCOM), Southeast Asia, attended from Vietnam as representatives of Brig Gen William M. Van Harlingen Jr.

ARIEN-MEND Meet Considers Climatic Stresses on Humans

Some 80 faculty members of 47 medical schools throughout the nation exchanged knowledge of "Environmental Stresses," May 2-3, at the Army Research Institute of Environmental Medicine (ARIEM), Natick, Mass.

The symposium was a quarterly meeting of members of the 16-year-old program called MEND (Medical Education for National Defense), sponsored by the Department of Defense and U.S. Public Health Service.

National MEND coordinator is Army Medical Corps Col David M. Tormey and headquarters is at the Bureau of Medicine and Surgery, Department of the Navy, Potomac Annex, Washington, D.C.

MEND is described briefly as a program "To encourage, within a physician's educational processes, an appropriate attitude towards the practice of medicine under adverse emergency conditions or within a hostile environment."

The ARIEM-MEND symposium dealt with the complex effects of climatic stresses—heat, cold, altitude—on the human body and its defenses. Army Medical Corps officers from Washington and as far away as Fairbanks, Alaska, joined with distinguished civilian doctors of medicine and PhDs as guest speakers.

The MEND symposium in February 1968 was conducted by the staff of the U.S. Army Surgical Research Unit at Brooke Army Medical Center, San Antonio, Tex. Another MEND symposium at the U.S. Army Edgewood (Md.) Arsenal Research Laboratories is planned late this year.

Reviewing the history of the MEND program, Col Tormey said it actually began with a committee established in 1950 by the American Medical Association and the Association of American Medical Colleges.

Its purpose was to explore methods "for introducing into a medical school's curriculum those special subjects which medical graduates would vitally need if they were to serve in the Armed Forces or as civilian physicians in time of national emergency."

To test the committee's recommendations, Col Tormey said the Department of Defense agreed to support an experimental program in five medical schools during the academic year 1952-53. These schools were the University of Buffalo, University of California in San Francisco, Cornell University, the University of Illinois and Vanderbilt University.

Success of the pilot program let to its expansion to include all medical schools wishing to participate.

Col David M. Tormey
National MEND Coordinator

Beginning with 1955, Col Tormey said, schools began joining the program at the rate of 10 to 15 annually. By 1963, all of the 88 undergraduate medical schools in the country were MEND participants. As new medical colleges came under development, they also were invited to join MEND.

Direction of the program within the Federal Government is a responsibility of the Federal Committee on MEND. It is composed of representatives of the Department of Defense, Army, Navy, Air Force and the Public Health Service.

Each medical school appoints its own MEND coordinator from its faculty, based generally on high academic status. Included are 2 deans, 17 associate or assistant deans, 11 department heads, 20 full professors and 34 associate or assistant professors.

Col Tormey commented that most MEND coordinators are full-time faculty members and approximately 50 percent are teaching surgeons.

"The motivation and interest of these coordinators as individuals and as a group is high," he said. "In spite of heavy schedules of teaching, investigation and practice, the work they do for MEND is considerable and significant.

"The coordinator's role in his own school is to integrate into the established curriculum information which will relate to the military application of basic scientific and medical principles, health programs in major disasters, and mass casualty care. It is hoped that a school will gear its program so as to stimulate students and create appropriate attitudes while

Natick Labs Food Expert Wins Isker R&D Award

Dr. Clarence K. Wadsworth, supervisory food technologist of the U.S. Army Natick (Mass.) Laboratories, recently received the 1968 Research and Development Associates Rohland A. Isker Award.

Presented at the organization's 22d annual meeting, the award was for his outstanding contributions to the development commercialization of irradiated foods for military and civilian use.

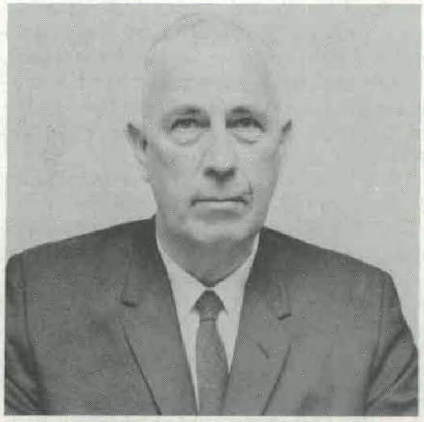
The Isker Award is presented annually by the R&D Associates, Inc., a nonprofit, military-industry liaison organization, for significant accomplishments in the fields of food and container research and development.

Dr. Wadsworth was cited specifically for his work on processing of white potatoes using ionizing energy to inhibit sprouting. Treated potatoes can be stored from one growing season to the next without spoilage caused by sprouting. The Food and Drug Administration, in 1964, approved potatoes irradiated for sprout inhibition for human consumption.

Before entering U.S. Government employment, Dr. Wadsworth was manager of research and development for William Underwood Co., Watertown, Mass., and research manager for General Foods Corp., White Plains, N.Y. Earlier, he was employed as a food research chemist with A&P Tea Co., in New York City.

Born in Gardiner, Maine, he earned a BS degree in 1934 at the University of Maine, and MS and PhD degrees (1937-1944) in bacteriology and chemistry at Michigan State University.

He is affiliated with the American Chemical Society, American Association for the Advancement of Science, American Society for Quality Control and the Institute of Food Technology.



Dr. Clarence K. Wadsworth

teaching appropriate subject matter."

This is attempted at the medical colleges in a variety of ways. As an example, some 34 schools conduct elective or required courses in emergency medicine. These have met with considerable enthusiasm on the part of both students and faculty, particularly when their content is related to an immediate or foreseeable application, i.e. highway accidents, local natural disasters, or a limited war, such as in Vietnam.

In 11 schools, animal surgery courses, partially supported by MEND, help to introduce students to the management of traumatic wounds and emergency procedures, such as cricothyrotomy and cardio-pulmonary resuscitation.

MEND conducts each year a series of teaching symposia for the benefit of faculty and students of the medical colleges. During the academic years 1965-66 and 1966-67, more than 1,500 faculty and students attended eight MEND-planned and sponsored symposia. Among many subjects discussed were disaster medicine, emergency medicine, combat surgery, environmental health problems (both in outer space and beneath the sea) and infectious diseases around the globe.

The idea of including students as participants in these symposia, originated from the school coordinators. For the past three years one symposium annually has been planned exclusively for students.

The student symposium for the academic year 1967-68 was held in Washington, D.C., in October, and dealt with "Military Medicine in Vietnam." The 2-day meeting was conducted at Walter Reed Army Medical Center, the National Naval Medical Center and Andrews Air Fore Base.

In addition to hearing lectures on current problems and accomplishments within the field of military medicine as it is being practiced in Vietnam today, the group has the opportunity to observe, at nearby Andrews Air Force Base, the deplaning operations of a medical evacuation flight from Vietnam.

This symposium attracted some 230 senior medical students from 75 medical colleges—the largest medical school group ever to attend a MEND symposium.

The program also sponsors the attendance of faculty and students at various courses conducted by the Armed Forces and the Public Health Service, all dealing with MEND-related subject matter. During the last two academic years, almost 1,000 individuals have participated.

MEND tries basically to serve as a communication link between federal health agencies and civilian medical educational centers. The office of the national coordinator attempts to serve as a liaison between the two parties.

To facilitate this interchange, MEND makes available to faculty and students, through their school coordinator, speakers, texts, reports and other forms of professional information generated by federal agencies and falling within the scope of MEND.

Recently a film library was established in the national coordinator's office containing films carefully selected for a medical student audience on such subjects as disaster medicine, emergency medicine, environmental medicine, and military medicine. These audio-visual aids are available for loan by school coordinators as part of their overall teaching program.

"Among those who have worked with MEND over the years," Col Tormey said, "there seems to be agreement that it, or something like it, is needed within the framework of modern medical education. Although it deals with a very small portion of a physician's total education and training, this attitude, this awareness for 'medicine under adverse conditions,' continues to be vitally important to the nation and more specifically to its responsible citizen-physicians."

215 Top Students, Teachers Attend National JSHS

Distinguished educators and top industrial leaders shared the spotlight as speakers at the Sixth National Junior Science and Humanities Symposium, attended by some 215 selected high school students and teachers, May 15-18, at Iowa City, Iowa.

Sessions were conducted at the University of Iowa and at HQ U.S. Army Weapons Command, Rock Island (Ill.) Arsenal. The conference was sponsored by the Office of the Chief of Research and Development. Arrangements were made by the U.S. Army Research Office-Durham, N.C., in cooperation with the university advisory committee, chaired by Dr. T. R. Porter, head of the University Science Center.

About 150 of the students participating were selected in 23 regional Junior Science and Humanities Symposia throughout the United States. An additional 25 were chosen from the Youth Science Congress Program sponsored by the U.S. Department of Health, Education and Welfare.

Each of the regional JSHS directors, a representative of the board of education and a teacher in each state, and about 15 teachers from the Youth Science Program were invited to attend the sessions.

"Exploring the Planets" was the topic of keynote speaker Dr. James A. Van Allen, head of the Department of Physics and Astronomy at the University of Iowa and famed worldwide for his discovery of high-intensity radiation belts in the upper atmosphere during the International Geophysical Year. The address started the conference on a high note.

Brig Gen Thurston T. Paul, director, Plans and Programs, Office of the Chief of Research and Development, DA, presented an inspirational and well-applauded address at the second session on "Why Science?"

Dr. Harry L. Levy, professor of the humanities at Fordham University, New York City, presided at the third session, highlighted by an address by Benjamin Swalin, director, North Carolina Symphony, on "Some Milestones in Our Western Culture." Dr. Howard R. Bowen, president of the University of Iowa, gave welcoming remarks.

Second-day highlights included the conference banquet and tours to the ultramodern Deere and Co. industrial plant and to HQ of the Weapons Command at Rock Island Arsenal. Dr. Gordon Miller, director of engineering research, Deere and Co., and Brig Gen William J. Durrenberger, CG of WECOM, were the featured speakers.

Host to the conference on the final day was the Collins Radio Co. of Cedar Rapids, Iowa. Dr. Gene Marner, director of research, spoke on "Industrial Research" following a tour of the Global Communication Center, Computer Center, Computer-Controlled Airline Message Center, and the Fabrication Division of the Research and Development Laboratories.

Arkansas State University Invites Hayes to Keynote JSHS Meet

Repeat performances as a principal speaker at regional Junior Science and Humanities Symposia are becoming increasingly common for Dr. John C. Hayes, chief, Programs and Concepts Branch, Scientific and Technical Information Division, Office of the Chief of Research and Development.

Typical is an invitation to give the keynote address on "Science—The American Dream" at the annual regional JSHS at Arkansas State University, State College, Ark., tentatively set Nov. 14-16. This will be Dr. Hayes' third consecutive performance in this role at the Arkansas symposium.

USAR R&D Units Slate Training Sessions

Four 2-week training sessions for members of the U.S. Army Reserve Research and Development Unit Program, with representation also from the U.S. Navy and U.S. Air Force, are scheduled from July through September.

Active duty training periods for members of the USAR R&D Unit Program, which is sponsored by the Office of the Chief of Research and Development (OCRD), are designed to update and broaden the professional training of the military scientists, engineers and technically qualified officers. Lt Col Kenneth G. Herring is OCRD Assistant for Reserve Affairs.

Training sessions are scheduled in four categories, as follows:

NUCLEAR SCIENCES. The eighth Army Nuclear Science Seminar (training session) at Oak Ridge, Tenn., July 14-27, is being arranged by the 3252d USAR R&D Unit. Approximately 100 Army, Navy and Air Force Reservists will participate.

Sponsors are OCRD and the Third U.S. Army. Lt Col John H. Neiler is directing the activities. The U.S. Atomic Energy Commission (AEC), Oak Ridge National Laboratory (ORNL), the Nuclear Division of Union Carbide Corp., the Oak Ridge Institute of Nuclear Studies, and the University of Tennessee (AEC Agricultural Laboratory) will be represented by top-level speakers and will provide other assistance.

RELIABILITY AND QUALITY CONTROL. Col Richard Story is training director for the 1221st R&D Unit sessions on the campus of the University of Connecticut at Storrs, July 14-27.

The theme, "Reliability and Quality Control—Tools for Accelerating Research and Development," is a first in the USAR R&D Unit training program. The purpose is to provide Reservists with up-to-date information on special techniques and strategies for conducting R&D work more rapidly and successfully.

TOOLS OF RESEARCH. Project responsibility for sessions from July 28-Aug. 10 at the California Institute of Technology, Pasadena, has been assigned to the 6159th R&D Unit, Pasadena.

Cohosts will be the 6154th R&D Unit, Maywood; the 6160th R&D Unit, Bakersfield; Detachment No. 1 of the 6160th R&D Unit, China Lake; and the 6164th R&D Unit, Santa Monica.

The program, in which numerous high-level R&D leaders will participate, will place major emphasis on current military research and development programs being conducted in the Southwest Pacific coast area.

Field trips are scheduled to the Jet Propulsion Laboratory, Edwards Air Force Base, China Lake, Point Mugu, Port Hueneme, the University of California at Los Angeles and Riverside, and various industrial establishments in the area.

ENGINEERING SCIENCES. The list of invited dignitaries and guest speakers for the 11th annual R&D Seminar of the 1621st USAR R&D Unit Reinforcement Training (Research), Fort Belvoir, Va., reads almost like a "Who's Who" in Department of Defense and Department of the Army R&D activities, including commanding generals of several major commands.

Scheduled Sept. 15-28 at the Army Mobility Equipment R&D Center, Fort Belvoir, the seminar is being arranged by Col Adolph H. Humphrey, acting assistant chief of the MERDC Military Technology Laboratory. Sixty selected Reservists, most of them with Mob Des assignments, are expected to participate.

Among invitees are Director of Defense Research and Engineering Dr. John S. Foster Jr., Assistant Secretary of the Army (R&D) Dr. Russell J. O'Neal, ARPA Director Dr. Eberhardt Rechtin, Army Materiel Command Deputy and Director of Laboratories Dr. Jay Tol Thomas, Army Chief of R&D Lt Gen Austin W. Betts, Chief of Engineers Lt Gen William F. Cassidy, Combat Developments Command CG Lt Gen Harry W. O. Kinnard, Chief of the Army Reserve Maj Gen William J. Sutton, Mobility Equipment Command CG Maj Gen Charles C. Case, Army Materiel Command Director of Developments Maj Gen Richard H. Free, Director of Army Research Brig Gen C. D. Y. Ostrom Jr.—and many others.

Application Information. Interested Reservists should submit an application for active duty training (DA Form 1058) to OCRD, DA, Attn: Assistant for Reserve Affairs, Washington, D.C. 20310. Although members of the U.S. Army Reserve R&D Unit Program have priority for attendance, space has been reserved for others. Reservists without an Army R&D mobilization designation should submit applications via parent organizations.

Redeye Successfully Completes Tests in Arctic

In its final Arctic environmental tests, the shoulder-fired Redeye missile achieved an extremely high reliability rating over a 3-month period at Fort Greely, Alaska, in temperatures that dipped to minus 40° F.

More than 1,000 of the infrared homing missiles are now being delivered by the Pomona division of General Dynamics to the U.S. Army and Marine Corps each month. Program management is provided by the Missile Command, Huntsville, Ala.

PACKED BY SOLDIERS during final Arctic environment tests, Redeye attained an extremely high reliability rating in temperatures of minus 40° F.

The world's smallest guided missile was easily carried by soldiers on both skis and snow shoes.

Tests were conducted to verify Redeye's operational capability after typical open storage (40° below), transportation and field handling in the winter environments.

Transportation and field handling tests followed for the same weapons in armored personnel carriers, trucks and amphibian cargo carriers.

After completion of the preliminary conditioning tests, the same weapons were fired at target drones. Results were outstanding.

Redeye can be carried and handled by frontline soldiers in much the same way as an infantry rifle. It is four feet in length, three inches in diameter and weighs about 29 pounds. In cross-country handling tests the infantry gunners carried a full complement of Arctic field equipment and protective clothing in addition to Redeye.

Redeye provides the individual soldier with a portable guided missile system for action against low-flying aircraft. The system greatly increases the effectiveness of individuals or small patrols without adding a burden of heavy equipment — important in rugged areas inaccessible to vehicles.

Night Operations Experiment 71.4 Nears Completion at CDCEC

Experiment 71.4, Exploratory Examination in Night Operations with Available Night-Vision Devices, is nearing completion of 7-month field trials at the United States Army Combat Developments Command Experimentation Command (CDCEC), headquartered at Fort Ord, Calif.

The experiment is concerned with new concepts for the use of night-vision devices now being used by the Army. More specifically, CDCEC is interested in finding out the effects of night-vision instruments when used in different existing light levels and their uses with some sort of artificial illumination.

Field trials for the experiment are under way at Hunter Liggett Military Reservation near King City, Calif., where CDCEC maintains a highly instrumented field laboratory.

Three types of night-vision equipment are being tested, the Small Starlight Scope, the Crew-Served Weapons Night-Vision Sight, and the Night Observation Device (medium range). All are designed to amplify existing light for the naked eye.

CDCEC chose an armored cavalry platoon with its four subunits—a tank section, a scout section, a rifle squad, and a support squad—to be used in the field trials.

Forty-two men are participating in the trials as player personnel, using reconnaissance and attack tactical situations. One hundred and sixty support personnel are involved.

Two 6-man squads are mounted on M114 reconnaissance carriers. Three 4-man crews mount M60A1 tanks in the tank section. The rifle squad is transported in a M113 armored personnel carrier, and the support squad is mounted on a M106 armored mortar carrier.

Xenon Searchlight mounted on M60A1.

Four different trial courses have been prepared for the experiment. During the first phase, subunits have four night operations per week, "running" two trial courses per night.

The target layout of the courses is different so that player personnel cannot familiarize themselves with the target locations. On one course, the subunits use the night-vision devices. On another course, they do not. Results from each trial run are compared to determine effectiveness of the subunits.

During this first phase, the subunits are tested under existing light levels (high, medium and low) as to their mobility, ability to locate targets, fire effectiveness, controllability and sustainability.

Some targets the subunits encounter on the trial courses are moving, some are stationary and some provide a signature for the players by firing or breaking light discipline.

Two types of artificial illumination are being used for selected trials of the first phase—infrared light and "pink" light. Infrared, which is not visible to the naked eye, is light between the visible spectrum and the radar region. Pink light is nearer to the visible spectrum than infrared, yet still not visible to the naked eye.

For the field trials, the infrared and pink light are produced by using filters on a tank-mounted Xenon searchlight.

CDCEC is especially interested in evaluating the uses of pink light. Two questions of specific interest are: "Is a unit more effective when using night-vision devices with pink light than when using the devices without pink light? Is a unit more effective when using night-vision devices with pink light than when using neither the devices nor pink light?"

The second phase of the field trials is a rerun of the first phase, with the platoon itself being used as the operating unit. Evaluations will be made as to the degree which the night-vision devices assisted by infrared or pink light improves the armored cavalry platoon's ability to accomplish its mission.

After field trials are completed, the data will be evaluated and the final report is expected to be completed on June 30.

CDCEC's Project Team III, headed by Col John W. Jennings, and Project Team V are working together on Experiment 71.4. The field trials are being conducted by Project Team III under direction of Lt Col Robert W. Short as project officer assisted by Maj Aubrey L. Knapper.

Crew-Served Weapons Night-Vision Sight.

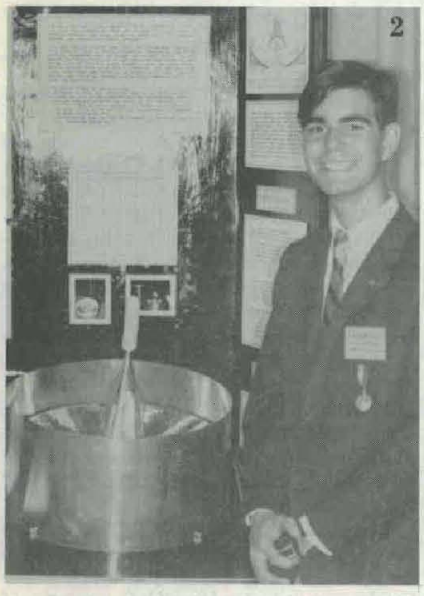
The data collection and evaluation is being done by Project Team V with Maj Raymond Miller as project officer. The team chief is Col James T. Root.

The CDCEC, which is the only organization of its kind in the Army, is the largest subordinate unit of the Combat Developments Command, Fort Belvoir, Va. In essence, CDCEC is the Army's field laboratory for combat developments.

In this field laboratory, various possible combinations of soldier-doctrine-material-organization are brought together in a realistic simulation of future combat.

With the information obtained from Experiment 71.4, the Army hopes to help the soldier do his job more effectively, even under the cover of darkness.

Small Starlight Scope.



Army Selects Winners in ISF for Visits, Job Offers

Twenty high school students from 15 different states and Canada won Department of the Army superior and meritorious awards for research projects of special interest to the Army as indicative of their career potential at the 19th International Science Fair in Detroit, Mich., May 12-18.

Director of Army Research Brig Gen Charles D. Y. Ostrom Jr. presented awards to the winners in Detroit's Ford Auditorium. The awards ceremony was conducted by Edward J. Sherburne Jr. of Science Service, the nonprofit organization that administers the International Science Fair Program.

More than 400 high school students participated from most of the 50 states, including Hawaii and Alaska, and from several foreign countries. In addition to the awards made by the Army, Navy and Air Force, 25 U.S. Government, industrial and professional organizations donated cash prizes ($100 maximum), plaques and, in some cases, expense-paid visits to their laboratories.

Army meritorious and superior award winners received certificates of outstanding achievement. The superior award winners also received offers of either summer employment or a one-week, all-expense paid visit to an Army Research and Development Laboratory.

One of the superior award winners was Don E. Baker, 18, a senior at Northwest High School, Indianapolis, Ind. His project is "Irradiative Computer Component Microminiaturization."

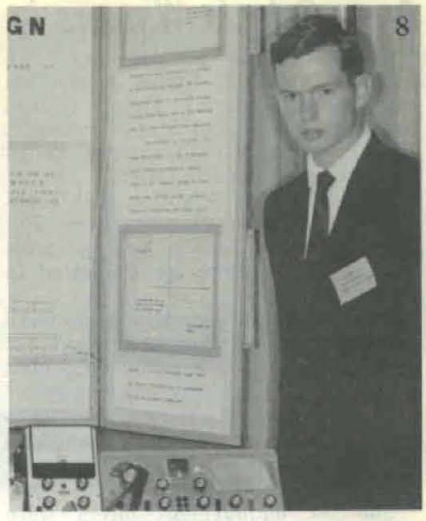
General Ostrom revealed that Baker is also the winner of "Operation Cherry Blossom," which entitles him to represent the U.S. Army at the 1969 Japan Student Science Awards Exhibit in Tokyo, Japan. Alternate winner in the Army contest is Christopher D. Patrinely, 16, who also received a superior award. He is a junior at Terry Parker High School in Jacksonville, Fla., and his project was "Minimum Temperature Forecasting with a Parabolic Reflector."

Baker and Patrinely received telegrams from Secretary of the Army Stanley R. Resor congratulating them on their achievements.

Other Army superior award winners and their research projects are:

- Eileen P. Bross, 17, a junior at Mother Cabrini High School, N.Y.C., "Radioprotective Cytological Studies on *Tradescantia paludosa*."
- John R. Park, 18, senior, North Miami High School, Miami, Fla., "Ecology of the Populations of Portunid Crabs of a Tropical Semi-Estuarian Bay."
- Wallace Head, 18, a senior at Palmyra High School, Palmyra, Mo., "Effects of Tobacco on *Paramecium caudatum*."
- Katherine M. Geier, 17, a senior at Wade Hampton High School, Greenville, S.C., "Bacteriocidal and Bacteriostatic Effects of Yellowroot."
- Robert M. Swift, 17, a senior at Stephen Tyng Mather High School, Chicago, Ill., "Biochemical Study of Prostaglandins."
- William Greenlee, 17, a senior at Whetstone High School, Columbus, Ohio, "Squalane: A Whale of a Molecule."
- Glenn A. Shankle, 17, a senior at Brazosport Senior High School, Free-

ARMY ISF AWARD WINNERS: Fig. (1) Don E. Baker, (2) Christopher D. Patrinely, (3) John R. Park, (4) Kenneth L. Jones, (5) Katherine M. Geier, (6) Eileen P. Bross, (7) Wallace Head, (8) Glenn Shankle, (9) William Greenlee, (10) Robert Swift.



port, Tex., "Antenna Research and Development."

• Kenneth L. Jones, 18, a senior at Enid High School, Enid Tex., "Development of a Two-Dimensional Ocean Wave Gauge for Surf Studies."

Meritorious Award winners and their projects are:

• David E. Rieger, 18, a senior, Rapid City (S.D.) High School, "Light Factors in Relation to Photosynthesis."

• Charles A. Neiditz, 18, a senior at William H. Hall High School, West Hartford, Conn., "Neoblastular Migration as Being the Cause for Blastemal Growth and Full Regeneration in Dugesiatigrina."

• Neil F. Martin, 17, a senior at Bethesda Chevy Chase High School, Bethesda, Md., "Variable Camber and Thickness Airfoil."

• J. Stephen Schuchman, 16, a junior at Hillcrest High School, Springfield, Mo., "Computerized Light Activated Robot Assembly."

• Marijane Doyle, 17, senior at Welland, Ontario, Canada, Centennial Secondary School, "Hepatic Regeneration."

• Melannie Terbovic, 17, junior at Monterey High School, Monterey, Calif., "How and Why Optical Illusions Occur."

• Albert G. Crawford, 18, senior at West High School, Salt Lake City, Utah, "Isolation of Extra Nuclear DNA Polymerase."

• Stephen L. Thaler, 18, University High School, Springfield, Mo., "Migration of Negative Crystals."

• Robert E. Dulgarian, 17, senior at Hope High School, Providence, R.I., "Streaming Plasma Research."

• Mike J. Uland, 16, junior at Jasper (Ind.) High School, "Fluidics—Design and Application of Fluid State Devices."

General Ostrom headed the Department of Army Panel of Judges for the awards that included as chairman Dr. J. Fred Oesterling, deputy scientific director for research, U.S. Army Natick Laboratories; Lt Col James E. Bunch, district engineer, U.S. Army Engineer District Lake Survey, Detroit, Mich.; Dr. Brennie E. Hackley Jr., Medical Research Laboratory, Edgewood Arsenal, Md.; Lt Col Charles A. Heisterkamp, MC, chief, Bioengineering Research Section, Research Division, U.S. Army Medical R&D Command, Washington, D.C.; and

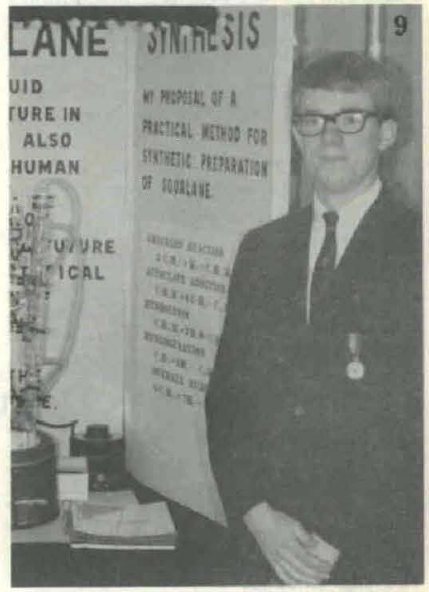
Maj Duane E. Hilmas, VC, project officer, Medical Research Branch, Research Division, U.S. Army Medical R&D Command, Washington, D.C.; Dr. Peter Holmes, microbiologist, Pioneering Research Laboratory, U.S. Army Natick (Mass.) Laboratories; Dr. Woodland Hurtt, research plant physiologist, Plant Science Laboratory, Fort Detrick, Md.; and

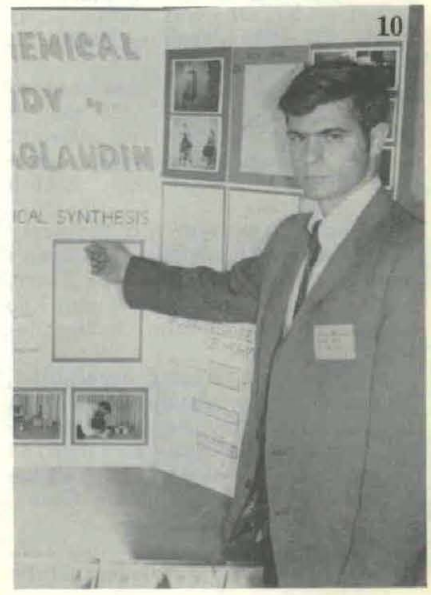
Dr. Jack G. Parks, research physicist, U.S. Army Tank-Automotive Command, Warren, Mich.; Edwin M. Vaughan, physical science administrator, Research Office, U.S. Army Weapons Command, Rock Island, Ill.; Col Stefano Vivona, MC, director, Division of Preventive Medicine, Walter Reed Army Institute of Research, Washington, D.C.

Reserve officers who served on the DA Judges Panel are Capt Salvador L. Camacho, senior research physicist, Linde Division, Union Carbide Corp., Indianapolis, Ind.; Maj Charles L. Collins, electronic engineer, Astrionics Laboratory, Marshall Space Flight Center, Huntsville, Ala.; Col Byrne M. Daly, general surgery, Jackson, Mich.; and

Lt Col John V. Perry, professor of mechanical engineering, Texas A&M University, College Station, Tex.; Capt Dudley B. Sisk, staff instructor, Purdue University, Battle Ground, Ind.;

(Continued on page 20)





Army Selects Winners in ISF for Visits, Job Offers

(Continued from page 19)

Lt Col Robert R. Stone, production manager, General Motors Corp., Saginaw, Mich.; and Maj Norman T. Taylor, coordinator of science, Board of Education, Jackson, Mich.

Jack B. Fenn, Scientific and Technical Information Division, Army Research Office, Arlington, Va., was project officer for Army participation in the fair.

Army Superior Award winners were given a choice of summer employment or a one-week, all-expense paid visit to the Army in-house laboratory of their choice. Alternates also were given certificates of achievement and will be selected for jobs or visits not accepted by the winners.

Summer employment offers were based on each student's disciplinary interest as it may be pursued at an Army laboratory closest to their homes as follows: Kenneth L. Jones, U.S. Army Corps of Engineers Waterways Experiment Station, Vicksburg, Miss.; John R. Park, Great Lakes Survey, Corps of Engineers, Detroit, Mich.; Christopher D. Patrinely, Army Natick (Mass.) Laboratories; Glenn A. Shankle, Army Missile Command HQ, Redstone (Ala.) Arsenal; and

Don E. Baker, Feltman Research Laboratories, Picatinny Arsenal, Dover, N.J.; Wallace L. Head, Walter Reed Army Institute of Research, Washington, D.C.; Eileen P. Bross, Army Aeromedical Research Unit, Fort Rucker, Ala.; Katherine M. Geier, Army Medical Research Laboratory, Fort Knox, Ky.; and Robert M. Swift and William Greenlee, HQ Army Weapons Command, Rock Island (Ill.) Arsenal.

In the event job offers are rejected in favor of one-week orientation visits, the winners are given an opportunity, based on their disciplinary preference to go to a more distant laboratory, as follows:

Kenneth L. Jones, Pitman-Dunn Research Laboratories; Don E. Baker, Feltman Research Laboratory; Eileen P. Bross, Medical Research and Nutrition Laboratory, Fitzsimons General Hospital, Denver, Colo.; John R. Park, Biological Research Laboratories, Fort Detrick, Md.; Christopher D. Patrinely, Army Natick (Mass.) Laboratories; Wallace L. Head, Walter Reed Army Institute of Research; and

William Greenlee and Robert M. Swift, Watervliet (N.Y.) Arsenal, Army Weapons Command; Katherine M. Geier, Medical Research Laboratory, Fort Knox, Ky.; and Glenn A. Shankle, U.S. Army Ballistics Research Laboratories, Aberdeen (Md.) Proving Ground.

New Medical Field Unit Produces Pure Water

The U.S. Army Medical Research and Development Command has announced development of a new portable water purification unit under a $350,000 contract with the Advanced Technology Operations group of Beckman Instruments, Inc.

The project was initiated to develop a field distillation system that could produce water for intravenous solutions for medical use in remote areas.

The water purification unit eliminates the need to carry large quantities of electrolytic solutions, packaged in glass, into remote field laboratories and hospitals. It provides sterile water that can be added to prepackaged dried salts and concentrated intravenous solutions for preparation of parenteral solutions.

The unit produces up to a gallon per hour of sterile, pyrogen-free water (U.S. Pharmacoepia Standards, USP, for Sterile Water for Injection) from local water sources. The complete system consists of a distillation unit, water quality monitor attachment, autoclave set and electrolyte reconstitution plastic sets.

A battery-powered electronic instrument continuously monitors the product water quality. The electrolyte sets contain prepackaged, dried or concentrated electrolytes. Material presently submitted to the Food and Drug Administration for approval includes dextrose 5 percent and sodium chloride 0.9 percent, USP; dextrose 5 percent, USP; dextrose 10 percent, USP; sodium chloride, USP, and sodium lactate, ⅙ molar, USP.

Most of the water purification units currently available are large systems, usually made of glass and difficult to clean. Beckman's water purification system is small and lightweight (about 30 pounds), is easily disassembled for cleaning, and can be carried in a suitcase or back-packed. Made of stainless steel, it is highly resistant to damage.

The unit is operable at any altitude at ambient temperatures of 35° F. or above and can utilize any available heat source such as a gasoline burner, coal, coke or wood fire, or an electric heater. Because of its durability, the water purification unit is ideally suited for remote-area parachute delivery.

Water from the sea, pond water or brackish water may be used to produce water that meets USP requirements for water for injection. Extensive testing on sea water has shown scale formation is easily controlled.

The prototype systems are currently being delivered to the U.S. Army Medical Research and Development Command for further evaluation under field conditions.

Paulick Assumes Deputy CG Post at TECOM

Brig Gen Michael Paulick, CG of the U. S. Army Training Center at Fort Campbell, Ky., since August 1966, became deputy commander of the Army Test and Evaluation Command May 15 at Aberdeen (Md.) Proving Ground.

He succeeded Brig Gen James F. Hollingsworth, who was reassigned as deputy CG of the Training Center at Fort Jackson, S. C.

General Paulick was promoted to one-star rank in June 1965 and in September was assigned as assistant division commander for combat operations, 7th Infantry Division, Eighth Army in Korea.

During a 2-year tour with the Army element of the U.S. Strike Command's Joint Test and Evaluation Task Force, MacDill Air Force Base, Fla., he earned the Joint Service Commendation Medal.

Qualified as a master parachutist, General Paulick commanded the 325th Parachute Infantry Regiment of the 82d Airborne Division—a Special Forces Group. He also served with the Weapons Systems Evaluation Group, Department of Defense.

He is a 1940 graduate of the U. S. Military Academy. After completing courses at the Infantry School and the Command and General Staff College, he remained as an instructor.

Among his numerous medals and awards are the Distinguished Service Cross, the Silver Star with Two Oak Leaf Clusters, the Bronze Star with one Oak Leaf Cluster, the Combat Infantryman Badge and two French awards—the Fourragere with Colors of the Croix de Guerre (with Palm), and Croix de Guerre with Gold Star.

Brig Gen Michael Paulick

Command Offers Computer Systems Advice

Counseling some 650 U.S. Army data-processing activities in the United States and at scattered points around the world to select the right computer for special requirements is a function of the Computer Systems Evaluation Command.

Headquartered at Fort Myer, Va., the command was established in October 1967 as an outgrowth of the Computer Systems Directorate, U.S. Army Information Data and Systems Command, under the Comptroller of the Army. Col Anderson Q. Smith, commanding officer, is a veteran in the Army automatic data processing programs.

The 77-man command's mission requires that much of the work be done in the field and from 25 to 50 percent of the technical personnel may be on temporary duty at any time. In advising commanders of field installations on selection of the proper computer, one consideration is invariably paramount—what will do the job at minimum cost?

The range of widely varying requirements is related to the depth and diversity of the Army mission in many parts of the world. In selecting computers, practicability for specific requirements must be considered—"a happy marriage" of capability and needs.

In South Vietnam, for example, the problem may be that of adequate stock control of aviation parts for helicopters supporting ground troops. In the Pentagon, Washington, D.C., troop movements and logistics are aided by many types of computers.

Along the Mississippi River, the Corps of Engineers uses computers to design vital dams and levees. At Redstone (Ala.) Arsenal, computers serve rocket engine design, configurations of missiles and many other needs. The range of tasks is staggering.

The U.S. Army Computer Systems Evaluation Command mission involves eight major areas of functional responsibility, described briefly as follows:

- Provides technical and engineering assistance to Department of the Army computer users or potential users.
- Assists proponents in development of data automation requirements and systems specifications.
- Determines the acceptability of computers for Army use.
- Evaluates and recommends selection of commercial and military equipment for general business or scientific and engineering applications.
- Provides technical support for on-site readiness reviews, specifications reviews and performance evaluations.
- Provides Army representation on General Services Administration (GSA) Negotiations Committee for Automatic Data Processing (ADP).
- Edits the ADP Technical Bulletin, an exchange of information and views for HQ Department of the Army and Army computer users around the world.
- Serves as technical consultant and supports the Comptroller of the Army in matters related to automatic data processing evaluation.

Col Anderson Q. Smith, commander of the United States Army Computer Systems Evaluation Command (USACSEC) is a native of Barnesville, Ga., where he attended Gordon Military College.

He received a BA degree in general education from the University of Omaha and is a graduate of the Command and General Staff College and the Army War College.

Commissioned as an Infantry second lieutenant in 1940, he transferred to the Signal Corps in 1960. He has served in Europe, Korea and Thailand, and recently, received the Joint Service Commendation Medal for his work with automatic data processing in Europe between 1964 and 1967.

Col Anderson Q. Smith

Col Smith was the first project manager of CCIS-70, the Army's ADP development program for field units and became commander of USACSEC when it was created in October 1967.

USARO Tests K-700 Keytape Equipment

A new system for bypassing punched business cards with an electronic device that encodes scientific and technical information on magnetic tape is receiving its first Army test at the U.S. Army Research Office (USARO), Arlington, Va.

Testing of the new Honeywell K-700 Keytape equipment will begin about June 24. It was installed mid-June in the Scientific and Technical Information Division, Office of the Chief of Research and Development.

Morton M. Marks, chief of the USARO System Research and Engineering Branch, views this innovation as the first step toward source-data automation for the Army Research and Development Information System (ARDIS).

K-700 KEYTAPE equipment functionally brings the operators "closer" to the equipment, enhancing their involvement in the total processing.

Responsibility for the ARDIS program rests with USARO S&TI Division chief, Col Dale L. Vincent, Army Director of Technical Information, and Marks is one of the key supervisors.

In preliminary trials, the K-700 Keytape has proved itself unusually quiet in operation in contrast to the normal keypunch system. Investigators of the new direct-on-tape method of feeding computers data for processing thus far have found the system economical and time-saving, Marks stated.

The basic 7-channel Model K-700 will be put through exacting paces for approximately 90 days at USARO to determine its feasibility. Adaptation to the new system by ADP keypunch operators already employed in USARO, it is estimated would require no more than one-half day.

The Model K-700 has a 64-character keyboard mounted on a movable console. Data is entered into the core memory of the unit by the operator. Either automatically, or by the operator, the device writes the data record from memory onto magnetic tape.

Use of the standard card-image format precludes the need for reprograming when converting from a keypunch-keywriter operation to a Keytape as a means of input data preparation.

Major RDT&E, Procurement Contracts Total $442 Million

Army contracts for research, development, test and evaluation, and procurement, each in excess of $1 million, totaled $442,036,580 for the period Apr. 9 through May 9.

As a new contractor for production of 5.56mm, M16A1 rifles, General Motors (GM) Corp. will receive $19 million for 60,000 rifles as the first-year increment to a multiyear, fixed-price contract.

GM also received a $20,101,662 modification for 155mm self-propelled howitzers, a $7,759,678 supplement for metal parts for 105mm projectiles, $1,453,159 for 6V53-T diesel engines for M551 vehicles, and $1,005,540 for 6V53 engines for the M113.

Bell Helicopter Co. gained a $19,497,888 modification for UH-1H Huey and a $5,500,000 modification for AH-1G Cobra helicopters. Boeing Co. was awarded $22,835,940 in contracts for CH-47 helicopters and spare parts.

Chamberlain Manufacturing Co. received three contracts — $16,160,017 for metal parts for 175mm, 155mm and 105mm projectiles, $1,316,700 for metal parts for 2.75-inch rockets, and a $2,631,250 modification for 155mm projectiles.

Olin Mathieson Chemical Corp. was awarded a $13,721,396 modification for operation and maintenance of a plant for production of propellants and ammunition components and a $4,227,482 modification for 81mm illuminating projectiles.

Continental Motors Corp. will get $16,626,266 for work on engine assemblies LDS-465-1A and AVDS 1790-2A. Harrington and Richardson Co. will receive $15,000,000 for 60,000 5.56mm M16A1 rifles as the first-year increment to a fixed-price, multiyear contract.

Hawk industrial prototype hardware, special tooling and test equipment, and metal parts for bomb nose fuzes will be furnished by contracts totaling $16,140,546 to Raytheon Co.

Sperry Rand Corp. is furnishing metal parts for medium-caliber artillery projectiles under a $11,646,888 modification contract and will get $1,544,138 for gyromagnetic compass sets and directional gyros.

Thiokol Chemical Corp. was issued a $13,711,831 modification for loading, assembling and packing of mortars, rocket motors, igniters and miscellaneous items, and for operation of Longhorn Army Ammunition Plant at Marshall, Tex.

E. I. duPont de Nemours and Co. received a $12,000,000 contract for designing and procuring equipment and supplies, and installing five line plants for production of TNT. Harvey Aluminum Sales, Inc., is receiving $11,631,954 under a modification for loading, assembling of ammunition and components, and for maintenance and support services at the Milan, Tenn., Army Ammunition Plant.

Contracts under $10 million. American Machine and Foundry (AMF) received $6,811,119 modification for metal parts for 750-lb. bombs and $1,296,000 for metal parts for 4.2-inch projectiles.

Hercules, Inc., was issued an $8,653,845 modification for production of propellants and support services at the Radford (Va.) Army Ammunition Plant.

Pace Corp. won three contracts totaling $8,351,843 for M123A1 and M112A1 cartridges and for illuminating signals and surface flares. Remington Arms Co. was issued a $7,673,805 modification for production of small arms ammunition and maintenance of the Salt Lake City Army Ammunition Plant, Independence, Mo.

A $7,472,000 fixed-price contract to Hughes Tool Co. is for light observation helicopters. Philco Ford Corp. received $5,000,000 as a first-year increment for classified electronics equipment and $2,406,274 for power supply units for Chaparral missiles.

Metal parts for 105mm projectiles are being furnished under a $7,400,918 modification with Levinson Steel Co.

$1.6 Million Contract Provides for Twister Prototypes

Construction of facilities for the manufacture of four Army ground-vehicle prototypes has been started by the Lockheed Missiles and Space Co. at Sunnyvale, Calif. Lockheed has received an initial $1.6 million contract awarded by the Army Tank-Automotive Command, Warren, Mich., for these vehicles.

The Army vehicles include two armored combat vehicles and two testbeds. They will be developed on the concept of Lockheed's agile, high-performance, off-road vehicle, Twister.

For two years Lockheed's 8-wheeled Twister has scrambled over test courses in Sunnyvale, and the Santa Cruz mountains, the Nevada desert, in deep snow in the high Sierras, and in the rice paddies of the Sacramento valley.

Army Twister vehicles will range in weight from seven to nine tons, accelerate from 0 to 45 miles per hour within 12 seconds, and have a top speed of 65 miles per hour, with a turning radius less than that of a jeep. They will have two bodies joined by a unique pivotal yoke.

Four wheels on each body will be driven by an engine in that body, so that the complete vehicle will have two engines and 8-wheel-drive. The wheels on Twister's front body are independently suspended, while those on the rear work in pairs on a walking beam.

This wheel suspension and body arrangement enables Twister to cross large obstacles under many different terrain conditions while keeping all eight driving wheels on the ground for maximum speed and power.

A prime factor today in restricting speed and mobility of any vehicle, combat or otherwise, a Lockheed official said, is the amount of pounding the driver can take before his control of the vehicle begins to suffer. "Twister has both the power and driver-protecting suspension to cross rough terrain at high speeds, as shown in the tests conducted."

Eight-Wheel-Drive Twister

and a $7,076,000 supplement to fixed-price contract with National Presto Industries, Inc.

Standard Products Co. will get $6,889,840 for track-shoe assemblies for M113 and M114 personnel carriers, Hol-Gar Manufacturing Corp., $6,302,-286 for 30-kw, diesel-engine-driven generator sets, and Bulova Watch Co., $5,708,149 (two contracts) for production of M524A5 fuzes for 81mm projectiles and head assemblies for 60mm mortar fuzes.

Hughes Aircraft Co. is receiving $2,258,409 for AN/PRC-74B radio sets and $3,110,922 for a semiautomatic flight operations center, ancillary items and reports. A. O. Smith Corp. received a $5,049,450 modification for metal parts for 750-pound bombs.

Contracts under $5 million. Uniroyal, Inc., for loading, assembling and packing ammunition and operation of the Army Ammunition Plant, Joliet, Ill., $4,850,147; Emerson Electric Co., $4,715,863 for line item repair parts for the XM-28 armament subsystem.

General Time Corp., $4,416,000 modification for M565 time fuzes; Donovan Construction Co., $4,380,000 for 155mm projectiles; Harnischfeger Corp., $4,259,276 for 20-ton truck-mounted cranes; R. G. LeTourneau, Inc., $4,141,080 for metal parts for 750-pound bombs; and

Ford Motor Co., $3,801,748 modification for 2,424 sedans; Honeywell, Inc., $3,686,581 for metal parts for fuzes; Olin Mathieson Chemical Corp., $3,684,480 for propellants for 7.62mm ball ammunition and 20mm ammunition; and

Standard Container Co., $3,534,003 (two contracts) for ammunition box assemblies; Northrop Carolina, Inc., two contracts totaling $3,495,136 for parachute ground flares and CS-1 chemical agent; General Instrument Corp., $3,386,618 for 750-pound bomb components; Litton Systems, Inc., $3,000,000 for AN/ASN-86 inertial navigation sets; and

Amron Corp., $1,594,618 for 40mm cartridge cases and $1,267,255 for metal parts for 40mm cartridge fuzes; Grumman Aircraft Engineering Corp., $2,819,600 for supplies and services for production of OV-1D aircraft and related items; and

Hercules Engines, Inc., $2,551,750 for multifuel engine assemblies for 5-ton trucks; Batesville (Ark.) Manufacturing Co., $2,395,800 for bomb fuzes; Rulon Co., $2,369,014 for metal parts for fuzes used on artillery ammunition; and

Studebaker Corp., $2,338,830 for 234 Hertz generator sets; Aerojet General Corp., $2,272,750 for seven forward-looking, infrared, airborne target-acquisition, fire-control systems; I. D. Precision Components Corp., $2,250,000 for metal parts for M557 fuzes used on various artillery shells; and

Allis Chalmers Manufacturing Co., $2,200,863 for 127 scoop loaders; Kanarr Corp., $2,115,021 for 40mm grenade launchers; TRW, Inc., $2,067,000 for bolt and roller assemblies for M14 rifles; Hayes-Albion Corp., $2,040,430 for 81mm projectiles; Kisco Co., Inc., $2,032,000 for metal parts for 105mm cartridge cases.

Contracts under $2 million. Carter Carburetor Division of ACF Industries, Inc., $1,779,456 for metal parts for fuzes for 81mm cartridges; LTV Electrosystems, Inc., $1,761,210 for AN/PRC-25 radio sets; Sanders Associates, Inc., $1,562,593 for advanced production engineering for the FAAR; and

Action Manufacturing Co., $1,500,-000 for metal parts for bomb fuzes; Ordnance Products, Inc., $1,495,533 for fuze assemblies for hand grenades; ITT Gilfillan, Inc., $1,491,676 for advanced production engineering program resulting in delivery of data items for AN/TPQ-28 ground radar sets; and

Whitaker Corp., $1,469,358 for igniters for 2.75 rocket motors; UMC Industries, Inc., $1,430,100 for loading and assembling 81mm illuminating projectiles; Security Signals, Inc., $1,402,878 for igniter time-blasting fuzes; and

Temco, Inc., Nashville, Tenn., $1,-380,301 for metal parts for 105mm projectiles; Wythe Tool and Machine Co., $1,365,000 for links for 7.62mm ammunition; Barry L. Miller, $1,363,-310 for links for 7.62mm ammunition; and

Mills Manufacturing Co., $1,303,800 for cargo parachutes; Kennedy Van Saun Corp., $1,291,500 for metal parts for 4.2-inch mortar projectiles; and

Goodyear Tire and Rubber Co., $1,241,980 for rubber-tracked shoe assemblies for M48 tanks; Western Electric Co., $1,226,000 for overhaul of two Nike Hercules systems; Chrysler Motors Corp., $1,208,582 for 342 trucks/truck chassis; and

H. Hertzberg and Sons, Inc., $1,203,-708 for chamber-cleaning brushes for M16 rifles; Collins Radio Co., $1,179,-383 for ten AN/TRC-136 radio terminal sets; Bogue Electric Manufacturing Co., $1,169,642 for 1,081 3-kw generator sets; and

Parsons Manufacturing and Stamping Co., $1,166,943 for rotating disks for 4.2-inch cartridges; Irving Air Chute Co., $1,124,470 for cargo parachutes; Kaiser Jeep Corp., $1,112,084 for 1½-ton trucks; General Electric Co., $1,103,700 for automatic aircraft guns and armaments parts; and

Electro Mechanical Corp., $1,057,-549 for electrical equipment shelters; General Dynamics Corp., $1,051,598 for FY 1968 engineering services for the Redeye system; and

Federal Laboratories, Inc., $1,042,-500 for hand grenades; AVCO Corp., $1,024,380 for turbine nozzles for T-53 engines used on UH-1 helicopters; Pioneer Recovery Systems, Inc., $1,000,110 for cargo parachutes; and Firestone Tire and Rubber Co., $1,000,000 for reactivation of a plant for production of large-caliber ammunition items.

XM45 E1 Refueler Slated for Delivery to Vietnam

Refueling operations for the M132 mechanized flamethrower and portable flamethrowers in Southeast Asia will be moved from rear echelons to the front lines by the new XM45 E1 mobile unit slated for early delivery.

The tracked refueler replaces two of the previous truck-mounted units by doubling the gasoline storage capacity and reducing the mixing and transfer time to one-half. It also has improved armor to protect personnel and components.

Developed at Edgewood (Md.) Arsenal, the XM45 E1 will be introduced to troops in Vietnam by a training crew headed by Maj John R. Frith and Richard C. Newman of the arsenal's Weapons Development and Engineering Labs. Newman headed a 6-man military-civilian team that introduced the XM45 prototype to the South Vietnamese Army last summer.

The arsenal's Technical Support Directorate wrote all requisitions for procurement, fabricated and assembled components, and met their schedule for estimated time and cost of project. Extensive use of surplus material saved an estimated $239,000 in overall production costs.

All testing was done at the arsenal and at the U. S. Army Testing and Evaluation Command at Aberdeen Proving Ground, Md.

XM45 E1 Flamethrower Refueler

OR Meet Centers on 'Systems Analysis'

"Systems Analysis in Operations Research" was the theme as 175 invited participants gathered for the Seventh Annual Army Operations Research Symposium at the Army Research Office-Durham, N.C., May 22-24.

Sponsored by the Office of the Chief of Research and Development with the Army Research Office-Durham (ARO-D) as host, the conference also attracted a nonparticipating group of Department of the Army military and civilian personnel, representatives of other military services and attendees from non-Department of Defense governmental agencies.

Director of Army Research Brig Gen Charles D. Y. Ostrom Jr. presented the opening address, following introductory remarks by Col Nils Bengtson, former ARO-D commander, and a welcome by Col Donovan F. Burton, current ARO-D commander.

Director of Research Scott A. Krane, Hallmark, Inc., was guest speaker at the banquet. Col Bengtson, now director, R&D Directorate, U.S. Army Missile Command, Redstone (Ala.) Arsenal, was toastmaster.

Brig Gen Paul D. Phillips (USA, Ret.), Acting Deputy Assistant Secretary of the Army (Manpower and Reserve Affairs), organized and served as chairman of the first general session on "Force Planning." Speakers included Darold W. Silkwood, office, Assistant Secretary of Defense (Systems Analysis) for Land Forces Programs; Brig Gen James T. Baldwin, director, Plans and Programs, Office of the Assistant Chief of Staff for Force Development, DA; and General Phillips.

The session on "Intelligence Applications of Operations Research" was organized and presided over by Lt Col Alfred A. Pabst, Office of the Assistant Chief of Staff for Intelligence, who discussed the role of OACSI in "Threat Production." Maj Audrey W. W. Short of OACSI and Charles Conley of HRB-Singer, Inc., gave talks.

Simultaneously a technical session was chaired by William Vogel, U.S. Army Security Agency. Two staff members of the Mathematics Research Center, U.S. Army—Dr. Martin Fox of Michigan State University and Dr. George Kimeldorf of California State College—gave a paper on "Strategies and Values in Noisy Duels."

Col Duane S. Cason, Office of Personnel Operations, DA, and Alfred Rubin of the Research Analysis Corp., discussed "Personnel Inventory Analysis." Dr. Richard Sorenson, U.S. Army Behavioral Science Research Laboratory, presented "Minimization of Training Cost and Quantity of Multi-Skilled Personnel Under Contingency Skill Requirement Conditions."

Dr. William Niskanen, Institute of Defense Analysis, Washington, D.C., spoke on "Estimation of Productivity and Cost of Major Military Forces in Vietnam" at a session presided over by Lt Col William Travis. With Dr. Marion R. Bryson and Maj Albert Thompson of ARO-D, Col Travis, chief of the Studies Branch, Army Research Office Studies and Analysis Division, also coordinated arrangements for the conference.

Contributed papers at a simultaneous session were: "A Time Dependent Artillery Evaluation Model," Alan S. Thomas, U.S. Army Ballistic Research Laboratories; "Automation in Contingency Resource Planning—The Contingency Readiness System (CONREDS)," Maj Paul P. Burns, Office of the Chief of Staff, DA; and "Simulation and Evaluation of Tactical Routing Methods for Army Communications Networks," Eugene E. Sartor and Miguel A. Carrio, U.S. Army Electronics Command.

Dr. Michel Balinski, City University of New York, presided at a technical working group session, limited to invitees, on basic operations research theory and potential profitable areas for further research.

"Operations Research/Systems Analysis—What Are They?" was the title of a session organized and presided over by James M. McLynn, Davidson, Talbird and McLynn, Inc. Panel members were Dr. Arthur C. Herrington, director, Naval Programs, Office of the Assistant Secretary of Defense (Systems Analysis), and Dr. Philip H. Lowry, head, Combat Analysis Dept., Research Analysis Corp.

Organizer and chairman of a session on "Weapons Systems Analysis" was Dr. John G. Honig, Office of the Chief of Staff, DA. Dr. Walter J. Strauss, Caywood-Schiller Associates, spoke on "A Critical Look at Weapons Systems Studies." The topic of Dr. Rufus Ling, Office of the Chief of Staff, DA, was "Factor Analysis of Combat Effectiveness (FACE)." Dr. Seth Bonder, University of Michigan, discussed "Analytical Approaches to Determining Combat Effectiveness."

A session on "Operations Research Education for the Military" was organized and presided over by Dr. Jack R. Borsting, Naval Postgraduate School. Speakers were Col L. L. Dunlap, Wright-Patterson Air Force Base, Lt Col Thomas R. Abernathy, HQ U.S. Marine Corps, Lt Col Raymond P. Singer, ACSFOR, and Cmdr T. L. Meeks, Naval Postgraduate School.

Dr. Daniel Willard, Office of the Under Secretary of the Army, organized and presided over a session on "A Systems Analysis in the Design of Lines of Communications Systems." He discussed "Random Walk and Military Logistics Network." E. C. Hurford, CDC, spoke on "Systems Analyses/Operations Research Techniques in Devising Air Lines of Communications."

Principals in a session on TATAWS (Tank, Antitank and Assault Weapons Systems) were Oscar Wells, chairman, Maj W. G. Eddins and Col Harold J. Fleck, all with the Combat Developments Command.

Dr. A. L. Slafkosky, U.S. Marine Corps, organized and chaired a panel session on "Small Arms/Small Arms Units." Panelists were Col Theodore Metzger, U.S. Marine Corps, George M. Gividen, Litton Scientific Support Laboratory, and G. Richard Backus, Marine Corps.

Robert F. Triplett, Office of the Secretary of the Army, presided at a session featured by presentations on "A Parametric Evaluation of Defense Versus Proliferation of the Strategic Missile Force," Maj Carl H. Hess, Office of the Chief of Research and Development, DA; "Nuclear War Gaming, an Aid to Communications Systems," Dr. R. Wight, U.S. Army Electronics Command; and "Micro-OR/SA," Maj Robert W. Otto, Army Combat Developments Command.

James L. Edmonson, Army Missile Command, chaired a session at which Dr. Frank E. Grubbs, Army Ballistic Research Laboratories, spoke on "A Generalized Target Damage Model and Its Use in the Allocation of Army R&D Resources," and Maj Horace Schow II, Army Materiel Command, spoke on "Adjusting the Discount Rate for Inflationary Trends." "Cost Effectiveness Analysis of a Nonnuclear Sergeant" was discussed by James L. Edmondson, Charles E. Colvin and Aaron Ellis, U.S. Army Missile Command.

"War Gaming—From the Producer and Consumer Point of View" was the topic of a session chaired by Martin W. Brossman, Research Analysis Corp. (RAC). Panelists were Col Norman Farrell, Combat Developments Command, and Lawrence J. Dondero of RAC.

Technical presentations at this session were: "Solution of a Truncating Queueing Model with Time-Dependent Arrival Rates," 1st Lt Ronald W. Meier, Corps of Engineers Strategic Studies Group; "Monte Carlo Methodology in Design of Truncated Sequential Tests," Dr. James K. Yarnold, URS Corps; "An Experimental Comparison of Monte Carlo Sampling Techniques to Evaluate the Multivariate Normal Integral," Dr. Elizabeth Niehl, U.S. Army Behavioral Science Research Laboratory.

'Aerial Crane' Presaging New Cargo Aircraft Era

Heavy-lift accomplishments of the U.S. Army CH-54A "aerial crane" helicopters in Vietnam may herald a new era for giant cargo-handling aircraft, utilizing specialized intermodal cargo container systems.

Jules A. Vichness, a pioneer in container development and chief of the Air Cargo Systems Branch at the Army Aviation Materiel Laboratories (AVLABS), Fort Eustis, Va., believes that with existing technologies "we can build helicopters with a tremendous heavy-lift potential."

A wide range of tasks being performed in Vietnam is raising the stature of the vehicle, Vichness reports in a recent paper. He says research and development efforts appear to be progressing to the realization of higher-capacity helicopter potentials.

Specialized missions may require specialized subsystems, he states. System effectiveness studies may indicate the need for a family of aircraft in the 25-, 40- and 60-ton capacity ranges.

Vichness reports that current and planned major areas of investigation include propulsion, transmissions, cargo handling and cargo control systems.

Some of the jobs being performed by the CH-54A in Southeast Asia are deployment of tactical equipment, combat logistical support, aerial evacuation, recovery of downed aircraft, bridge construction and other tasks requiring unusually heavy lift power.

Off-loading tests conducted from ship to shore and return have substantiated military confidence in the versatility of the CH-54A.

Some of the tests were performed under adverse weather conditions, with container ships offshore. Containers up to 20,000 pounds were airlifted, and more than 400,000 pounds were carried by the hook of a single helicopter in 5½ hours.

Heavy-lift helicopters were until recently limited to military applications, but are now finding increasing use by commercial companies.

Among the advantages of using the huge cranes and container ships are:

- Shortened time in "war risk" areas means reduction in costs, such as ship's crew bonuses.
- Reduction in shoreside manpower and equipment.
- Development of cargo-delivery independent of tidewater facilities.
- Greater logistics mobility and flexibility.
- Ability to move cargo over unimproved coast lines.
- Improved dispersal capability to minimize target vulnerability.

Vichness said that research by the Army for a heavy-lift helicopter began in the early 1950s. Hoists had been introduced on earlier helicopters and reached a maximum capacity of about 600 pounds.

In his report he is optimistic about future heavy-lift aircraft developments. He said that technology has so advanced that unheard of—and undreamed of—weights in containers eventually will be airlifted.

CH-54 airlifts damaged Flying Crane.

Top Officials Discuss Army Combat Mobility

Current capabilities and future Army requirements for rapid movement under all conditions of terrain and environment were considered by Army key officials and leaders of industry at a Combat Mobility Symposium May 26-28 at Fort Benning, Ga., sponsored by the Association of the United States Army.

Assistant Secretary of the Army (R&D) Dr. Russell D. O'Neal was the banquet speaker and Vice Chief of Staff General Ralph E. Haines Jr. spoke informally at a May 27 luncheon. General James K. Woolnough, CG, U.S. Continental Army Command, was host and welcoming speaker.

Chief of Research and Development Lt Gen Austin W. Betts, Maj Gen John R. Deane Jr., director, Doctrine and Systems, Office of the Assistant Chief of Staff for Force Development (ACSFOR) and Deputy Assistant Chief of Staff for Intelligence Maj Gen Wesley C. Franklin were among the speakers.

Representing the U.S. Army Materiel Command (AMC), Deputy CG, (Lt Gen) William B. Bunker, discussed "Problem Areas." Maj Gen Shelton E. Lollis, CG of the U.S. Army Tank-Automotive Command, spoke on "Component Development for Ground Applications."

Other speakers included: Brig Gen Jack C. Fuson, Director, Transportation, Office of the Deputy Chief of Staff for Logistics, "Logistic Mobility"; Lt Gen Harry W. O. Kinnard, CG, U.S. Army Combat Development Command, "The Airmobile Division for Worldwide Application"; Col E. L. Powell Jr., Director of Army Aviation, ACSFOR, "Aviation Today and Tomorrow"; Brig Gen W. B. Fulton, deputy commander, Fort Polk, "Mobility in Riverine Operations."

The AUSA program included displays of ground and air vehicles, U.S. Army Limited War Laboratory items, communication equipment, and a mobility demonstration.

Dr. Siple Receives Culver Medal, 7th Honorary DSc

Dr. Paul A. Siple, special scientific adviser, U.S. Army Research Office, has added the Helen Culver Gold Medal of the Geographic Society of Chicago and an honorary DSc degree from Kent State University at Kent, Ohio, to his long list of honors.

Recognized as the Army's most distinguished cold regions explorer in a career spanning nearly 40 years, Dr. Siple joined such renowned arctic and antarctic research pioneers as Roald Amundsen, Sir Ernest Shackleton, Robert F. Scott, Vilhjamur Stefansson and Admiral Richard E. Byrd in winning the Helen Culver Gold Medal.

Amundsen was the first recipient of the gold medal when it was established in 1907 by Mrs. Culver as a famed philanthropist and one of the early and most active members of the Geographic Society of Chicago. Sir Shackleton received the award in 1910, Scott in 1914, Stefansson in 1919 and Admiral Byrd in 1926.

Dr. Siple is the first recipient of the medal since 1959, when it was awarded to Robert S. Platt, the only recipient since 1953. In 1948, a 17-year break in presentation of the medal was marked by award to Wallace W. Atwood, Charles C. Colby, Vernor C. Finch and Derwent S. Whittlesey.

The Helen Culver Gold Medal signalizes recognition for exceptionally distinguished contributions to the advancement of geographical knowledge through pioneering explorations or through other scientific techniques.

Kent State University's presentation of an honorary DSc degree to Dr. Siple was the seventh honorary degree he has received in recognition of his remarkable achievements. Six are DSc (doctor of science) degrees.

During his illustrious career, Dr. Siple has been honored with a long list of the highest awards by the Department of Defense and various professional organizations. The indomitable courage and will power characteristic of his explorations are being proved now in a recovery from a partial paralytic stroke sustained June 6, 1966.

Col Stewart C. Meyer

Lt Col Robert L. Russell

Lt Col Jack E. Fincham

Lt Col William H. Tuttle Jr.

2 of 4 New OCRD Assignees Serving 2d Tour

Two of four officers assigned recently to the Office of the Chief of Research and Development returned after less than 2-year absences.

COL STEWART C. MEYER served with OCRD from June 1963 to February 1967 as assistant director of Plans and Programs and is now deputy director of the Missiles and Space Directorate.

In Vietnam from June 1967 to March 1968, he was executive officer for II Field Force Vietnam Artillery for about three months until he became CO of the 9th Infantry Division Artillery.

Before attending the Army War College (1962-63), Col Meyer was executive officer, 8th Infantry Division Airborne Brigade in Germany.

He is a 1943 graduate of the U.S. Military Academy and has an MS degree in mechanical engineering from the University of Michigan (1950).

Among his medals and awards are the Legion of Merit, the Bronze Star Medal with five Oak Leaf Clusters and the Air Medal with 10 OLCs.

LT COL ROBERT L. RUSSELL is a staff officer, Space Branch, Nike-X and Space Division. From September 1966 to March 1968, he was commander, Hawk Missile Battalion, U.S. Army Europe.

Other assignments include S-3 Hawk Group, USAREUR (1964-66); Electronics Division, Communications and Electronics Department, Artillery School, Fort Sill, Okla. (1960-63); and battery commander, Missile Battalion, Nike-Ajax New York Defense, Fort Tilden.

Lt Col Russell has an MS degree in electrical engineering from the Georgia Institute of Technology which he attended from June 1958 to June 1960. He also is a graduate of the Command and General Staff College.

Among his medals and awards are the Bronze Star with one Oak Leaf Cluster and the Korean Hwa Wrang with Gold Star.

LT COL JACK E. FINCHAM is assigned as a staff officer with the Air Movement Branch, Air Mobility Division. He recently completed a tour in Vietnam as II Corps Artillery adviser and as G-3 adviser, II Corps.

After tours as commander, C Battery, 1st Field Artillery Battalion (Rocket/Howitzer), 31st Artillery, 7th Infantry Division in Korea (1959-60) and assistant professor of military science at Staunton (Va.) Military Academy (1960-64), he was S-3 and executive of the 321st FA Bn and then S-3 of the 101st Division Artillery at Fort Campbell, Ky. (1965-66).

Lt Col Fincham has a BS degree in business education from Virginia Polytechnic Institute and is a graduate of the Command and General Staff College.

Among his medals and awards are the Legion of Merit, Army Commendation Medal and the Staff Service Medal, First Class, Vietnam.

LT COL WILLIAM H. TUTTLE JR. has been assigned as executive for the U.S. Army Advanced Ballistic Missile Defense Agency, a Class II activity of OCRD. He was a staff officer, Air Defense and Missiles Division, OCRD, from July 1963 to August 1966.

His assignments include commander, 1st Battalion, 12th Artillery (Honest John) Korea (1967-68) and NATO exchange officer with the French Army; and battery commander, 78th Artillery, U.S. Army Europe (1957-60).

In 1963 he received an MS degree in mechanical engineering from the University of Southern California after two years of study under an Army advanced education program. He is a 1967 graduate of the Armed Forces Staff College and the Command and General Staff College (1961).

Among his awards are the Bronze Star Medal with V and the Army Commendation Medal with two Oak Leaf Clusters.

Army R&D Chief Hosts ABCA Reception

CHIEF OF R&D Lt Gen A. W. Betts and Mrs. Betts, hosts for the 19th annual Washington Standardization Office (WSO) reception, converse with Maj Gen Douglas Vincent, head of the Australian Joint Services Staff, and Mrs. Vincent.

Col Ostrom Leaves OCRD To Succeed Col Freund As Vietnam Data Team CO

Command of the U.S. Army Wound Data and Munitions Effectiveness Team (Vietnam) changed early this month when Col Thomas R. Ostrom succeeded Col Benedict L. Freund upon completion of his tour of duty.

Promoted in April 1968, Col Ostrom is a brother of Director of Army Research Brig Gen Charles D. Y. Ostrom Jr. His new assignment terminated a 4-year assignment with the Life Sciences Division, U.S. Army Research Office, Office of the Chief of Research and Development, where he was chief of the Medical and Biological Sciences Branch.

Typical of the matters that might be of primary concern to the 43-man U.S. Army Wound Data and Munitions Effectiveness Team (Vietnam) are a new steel helmet with a greater protection capability, a new "flak" vest which will be more comfortable and yet afford improved safety to aircrewmen, and improved weapons and ammunition for use in Vietnam. Compiling data to ascertain precisely the requirements is a daily function.

In describing the group's wound documentation methods, Col Freund recently stated: "We attempt to identify the weapon causing the wound, photograph the wound, X-ray it to determine the path of the fragment or projectile, determine the medical attention given, and record the time lapse between wounding and treatment."

The group has representatives in the field with elements of the 4th and 25th Infantry Divisions. Each unit is supported by a 12-man field team that submits detailed reports on each and every casualty in the unit to which they are attached at battalion level.

Where an item of protective gear is struck, such as a helmet, the gear is recovered and sent to the Continental United States to be assessed for its protective value. The field data collection, which has a several-fold purpose, represents the first U.S. Army effort of this magnitude.

Data collected will be made available to The Army Surgeon General's Office for use in design of future medical treatment facilities and to aid in determining medical supply requirements.

Data also will help the Army Ballistic Research Laboratories at Aberdeen (Md.) Proving Ground to determine exactly how effectively current protective gear is serving, through comparison of laboratory testing and field data.

"The Army Combat Developments Command is responsible for future organizational planning," Col Freund said. "It is important that the command knows how a man fares after being wounded. Was he able to continue his mission? What were his capabilities? What were the witnesses' evaluations of his reactions?"

These questions and more than 200 others are answered by the Wound Data and Munitions Effectiveness Team (Vietnam) with the report of a casualty. Data compiled and sent back to Edgewood (Md.) Arsenal is checked and computerized for further evaluation. Objectively, the goal is progress in training, organization and equipment.

Effectiveness of U.S. Army protective gear, combined with the skilled efforts of medical personnel "on-the-ground" for prompt treatment, accounts for 85 percent of all soldiers wounded in Vietnam being returned to duty. Nearly half of the casualties do not require hospitalization.

Col Thomas R. Ostrom receives his "eagles" from brother Brig Gen Charles D. Y. Ostrom Jr., Director of Army Research.

Col Benedict L. Freund

AMC Tests Worldwide Logistics Concept

Responsibility and accountability for "high dollar value" secondary equipment items, each involving an annual demand in excess of $100,000 and totaling more than $600 million annually, have been centralized by the U.S. Army Materiel Command under a new concept in worldwide logistics management.

Aimed at improving supply service to troops in the field, the new concept is being applied to more than 1,780 secondary supply items under appropriate AMC National Inventory Control Points. In the past, each oversea theater was responsible and accountable for all supply items physically located in the theater.

Secondary items involved in the concept are components and repair parts used in the assembly and maintenance of major end items such as tanks, aircraft or weapons systems. Ranging in price per unit from three cents (cable) to $78,000 (missile platform), the average unit price of the 1,780 items is $4,300.

Objectively, with the more centralized control and knowledge of worldwide stocks at AMC level, troop requirements can be met from any storage location in the world.

Under the new system, it was explained, stocks can be redistributed as necessary, surpluses can be avoided, records of materiel in transit can be maintained, and procurement and maintenance can be based on total requirements and assets.

Management and control of this new concept is assigned to the Worldwide Logistics Management Office, under the AMC Director of Supply.

SCIENTIFIC CALENDAR

5th International Symposium on the Chemistry of Natural Products, sponsored by the International Union of Pure and Applied Chemistry, London, England, July 8-13.

11th International Congress of Photogrammetry, sponsored by the International Society of Photogrammetry, Lausanne, Switzerland, July 8-20.

2d International Symposium on the Chemistry of Organic Silicon Compounds, sponsored by the International Union of Pure and Applied Chemistry, Bordeaux, France, July 9-12.

4th International Research Symposium on Electrical Contact Phenomena, sponsored by IEE, Swansea, Wales, July 15-18.

Conference on Nuclear and Space Radiation Effects, sponsored by the University of Montana and IEEE, Missoula, Mont., July 15-18.

Design Automation Workshop, sponsored by IEEE, Wash., D.C., July 15-18.

2d Conference of the Society for Analytical Chemistry, sponsored by the International Union of Pure and Applied Chemistry, Nottingham, England, July 15-19.

International Conference on Crystal Growth, sponsored by AFCRL, U.K. Ministry of Technology and the International Committee on Crystal Growth, Birmingham, England, July 15-19.

6th International Symposium on Rarefied Gas Dynamics, sponsored by ACS, Cambridge, Mass., July 22-26.

Symposium on Electromagnetic Compatibility, sponsored by IEEE, Seattle, Wash., July 23-25.

Conference on Aurora and Airglow, sponsored by OAR, As, Norway, July 29-Aug. 9.

Gordon Research Conference on High Temperature Chemistry, sponsored by OAR, Crystal Springs, Wash., July (date undetermined).

H. Hoyt Harris

John L. Faherty Jr.

2 Employes Receive Sloan Fellowships at MIT

Two U.S. Army civilian employes have been awarded 1968 Sloan Fellowships at the Massachusetts Institute of Technology to continue their education through a year of intensive study leading to master of science degrees in management.

H. Hoyt Harris, deputy director of the Systems Engineering Division of the SAM-D (Surface-to-Air-Missile-Development) Project Office, Redstone Arsenal, Ala., was nominated by Maj Gen Charles W. Eifler Jr., CG of the U.S. Army Missile Command (MICOM).

U.S. Program/Project Manager for the Mallard Project, Maj Gen Paul A. Feyereisen, nominated John L. Faherty Jr. Faherty is special assistant for international affairs in the 4-nation communications program and is employed at HQ U.S. Army Electronics Command (ECOM), Fort Monmouth, N.J.

Fifty Sloan Fellows were selected from government and industry, based on 10 to 15 years of outstanding experience and high potential for continuing development and advancement.

The program encompasses four main interrelated areas of executive development: management decisions within the context of specific functions and supporting specialties; study of "dynamic environment" in which an organization must operate; research toward the required thesis; and management policy and practice.

Fellowship studies includes discussions with leading government and corporate executives in the U.S. and abroad.

Col Surkamp Directs Night Vision Program

Army Night Vision Program project manager responsibility was assigned in May to Col Arthur T. Surkamp, who returned recently from a year of service in Vietnam with a U.S. Army Engineer Field Force.

Stationed at Fort Belvoir, Va., where the Army Night Vision Laboratory facilities are located, Col Surkamp directs the activities of night vision projects, exercising full authority delegated by General Frank S. Besson Jr., CG of the Army Materiel Command.

Graduated from the United States Military Academy in 1943, Col Surkamp received a master's degree in civil engineering from Harvard University in 1948 and a master's degree in international affairs in 1963 from George Washington University, Washington, D.C. He is also a graduate of the Army Engineer School Advanced Course, the Command and General Staff College, and Army War College.

Col Arthur T. Surkamp

During World War II, he served in the European Theater as a company commander and battalion operations officer in an Engineer Combat Battalion, participating in five campaigns.

Among his decorations and awards are the Silver Star, Legion of Merit, Bronze Star with V Device, Air Medal with four Oak Leaf Clusters, Joint Service Commendation Medal, Army Commendation Medal and the Vietnamese Honor Medal.

MICOM's Harris received a BS degree in electrical engineering from the University of Alabama in 1950. After working for three years with an Atlanta firm, he served two years as a first lieutenant in the U.S. Air Force, then worked with the Alabama Power Co. until he transferred to Redstone Arsenal in 1957. He has traveled to England, Scotland, France, Italy and Japan on official Army business.

FAHERTY, a Civil Service employe at Fort Monmouth since 1950, began as a junior engineer. He has held progressively more responsible positions in the former Army Signal Corps laboratories and with ECOM.

Before being named international assistant to the U.S. Mallard project manager, he was director of the Technical Management Division of the program.

Faherty graduated with an engineering degree from Stevens Institute of Technology in 1950 and is studying at Stevens toward a master's degree in management science.

Dr. Halpert Gives Papers To AFIP Upon Retirement

Seven volumes of 188 papers published since 1922 were presented recently to the library of the Armed Forces Institute of Pathology (AFIP) by Dr. Bela Halpert when he retired from a 47-year medical career.

Dr. Halpert had served since March 1966 as special assistant for Veterans Administration pathology at AFIP.

AFIP Director Navy Capt Bruce H. Smith accepted the collection as one "of great value . . . and will serve as an influence from a long and successful career upon the young physicians who come here to study."

The papers range from "A Brief Systematic and Topographic Anatomy; An Outline of Anatomy," published in Budapest, Hungary, in 1922, to "Homologous Lyophilized Vein—Experimental Study for Tympanic Closure in Dogs," published in 1965.

Working with Drs. George L. Jordan Jr. and Michael E. DeBakey for the past 10 years, Dr. Halpert studied vascular grafts and prostheses in experimental animals and in man. Their findings are considered significant contributions to medical literature on the healing of vascular wounds.

Dr. Halpert received his medical degree in 1921 from the German University of Prague. He served in academic positions at The Johns Hopkins University, University of Chicago, Yale University, Louisiana State University, University of Oklahoma and Baylor University, where he holds the title of professor emeritus of pathology.

Army Vehicle Pioneer Rasmussen Retires

One of the U.S. pioneers in the field of combat vehicles design and testing, Carl Rasmussen of the U.S. Army Tank-Automotive Command (ATAC), Warren, Mich., retired recently after more than 34 years U.S. Government service.

As chief of the Engineering Control Systems Division of ATAC's Development and Engineering Directorate, Rasmussen influenced or has been associated with every combat vehicle developed by ATAC and its predecessor organizations from before the World War II period.

Included among activities he directed were the design and development of tractors for towed artillery, tracked cargo carriers, medium and light tanks, and other vehicles that were forerunners of modern weapons and vehicle systems.

Rasmussen is credited with much of the evolutionary development of the Army combat vehicle fleet that today includes the M48 and M103 tanks, self-propelled artillery, the M113 armored personnel carrier, the M116 tracked cargo carrier, the M151 jeep and other tracked and wheeled vehicles and components.

A native of Oshkosh, Wis., Rasmussen attended schools in Wisconsin but his engineering talents, for the most part, were self-taught and developed. He entered the engineering field in 1921 as a designer of logging tools and construction equipment for an Oshkosh tool company, and later was a designer of marine engines and 4-wheel drive trucks for motor manufacturing firms.

In 1934, he joined the engineering staff at Rock Island (Ill.) Arsenal. His first experience in weapons systems was as a member of a group assigned the job of design and development of antiaircraft gun mounts and machinegun mounts for combat tanks.

In 1942, he was temporarily assigned to the Office, Chief of Ordnance in Washington, D.C., and given the job of consolidating information on World War II combat vehicles.

Transferred to the Aberdeen Proving Ground in March of 1942, he served as a member of a 3-man Advisory Board, instructing new officers in combat vehicle design. In September 1942, he came to the newly established Detroit facility of the Office, Chief of Ordnance and was named chief of the Design Section, R&D Division. Many of the engineers who today are the nucleus of our present Automotive and Weapons Systems developers received their early training under Rasmussen's watchful eye.

Carl Rasmussen

In 1945, he assisted in setting up and activating the Detroit Arsenal facility. He was appointed chief of the Tank and Self-Propelled Artillery Section and subsequently was named chief of the Combat Vehicle Branch with responsibility for development of all combat vehicles.

Following the reorganization of the Army in 1962, the 64-year-old combat vehicle expert was appointed to the post of chief of the Procurement and Production Engineering Division. In this capacity he was responsible for coordinating with industry and recording engineering data on all military vehicles as a basis for design improvement.

Dr. Thomas Joins Review Of Materiel in Vietnam

Army Materiel Command Deputy and Director of Laboratories Dr. Jay Tol Thomas participated recently in what is believed to be the first in-process review of a materiel item held in Vietnam, involving the Visual Airborne Target Locating System.

VATLS is currently being evaluated in Vietnam and the Army Concept Team in Vietnam (ACTIV) decided that an in-process review, such as is conducted regularly by the Materiel Command in the United States, should be scheduled.

When Dr. Thomas arrived on an observation trip, the agenda had been prepared and invitations sent to interested agencies. He was invited to stop in and see how ACTIV was doing with the AMC review technique. As a result, he devoted more than an hour and a half to a lively discussion of VATLS.

Lt Col Chesley Maddox, Signal Corps, was the chairman and he opened with a background talk on the VATLS development. Maj William Pittard, Artillery, reported on details of the evaluation to date.

Other participants were Col J. Elmore Swenson, ACTIVE commander; W. Marroletti, deputy science adviser, U.S. Army Vietnam; and representatives from G2, G3 and Communications-Electronics of USARV HQ, plus a representative from the office of the science adviser, MACV.

USAEPG Tests AN/TSQ-72, Mobile GCA Tower

Engineering testing of a strange-appearing but highly functional equipment system is nearing completion at the U.S. Army Electronic Proving Ground (USAEPG) at Fort Huachuca, Ariz.

The AN/TSQ-72 Landing Control Central is in effect, a mobile ground-controlled approach (GCA) tower designed to provide a rugged, compact, air-transportable system containing all the equipment necessary to control Army aircraft arriving and departing during instrument flight rules (IFR) or low-visibility conditions.

AN/TSQ-72 Landing Control Central

Intended for use in support of tactical IFR operations, it is designed for division, corps and Army airfields as well as other airfields and landing areas where IFR capabilities are required, such as in Southeast Asia.

Performing the testing for USAEPG is its Avionics, Meteorology and Electronic Warfare Division. John D. Mulhorn is acting as test officer.

Some prominent advantages of the Landing Control Central are its mobility and speed of emplacement. A crew of five can emplace it and be ready to handle air traffic in a very short period of time.

The Landing Control Central equipment was fabricated by the Lexington Bluegrass Army Depot, Lexington, Ky. Primary components are a trailer-mounted radar and a truck-mounted control van with a one-man glass enclosed tower protruding from its top.

DECORATION FOR EXCEPTIONAL CIVILIAN SERVICE. *William M. Hartness*, scientific adviser to the U.S. Army Combat Developments Command Special Warfare Agency, Fort Bragg, N.C., recently received the Army's highest civilian employe award.

The citation states in part: "Mr. Hartness, by highly professional and exacting and analysis, definitively evolved and authoritatively documented communist organization and methodology in subversive insurgency.

"The act constitutes an original and invaluable contribution to the United States and the Free World and represents a major breakthrough in understanding and countering this threat."

MERITORIOUS CIVILIAN SERVICE AWARD. *Frederick T. Clifford* of Picatinny Arsenal, N.J., recently received the Army's second highest award for civilian employes in recognition of bravery in rescuing a drowning man from an outdoor swimming pool last summer.

BRONZE STAR MEDAL. *Capt Roger C. Turner*, now serving with the U.S. Army Combat Developments Command Experimentation Command (CDCEC) at Fort Ord, Calif., received the BSM and two Air Medals for his recent service in Vietnam.

LEGION OF MERIT. *Col Robert H. Scales*, deputy commander of the U.S. Army Satellite Communications (SATCOM) Agency, was presented the LOM at Fort Monmouth, N.J., before departing for a new assignment as deputy commander, U.S. Army Depot, Saigon.

He was cited for his efforts in immediate support of the commander for development of SATCOM programs. During his tour, the SYNCOM System became operational and the Defense Satellite Communications System was developed and placed into operational use for military communications.

Col Gladys E. Johnson, newly appointed director of Nursing Activities, Walter Reed Army Medical Center, and chief, Nursing Services, Walter Reed General Hospital, was presented the LOM for her service in the Office of The Surgeon General from June 1963 to February 1968.

During this time, Col Johnson served consecutively as assistant chief of the Army Nurse Corps Branch, Directorate of Personnel and Training, and as assistant chief of the Army Nurse Corps.

Noted particularly was the manner in which she faced the critical demands placed upon her during the Vietnam buildup when the Army Nurse Corps was below strength. Due to her efforts, hospitals showed a marked increase in the retention rate of Army nurses and vital manpower requirements were realized.

Col George W. Johnston, executive officer in The Army Surgeon General's Directorate of Professional Service, was awarded the LOM upon his recent retirement following more than 25 years of service.

Presented by the Army Deputy Surgeon General (Maj Gen) James T. McGibony, the award was for outstanding meritorious service from September 1964 to April 1968.

During this period, Col Johnston served as chief of the Chemical and Biological Agent Defense Branch, Research Division, U.S. Army Medical Research and Development Command. He served concurrently as assistant chief of the Pathology and Laboratory Consultant Branch of the Directorate of Professional Service, as assistant chief of the Medical Service Corps and its Medical Allied Sciences Section, and as biochemistry consultant in the Office of The Surgeon General.

ARMY COMMENDATION MEDAL. *Capt Bernard B. Blaauw*, a medical consultant in The Army Surgeon General's Medical Consultant Branch, Directorate of Professional Service, was awarded the ACM for meritorious service as a medical consultant from July 1967 to May 1968.

Lt James P. Kurtz, the first Naval officer to command an Army nuclear power plant, has been awarded the ACM for meritorious service as Officer-in-Charge of the SM-1 Nuclear Power Plant at the Nuclear Power Field Office, Fort Belvoir, Va.

Lt Kurtz was cited for his outstanding engineering acumen, managerial ability, cost consciousness, leadership, and a spirit of cooperation while commanding the power plant from November 1966 to November 1967.

CWO John W. Cates received the ACM for meritorious service while stationed at the 6th Medical Depot in Korea from August 1966 to August 1967. He is now assigned to the Maintenance Section in The Army Surgeon General's Directorate of Plans, Supply and Operations.

M/Sgt Fred T. Wantland, USAF, a member of the 3429th Technical Training Squadron, received the ACM for meritorious service as chief and senior instructor, Training Support Branch of the Training Department, Nuclear Power Field Office, Fort Belvoir, Va.

S/Sgt Eugene Robinson, now with the U.S. Army Mobility Equipment Research and Development Center at Fort Belvoir, received the award for "exceptionally meritorious service in support of allied counterinsurgency operations in the Republic of Vietnam."

Dr. Baldes Honored by Eric Liljencrantz Award

Dr. Edward J. Baldes, who at age 69, began a key assignment six months ago as U.S. Army Aeromedical Research Unit scientific adviser at Fort Rucker, Ala., was recently presented the 1968 Eric Liljencrantz Award.

Cited for basic research in the biophysical sciences, Dr. Baldes served as a member of the Scientific Analysis Branch, Life Sciences Division, Office of the Chief of Research and Development from 1963 until December 1967. Then he began what he terms "possibly the most important job in my life, in a completely new location."

Dr. Edward J. Baldes

The Liljencrantz Award is the latest in a long list of honors received by the eminent biophysicist. He was associated for 40 years with the Mayo Clinic, Rochester, Minn., before he became a staff member of the Office, Chief of Research and Development.

Established by Charles Pfizer and Co., Inc., the award memorializes Cmdr Eric Liljencrantz, MC, USN, whose brilliant career in Aviation Medicine was cut short by his death in an airplane accident in 1942. It is given for the best paper on basic research in the problems of acceleration and altitude.

A complete biography on Dr. Baldes was published in the December 1967 issue of this Newsmagazine and also in the May 1968 issue of *Aerospace Medicine*, which pays tribute to the recipients of the Aerospace Medical Association's ten annual awards.

Nike-X Floating Plant Memorializes Sgt Weber

"Power Ship Andrew J. Weber" is the name carried by the power facility of the Nike-X research and development for the Multifunction Array Radar (MAR) that will be placed in operation at Kwajalein Island this year. Final tests are set this summer.

M/Sgt Weber's memorial, known as the MAR II Floating Power Plant, is nearing completion at the Bethlehem Steel Corp. yard at Baltimore. Md. Designed to furnish precise electrical power for the Nike-X MAR, the plant will be capable of generating 20,000 kilowatts—enough electricity for a community of 25,000 people.

When fatally injured on duty at Kwajalein Island, M/Sgt Weber was a test noncommissioned officer for the Nike-X Engineering Test Organization. The Army Legion of Merit was awarded to him posthumously for "exceptionally meritorious conduct for performance of outstanding service."

Sgt Weber similarly distinguished himself while serving as a staff and faculty member of the U.S. Army Air Defense School and earlier as a test noncommissioned officer at White Sands (N. Mex.) Missile Range.

Emplaced on a surplus World War II U.S. Navy drydock, 240 feet long and 101 feet wide, the MAR II plant was developed under a $9 million contract with General Electric Co., awarded by the Corps of Engineers.

Specifications include automatic precision and control of frequency and voltage, plus-minus .25 percent, controlled either locally from the barge or remotely from Kwajalein Island. Maximum voltage transient with a 25 percent step load change is 2 percent with recovery to steady state within 0.5 seconds. Frequency variation will not exceed 0.5 cycles/seconds with 1.5 seconds recovery time to steady state upon the same load change.

Three modes of operation are Standby with a load of 2,800 kilowatts on bus B, Surveillance with a load of 8,000 kilowatts on bus A and 2,100 on bus B, and Maximum Traffic with a load of 13,800 kilowatts on bus A and 2,100 on bus B. A period of less than one minute is needed for a load change from Surveillance to Maximum Traffic. Auxiliary power for the vessel's operation or for miscellaneous loads can be supplied by either bus.

General Electric was required to provide for the complete overall design for the MAR II Floating Power Plant, utilizing for the first time in this country both gas-turbine and diesel-design power units.

Before the deckhouse could be constructed, the former drydock was submerged and the wingwalls floated off at the shipyard. An operational deck was constructed four feet above the main deck. The space between is used for service piping and wiring and for the power plant installation.

A load bank designed specifically for testing the power generating system, consisting of resistive, reactive load sections, with transformers and voltage regulators, will be shipped separately to Kwajalein and will become property of the government.

When tests of the plant are completed at Bethlehem's Key Highway Yard, the vessel will be towed down the East Coast, through the Panama Canal and across the Pacific Ocean to Kwajalein. There it will be serviced in a slip for final tests prior to Corps of Engineers acceptance.

Former OCRD Officer Selected as White House Fellow

Among 19 White House Fellows for 1968-69 selected in May from more than 1,000 applicants, under an annual program President Johnson initiated in 1964, is Maj Arthur E. Dewey, aide-de-camp to General Frank S. Besson Jr., CG of the Army Materiel Command.

Maj Dewey served from May 1965 to July 1966 as assistant executive secretary of the Army Scientific Advisory Panel and action officer, Air Mobility Division, Office of the Chief of Research and Development.

The national competition to select the winners began in January and culminated recently in two days of interviews by the President's Commission on White House Fellows. Former Secretary of the Treasury Douglas Dillon, head of the commission, stated:

"Selection is based on intelligence, character, ability and promise of future development. The standards are so high and the opportunity so unique that a young person can win no more impressive honor than to be named a White House Fellow."

President Johnson established the White House Fellows program to give rising young leaders one year of "first-hand, high-level experience with the Federal Government and to increase their sense of participation in national affairs."

The 49 Fellows selected during the first three years of the program have acted as assistants to White House staff members, the Vice President and Cabinet officers. Maj Dewey, the second AMC officer to win this honor, will be selected for his specific post later this month.

Maj Ronald E. Lee was the first Armed Forces officer chosen in the initial selection of White House Fellows. He instituted management procedures used by AMC and the Army in the U.S. Post Office Department, where he now is director, Office of Planning and Systems Analysis.

Maj Dewey graduated from the U.S. Military Academy in 1956 as a Corps of Engineers officer. In 1961 he received an MS degree in engineering from Princeton University. His military duties have taken him from troop commands in the field to assignments on the General Staff in the Pentagon. He is a senior Army aviator with nearly 3,000 hours of flying time, and is a registered professional engineer.

Maj Arthur E. Dewey

Director of Army Research Awards Commendation Certificates to 6

Director of Army Research Brig Gen Charles D. Y. Ostrom Jr. presented Commendation Certificates May 20 to six U.S. Army Research Office personnel for outstanding performance.

In addition to the Commendation Certificate, *Barbara L. Gaither*, chief clerk of the Behavioral Sciences Division, received a Certificate of Achievement.

Receiving Commendation Certificates were *Dr. Fernand P. de Percin*, chief of the Regional and Special Projects Branch, Environmental Sciences Division; *Merrill V. Kreipke*, general engineer (ground mobility), Geophysical Sciences Branch, ES Division; and

Eugene W. Stubbs, contract specialist, Contracts and Grants Branch, Research Programs Office; *Harriet B. Doyle*, programs and budget assistant, Programs Branch, Research Programs Office; and *Patricia A. Vermette*, clerk-typist, Programs Branch, Research Programs Office.

AE, R&D Officer Programs Prove Rewarding to Careerists

(Continued from page 2)

are provided for rapid progress in their basic branches and selected career fields.

If you happen to be among the truly ambitious officers who would like to see stars—on their shoulders—the possibility also is supported convincingly by the AE and R&D Officer Programs. Five members have progressed to general rank within the past two years. Several who enrolled earlier are 2- or 3-star generals.

The five newest AE and R&D Programs generals are Curtis W. Chapman Jr., Howard H. Cooksey, Morton McDonald Jones, Wilson R. Reed and William W. Stone Jr. Brig Gens Chapman, Jones and Reed have something in common in that they began their military careers as classmates at the United States Military Academy, graduating in 1941.

General Stone started his career in 1941 as an Army Air Corps cadet at California Institute of Technology at Pasadena. General Cooksey came up "the hard way" as a 1943 graduate from the Officers' Candidate School at Fort Benning, Ga.

GENERAL CHAPMAN served tours in Hawaii, Australia, New Guinea and Manila following graduation from USMA. He was assigned to R&D on the Army General Staff after receiving an MS degree in civil engineering from California Institute of Technology.

Brig Gen C. W. Chapman

Following graduation from the Command and General Staff College at Fort Leavenworth, Kans., General Chapman was assigned to Morocco as chief of the Operations Division and later as deputy division engineer for the Mediterranean Division. He applied for acceptance in the R&D Officer Program in 1961 while serving in the Directorate of R&D, Office of the Chief of Engineers, Washington, D.C.

In 1962 he served in Korea as commander of the 36th Engineer Group (Combat), returning to the U.S. for the 1963-64 class of the Industrial College of the Armed Forces. Following two years as executive to the Chief of Engineers, HQ Da, he was assigned as chairman of the Special Studies Group, Office of the Joint Chiefs of Staff in mid-1966. Promoted to brigadier general in June 1967, he currently commands in the 20th Engineer Brigade in Vietnam.

GENERAL JONES' first assignment was with the Cavalry at Fort Riley, Kans. Graduated from the Command and General Staff College in 1943, he served as CO of Troop C, 15th Cavalry Regiment at Camp Young, Calif., until assigned to Europe in 1944.

Brig Gen M. M. Jones

In Europe he served as a troop commander and as executive officer of the 17th Cavalry Reconnaissance Squadron, returning in 1947 to attend the Advance Course at the Armored School at Fort Knox, Ky., where he remained two years on the faculty.

Ordered to the Joint U.S. Military Advisory Group in the Philippines in 1950, he returned in 1953 to command the 710th Tank Battalion, 11th Airborne Division, Fort Campbell, Ky. In 1954, he received a master's degree in nuclear physics from the University of Virginia and was assigned to the Armed Forces Special Weapons Project, Washington, D.C. During this tour he joined the AE Program.

General Jones transferred from Armor to the Ordnance Corps in 1959, attended the Armed Forces Staff College in 1960 and served with the Research and Engineering Directorate, Ordnance Tank-Automotive Command until he became a student in 1963 at the National War College. His next assignment was CO of the 71st Ordnance Group (Ammo) in Korea.

Upon completion of the Korean tour, he became project manager of General Purpose Vehicles, Michigan Army Missile Plant, Warren, Mich. Promoted to brigadier general in June 1967, he is presently CG of the U.S. Army Support Command, Cam Ranh Bay, Vietnam.

GENERAL REED was assigned to Europe with the 379th Field Artillery Battalion as operations officer in 1944, after completing the basic and field officer's courses at the Artillery School and the Command and General Staff College course.

Brig Gen W. R. Reed

In 1947 he returned to the U.S. to become an instructor in the newly formed Mississippi National Guard, serving until assigned to the R&D Division, Assistant Chief of Staff, G-4, in October 1950. He later became assistant chief of the Tripartite Standardization Branch and then was assigned to the Office of the Secretary of Defense, with duty station in Paris, France.

General Reed was nominated for the R&D Officer Program during an assignment at Fort Carson, Colo., where he commanded the 9th Infantry Division Artillery. From September 1958 through June 1959, he was assistant to chief of staff, G3, 9th Infantry Division.

Following graduation from the Army War College in 1960, he served in the Office of the Chief of Research and Development, DA, Washington, D.C., until he was transferred to the Office of the Chief of Staff in 1962.

In July 1944, he took command of the 1st Cavalry Division Artillery (later designated the 2d Infantry Division Artillery) and in 1955 was assigned as Assistant Director of Developments, Office of the Chief of R&D, DA, Washington, D.C.

Since he was promoted in October 1947, Brig Gen Reed has been CG of the Automatic Data Field Systems Command, Fort Belvoir, Va. His academic qualifications were enhanced in 1952 by award of an MA degree in international relations from Georgetown University.

GENERAL STONE began his career as a meteorologist and as munitions test officer in California, Florida and Panama prior to his transfer to the Chemical Warfare Service in 1944. He participated as a technical officer in atomic bomb tests at Bikini and Eniwetok in 1946 and 1948, then served four years at the Army Chemical Center, Edgewood (Md.) Arsenal.

Three years as director, Technical

Brig Gen W. W. Stone Jr.

Operations, Dugway (Utah) Proving Ground, preceded an assignment with the Office of the Chief of Research and Development, HQ DA, Washington, D.C. During the latter tour he became a member of the R&D Officer Program and served for a year as executive, U.S. Army Research Office.

Sent to Korea in 1962 as senior chemical adviser to the First Republic of Korea Army, he returned to the U.S. in 1961 for a tour at the Army Chemical Center as director, Operations Research Group, until he began a 2-year assignment in July 1962 with the Plans and Policy Directorate, J-5, Joint Chiefs of Staff.

General Stone returned to Dugway Proving Ground in August 1964 as commanding officer, followed by a tour as director, Research, Development and Engineering at Picatinny Arsenal, N.J. In November 1966 he assumed command at Edgewood Arsenal, was promoted to brigadier general in August 1967, and is currently deputy to Dr. Jay Tol Thomas, Army Materiel Command Deputy and Director of Laboratories.

General Stone received a BS degree in physics in 1940 and master's degree in meteorology in 1941 from the California Institute of Technology at Pasadena, Calif. He is a graduate of the Army Chemical School Advanced Course, the Command and General Staff College and Army War College.

GENERAL COOKSEY achieved one-star rank Feb. 1, 1968 and is currently director, Personnel, U.S. Strike Command HQ MacDill AFB, Fla.

From 1963 to 1966, he served with the Office of the Chief of Research and Development, HQ DA, first as deputy chief, Combat Materiel Division, then as chief. He became executive to the Chief of Research and Development in 1965. In 1966-67, he commanded the First Brigade, 2d Infantry Division, Korea.

Brig Gen H. H. Cooksey

General Cooksey was accepted into the R&D Officer Program during a 1954-57 assignment with the Office of the Chief of R&D, HQ DA. In 1958-59 he attended the Armed Forces Staff College. Then he was assigned to HQ U.S. European Command in the Joint Secretariat until he became deputy commander of the 2d Battle Group, 6th Infantry Regiment in Berlin (1961-62).

During World War II, he served a tour with the 158th Regimental Combat Team during the Northern Philippines and Luzon campaigns. Upon return to the U.S., he held a number of administrative and command positions prior to assignment as assistant professor, Military Science and Tactics, Drexel Institute, Philadelphia, Pa. He was with the 7th Infantry (Hour Glass) Division during the Korean War.

Graduated from Virginia Polytechnic Institute at Blacksburg in 1941, General Cooksey received a master's degree from George Washington University, Washington, D.C., in 1964. He is a graduate of the Command and General Staff College and the National War College.

WSMR Scientists Collect Jupiter Data With Aerobees

Scientists at White Sands (N. Mex.) Missile Range received data from the planet Jupiter via two different, but related, Aerobee rocket shots fired 40 minutes apart May 17.

Both experiments were designed to measure the reflectivity of the planet in the ultraviolet spectrum. Each rocket carried a 12-inch Cassegrainian telescope in addition to the telemetry equipment required to relay the data obtained back to receiving stations at White Sands. Both payloads were recovered intact in the White Sands impact area.

Dr. Roland C. Anderson of the University of Florida was the scientist in charge of the first shot. Dr. Yoji Kondo, a research associate with the National Academy of Science, was the senior scientist for the second.

At the same time the second rocket-borne telescope gathered information on Jupiter, the solar system's largest and most massive planet, it was also aimed at the star Arcturus. The latter, said Dr. Kondo, "is a 'giant' star of the late spectral type, or a 'cold' star. Although it is an interesting subject, it is not commonly observed because of a relative weakness in radiation in the ultraviolet spectrum."

Dr. Kondo added that this was possibly the first time such an observation has been made of the cold star in the ultraviolet spectrum.

In the first shot the Cassegranian telescope was trained on Jupiter for nearly three minutes. The second observation was divided equally between the planet and cold star, with about 100 seconds on each terrestrial body.

The scientist, who is doing this research study for the Goddard Manned Space Flight Center in Maryland, said that most observations of Jupiter have been from the ground. Although some have been made from rocket or balloon-borne equipment, the two observations employed more sophisticated equipment.

The payload of each weighed about 300 pounds, and employed the STRAP-2 guidance system that, according to Dr. Kondo, "enables us to point the telescope within 10 seconds of the arc of target." A star tracker adjusted the telescope from the star to Jupiter.

The information obtained on the spectral energy output of both Jupiter and Arcturus will be analyzed by Dr. Kondo at Goddard. Data received from the first rocket will be sent to the University of Florida and to Kitt Peak National Observatory, cosponsors of the experiment, where it will be analyzed and reduced to usable information. The information will aid astrophysicists in studies and research work involving Jupiter and Arcturus.

STRATCOM Awards Contract For Complex Computer System

Plans for installation and maintenance of a complex computer system at HQ Strategic Communications Command, Fort Huachuca, Ariz., under a $1 million-a-year contract, was announced May 31 by Maj Gen Walter E. Lotz Jr., CG of STRATCOM.

Replacement of four second-generation computers, by the more efficient third-generation system is planned to begin around Christmas. Time-phased expansion to include remote terminal installation will extend into 1970.

A rental-purchase agreement for the new digital computer system was reached with the Control Data Corp. To insure no interruption of service during the installation, the old and replacement units will be involved in a "parallel operation."

STRATCOM computers serve the worldwide command as well as the U.S. Army Proving Ground, U.S. Army Garrison tenant units stationed at Fort Huachuca and numerous other federal agencies in the area.

1968 R&D Achievement Awards Won by 18 Individuals, 5 Teams

(Continued from page 3)

in safely firing unguided rockets. They researched, designed and developed the meteorological data acquisition and rocket impact prediction system that proved unfailingly reliable in making adjustments despite high wind deflections in firings from Green River, Utah, to impact at White Sands (N. Mex.) Missile Range.

Cited for this exceptionally important achievement are *Vertis C. Cochran,* supervisory mathematician, *Louis D. Duncan,* research mathematician, *Roy I. Glass* (deceased), supervisory electronics engineer, *Henry Rachele,* physical sciences administrator, and *Elmer J. Trawle,* supervisory meteorologist.

ROBERT P. BAUMANN, a supervisory chemical engineer at Picatinny Arsenal, Dover, N.J., conceived and supervised the demonstration of a method of controlling orientation of metallic staples in propellant compositions to achieve very high burning rates in high-energy systems for missiles.

OPTICAL TECHNOLOGY TEAM. Three employes of the Advanced Sensors Laboratory, R&D Directorate, U.S. Army Missile Command, Redstone Arsenal, Ala., teamed up to earn an award for their research in optical beacon and optical transmitter technology applied to command-guided missiles.

Physicist *Walter E. Miller* and electronic engineers *Jimmy R. Duke* and *Robert L. Sitton* were recognized for successfully testing and demonstrating the application of state-of-the-art photoemissive diodes in "providing hitherto unachievable performance in optical beacons and transmitters for command guidance."

THEODORE M. POCHILY, senior development chemist in the Benet Research and Engineering Laboratories, Watervliet (N.Y.) Arsenal, developed a new method of treating titanium by an anodic process to enhance and broaden the use of titanium components for weapons and industry.

The process has been applied successfully to titanium components for C-5A, F111 and SST aircraft, atomic submarines, star-tracking devices and the Manned Orbital Laboratory .

REXFORD G. BOOTH, chief of the Guerrilla Warfare Countermeasures Branch, Intrusion Detection and Sensor Laboratory, Mobility Equipment R&D Center (MERDC), Fort Belvoir, Va., was recognized by the judges for design and development of infrared intrusion detectors in response to specific high-priority requirements for Southeast Asia.

WILLIAM J. HAAS, Electromagnetic Effects Division Electrotechnology Laboratory, MERDC, performed research in establishing new scientific knowledge of proven national significance in the field of nuclear electromagnetic pulse effects. This research advanced the physical understanding and computation methods on the electromagnetic pulse environment produced by nuclear explosions under various burst conditions.

PRESSURE VESSELS RESEARCH. Working as a team from the U.S. Army Materials and Mechanics Research Center, Watertown, Mass,. *Jiro Adachi,* research mechanical engineer, and *John F. Mescall,* mathematician, established a sound scientific basis for technical improvements in the design of thin-wall pressure vessels for use in military equipment.

Their citation states that this experimental-theoretical stress analysis of cylindrical shells capped with torispherical end closures, permits efficient design against catastrophic rupture and buckling under service conditions.

GEORGE D. KAHL is chief of the Fluid Physics Branch, Exterior Ballistics Laboratory at the U.S. Army Ballistic Research Laboratories (BRL), Aberdeen (Md., Proving Ground.

The basis for his R&D Achievement Award was discovery and use of generalized forms of the van der Waals equation of state to correlate data on the high-temperature vaporization of metals. This contribution is evaluated as offering an important new approach to information on the high-temperature properties of matter.

DR. CESLOVAS MASAITIS, chief of the BRL Applied Mathematics Branch, Computing Laboratory, proposed a new fuzing concept for substantially reducing average burst-point errors and assisted in its critical investigation by helping to evaluate and supervise contracts to construct pilot models of fuzes to embody this concept.

JUSTIN M. TUOMY, chief of the Dairy, Poultry and Dehydrated Products Branch of the Animal Products Division, U.S. Army Natick (Mass.) Laboratories, conceived and demonstrated a major processing innovation which resulted in a highly significant improvement in the acceptability and use characteristics of the Food Packet, Long Range Patrol.

Tuomy subsequently collaborated with procurement officials and suppliers to the end that 11 million packets will be procured during 1967 and 1968. Reports from Vietnam, the citation states "unequivocally identify the Long Range Patrol Packet as the outstanding contribution to the feeding of combat troops."

DR. TUNG-HO CHEN is a research chemist in the Basic Chemical Section, Chemical Research Branch of the Pyrotechnics Laboratory, Picatinny Arsenal. He was selected for performing fundamental research leading to the development of a relatively simple and highly sensitive spectrophotometric method for determining microquantities of chlorate, chlorite, hypochlorite and chloride in perchlorates.

Dr. Chen's findings apply to all alkali metal perchlorates and to numerous chlorine-oxygen-bearing compounds utilized by the U.S. Army in ammunition, propellants and pyrotechnics.

VINCENT J. DONADIO, supervisory mechanical engineer at Picatinny Arsenal, conceived a production process required for the manufacture and automated assembly of special components for the Beehive-type antipersonnel ammunition. This concept solved a critical, mass production problem of a much-needed item of ammunition used in the Southeast Asia conflict.

Donadio is acting section chief, Ammunition Engineering Directorate, Munitions Engineering Division, Ammunition Engineering Laboratory, Antipersonnel Section.

LAWRENCE A. OUELLETTE, a senior technician-specialist within the Nuclear Engineering Directorate at Picatinny, contributed to the Army weapon program by the development of unique telemetry for laboratory air-gun and artillery (in-bore) use.

This telemeter design provides for the first time in the history of projectile development a reliable method of obtaining complex performance data.

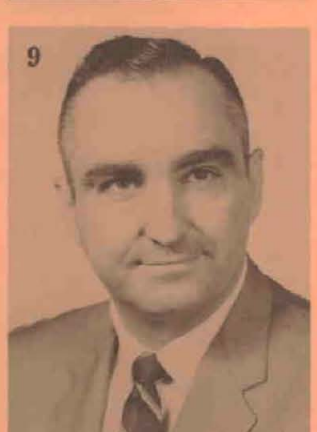
DR. EDWARD J. SCHANTZ, a research biochemist and senior investigator at Fort Detrick, Frederick, Md., performed research on the isolation and purification of biologically active substances originating from natural resources, specifically, on the purification of staphylococcal interotoxins.

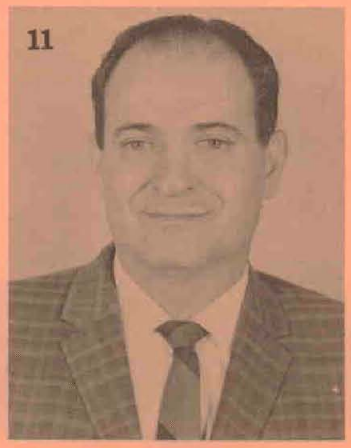
This work has accelerated interest in research on toxins and establishes a basis for technical improvements.

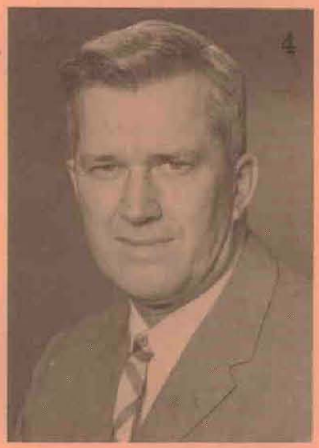
R&D Achievement Award Winners

(Article on basis of selection begins on page 1.)

(1) ***James T. Ballard,*** Waterways Experiment Station (WES), Vicksburg, Miss. (2) ***Harry H. Ulery Jr., Donald N. Brown, Donald M. Ladd, Richard Ahlvin,*** WES. (3) ***Ronald J. Goldstein,*** U.S. Army Security Agency, Arlington Hall Station, Va. (4) ***Justin M. Tuomy,*** Natick (Mass.) Laboratories. (5) ***John F. Mescall,*** U.S. Army Materials and Mechanics Research Center (AMMRC), Watertown, Mass. (6) ***Jiro Adachi,*** AMMRC. (7) ***Leonard F. Marcus, Lloyd L. Salisbury Jr., Albert B. Colman,*** U.S. Army Medical Biomechanical Research Laboratory, Walter Reed Army Medical Center, Washington, D.C. (8) ***Dr. Ceslovas Masaitis,*** U.S. Army Ballistic Research Laboratories (BRL), Aberdeen Proving Ground, Md. (9) ***George D. Kahl,*** BRL. (10) ***Hugh T. Reilly,*** U.S. Army Limited War Laboratory, Aberdeen Proving Ground, Md. (11) ***Aaron Ismach,*** U.S. Army Medical Equipment Research and Development Laboratory Aberdeen Proving Ground, Md. (12) ***Bruce McCurdy Hall,*** Extraterrestrial Research Agency, Chief of Engineers, Washington, D.C.



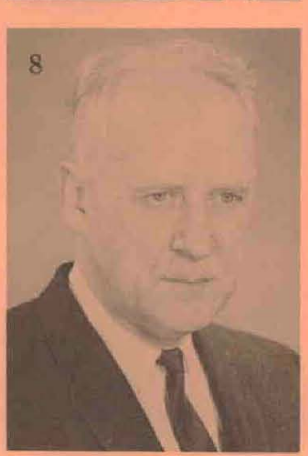




R&D Achievement Award Winners

Seventeen of 35 Research and Development winners for 1968 are pictured on this page. For other winners and the laboratories with which they are associated, see page 35.

(1) ***Dr. Donald A. Smith,*** U.S. Army Electronics Command (ECOM), Fort Monmouth, N.J. (2) ***Elmer J. Trawle, Vertis C. Cochran, Louis D. Duncan, Henry Rachele,*** ECOM. (3) ***William J. Skudera Jr.,*** ECOM. (4) ***William J. Haas,*** U.S. Army Mobility Equipment Research and Development Center (MERDC), Fort Belvoir, Va. (5) ***Rexford G. Booth,*** MERDC. (6) ***Theodore M. Pochily,*** Benet Research and Engineering Laboratories, Watervliet (N.Y.) Arsenal. (7) ***Walter E. Miller Jr., Jimmy R. Duke, Robert L. Sitton,*** U.S. Army Missile Command, Redstone Arsenal, Ala. (8) ***Dr. Edward J. Schantz,*** Fort Detrick, Frederick, Md. (9) ***Vincent J. Donadio,*** Picatinny Arsenal, Dover, N.J. (10) ***Lawrence A. Ouellette,*** Picatinny Arsenal. (11) ***Robert P. Bauman,*** Picatinny Arsenal. (12) ***Dr. Tung-ho Chen,*** Picatinny.



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