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R&D Achievement Awards Recognize Services of 45 Employes

Forty-five employes from among nearly 8,000 performing as scientists and engineers in U.S. Army in-house laboratories were selected this month as 1969 Research and Development Achievement Award winners.

Initiated in 1961, by then Chief of R&D Lt Gen Arthur G. Trudeau, the R&D Achievement Awards have increased steadily in importance as one of the most prestigious forms of recognition that can reward notable contributions to the Army's broad program of scientific investigations.

Criteria require that a recipient of an Army R&D Achievement Award be "directly responsible for a significant scientific or engineering achievement, in that it (1) establishes a scientific basis for subsequent technical improvements of military importance and/or (2) materially improves the Army's technical capability and/or (3) contributes materially to the national welfare."

Selection of winners of the 27 awards this year—20 individuals and seven teams consisting of 25 members—was made by a panel of judges headed by Dr. I. R. Hershner Jr. He is chairman of The Army Research Council (TARC) and chief, Physical and Engineering Sciences Division, U.S. Army Research Office (USARO), Office, Chief of Research and Development (OCRD).

Others who served on the panel are Dr. Carl Lamanna, deputy chief, Life Sciences Division, USARO; Dr. Fernand P. de Percin, chief, Regional and Special Projects Branch, Environ-

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AMC Slates Realignment Approved by Chief of Staff

Major realignment of the U.S. Army Materiel Command Headquarters, phased over a period of several months, has been approved "in principle" by Army Chief of Staff General William C. Westmoreland.

Plans for the changes, recommended by AMC CG General Ferdinand J. Chesarek, who succeeded General Frank S. Besson Jr. effective Mar. 10, were announced May 5 by AMC HQ. In an interview, General Chesarek pointed out that many of the changes stem from studies initiated by General Besson and made available to him when he assumed command.

Objective of the restructuring, it was explained, is to improve the managerial structure and provide better control over assigned missions and functions—specifically, to reduce the span of control of the CG and achieve

(*Continued on page 4*)

Hardin Assumes SEA Post In Office of ASA (R&D)

(*See story on page 9*)

Clyde D. Hardin

Project THEMIS Expanded by 26 Research Programs

Project THEMIS, started two years ago to establish new centers of scientific excellence throughout the United States, was expanded Apr. 15 by addition of 26 new research programs at universities in 18 states and the District of Columbia.

Secretary of Defense Melvin R. Laird announced selection of the new programs from a total of 198 full-length proposals received from academic institutions throughout the United States.

Preliminary screening narrowed the list by 75 percent, to 49. On-site visits were made for in-depth evaluation of capabilities for meeting centers of excellence criteria of other proponents prior to selection.

The additions raised to a total of 118 the number of research programs and increased the field of participating colleges and universities from 66 to 76. Funding levels were being negotiated as the *Army Research and Development Newsmagazine* went to press. Total THEMIS expenditures are tentatively planned at about $28.5 million.

All THEMIS research programs are unclassified and are designed to attain two complementary objectives:

- Develop new centers of scientific excellence capable of contributing basic knowledge towards solution of important future Defense proglems.
- Achieve a wider geographical distribution of Defense research funds, giving preference to institutions that received little or no previous Department of Defense support.

The 10 colleges and universities newly selected for support, the field or research detailed in their proposals, and the sponsoring organizations are as follows:

University of Alabama, "Structural

(*Continued on page 6*)

Featured in This Issue . . .

Engineers Corps Centers R&D Control in New Office

R&D program management responsibilities for the Office of the Chief of Engineers are centralized in a new office established May 1, Chief of Engineers Lt Gen W. F. Cassidy announced.

The OCE Research and Development Office is charged with over-all management of the R&D program although R&D functions of the Military Construction Directorate, Military Engineering Directorate, and Civil Works Directorate are unchanged.

Among principal functions assigned to the new office will be to eliminate duplication or overlapping of OCE R&D activities wherever practicable and to integrate more closely the over-all effort for adequate support.

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Army R&D Newsmagazine

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Editor . . . . . Clarence T. Smith
Associate Editor . . . . George J. Makuta

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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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7th National JSHS Achieves Peak of Success at USMA

Boast that the Seventh National Junior Science and Humanities Symposium Apr. 30–May 3 at the U.S. Military Academy was the "biggest and best ever," and most of 275 participants will enthusiastically agree.

Sponsored by the Army Research Office-Durham (ARO-D) N.C., on behalf of the Army Chief of Research and Development, the 1969 symposium was limited to the USMA—without the New York tour of United Nations HQ that featured several National JSHS at the academy.

Highlights were numerous, including outstanding addresses by five noted academic and industrial leaders as well as by several military officials. Dr. Harry L. Levy, professor of the humanities at Fordham University, was perhaps the most resoundingly applauded for a presentation titled "Ancient Greek Tragedy and Present-Day Ethics."

Former Assistant Secretary of the Army for Research and Development Willis M. Hawkins, vice president for Science and Engineering, Lockheed Aircraft Corp., spoke on "The Growing Need for Innovation: An Engineering Challenge." "Science and World Affairs" was the topic of Col Amos A. Jordon, professor and head of the Department of Social Sciences, USMA.

Dr. Margaret Mead, professor of anthropology, Museum of Natural History in New York City, keynote speaker at the 1967 National JSHS, scored again with "Character, Technology and Cultural Change." Another featured address was "The Molecular Languages" by Dr. Walter Gordy, professor of physics at Duke University, Durham, N.C.

USMA Superintendent Maj Gen Samuel W. Koster welcomed the conferees following an invocation by the Reverend James D. Ford, USMA chaplain. ARO-D Commander Col Donald F. Burton presided at all morning sessions.

"Operation Crossroads-Africa," an innovation at the 1967 National JSHS at the USMA, was again an outstanding success, featuring USMA cadets R. L. Hunt, G. W. Ricker, J. F. Seck and D. P. Wagner in the presentation.

Remembered probably most of all by the majority of the student participants was the expansion of visits to classrooms of the cadets and the opportunity to chat with them. Equally popular as an innovation was the chance to join with them at meals in the huge USMA messhall.

About 160 students were representative of winners at 25 regional JSHS involving nearly 5,000 students throughout the nation—a program innovated by ARO-D in 1958 and now supported jointly by the Department of the Army, industry and major universities in states involved.

Dr. Margaret Mead, professor of anthropology, Museum of Natural History, New York City, flanked by Mrs. Roger Whiteford, Maryland Academy of Science, and JSHS student participants Ronald Kaetzel, Mt. Airey, Md., and Debbie Revere, Jacksonville, Fla.

Twelve students selected from the Youth Science Congress Program sponsored by the Office of Education, U.S. Department of Health, Education and Welfare, were accompanied by their teachers. The 25 regional directors of JSHS, selected teachers and various military leaders concerned with the program also participated.

Seminar sessions, giving students the chance to express views in open discussion, dealt with such subjects as: Impact of Specialization on Careers; Morality Aspects of Science; Responsibilities of Students; Development of Responsibility in Youth; Is Religion Necessary in a Society?; Benefits of Science-Fiction; Forced Development of Children to Limits of Capabilities; Necessity for Mix of Humanities and Science in Formal Education; Society and Environment; Minority Groups in Our Society; Creativity; Freedom to Conduct Experiments on Living Animals; Impact of Technology on Social Progress; The Voice of the People: Violence of Voting; and Student Control of Education.

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R&D Achievement Awards Recognize Services of 45 Employes

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mental Sciences Division, USARO; Col John J. Doody, Directorate of Plans and Programs, OCRD; Harry L. Reed Jr., scientific adviser, and Lt Col Allen F. Grum, Directorate of Developments, OCRD; Col Ralph J. Hill and Lt Col Eugene M. Simpson, Directorate of Missiles and Space, OCRD.

Selection by the panel, however, was but the final step in a series of thorough evaluations of the achievements credited to nominees selected by each of the major commands, the Office of The Surgeon General and the Chief of Engineers. Each major headquarters substantially narrowed the field of candidates, as proposed by supervisors at bench level and reviewed by scientific directors or chief scientists at each installation.

To enable working associates of award winners to join in honoring them at appropriate ceremonies, the policy of presenting the awards at each of the installations concerned will be followed again this year.

Chief of Research and Development Lt Gen Austin W. Betts expects to continue the policy he established in 1967 of visiting each installation to make the presentations. Consequently, presentation of awards is expected to extend over the major part of the summer. Each award consists of a lapel pin and a wall plaque appropriately engraved.

Achievements recognized by the 1969 awards are indicative of the diversity and depth of Army in-house R&D activities, as conducted at more than 50 in-house laboratories and arsenals. As in previous years, the results reach into virtually all of the major scientific disciplines, reflecting also the scope of cooperative interdisciplinary effort.

Award winners are representative of numerous activities to develop, on a greatly accelerated basis, many of the urgent special requirements of the war in Southeast Asia.

Included in this category are improved body armor for aircrewmen and the foot soldier, personnel detection methods to minimize ambush, improved communications devices, mobility equipment, night-vision devices, new propellants and increased firepower.

Other awards are for progress in investigations into solid-state physics, biochemistry, microbiology, soil mechanics, map production, combat surveillance equipment, improved optical tracking devices, more reliable methods of detecting chemical agents in the atmosphere, new types of lubricants, liquid fueled rocket engines, more precise means of measuring color differentiations, mechanics of explosives, special and composite materials—to list only a few efforts.

Army R&D Achievement Award winners for 1969 and a brief description of the research, engineering or developmental successes that merited their selections are listed as follows:

ARMY MATERIEL COMMAND. Three *Electronics Command* (ECOM) employes at Fort Monmouth, N.J., were selected for their work on microwave devices, special sensors and thin-film technology.

John P. Agrios, chief of the Microwave Devices Section, Microwave and Magnetics Branch, Electronics Parts and Materials Division, was cited for establishing a "noteworthy management record related to development and application of new microwave transmission line devices and systems to Army electronic equipments.

"His outstanding leadership, effective working relationships with systems designers, and foresight and initiative in generating timely and meaningful programs have provided

(*Continued on page 31*)

Seven of 45 Research and Development winners for 1969 are pictured here. For other winners and the laboratories with which they are associated, see pages 35 and 36.

Counterclockwise from right: (1) *Dr. James A. Murfee Jr.* and *William A. Duncan*, U.S. Army Missile Command, Redstone Arsenal, Ala. (2, 3) *Karl H. Steinbach* and *Jere D. Dando*, U.S. Army Mobility Equipment R&D Center, Fort Belvoir, Va. (4, 5, 6) *Dr. M. Juul Hvorslev, Dr. Garbis H. Keulegan* and *John G. Jackson Jr.*, U.S. Army Engineer Waterways Experiment Station, Vicksburg, Miss.

Army Materiel Command Slates Realignment Approved by CofS

(*Continued from page 1*)

greater utilization of talent throughout the AMC HQ.

Emphasized, in response to a query regarding the meaning of General Westmoreland's "in principle" approval of the proposed changes, is that only the general concept and broad outlines have the green light for implementation. Details and specifics "are still being worked out."

How the span of control will be reduced may still be subject to further consideration, but the main goal is firm—a significant (by about 60 percent) reduction in the present total of about 190 commands, agencies or individuals reporting directly to the AMC Command Group.

Included in the group are nine major subordinate commands, 19 depots, nine central laboratories, 67 project managers and 54 separate installations or activities, all sharing in responsibilities currently involving funding of about $14 billion annually.

The reorganization as proposed affects only AMC HQ and will have "no immediate effect on field organizations." Personnel implications will not be significant, since the reorganization will be achieved within existing personnel space allocations.

Changes, however, will require transfer of some HQ personnel to locations outside of Washington, D.C., specifically two of the 14 project managers offices. Some individuals will be reassigned, but it is not contemplated that reductions in force will occur.

With the relocation of the PM for Aircraft Weaponization, 44 personnel will be given an opportunity to move to HQ U.S. Army Weapons Command at Rock Island, Ill., or "every effort will be made to reassign them to appropriate positions." Only five personnel are involved in the move of the PM for Manned Aerial Vehicle for Surveillance to HQ U.S. Army Aviation Systems Command, St. Louis, Mo.

Initial reduction of the number of PMs from 67 to 49 is envisioned by disestablishing 10 whose functions will be assumed by the major subordinated commands and by combining eight with other project managers. A detailed study is addressing project management "across the board."

Heading the list of key executives within HQ AMC in the realignment is the existing Principal Deputy Commanding General, who will serve as the CG's "alter ego" and resource manager for people, money and facilities.

The Deputy for Laboratories, a position vacant since the resignation of the late Dr. Jay Tol Thomas last September, will continue to focus on the scientific community and to direct the activities of nine central in-house laboratories and supervising quality of technical operations of other AMC in-house laboratories.

Among important changes approved is the appointment of two new Deputy CGs—for Materiel Acquisition, and for Logistics Support.

Materiel Acquisition will focus on the industrial base, with control of research and engineering, procurement and production, materiel requirements, logistics data management and related functions.

Logistics Support will be concerned with support of the field Army—control of operational readiness functions, distribution, transportation, maintenance, international logistics and the AMC depot system.

Project manager offices that will be disestablished are those for Flat Top; M113 Italy Coproduction; M107/M110 Artillery; Amphibians and Watercraft; Mortar Ammunition; Multifuel Engines; Rifle; GOER Vehicles; Sergeant Missile; Artillery Ammunition.

PM Offices scheduled for combining include Mallard/Random Access Discrete Address; Special Warfare/Special Mission Operations; Manned Aerial Vehicle Surveillance/Mohawk; UTTAS/Iroquois Aircraft; Air Traffic Management/Position and Navigation System; Selected Priority Operations/TPQ-28; Air Defense Control and Coordination/Target Missile; and AACOMS/TAS Teletypewriter/COMSEC.

A comparison of the present and proposed AMC structure is reflected in organizational charts on page 5.

Food Symposium Slated at Natick

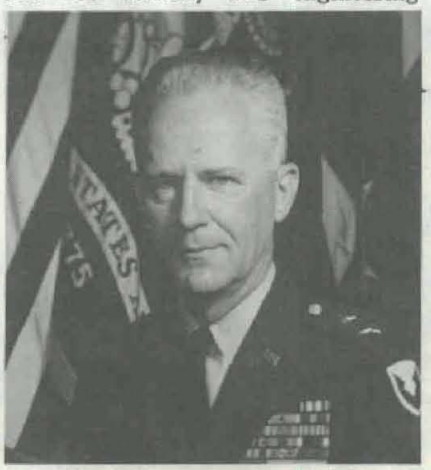
"Feeding the Military Man," a symposium sponsored by the National Academy of Sciences—National Research Council (NAS-NRC), U.S. Army Natick Laboratories, and Research and Development Associates, Inc., will be held at the U.S. Army Natick Laboratories, Natick, Mass., Oct. 20-22.

AMC's Maj Gen Free Heads CE South Atlantic Division

Maj Gen Richard H. Free, U.S. Army Materiel Command Director of Research, Development and Engineering, is assigned to new duties Aug. 1 as South Atlantic Division Engineer, Army Corps of Engineers.

Headquartered in Atlanta, Ga., he will be in charge of planning, engineering and design, construction, operations and administration of Corps of Engineers programs in the Southeastern United States, Panama, Puerto Rico and the Virgin Islands.

These programs include water resource development projects, construction of facilities for Army and Air Force military bases, aerospace facilities for NASA, and engineering studies related to the feasibility of constructing a sea level canal to replace the Panama Canal.



Maj Gen Richard H. Free

General Free was Army Southwestern Division Engineer at Dallas, Tex., from 1964 to 1966, and District Engineer at Norfolk, Va., for the preceding two years. He served from 1959 to 1962 at Supreme Headquarters Allied Powers Europe (SHAPE).

From 1955 to 1958 he was stationed in Washington, D.C., as executive secretary of the Military Liaison Committee, Atomic Energy Commission. He served for two years as assistant commander of the Yokohama Engineer Depot in Japan after a year in Korea as a combat battalion and group commander.

Other major assignments include Armed Forces Special Weapons Project, Albuquerque, N. Mex. (1948–52) and intelligence officer in the Manhattan Engineer District, Washington, D.C. (1946–47).

During World War II, General Free served in the European Theater as commanding officer, 101st Engineer Combat Battalion, 26th Infantry Division. He later served as executive officer, Engineer Section, HQ U.S. Forces, Austria.

General Free graduated from the U.S. Military Academy in 1940, received a master's degree in engineering from Cornell University in 1948, and is a graduate from the Industrial College of the Armed Forces.

PROPOSED HQ AMC ORGANIZATION

COMMANDING GENERAL

DEPUTY COMMANDING GENERAL

CHIEF OF STAFF

SEC'Y OF THE GENERAL STAFF

5 SPECIAL ASSISTANTS

SELECTED PROJECT MANAGERS

PERSONNEL AND TRAINING

INSTALLATIONS AND SERVICES

COMPTROLLER

PLANS/ANALYSIS COORDINATING OFFICE

AMC BOARD FOR PLANNING

ARMY MATERIEL SYS ANALYSIS AGENCY

MANAGEMENT INFORMATION SYSTEMS

QUALITY ASSURANCE

SPECIAL STAFF

JAG, CHAPLAIN
GENERAL COUNSEL
INFORMATION
IG, HISTORICAL
ADMINISTRATIVE
SECURITY
SAFETY, SURGEON

DEPUTY FOR LABORATORIES

AMC LABORATORIES

COMMODITY COMMAND LABORATORIES

DEPUTY CG FOR MATERIEL ACQUISITION

RESEARCH AND ENGINEERING

PROCUREMENT AND PRODUCTION

LOGISTICS DATA MGMT

MATERIEL REQUIREMENTS

MIDA/DMCC

DEPUTY CG FOR LOGISTICS SUPPORT

OPERATIONAL READINESS

DISTRIBUTION AND TRANSPORTATION

MAINTENANCE

INTERNATIONAL LOGISTICS

DEPOTS

PRESENT HQ AMC ORGANIZATION

COMMANDING GENERAL
DEP COMMANDING GENERAL
CHIEF OF STAFF
DEP CHIEF OF STAFF
ASST TO DCG FOR DEPOTS
SEC'Y OF THE GENERAL STAFF

18 PROJECT MANAGERS

40 PROJECT MANAGERS OUTSIDE AMC HQS

DEPUTY FOR LABORATORIES

AMC BOARD

11 SPECIAL ASSISTANTS

COMPTROLLER & DIRECTOR OF PROGRAMS

DIRECTOR OF PERSONNEL & TRAINING

DIRECTOR OF INSTALLATIONS & SERVICES

SPECIAL STAFF
JAG, CHAPLAIN
GENERAL COUNSEL
INFORMATION
IG, HISTORICAL
ADMINISTRATIVE
SECURITY, SAFETY

OPERATIONAL READINESS

COMBAT SURVEILLANCE & TARGET ACQUISITION SYSTEMS

LOGISTICS DATA MANAGEMENT

DIR. OF MANAGEMENT SYSTEMS & DATA AUTOMATION

DIRECTOR OF QUALITY ASSURANCE

DIRECTOR OF MAINTENANCE

DIRECTOR OF MATERIEL REQUIREMENTS

DIRECTOR OF DISTRIBUTION & TRANSPORTATION

DIRECTOR OF INTERNATIONAL LOGISTICS

DIRECTOR OF PROCUREMENT & PRODUCTION

DIRECTOR OF RESEARCH DEVELOPMENT & ENGINEERING

2 MAY 1969

APG Simplifies Inspection of Weapons in Field

Future detection of structural failures in weapons in the field is expected to be simplified due in part to a new device being tested by a small unit within the Proving Ground's Materiel Test Directorate (MTD), Aberdeen Proving Ground, Md.

The portable magnetic recording borescope (MRB) developed by Watertown Arsenal, Mass., is being evaluated for field application at MTD's Materiel Evaluation Unit of the Physical Test Section, Engineering Measurements and Analysis Branch, Supporting Services Division.

When it becomes available, the portable MRB scope, expected to weigh about 100 pounds, will allow gun inspections to be made in the immediate combat zone. The need for dismantling the weapon and moving it to a rear area for inspection will thus be eliminated.

Hailed as a major contribution to weapons technology and safety, the MRB, in combination with the autofrettage method of manufacturing large-caliber weapons, is expected to increase greatly the service life of gun tubes.

William H. Taylor, lead foreman for the Materiel Evaluation Unit, said the MRB scope now in use weighs 250 pounds and is used as a backup to two other methods, magnetic particle and ultrasonic inspection, of checking gun tubes for incipient structural failure.

"Magnetic particle inspection," he explained, "is a technique whereby an oil bath with fluorescent suspended magnetic particles flows over a turning gun tube. If a tube has a defect, the suspended particles cling to the crack or flaw and are pinpointed by an inspector using a near ultra-violet light that causes the particles to fluoresce. A copper rod that runs the length of the tube acts as the central conductor of current and produces the magnetic field that holds the particles in longitudinal cracks. Transverse flaws are detected by means of a coil.

MATERIALS TESTER Donald W. Horton starts a 175mm gun tube turning as a fellow employe (under canopy at rear) makes his way forward along the tube with a black light scope. The process is part of the Aberdeen Proving Ground Material Evaluation Unit's mission of inspecting each weapon before it enters the Army inventory.

"The ultrasonic test method utilizes reflected high-frequency sound, which is bounced off internal flaws. It is measured by employing an oscilloscope, much in the manner that radar waves reflect from an object."

Taylor said that when the portable MRB scope becomes a reality, his organization and similar units in combat zones will be able to go to the firing position to inspect weapons.

The principal advantage of an MRB is that it provides a rapid means of locating cracks in the bore as well as determining the depth of the flaw. "No other method is as effective as the MRB," Taylor said.

"Another advantage is that utilizing the MRB provides a print-out of the condition inside the tube. This becomes a permanent record and, as such, is a vital maintenance adjunct."

MRB incorporates a magnetic recorder tape head that rotates in the barrel and feeds back a picture via amplifiers and fiber optics.

Taylor has a patent disclosure award for the black light borescope. He described activities of his 8-man unit as "nondestructive testing," as opposed to firing a weapon until it fails.

Saddled with the important mission of inspecting every weapon—from a 40mm gun to the big 175mm and 8-inch howitzer—before it is accepted and placed in the Army inventory, the Materials Evaluation Unit has been in existence at Aberdeen Proving Ground since World War II.

Prior to being inspected by the unit, each weapon is test-fired several times with varying charges.

Project THEMIS Expanded by 26 Research Programs

(*Continued from page 1*)

Mechanics," U.S. Air Force; University of Arizona at Tucson, "X-Ray and XUV Radiation Physics," Air Force; Boston (Mass.) College, "Elementary Chemical Kinetics," U.S. Navy; University of California at Riverside, "Solar Radiation Effects," Navy; University of Georgia at Athens, "Statistical Analysis and Information Retrieval," Navy; Hahnemann Medical College, Philadelphia, Pa., "Bioamines in Stress," Navy; and

Michigan State University at East Lansing, "Behavioral Studies," Air Force; Rhode Island University at Kingston, "Photo Electronic Imaging Devices," Army; Virginia Polytechnic Institute at Blacksburg, "Vehicle Engineering and Control," Navy; Washington University, St. Louis, Mo., "Optimum Detection Systems" and also "Control, Guidance and Information Studies," Air Force; and Yeshiva University, N.Y.C., "Research on Thin Film Materials," Navy.

Institutions previously involved in the Project THEMIS that successfully submitted proposals for new research programs are:

Catholic University, Washington, D.C., "Underwater Acoustics," Navy; Colorado State University at Fort Collins, "Effects of Environment on Sensors," Air Force; University of Delaware, "Oceanography," Navy; University of Hawaii at Honolulu, "Vector-borne Tropical Diseases," Army; and

Illinois Institute of Technology, Chicago, "Degradation of Structural Materials," Army; University of Kentucky, "Environmental Stress Physiology," Air Force; Lehigh University, Bethlehem, Pa., "Fluid Amplification," Navy; University of Minnesota, "Organization Performance and Human Effectiveness," Navy; and

University of Missouri, "Basic Studies of Electronic Materials," Air Force; Rensselaer Polytechnic Institute, Troy, N.Y., "Optimum Digital Signal Processing," Army; Rice University, Houston, Tex., "Remote Sensing of Gamma Ray Signatures," Army; and University of Virginia, "Cryogenic Instrumentation," Navy.

ECOM Engineer Granted Patent

"Low-Loss Controllable Parameter Transmission Line" is the title of a U.S. patent (No. 3,413,575) issued recently to Donn V. Campbell, an electronics engineer of the Army Electronics Command.

Assigned to Division "C" of ECOM's Institute for Exploratory Research, Campbell states that one of the applications of the inventicn is in antenna arrays. For example, it can be used as a variable delay line to adjust the phase of elements in an antenna array for both transmitting and receiving.

Army Loans Aircraft to Rutgers for Project Eagle

Lt Gen Harry W. O. Kinnard, CG, USACDC, meets with Cooper Bright (left), director of the Rutgers Center for Transportation Studies, and David Goldberg, director of the N.J. State Transportation Department, during ceremonies at which Army "turned over" aircraft for Project Eagle mass transit tests.

Continuation of Project Eagle, a 3-year-old study intended to convert aircraft to "accumulator power," as a step toward providing mass urban transportation at costs more acceptable to the public, is being aided by loan of an Army airplane to Rutgers University.

The goal is to achieve complete vertical takeoff and landing capability for fixed-wing aircraft. This would enable establishment of demonstration airlines, using small airports located in the Connecticut-New York-New Jersey tri-state area. A relatively small number of aircraft then could accommodate a large number of passengers over a short period.

Project Eagle is watched and supported by officials of U.S. Department of Transportation, New Jersey Master Transportation Plan, and the National Aeronautics and Space Administration. Testing is being done by Rutgers and at the Federal Aviation Agency National Aeronautical Facilities Evaluation Center near Atlantic City.

CTS director Cooper B. Bright explained that one type of conversion substitutes special fabrics for aircraft metal wing covering to store compressed air from the engine in the wing. Analysis has determined that takeoff distance for one type of aircraft can be reduced from 1,400 to 300 feet.

"Aircraft converted to accumulator power under Project Eagle will use air space below 3,000 feet over the tri-state area," Bright said.

Secretary of the Army Stanley R. Resor, in authorizing the loan of the short takeoff and landing (STOL) U-1A De Havilland airplane, said that the loan is "directly in line with the policy of the Department of Defense to help alleviate pressing domestic problems and to assist in solving the critical social needs of our nation."

Lt Gen Harry W. O. Kinnard, CG of the U.S. Army Combat Developments Command, presented the aircraft to Dr. Mason Gross, Rutgers University president, in ceremonies at Mercer County (N.J.) Airport.

Regarded as Army aviation's "helicopter pioneer," who took airmobile tactics to Vietnam, General Kinnard commented on the study being conducted by the Rutgers Center for Transportation Studies (CTS) of the Eagleton Institute of Politics:

"Just as the Army found it necessary to free itself from the 'tyranny of terrain' by use of the helicopter and complementary aircraft, so will our cities and industries."

General Kinnard has written and spoken widely on the applications of Army aviation research to civic transportation, traffic control, fire fighting, cargo handling, medical service, agriculture and construction.

Reflecting on the "cooperative federalism" aspects of the project, General Kinnard said that while "many steps must still be taken in air traffic control, noise and vibration reduction, and other areas to make mass air transportation fully acceptable, concerted efforts involving all levels of government—the educational, scientific and industrial communities and the general public—can overcome the technological problems."

He cited a need for very detailed studies of "microfunctions"—micronavigation, microcommunications, microweather, microtraffic control—applying to aircraft moving within and between cities.

Dr. Gross said he considered the loan "to be of real importance in demonstrating how the Department of Defense can offer assistance in solving the most pressing domestic problems facing the nation.

"We at Rutgers fully realize the enormity of the flight research task that lies ahead in this project, but with the kind of support and cooperation shown by the U.S. Army, we are enthusiastic to move forward."

AMMRC Assists ERG With Fort Greely SM-1A Plant

Installation of the steam generator of the SM-1A Nuclear Power Plant at Fort Greely, Alaska, completed recently, provided a demonstration of cooperation between two branches of the U.S. Army.

The Army Engineer Reactors Group (ERG), Fort Belvoir, Va., had the responsibility to replace the generator. To assure that piping met high-pressure welding standards and codes, ERG sought assistance of the Army Materials and Mechanics Research Center (AMMRC), Watertown, Mass.

The Quality Assurance Division at AMMRC has been providing technical assistance to the various AMC Commodity Commands under their Materials Testing Technology Program. As the ERG is not part of AMC, authorization to assist ERG was requested and granted by the Quality Assurance Directorate, AMC.

Ernest H. Rodgers, widely experienced in nondestructive testing inspection, was selected. In addition to establishing criteria for weld inspection of primary piping, he visited Fort Greely in mid-March to monitor the entire process, consisting of nozzle-to-pipe alignment, visual weld inspection, liquid penetrant weld inspection and isotope radiographic inspection of final weldments. Cooperation and quality of workmanship exhibited by ERG personnel was reported excellent.

Col R. E. Ednie, director of ERG, forwarded a letter of appreciation to Rodgers which states, in part:

"The wealth of experience and technical expertise which Mr. Rodgers contributed materially assisted the weld inspectors to evaluate properly and accurately the quality of Tungsten Inert Gas welds on 12 and 14-inch diameter Schedule 80 stainless steel primary system piping. . .Mr. Rodgers' efforts forcefully attest to the effectiveness of a strong military-civilian partnership."

Army-Industry Meeting Reviews Art of Cybernetic Mechanisms

Cybernetic mechanisms state-of-the-art was reviewed at a recent symposium on "Aids to Human Motion" co-sponsored by the U.S. Army Tank-Automotive Command and the Specialty Materials Handling Products Operation of General Electric Co.

Participants represented the Departments of Defense, Army and Navy, the National Aeronautics and Space Administration, Veterans Administration, Institute for Defense Analysis, and academic institutions.

Informal discussions involved existing devices with feedback systems, such as the "Quadruped" multipurpose machine developed by contract with General Electric Co. under joint sponsorship of the Advanced Research Projects Agency and the Army.

Demonstrated with the quadruped were such other human motion devices as manipulators and powered prosthetic arms using electric or hydraulic power with sophisticated devices for electromyographic or audio actuation.

Presentations included the role of computers and of computer subroutines, control systems for cybernetic mechanisms, and the use of television as an automatic recognition device coupled with remotely controlled powered manipulators.

Ralph Mosher, in charge of General Electric Co. development of the Quadruped, described the feedback control that can be obtained with the hydraulic bilateral servo system. One of the recent demonstrations, as televised over a national network, showed the front foot of the machine being set down on an egg on the ground without breaking the shell, to indicate the delicate precision of control.

Mosher also demonstrated, with eyes blindfolded, how the Quadruped can be walked with the operator controlling it solely by sense of "feel."

Steady progress is being made in each of the individual areas of cybernetic mechanism effort, according to a summary of results of the meeting. Indicated was a need for more work in development of sensors, primarily in the area of television for remote viewing and in other sensors to duplicate human sensory functions.

Continued developmental work, when coupled with progress by automatic recognition through television and in computer routines and subroutines that can recognize a situation and provide a predetermined course of action, points to the feasibility of a truly cybernetic device.

Members of the developmental team foresee, as one of the first practicable applications of advanced technology, a remotely controlled mobile mechanism for operation in environmentally or strategically hostile areas.

Conferees at the recent meeting in Detroit indicated that the state-of-the-art in cybernetic mechanisms should be reviewed again next year.

Objectively, at that time it may be feasible to determine if sufficient progress has been made to permit the coupling of a number of the subsystems being developed into a system that more closely approaches a fully functional cybernetic mechanism.

CYBERNETIC MECHANISMS meeting attendees pictured with full-scale Quadruped device are (from left) Ralph Mosher, consulting engineer, Specialty Materials Handling Products Operation, General Electric Co.; Dr. C. J. Wang, director, Advanced Engineering, Office of the Secretary of Defense; Dr. Leonard S. Wilson, chief, Environmental Sciences Division, Office of the Chief of Research and Development; Dr. E. N. Petrick, chief scientist/technical director, U.S. Army Tank-Automotive Command; Walter E. Gray, manager, Specialty Materials Handling Products Operation, General Electric Co., Contractor for Quadruped.

HumRRO Incorporates as Nonprofit Research Corp.

Intention of the Human Resources Research Office (HumRRO) to separate from George Washington University, where it was established in 1951 as a U.S. Army contract agency, has been announced along with plans to set up a nonprofit research corporation.

Many details of the contemplated change remain to be worked out over a period of several months. Transfer has been requested by Dr. Meredith P. Crawford, director of HumRRO since its inception, and approved by Dr. Lloyd H. Elliott, university president.

Incorporation of the Human Resources Research Organization (retaining the acronym of HumRRO) as a nonprofit enterprise was announced recently. The incorporators are former Secretary of the Army Stephen Ailes, Dr. Crawford and his current HumRRO associate director, Dr. William A. McClelland. Still to be selected is a board of trustees.

HumRRO has operated primarily as an Army contract agency, concerned principally with education and training research. Since 1967 it has conducted research for other U.S. Government agencies and industry. As a nonprofit research corporation, HumRRO will have greater administrative and fiscal flexibility to pursue an expanded R&D program, Dr. Crawford stated.

Within the past two years HumRRO has conducted research on selection and training of employes for the U.S. Post Office Department; a similar effect for the Louisiana Regional Medical Program; an investigation of rotary-wing aircraft-simulator training requirements for the U.S. Coast Guard; a literature survery of leadership research for the Office of Naval Research; and a study of maintenance procedures and practices for the Ford Motor Co.

HumRRO, as a corporate enterprise, will continue to work for current sponsors, it was stated, and is expected to retain its 260 employes after separation from the university.

The seven separate HumRRO research divisions (laboratories) will continue to occupy present quarters in Alexandria, Va. (300 N. Washington St., Office of the Director, and of two of the divisions); Fort Knox, Ky.; Presidio of Monterey, Calif.; Fort Benning, Ga.; Fort Bliss, Tex.; Fort Rucker, Ala.

Fisher Succeeds Hardin at Harry Diamond Labs

Selection of Clyde D. Hardin as Special Assistant for Southeast Asia Matters, Office of the Assistant Secretary of the Army (R&D), was followed recently by appointment of Evan D. Fisher to succeed him at the Harry Diamond Laboratories, Washington, D.C.

Until promoted to the PL 313 position as successor to Howard P. Gates, who resigned late in February, Hardin had been employed 21 years at the Harry Diamond Laboratories. He was chief of R&D Laboratory 400 (1965–69) after six years as chief of the Advanced Research Laboratory.

Hardin's scientific achievements have earned him numerous honors and Outstanding or Excellent Performance Ratings, listing in *American Men of Science* and the Marquis *Who's Who*, and nomination in 1955 with a commendation from the Secretary of the Army for the Arthur S. Fleming Award.

Army Chief of Staff General William C. Westmoreland, then commanding general of MACV, recognized Hardin for achievements on two special assignments (three months in 1967 and two months in 1968) as consultant to the scientific adviser, Military Assistance Command, Vietnam.

The general's letter of commendation cited Hardin for "outstanding contributions. . .with the Radar and Counter Mortar Radar Project. . .VT Fuzing Project. . .Dud Munition Problem. . .Phase 1 ARMOROCCO Study. . .far-sighted recognition last October of the inherent capabilities of the TPS-25. . ."

General Frank S. Besson Jr., then CG of the U.S. Army Materiel Command, also commended Hardin for his outstanding service to MACV in presenting him with a Special Act or Service Award in 1968 for his contributions to improved operational capabilities.

Hardin and Fisher are members of a 7-man HDL team selected for 1969 Army Research and Development Achievement Awards. The team (see Page 1 lead story) developed the smallest and most rugged proximity fuze ever produced by fully automated manufacturing and correlated testing methods.

In addition to presenting numerous technical papers at scientific meetings on radar applications to military requirements for instrumentation and materiel, as well as on fuzing problems, Hardin has been granted U.S. Patent No. 2,908,870 (1959) for "Generation of Very Short Microwave Pulses." He is coinventor of "Missile Booster Control Cut-off System" and "Device for Measuring Pulse Jitter."

Hardin has served as Army liaison member of the American Ordnance Association Fire Control Division since 1964, and Army representative to the Quadripartite Technical Panel 04 (fuzes and initiators). He also served with Panel D4 (missile fuzing), starting in 1960 and continuing to date, and with the Joint Services Advisory Group radar panel of the MIT Lincoln Laboratories.

A senior member of the Institute of Electronics and Electrical Engineers, Hardin is affiliated with a number of professional organizations, including the American Association for Advancement of Science and the American Ordnance Association. He is a past president of the District of Columbia Science Chapter of the Armed Forces Management Association.

Achievements as president of the Rockville (Md.) Civic Association (1955–57) earned him the City of Rockville Distinguished Service Award in 1956. He also was organizer of the Citizens for Good Government, which helped to win Rockville the All-America City Award (1953–58 and 1962–64), and has served as president of Rockville PTAs and the Little Theater Group, and as chairman of school, church and other civic institutions.

Graduated from Wake Forest (N.C.) College in 1948 with a BS degree in physics and mathematics, following U.S. Navy service (1943–46) as a radar technician, Hardin has done graduate work at the University of Maryland and the National Bureau of Standards Graduate School.

Hardin started his Federal Civil Service career with the National Bureau of Standards as a group leader in ordnance electronics research (1948–53) and transferred in 1953 to the Diamond Ordnance Fuze Laboratory, which was redesignated the Harry Diamond Laboratories in 1962. He has authored or coauthored 18 tech reports with NBS and HDL.

EVAN FISHER is a 26-year veteran of Federal Civil Service and has been with the Harry Diamond Laboratories since 1953, when the nucleus of the current organization was transferred from the National Bureau of Standards. He was a junior mechanical engineer at David Taylor Model Basin in Washington, D.C., for three years following graduation from the University of Maryland with a BS degree in engineering.

With HDL, Fisher has advanced his career in progressively responsible assignments. Solid backing for his current assignment as acting chief of R&D Laboratory 400 dates to his assignment as a branch chief in the lab in 1958. His area of expertise is in design, development, testing and evaluation of proximity fuzes and electromechanical ordnance devices.

Evan D. Fisher

In his new assignment he will have charge of one of HDL's major laboratories, with responsibility for directing activities in fuzing for bombs, mortars, projectiles, mines, rockets, grenades and related ammunition. The laboratory also is involved in R&D for fuzing of nuclear missiles, high-resolution radar systems, safety and arming devices, and fluidic and flueric devices.

Fisher is a member of the American Society of Mechanical Engineers and the American Ordnance Association. He has presented and published a number of technical reports and articles about military ammunition.

Corps of Engineers Centers R&D Control in New Office

(*Continued from page 1*)

The office will be charged with making new R&D work assignments, helping to determine facilities requirements, and resolving jurisdictional controversies as they arise.

Headed by an engineer officer (rank of colonel) still to be selected, the office will be staffed with a deputy chief (GS-16), an assistant for management (planning officer GS-14), an assistant for programing (program analyst GS-13), assistant for administration (administrative officer GS-11), a GS-7 secretary and a GS-6 clerk-typist.

Robert F. Jackson, a veteran civilian employe of the Corps of Engineers who has been serving as research coordinator in OCE, has been appointed to the position of deputy chief. Recruitment to fill other positions was underway at press time.

Metal With 'Memory' Demonstrated

Nitinol, Crushed or Twisted, Responds to Heat

Would you suspect someone of spoofing you if you were told that a new metal has the mysterious quality of returning to its original form, simply by reheating it, after it has been crushed or badly twisted?

Nitinol has that quality, which has earned it the description of the "metal with a memory." Illustrations of the phenomena were given Apr. 29 at a convention of the Society of Aerospace Materials and Process Engineers in Los Angeles, Calif.

William B. Cross, a senior development engineer of Goodyear Aerospace Corp. in Akron, Ohio, and John E. Cooper and David E. Bowker of the National Aeronautics and Space Administration's Langley Research Center, Hampton, Va., coauthored a technical paper describing Nitinol.

For the design engineer, for practical applications to civilian and military requirements, just what is the significance of a metal that can be "set" in a desired form, crushed or twisted into an unrecognizable mass, and then returned to shape simply by reheating it?

Fred J. Stimler, project engineer for Goodyear Aerospace astronautics programs, offers one answer: "Just put the large structures into suitably compact packages on the ground, boost them into space and let them unfold from solar heat."

Langley Research Center's interest in the qualities of Nitinol led to a contract with Goodyear Aerospace to study the phenomena and demonstrate its potential usefulness by fabricating three model machines. The models were a high-force actuator, an energy storage device and a self-erectable mechanism—all delivered recently.

The actuator consists of a fulcrum attached to six strands of 20-mil Nitinol wires, which are "pulled back" about seven percent. When heated by electric current, the wires contract, forcing the fulcrum against an object (such as an ordinary lead pencil) until it breaks.

In the energy storage device, the Nitinol wire is affixed to a pulley and a weight is attached to the pulley by a string. When the 20mm-diameter wire is heated, it contracts to lift a one-half pound weight about 5/8 of an inch through pulleys and clutches.

The self-erectable mechanism is similar to a Chinese whistle that unfurls when blown. Four Nitinol wires are imbedded; two, when heated, cause the device to curl up. Likewise, the other two cause it to uncurl.

William Buehler, a metallurgist with the Naval Ordnance Laboratory, White Oak, Md., accidentally discovered the peculiar quality of Nitinol, an alloy of 55 percent nickel and 45 percent titanium, while searching for a nonmagnetic and noncorroding material to be used in tools for dismantling magnetic mines.

When annealed above its transitional temperature range, the alloy's atomic structure can be "set." Crushed or otherwise distorted after it has cooled, it requires only moderate temperatures to reshape it as designed. It can be formed into wire, sheets or other forms.

Stimler's favorite way of showing off Nitinol's qualities is to set it in the form of a paper clip. He straightens it and, to demonstrate its "memory," stirs a cup of coffee. Dutifully, it returns to its original paper clip form.

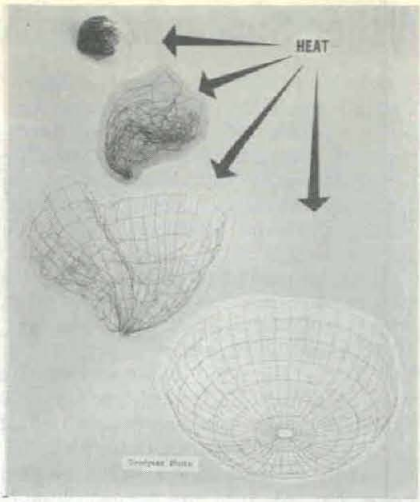


PHOTO COMPOSITE shows how Goodyear Aerospace's small space satellite antenna (lower, right) made of 55 Nitinol wire, can be crushed into a ball of wire (top) and then returned to original shape merely by heating.

"SELF-ERECTABLE" unit, one of several built by Goodyear Aerospace to find a practical application for Nitinol, consists of four Nitinol wires encased in transparent plastic. When heated, the two inner wires cause the unit to coil. The outer two wires, when heated, uncoil unit to 18 inches.

Brig Gen Kogstad Named AMC Director of Maintenance

Army Materiel Command (AMC) Director of Maintenance is Brig Gen Arthur W. Kogstad's new title, following service as director, J-1, U.S. European Command, and assistant CO, 4th Armored Division.

A 1940 Loyola (Chicago) University graduate, General Kogstad attended Northwestern University and in 1964 received a master's degree in international affairs from George Washington University. He has served as a professor of Military Science and Tactics at Pennsylvania State University.

A large part of his military career has been in personnel assignments, including personnel staff officer with U.S. Forces Australia; Far East Command; United Nations Command in Korea; U.S. Army Europe; and Office of the Joint Chiefs of Staff in Washington.

The general entered the Army in 1941 as an enlisted man and received five World War II European Theater campaign battle stars for service with the XIX Corps and the 2d Armored Division. He served in Korea with the Far East Command General HQ and in Vietnam as deputy commander, U.S. Army HQ Area Command. He also was special assistant for Systems, Programs, and Operations with HQ U.S. Army Vietnam.

As AMC director of Maintenance, General Kogstad will direct and control U.S. Army materiel maintenance activities worldwide.

Brig Gen Arthur W. Kogstad

WES Launches Extensive Sensor Systems Research Program

The U.S. Army Engineer Waterways Experiment Station (WES), Vicksburg, Miss., recently launched another research program projected over a 5- to 10-year period to support several Army agencies seeking new means of detecting mines, booby traps and tunnels such as are complicating warfare in Vietnam.

Demonstrated masters at camouflage and guerrilla warfare, the Viet Cong harass, intimidate, terrorize and then rapidly disappear—underground. Reliable sensor systems for detecting the vast tunnel complexes and for locating the mines and booby traps in the approach areas would assist United States troops in combatting this type of enemy action; also, in destroying caches of weapons, ammunition and other supplies stored in special rooms within the complexes.

Preliminary studies on detection systems were conducted in early 1968 in Vietnam by a team from WES. The TET offensive in 1968 interfered with plans for additional in-country research and the studies were shifted to a locality representative of not only Southeast Asia but of tropical environments in general.

Puerto Rico was selected because of its complex environment. Although the island is only 100 miles long and 35 miles wide, it has a wide variety of environmental or terrain types, ranging from dense, moist tropical rain forests to conditions approaching a true desert, with various cacti and thorny scrub vegetation. Topography is similarly variable, as are soils and rock formations.

WES already has extensive pertinent data on Puerto Rico, gathered by a detachment stationed there for several years to conduct continuing environmental research.

Already selected are 22 areas for general research to evaluate present-day sensors and to develop new techniques for future sensor systems. At one of the two primary tunnel sites selected, a tunnel complex will be built according to Viet Cong specifications and construction techniques.

No mechanical equipment will be allowed in digging and backfilling operations. All work will be accomplished by hand, with only the type of tools used by the Viet Cong. This means that the tunnel will be dug from underground with the spoil brought out through small and easily camouflaged ocean openings.

The tunnel complex will be approximately three times as long and as wide as the length of a football field. The depth will vary from approximately 4½ feet to 18 feet underground.

The complex will contain storage rooms and sleeping quarters as well as the normal tunnel portions used for intercommunication as well as for escape routes after combat or tactical maneuvers. Volunteers will live in the rooms and eat special diets. Weapons and munitions will be stored in the tunnels.

With all conditions in Vietnam tunnels exactly duplicated, the ability of trace-gas sensors for monitoring gases emitted by explosives and gases emitted by human beings can be evaluated. Before, during and after the construction phase, other types of candidate existing sensor systems will be evaluated to determine their capabilities for detecting tunnels.

In addition to the ground-borne evaluation of sensor systems at these complexes, multispectral visible and infrared flights will be made over the areas. Electromagnetic and seismic surveys will be conducted. Trace-gas experiments and geochemical analyses will be made. The reflectance and emission properties of soils in both the visible and infrared regions of the spectrum will be evaluated. Meteorological data will be collected.

Ecological factors will be monitored for one year at the other primary tunnel site selected before a second tunnel complex is constructed. This program of gathering background information will provide additional scientific data for analyzing capabilities of various sensor systems.

Mine and booby traps, nonmetallic and primarily constructed of wood and plastic materials, will be installed at other sites and sensor systems will be evaluated to determine capabilities for detecting these munitions.

Several organizations will participate in this military R&D team effort. WES is responsible for writing specifications for the tunnels, monitoring the construction phase, evaluating reflectance and emission properties of the areas in which the tunnels are being constructed, and collecting meteorological data.

The Mobility Equipment Research and Development Center, Fort Belvoir, Va., is the program coordinator for the development of new sensor systems. The U.S. Army Electronics Command, Fort Monmouth, N.J., will be responsible for running electromagnetic surveys.

The Army Terrestrial Science Center, Hanover, N.H., will be involved with trace gas experiments, geochemical analysis, and airborne remote sensing studies.

The mines and booby traps will be constructed and installed by Frankford (Philadelphia, Pa.) and Picatinny (Dover, N.J.) Arsenals.

The U.S. Army Materiel Command is sponsoring the studies.

WECOM Selects Lorenzen As R&D Man-of-the-Month

Research and Development Man-of-the-Month for May in the U.S. Army Weapons Command, Rock Island, Ill., is Ted G. Lorenzen Jr., a veteran of 20 years U.S. Government service.

Col L. M. Orman, WECOM Research and Engineering director, announced that Lorenzen had been selected for his contributions and untiring efforts in development of small arms. He has been a group leader for such key programs as caseless ammunition weapon systems, 40mm automatic grenade launcher, and a variety of other special purpose weapons.

Lorenzen is a graduate from Bradley University, Peoria, Ill., with a BS degree in mechanical engineering.

TUNNEL COMPLEX to be built in Puerto Rico will duplicate those of the Viet Cong, including storage rooms such as this one discovered by U.S. troops.

APG Schedules Tests for XM167 Vulcan

Combined engineering and initial production testing of the towed version of the Vulcan Air Defense System, the XM167, is scheduled to be completed in August at Aberdeen (Md.) Proving Ground.

Col Paul A. Troup Jr., director of the APG Materiel Test Directorate (MTD), said the 6-barrelled 20mm cannon, based on the Gatling Gun principle, is being evaluated for durability, reliability and accuracy as part of the Army Test and Evaluation Command's test program.

Ronald L. Henry, a test director for the Small Arms and Aircraft Weapons Branch, explained that the integrated tests are designed to evaluate the weapon under such conditions as high and low temperature, rain, sand, dust and humidity, radio interference and automotive and amphibious characteristics.

Developed as the primary armament of the Army's newest unit, the Chaparral/Vulcan battalion, the XM-167 is the first shell-firing anti-aircraft weapon to be adopted as standard since the World War II era. It spews out projectiles at rates of either 1,000 or 3,000 rounds per minute.

To bring its firepower to bear on target, the gunner uses a fire-control system incorporating the advantages of radar, computers and optical sighting. The gunner tracks the target through an updated, sophisticated version of a previously developed gyroscopic lead-computing optical sight.

When the target is acquired and is within the effective range, a green ready-to-fire light flashes. This alerts the gunner to fire a preselected burst of 10, 30, 60 or 100 rounds.

The VAD system was developed to low-flying aircraft, subsonic missiles, defend troops against helicopters, or low-flying drone aircraft. It fills the gap in air defense left by ground-to-air missiles designed for mid-altitude and high-altitude use. In Southeast Asia it has been employed against ground targets such as troops, trucks, boats and lightly armored vehicles.

The towed version uses the same turret, gun and firing control combination as its "big brother," the self-propelled XM163. Mounted on a lightweight trailer, the XM167 weighs only 3,000 pounds, which permits it to be airlifted beneath a helicopter.

DoD Announces Appointment of Doolin as Deputy ASD(ISA)

Appointment of a new Deputy Assistant Secretary of Defense (International Security Affairs) for East Asia and Pacific Affairs was announced recently by the Department of Defense.

Dr. Dennis James Doolin succeeded Richard A. Steadman in this position when the latter resigned to enter the private investment field. Until he accepted the DoD appointment, Dr. Doolin was a senior analysist in Chinese Communist and Asian Affairs, Central Intelligence Agency.

Since 1967 he has been on leave from Stanford University, where he formerly was research curator, East Asian Collections, Hoover Institution.

Born Oct. 28, 1933, in Omaha, Nebr., he graduated from the University of San Francisco (BS degree, summa cum laude, 1958) and earned MA and PhD degrees in Chinese studies at Stanford.

From 1951 to 1954 he served in the United States Navy.

Watervliet Metal-Forming Process Publicized

Watervliet (N.Y.) Arsenal's contributions to development of hydrostatic fluid extrusion, a process which forms metals that cannot be shaped by conventional methods, is described in a recent issue of "Steel," national weekly.

"Hydrostatic Extrusion: Can You Afford to Wait?" discusses the arsenal's use of the method to shape maraging steels, high-strength alloys and other "hard-to-form" metals. The process is completed in one pass at room temperature, thus eliminating the need for tedious multiple passes and heating equipment in such conventional techniques as forging, rolling and hot extrusion.

Watervliet metallurgist Charles Nolan is quoted as saying that the forming ability of hydrostatic fluid extrusion offers substantial encouragement to researchers experimenting with new materials—"It is not unreasonable to assume that the process will bring whole new families of allows to fruition."

A paper on the arsenal's work with the process was presented at the 1969 International Engineering Conference of the American Society of Tool and Manufacturing Engineers at Chicago on May 6. The paper, "The Cold Reduction of High Strength Materials by Hydrostatic Fluid Extrusion," was prepared by Dr. Thomas E. Davidson, chief of the arsenal's Physical and Mechanical Metallurgy Laboratory, Dr. J. J. Pepe, and Nolan.

Documentation Suggestion Saves MICOM $130,000

Savings of nearly $130,000 are credited to two Army Missile Command technical writers due to a search of engineering documentation.

Luke D. Williams and Robert J. Ruyle of the Supply and Maintenance Directorate were assigned the task of providing guidance to depot maintenance personnel in calibrating test equipment used in the overhaul of Pershing missile components.

Technical manuals normally would be used for this purpose, but a contractor estimate of the cost of preparing two manuals was $73,981 and cost of maintaining the manuals over a 2-year period was estimated at $55,443.

Williams and Ruyle believed this money could be saved by using existing engineering documentation. This documentation, however, was more detailed than ordinarily required since it had been used to support engineering, manufacturing and quality assurance of complex missile test equipment.

Convinced after a thorough search of the files that the documentation could also support the operation, maintenance and calibration of the test equipment, they arranged their findings into a logical package provided to technicians at Pueblo Army Depot.

The Depot's employes successfully operated, calibrated and maintained all test equipment, using only the engineering documentation. The requirement for the two technical manuals was cancelled, and a net savings of $129,424 was chalked up by the Army Missile Command.

Williams, a native of Centreville, Ala., has worked at MICOM since 1962. A native of Shawnee, Okla., Ruyle joined MICOM in 1964. He retired from the U.S. Navy as a senior aviation ordnance chief after 23 years service.

MICOM MONEY SAVERS Luke D. Wiliams (right) and Robert J. Ruyle.

Advanced Power Sources Groups to Meet May 20-22

Department of Defense, industrial and academic invited representatives will participate in the 23d Annual Power Sources Conference, the largest of its kind in the world, May 20-22 at Atlantic City, N.J.

Presentations of technical papers and discussions of progress on research and development of advanced power sources are expected to attract more than 800 U.S. leaders.

The U.S. Army Electronics Command (ECOM), Fort Monmouth, N.J., is sponsoring the conference in cooperation with the U.S. Army Materiel Command, U.S. Army Mobility Equipment R&D Center, Harry Diamond Laboratories, and Interagency Advanced Power Group.

Seven sessions are scheduled to consider fuel cells, power processing, primary batteries, zinc-air batteries, secondary batteries, fuze power sources, and thermal energy conversion. Galen R. Frysinger, chief of the Power Sources Division, Electronic Components Laboratory, ECOM, is conference chairman.

ECOM speakers include Leonard J. Rogers, John Perry, Stephen J. Bartosh, Frank J. Wrublewski, Francis P. Malaspina, Frysinger, Arthur M. Anton, Alfred J. Legath, Howard R. Knapp, Joseph E. Ellison, David M. Sague, Nicholas T. Wilburn, Martin J. Sulkes, Erminio J. Settembre, Silvia A. Duze, Otto C. Wagner, Joseph P. Angello.

MERDC speakers are Walter G. Taschek, Edward A. Gillis, Edward J. Dowgiallo, Robert M. McKechnie III, Richard N. Belt, and Glynn E. Burchette. HDL speakers include Morton A. Barron, Raymond M. Comyn, and Asaf A. Benderly. Dr. Francis C. Schwarz will represent NASA, and Lt R. P. Bonner is scheduled to speak for the U.S. Marine Corps.

Other speakers will represent Union Carbide Corp., Pratt and Whitney Aircraft, Tyco Laboratories, TRW Systems Group, Transitron Electronic Corp., Sprague Electric Co., Arnold Engineering Co., Bell Telephone Laboratories, Bose Corp., Westinghouse Electric Corp., and

Gulton Industries, Inc., Electrochemica Corp., Whittaker Corp., Yardney Electric Corp., Eagle-Picher Co., American Cyanamid, General Electric Co., Texas Instruments, Battelle Memorial Institute, Wurlizer Co., Eureka-Williams Co., Catalyst Research Corp., and

Penn State University, Thermo Electron, Inc., Fairchild Hiller, and North American Rockwell.

MICOM McMorrow Labs Set Completion For Early 1971

A large addition to the Army Missile Command's Francis J. McMorrow Laboratories, a complex housing most of the Research and Engineering Directorate, is to be completed by early 1971.

Bids for construction will be considered May 22 at the U.S. Army Corps of Engineers district office in Mobile, Ala. The addition will serve as an advanced concepts development facility. Entire missile systems will be proven out through the use of mathematical models and hybrid computers without the necessity of building prototypes.

The 3-story addition, with more than 75,000 square feet of floor space, will be a concrete, steel and masonry structure with masonry and protected steel siding.

Picatinny Team Develops Computer Analysis Technique

In reducing flight data from missile warhead sections, Picatinny Arsenal, Dover, N.J., has acquired a new capability for sophisticated analysis of nuclear hardware, using a hybrid analog-digital computer installed recently in Feltman Research Laboratories.

In a joint year-long project involving the Pershing missile, a team of Nuclear Engineering Directorate (NED) and Feltman Resarch Laboratories (FRL) engineers developed the advanced computer analysis technique, which they believe will be equally effective for reducing data from other missile systems.

George Batchis, Ralph Yearwood and Don Proefrock of the NED, and A. G. Edwards, Ingrid Engle and Jonathan Lutz of FRL formed the team.

Until the new computer was purchased, data collected from test flights went to a private contractor for reduction and analysis. Now the team-developed computer technique in routine fashion examines the data and stores important pieces in a specific location. At the same time it discards any erroneous data.

In the second step, the computer takes programed data for the flight and calculates a distance along the trajectory the missile travels from a predetermined reference point on the flight path. It determines times, heights, etc., at which functions occur within the missile warhead.

As a final step, the team compares summaries with the correct preflight test theory, and thus is able to determine the errors in the system. The automated techniques made possible by the new computer eliminate most tedious hand reduction needed earlier.

In the recent Pershing test, using data sent on from White Sands, the computer reduced it in a detailed pattern. This gave Picatinny engineers control of the adaption kit performance. They processed the whole package at Picatinny instead of dealing with a contractor, and saved money and time.

The adaption kit is perhaps the missile warhead's most important part. This incredibly complex mechanism, containing thousands of parts, includes a fuzing system which performs safing and arming functions.

For one thing, it is a computer. This computer has the new analog-digital computer at Picatinny as a monitor or overseer, so that each step of the test flights receives the closest kind of scrutiny.

In its safing and arming function, the computer in the adaption kit must sense the forces at play on the missile warhead section—distance along the trajectory, speed, drag, etc. It must know instantly if—and when—any changes in these forces take place.

Based on these computations, the fuze "tells" the missile when it is at proper altitude above the target for detonation of the warhead and effective target destruction.

Using the new capability, engineers at Picatinny Arsenal can now follow each step of reducing flight data. They will know the task is done the same way each time and will be able to arrange for an individual assigned to a job to stay with it until the work is finished.

ENGINEERS Ralph Yearwood and George Batchis, members of a 6-man team that developed a capability for reducing flight data from missile warhead sections, examine final results of data reduction at Picatinny Arsenal.

Deputy Chief of Staff Personnel Take Pace Awards

Presentation of two annual Pace Awards in the office of Secretary of the Army Stanley R. Resor May 2 was one of the highlights of the Seventh Annual Army Secretariat Alumni Conference in the Pentagon, Washington, D.C., with numerous former high-ranking Army officials in attendance.

Former Secretary of the Army Frank Pace Jr. (1950-53) presented the awards named in his honor to Kyle F. Davis, Office of the Deputy Chief of Staff for Logistics, HQ DA, and Lt Col George Edward Marine, assigned to the Office of the Deputy Chief of Staff, Military Operations.

The Pace Awards give special recognition to a civilian employe (GS–14 or below) and a military officer at HQ DA for a "contribution of outstanding significance" during the previous calendar year. Individual rather than head-of-a-team work is required.

Backed by 26 years of Federal Civil Service employment, Davis is a GS–13 supply management representative-program analyst. His Pace Award achievement was "developing, supervising and insuring implementation of the Army Foreign Military Sales Management Review System."

When he was assigned to this project in 1968, the award justification states, "there was in existence no management tool reflecting both supply and fiscal performance or the status of over-all programs for foreign military sales participating countries."

The complexity of his task is reflected by the vastness of the program to which he was assigned. Involved at that time were 64 countries and six international organizations, with some 5,000 individual contracts linked to several million individual requisition lines for sales valued at about $2.9 billion annually.

In one case involving a representative FMS order, Davis was credited with developing a system for joint conciliation that resulted in savings to the U.S. "in excess of $400,000."

Importance of Davis' achievement is attested in the award justification by the statement that he "assumed complete leadership and his original ideas were accepted into the procedures required to create this system.

"The success of his effort is indicated by the fact that the format and procedures have been accepted by the Assistant Secretary of Defense (ISA/ILN) and may become the standard pattern for all military departments in performing effective country program reconciliations."

LT COL MARINE was selected for the Pace Award on the basis of outstanding service as chief, Strategic Mobility Branch, Strategic Studies and Mobility Division, Plans Directorate, Office of the Deputy Chief of Staff for Military Operations.

The justification for his selection states that he "served as the Army point of contact for the Special Assistant for Strategic Mobility, Office of the Joint Chiefs of Staff . . . provided input for joint documents concerning airlift and sealift forces and the level and type of prepositioned Army equipment . . . reviewed joint and other service documents containing matters of strategic mobility interest to determine impact on the Army."

The tribute to his performance added that he "was primarily concerned with all phases of strategic mobility as it pertained to the Army and was the focal point for inquiries to the Army on all strategic mobility matters."

Army Equips Mine Detection Set With Remote Control

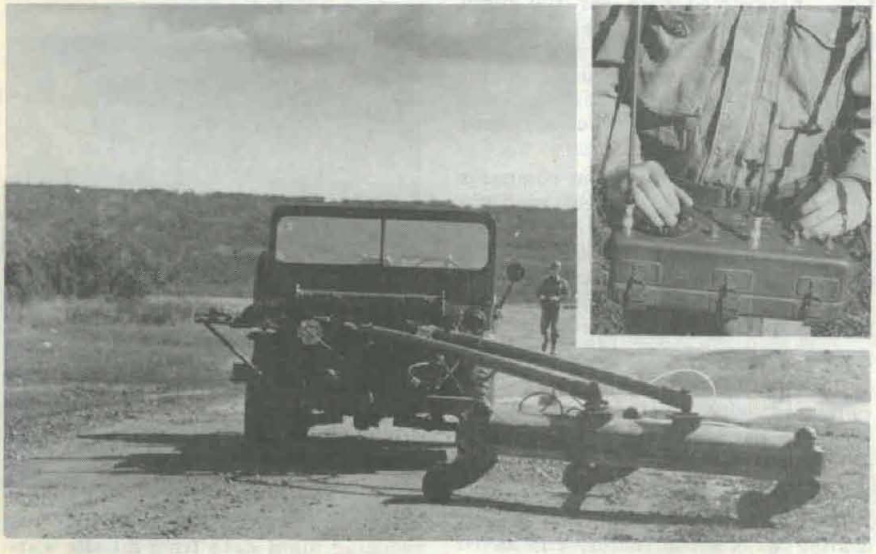
Remote control operation has been added to the truck-mounted mine detecting set developed by the U.S Army Mobility Equipment Research and Development Center (MERDC).

Designed to reduce detection hazards, the system enables the operator to start the vehicle, engage and disengage the clutch, shift forward and reverse, advance and retard the throttle; also, to steer, apply the brakes and perform all control functions of the basic detector, all at some distance from the vehicle.

The detector, developed about 12 years ago, automatically stops the truck when it locates a buried metallic-type mine in or along roads.

Developed by Ryan Aeronautical Co., under a contract with the center, the prototype has two independently powered units, consisting of radio transceivers, antennas and associated electronic equipment. One unit is a truck-mounted transceiver, the other a 12-pound control pack harnessed on the operator's chest.

Four standard Army truck-mounted mine detector sets have been equipped with remote control systems.



EQUIPPED WITH REMOTE CONTROL UNIT (inset), driver walks behind truck-mounted mine detector during field test of system developed by contract.

McCarron Commands Center At Army Missile Command

Command of the U.S. Army Missile Command's Metrology and Calibration Center was assumed early in May by Lt Col Dean J. McCarron, reassigned from HQ Army Combat Developments Command (CDC), Fort Belvoir, Va.

The center has worldwide responsibility for calibration support of the Army and other Armed Services wherever a need exists.

Lt Col McCarron is a 1949 graduate from the U.S. Military Academy with a master's degree in engineering from Purdue University. He has held a variety of increasingly responsible assignments in the United States, Europe and the Far East. He was awarded the Legion of Merit for achievements on CDC's general staff.

TATAWS Project Aiding Future Tank-Antitank Capability of Army

Sounds of battle are never heard although 120 times a day a U.S. Army tank battalion attacks, fights delaying action or defends terrain against a well-armed enemy—in a study project designated TATAWS.

The acronym stands for Tank, Antitank and Assault Weapons Requirements Study. All battles are simulated, without the clank of armor, the impact of antitank missiles and the blast of artillery.

The Armor Agency, Fort Knox, Ky., an Army Combat Developments Command element, lets computers do the fighting, for evaluation purposes.

Results of the long-range TATAWS experiments are expected to provide insights into effectiveness of simulated combat operations, including costs for new tank, antitank and assault weapons as envisioned for the Army of the future. Various alternatives are developed and studied as a basis for decision.

Responsible for formulating the best combination of weapons in tank and mechanized infantry battalions, the Armor Agency has a secondary aim of determining weapons for airmobile, airborne and cavalry units.

Equipment considered in the computer battles includes new and developmental tanks, infantry carriers, scout vehicles and antitank weapons, as well as current versions of these weapons and vehicles.

To establish meaningful missions for units equipped with the various weapons systems, future war situations are forecast, using nationally approved intelligence for employment of the enemy force and area of operations. Analysis of the various situations provides a total of 121 battle actions involving battalion-size forces.

These battle actions are used to structure the computer-simulated combat arena and alternatives for the combat situations to be faced by the U.S. battalion, consisting of an attack and defense at both long and short opening ranges.

This "combat set" of four battles require three weeks to program on the computer; actual computer running time is about nine hours.

After the objectives were specified, the weapons had to be incorporated into tank and mechanized infantry battalions and then cross attached to form task forces as normally organized for combat.

Forming these task forces enabled the study group to identify each separate alternative and was one of the more challenging aspects of the TATAWS study. Since new employment doctrine as well as organizational changes were to be explored, it was not feasible to substitute the new weapons into current organizations.

The highest tactical headquarters controlling and supporting these weapons systems in their nonattached role is the battalion. Accordingly, the study group began at this level and structured battalions organized with a wide spectrum of weapons quantities. Included were the traditional amounts and also some rather radical excursions from the obvious.

Under this study concept, each tank battalion was given from 36 to 91 tanks. Differing the types of tanks and several feasible mixes of two types resulted in 57 different tank battalion alternatives. In a similar fashion, the mechanized infantry battalion excursions yielded 50 battalion options.

Task forces resulting from cross attachment of the 57 tank and 50 mechanized infantry battalions produced an awesome figure of some 3,420 possible alternatives for the study group to consider.

The study plan used to evaluate this multitude of alternatives provided for the use of two performance models and two cost models. The plan also had to be flexible enough to permit the late introduction of new alternatives derived from examination of initial concepts.

The preliminary examination was conducted using output from the first of the two performance models, the Filter combat simulation. Analysis of the data output of the Filter and its associated cost model resulted in some 64 alternatives being carried forward to the next performance model, the Individual Unit Action (IUA) model jointly developed by the Armor Agency and Lockheed Missiles and Space Co.

In the IUA Simulation, weapons systems can have widely varying mobility, vulnerability and firepower characteristics to achieve a highly realistic and flexible simulation of battalion-size battles. A wide range of tactical play is staged over varied terrain, with alternative routines for supporting elements such as artillery, tactical aircraft, helicopter gunships, minefields and other associated battlefield equipment.

The performance of the 64 alternatives tested in the IUA simulation was analyzed by using cost and combat effectiveness procedures. This required considerable investigation of the data by military analysts in the study group.

Data output from the IUA cost models and effectiveness data from the IUA performance models were jointly considered in determining the best alternatives for each type of tank.

These final alternatives were further subjected to a battery of tests to evaluate performance under conditions such as night combat, delay operations, and variations in threat quality. Finally, the study group converts the best battalion-size task forces back to pure organizations. The Army Materiel Command and Continental Army Command then can complete their portion of the TATAWS project.

A companion war game conducted by the Combat Operations Research Group, using simulation data furnished by the TATAWS Study Group, is designed to employ, in a division size area of operations, the best tank battalion, its alternative, and the best mechanized battalion emerging from the study. Knowledge gained provides some insights for optimizing the number of tank battalions and mechanized infantry battalions within a division.

TATAWS thus yields tomorrow's tank and antitank capability of the U.S. Army by simulated testing.

SCIENTIFIC CALENDAR

Iron Metabolism and Anemia Conference, sponsored by OTSG and Pan American Health Organization, Washington, D.C., June 9.

Symposium on Pattern Recognition Studies, sponsored by AMC and Society of Photo-Optical Instrumentation Engineers, N.Y.C., June 9–10.

International Communications Conference, sponsored by IEEE, Boulder, Colo., June 9–11.

15th Conference of Army Mathematicians, sponsored by ARO–D and Army Mathematics Steering Committee, St. Louis, Mo., June 11–12.

Cell and Cell System Ecology Conference, sponsored by OCRD, European Atomic Energy Community and National Institute of Health and Medical Research of France, Paris, France, June 13–15.

1969 International Data Processing Conference, sponsored by DPMA, Montreal, Quebec, Canada, June 16–19.

Computer Conference, sponsored by IEEE, Minneapolis, Minn., June 17–19.

Electromagnetic Compatibility Symposium, sponsored by IEEE, Asbury Park, N.J., June 17–19.

Joint National Meeting on Planning Challenges of the 70s in Space and the Public Domain, sponsored by American Astronautic Society and Operations Research Society of America, Denver, Colo., June 17–20.

Aerodynamic Problems Associated with Helicopters and V/STOL Aircraft, sponsored by AMC and Cornell Aeronautical Lab., Inc., Buffalo, N.Y., June 18–20.

72d Annual Meeting of ASTM, Atlantic City, N.J., June 22–27.

Summer Power Meeting, sponsored by IEEE, Dallas, Tex., June 22–27.

2d International Conference of the Center for High Energy Forming, sponsored by AMC, Estes Park, Colo., June 23–27.

Conference on Application of Continuous Simulation Languages, sponsored by ACM, IEEE, SHARE and SCI, San Francisco, Calif., June 30–July 1.

Townsley to Direct CERL Upon Completion of NWC

Pace Award winner (1966) Lt Col Edwin S. Townsley has been selected as the second director of the Construction Engineering Research Laboratory, an Army Corps of Engineers facility at Urbana-Champaign, Ill., when he graduates from the National War College.

Like his predecessor, Lt Col Rodney E. Cox, Col Townsley takes into his new assignment a PhD degree and numerous other impressive credentials. His selection for the Pace Award, named in honor of the former Secretary of the Army, was based on a wide range of achievements in 1964-65 as a staff officer, Combat Materiel Division, Office of the Chief of Research and Development.

Particularly notable among new items of military materiel on which he worked was the development and procurement of image intensifier equipment to improve night-time operational capabilities of the U.S. Army in the Southeast Asia conflict.

Col Townsley was graduated from the U.S. Military Academy in 1949 with a BS degree in military engineering. He received a master of public administration degree from Harvard University, earned an MS degree in structural dynamics in 1957, and in 1959 obtained a doctoral degree in civil engineering. The latter degrees were awarded by the University of Illinois.

Included among his military assignments after returning from the Korean War was duty as military assistant to the director, U.S. Army Waterways Experiment Station, Vicksburg, Miss., and assistant plans officer, Engineer Section, Seventh U.S. Army from 1961 to 1963.

Dr. L. R. Schaffer, professor of civil engineering at the University of Illinois and the assistant director of the Construction Engineering Research Laboratory (CERL), is acting as director until Col Townsley graduates from the War College in June. Dr. Schaffer is also chief of CERL Engineering Development.

Since 1961 Dr. Schaffer has been in charge of the academic program for construction engineering and management in the university's Department of Civil Engineering. He is acclaimed as one of the nation's leading experts in this field.

"We feel particularly fortunate," a Corps of Engineers official stated, "to have a man of Dr. Schaffer's ability on the CERL staff."

Lt Col Edwin S. Townsley

Ex-Edgewood CO Gets Position Of Maness, Assigned to Korea

Assignment of Brig Gen Lewis E. Maness to the Eighth U.S. Army in Korea was followed by appointment of Col Richard A. Hiscox to succeed him Apr. 28 as Assistant Director of the Budget (Operations), HQ Department of the Army, Washington, D.C.

Lt Gen Frank J. Sackton, Comptroller of the Army, announced that Col Hiscox had been moved up to the key position after serving in his office as executive officer. Edgewood (Md.) Arsenal personnel remember Col Hiscox as commanding officer of the arsenal when it was a part of the U.S. Army Chemical Center, phased out in the 1962 Army reorganization.

After serving as director of manufacturing at Edgewood Arsenal in 1963, Col Hiscox moved to the Pentagon for a series of increasingly important budgeting and fiscal management jobs.

Graduated from Michigan State University in 1949 with a BS degree in chemical engineering, he obtained an MS degree in industrial management from Purdue University in 1961. He is a graduate of the Chemical Corps Advanced Officers Course, Army Command and General Staff College, and Army War College.

WES Designates Brown as Technical Director

Selection as technical director, U.S. Army Waterways Experiment Station, Vicksburg, Miss., recognized Frederick R. Brown early in April for 35 years of distinguished service with WES. He has served as assistant technical director since 1963.

Honored by the Junior Chamber of Commerce as "Vicksburg's Man of the Year in 1968," Brown succeeded J. B. Tiffany, who became special assistant to WES Director Col Levi A. Brown after serving since 1940 as technical director. WES is a U.S. Army Corps of Engineers element.

Frederick Brown's new duties make him responsible for technical guidance of nearly 200 studies and research and development activities. Included are scientific investigations of hydraulics, characteristics of soils, mobility factors, reinforced concrete, environmental conditions, and nuclear weapons effects.

Since 1963 he has held a dual position as assistant technical director and chief of the Office of Technical Programs and Plans, which was established that year. He is a registered professional engineer in Mississippi, is listed in *Who's Who in Engineering* and *American Men of Science*, and has a BS degree from the University of Illinois.

Representing the Corps of Engineers, Brown presented technical papers to the International Association for Hydraulic Research in The Netherlands in 1955 and in Yugoslavia in 1961. By request of the U.S. State Department, he was a consultant to the governments of Columbia, South America and Egypt, providing technical assistance in hydraulic laboratory operation.

As chief of the WES Hydrodynamics Branch, Hydraulics Division in the early 1950s, Brown organized a group of specialists to conduct nuclear weapons effects research. The work formed the nucleus for a major expansion, and Brown became the first chief of the Nuclear Weapons Effects Division.

During World War II, he led hydraulic studies "of inestimable value to major military objectives," and was awarded the War Department's Meritorious Civilian Service Award. He received the same award for service as assistant technical director at WES.

Brown was chairman, Executive Committee, Hydraulics Division, American Society of Civil Engineers (1967-68). He is an active member of the National Society of Professional Engineers, International Association for Hydraulic Research, Permanent International Association of Navigation Congresses, and Society of American Military Engineers.

Frederick R. Brown

Army RDT&E, Procurement Contracts Total $278.9 Million

Army contracts exceeding $1 million each for research, development, test, evaluation and procurement from Mar. 9 through Apr. 8 totaled $278,981,968.

Kaiser Jeep Corp. is receiving $29,746,076 as the first increment to a multiyear contract for XM809 5-ton trucks. Remington Arms Co., Inc., gained $27,968,533 in three contracts for 7.62mm and 5.56mm cartridges and for loading, assembling and packing small-caliber ammunition.

Olin Mathieson Chemical Corp. was awarded $24,606,088 in contracts for cartridges, fuel assembly blocks for smoke pots, propellants, and for loading, assembling and packing M84A1 fuzes for 81mm projectiles.

Sperry Rand Corp. will be paid $20,079,830 to load, assemble and pack ammunition, and for support services. Two contracts totaling $11,300,000 went to Texas Instruments, Inc., for AN/AA5–24 infrared detecting sets and other electronic equipment.

Harnischfeger Corp., Milwaukee, Wis., will get $10,863,398 for truck-mounted cranes. Grumman Aircraft Engineering Corp. is receiving $10,268,556 for OV–1D Mohawk aircraft related test data and reports.

Contracts under $10 million. Hesse-Eastern Division of Norris Industries, Inc., Brockton, Mass., $9,263,666 for 66mm rocket launchers; Raytheon Co., $8,688,150 for engineering services for the improved Hawk missile system and value engineering program requirements; and

General Motors Corp. $8,227,885 (four contracts) for generator sets, spare parts for the M551 tank, 155mm self-propelled howitzers, and for storage batteries for general vehicle application; and

Continental Motors Corp. $7,722,474 (three contracts) for spare diesel engines for M60 and M48 tanks, for remanufacture of multifuel engine assemblies used on 5-ton trucks, and for overhaul of multifuel engines for 2½-ton trucks; and

Silas Mason Co., Inc., $6,494,132 to load, assemble and pack ammunition; Honeywell, Inc., $6,047,900 for grenade fuzes; Litton Systems, Inc., $5,891,000 for navigational systems for OV–1D aircraft; Chamberlain Manufacturing Corp., $5,840,182 for parts for 81mm projectiles, and for repairs and facilities in support of parts production of 8-inch and 175mm projectiles; and

General Electric Co., $5,519,262 for AN/MPQ–4A radar sets; Federal Cartridge Corp., $5,274,260 to load, assemble and pack tracer ammunition; Union Carbide Corp, $5,049,270 for batteries and high temperature testing; Bulova Watch Co., $4,941,398 for fuze parts; Hughes Aircraft Co., $3,880,941 for forward-looking infrared systems for aircraft; Magnavox Co., $3,803,614 for AN/ARC–131, VHF–FM radio sets; Whittaker Corp., $3,473,580 for fuze parts; and

P.R.D. Electronics, Inc., $3,133,157 for AN/USM–234 microwave sets; Airport Machining Corp., Martin, Tenn., $3,093,750 for parts for 2.75-inch rocket warheads; Mine Safety Appliances, Pittsburgh, Pa., $2,829,480 for riot control agent masks; Varo, Inc., $2,477,402 for 40mm grenade launchers and for AN/PVS–2 starlight scopes; Uniroyal, Inc., $2,450,386 for pneumatic tires; and

Stromberg-Carlson Corp, $2,384,000 for integration/maintenance management and technical operation services for the automatic telephone system in Southeast Asia; Hughes Tool Co, $2,357,334 for rotor blades for OH–6A helicopters; and

National Gypsum Co., $2,351,885 to load, assemble and pack ammunition; Northrop Corp., $2,292,916 for fabrication and assembling 152mm canisters; Colt's, Inc., $2,205,000 for 20-round magazine assemblies for M16 weapons; Gould National Battery, Inc., $2,178,460 for dry batteries and high temperature testing.

Contracts under $2 million. Bell Helicopter Co., $1,928,941 for rescue hoists for UH–1 helicopters; Motorola, Inc., $1,912,136 for pilot line facilities for XM596 fuzes used on 40mm grenade launchers; Collins Radio Co., $1,909,812 for AN/TRC–132A radio terminal sets; and

Whirlpool Corp., $1,890,434 for fabricating and assembling 152mm canisters; Thiokol Chemical Corp., $1,757,538 for CS2-filled munitions; Western Electric Co., Inc., $1,656,900 for improved Nike Hercules kits; and

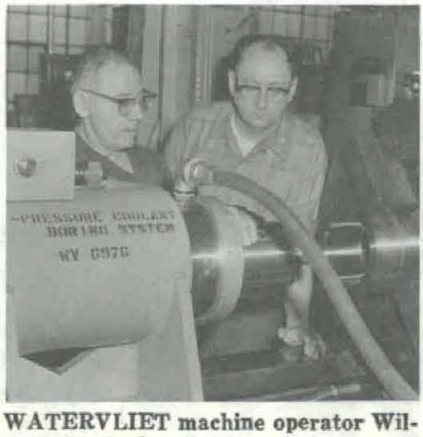
Pace Corp., $1,593,141 for M127A1 illuminating signals; FMC Corp., $1,500,000 for cargo carriers with material handling kits and personnel heaters; Wilkinson Manufacturing Co., Fort Calhoun, Neb., $1,315,957 for metal parts for fuzes; Smith and Wesson Division of BangoPunta Co., $1,300,255 for revolvers; and

R.E.D.M. Corp., Wayne, N.J., $1,287,000 for fuze parts; John R. Hollingsworth Co., Phoenixville, Pa., $1,268,594 for 3 kw., 28-volt generator sets; Ametek, Inc., Sheboygan, Wis., $1,226,172 for support assemblies for ammunition containers; and

Bell Aerospace Corp., $1,193,753 for UH–1 helicopter spur gears; Xerox Corp., $1,184,050 for AN/TVS–2 night vision sights; Hercules, Inc., $1,167,077 for propellants; Hayes International Corp., $1,155,056 for parts for 2.75-inch rockets; and I. D. Precision Components Corp., Jamaica, N.Y., $1,099,132 for fuze parts.

Watervliet Arsenal Develops HP Coolant Boring System

Boring of the 105mm howitzer gun tube by a new process known as the "High Pressure Coolant Boring System" has reduced the time required by 70 percent, and the technique promises to yield other dramatic results.



WATERVLIET machine operator William Meslanka (left) and George A. Hutson insert cutting head of new tube boring system into 155mm tube.

Watervliet (N.Y.) Arsenal, a U.S. Army Weapons Command installation, credits the method to one of its engineering technicians, George A. Hutson. Boring penetration has been increased from two inches per minute by the conventional method to 10½ inches by the new technique.

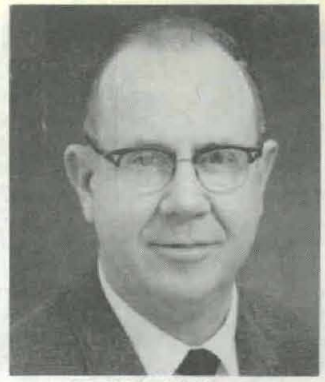
Moreover, tool maintenance time has been reduced correspondingly. Using the new system, tool servicing is necessary only after 15 to 20 applications, as compared to reconditioning after each operation with the conventional wood pack reamer.

Watervliet Arsenal engineers say the existing boring lathes can be converted to the coolant system "at comparatively modest cost." Within five years, they predict, all medium cannon at Watervliet Arsenal will be bored with the new method.

Savings in cost by use of the technique on the volume of guns produced at Watervliet have not been computed, but with a 70 percent cut in time required, plus reduced tool maintenance, over-all economies are expected to be substantial.

Director
Col Levi A. Brown

Deputy Director
Lt Col F. M. Anklam



Technical Director
F. R. Brown

Special Assistant
J. B. Tiffany

WES to Celebrate 40th Anniversary June 18

Achievements that have made the Waterways Experiment Station (WES), a U.S. Army Corps of Engineers activity at Vicksburg, Miss., an institution recognized worldwide for unique capabilities, will be celebrated June 18, its 40th anniversary. Ceremonies open to the public are expected to attract numerous dignitaries.

WES is unique among Army in-house laboratories in that it is virtually self-sustaining. Practically all its funds for operation are provided by sponsors of the special work it performs, involving about $20 million for the current fiscal year.

"Customers" of WES include essentially all other Department of the Army agencies as well as the Navy, Marine Corps, Air Force, Defense Atomic Support Agency, Defense Communications Agency, Atomic Energy Commission, U.S. Office of Civil Defense, and Department of the Interior.

Under unusual conditions, on a carefully selective basis, work may be performed for foreign, state and local governments and U.S. industry.

Staffed with some 1,250 Federal Civil Service employes and about 40 military personnel (some 30 of them enlisted men), WES has published several thousand technical reports that have been distributed worldwide. More than half the staff are professional scientists and engineers, many of whom have advanced degrees.

WES researchers perform investigations in diverse engineering fields such as hydraulics, soils and foundations, concrete formulated for many special requirements, flexible pavements, nuclear weapons effects, mobility, environmental effects, geology, terrain analysis, expedient surfacing, soil dynamics, rock mechanics, flood control, rivers and harbors construction, and numerous others.

Organizationally, WES consists basically of an executive office, an advisory and administrative staff, a technical staff composed of five divisions (Hydraulics, Soils, Concrete, Nuclear Weapons Effects, and Mobility and Environmental), and two support divisions (Technical Services, and Construction Services).

Lt Gen Edgar Jadwin, then Army Chief of Engineers, directed on June 18, 1929, that the president of the Mississippi River Commission, Brig Gen Thomas H. Jackson, establish a hydraulic laboratory in the alluvial valley of the Mississippi River. Planned originally "at or near Memphis, Tenn.," WES was located at Vicksburg to be near the commission staff.

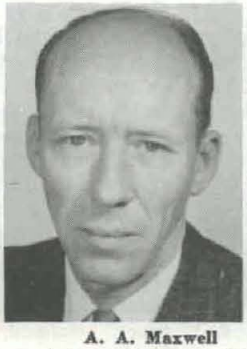
From that small beginning, programed for $50,000 the first year, WES has progressed to the largest and most diversified laboratory of the Corps of Engineers. Current director is Col Levi A. Brown, a veteran Corps of Engineers career officer who has served in Japan, Germany, Vietnam and in various important assignments in the United States.

Col Brown is a 1946 graduate of the U.S. Military Academy with a master's degree in civil engineering from California Institute of Technology, a degree from Columbia University, and is a graduate of the Army Command and General Staff College, and U.S. Army War College.

Deputy director of WES is Lt Col Frederick M. Anklam, a former commander of the U.S. Army's experimental "Camp Century" on the Greenland Icecap and a 1954 U.S. Military Academy graduate. He has an MS degree in civil engineering from the University of Illinois and has done additional graduate work in operations research and industrial engineering at New York University.

WES Technical Director Frederick R. Brown is backed by 35 years experience with WES and is a 1934

E. P. Fortson Jr.
Chief, Hydraulics Div.



A. A. Maxwell
Acting Chief, Soils Div.

Bryant Mather
Chief, Concrete Div.

G. L. Arbuthnot Jr.
Chief, Nuclear Weapons Effects Div.

W. G. Shockley
Chief, Mobility & Environmental Div.

University of Illinois graduate with a BS degree in civil engineering. He has achieved international recognition through participation in conferences and as a consultant to foreign governments, and is a member of numerous national and international professional organizations.

Joseph B. Tiffany, special assistant to the WES director, has more than 40 years service with the Corps of Engineers—over 36 at WES, which well qualified him to publish, in June 1968, a "History of WES." Since 1940, though his titles have changed, his duties have remained relatively constant as the principal assistant to the director. He gave up the title of technical director in 1968 to take his present job.

Graduated from the University of Illinois in 1932 with a BS degree in civil engineering, he serves as chairman or member of several Corps of Engineers committees and boards. He is known for publication of numerous technical papers and reports, and has made many presentations before professional societies.

Task Group Completes Guide For Man-Materiel Integration

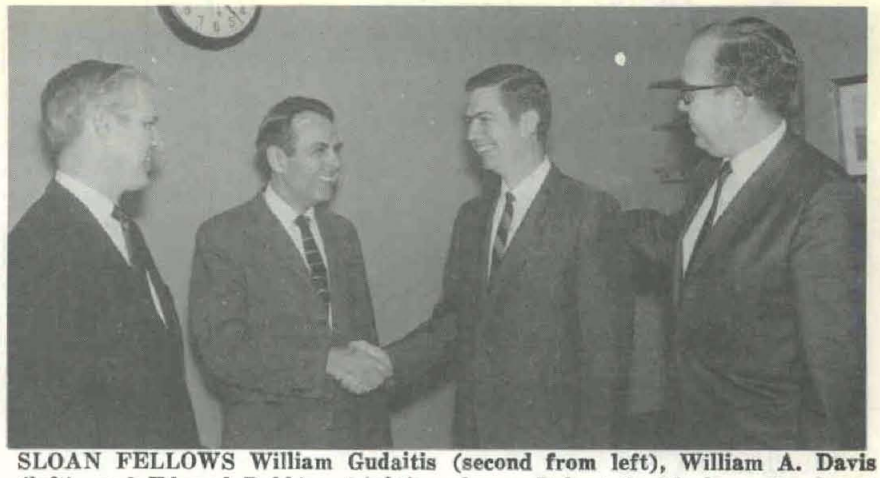
Completion of a guide that serves to integrate manpower characteristics into materiel systems under development was announced this month by the U.S. Army Human Engineering Laboratories, Army Materiel Command, Aberdeen (Md.) Proving Ground.

Working to meet a requirement assigned to the Army Materiel Command under AR 602–1, "Man-Materiel System, Human Factors Engineering Program," a task group completed the guide in six months intensive effort.

Director of Defense Research and Engineering Dr. John S. Foster Jr. emphasized this area in a special Department of Defense study often referred to as the Nucci Report, published in October 1967. The guide developed by HEL fulfills many of the manpower resources integration requirements specified in recommendations of this report.

The guide is being staffed and reviewed preliminary to publication as an Army Materiel Command document. It will detail procedures involving characteristics such as personnel skills, training, implications and human performance, anthropometric data and biomedical factors to be considered during the life cycle of Army materiel.

Implementation of many of the key features prescribed by the guide is expected to begin in the near future.



SLOAN FELLOWS William Gudaitis (second from left), William A. Davis (left), and Edward Dobbins (right) welcome Robert O. Black as the latest U.S. Army Missile Command employe to win an Alfred P. Sloan Fellowship for a year of graduate study at the Massachusetts Institute of Technology.

MICOM Employe Gains Alfred P. Sloan Fellowship

An Alfred P. Sloan Fellowship for a year of graduate study at the Massachusetts Institute of Technology has been won by an Army Missile Command (MICOM) employe for the fifth consecutive year.

Robert O. Black, chief, Systems Performance Analysis Division, Product Assurance and Test Management Office, is the only Department of the Army civilian selected for this year's class, starting in June.

In being selected by MIT for a Sloan Fellowship from a group of exceptionally able executives of government agencies and private industry in this country and several foreign nations, Black follows the lead set by William V. Gudaitis of MICOM in the 1965–66 class.

William A. Davis was a member of the next class and he was followed in successive years by Edward B. Dobbins and Hoyt Harris, who is completing his study this spring.

The Sloan Fellowship provides for a year's study at MIT, leading to an MS degree in management. The program consists of special courses with senior members of the MIT faculty, supplemented by a program of field visits and management seminars in which the Sloan Fellows have an opportunity to meet outstanding leaders in business and government, here and abroad.

A finalist in the 1968 balloting for the Arthur S. Fleming Award, for outstanding young men in the government service, Black has distinguished himself with the Missile Command over the past 14 years.

He was a distinguished military graduate of the University of Oklahoma in 1955 and was assigned to Redstone for two years soon after being commissioned. He returned to the arsenal as a civilian in May 1958.

Since that time he has been cited on numerous occasions for his contributions in system performance studies and for the development of a computer model that realistically simulates the impact of logistics support and the reliability of a deployed missile system.

In addition to being the first Missile Command nominee for the Fleming Award, Black was the recipient of the Meritorious Civilian Service Award and the Exceptional Civilian Service Award.

MERDC Employes Win Honors For Space Exploration Efforts

Harry L. Bibber and Kenneth L. Treiber, U.S. Army Mobility Equipment Research and Development Center, Fort Belvoir, Va., were cited recently for contributions to the early advancement of space exploration.

Each was presented a sterling silver medal, commemorating the 10th anniversary of Explorer I, and a letter from Lt Gen A. W. Betts, Army Chief of Research and Development, welcoming them as members of an organization known as Pioneers 58. The presentations were made by Col Edwin T. O'Donnell, MERDC commander.

Bibber contributed illustrations for a handbook on amateur rocketry and designed the medal first presented to a select group of space pioneers at a dinner in January 1968, marking the anniversary of this country's first successful space satellite. Treiber received the award for authoring a chapter on hydraulics and pump design for missiles.

MICOM Employes Learn Ancient Art

Silent Communication Aids Handicapped Girls

Communication between employes in one U.S. Army Missile Command office at Redstone (Ala.) Arsenal is accomplished without even a whisper, a written note or any of the other normal means—except that the method is international and ancient.

Sign language is used, because some employes are deaf or mute in the Consolidated Supply Division. They work as key punch operators. "They couldn't join us, so we joined them," is the way Mrs. Wister Woody, the supervisor, explained a room full of people talking with their hands.

Initially, there was some concern about how they would all talk together, the deaf and the hearing, but soon those who didn't know the sign language decided on their own to get cards describing it so they could learn. Against a background of the harsh clatter of key punch machines, all the talking goes on by hand signals and facial expressions.

The deaf girls are Linda Anderton of Clinton, Tenn., Zelma Grizzard of Huntsville and Betty Williams of Goodspring, Tenn. "They tell us a lot through the expressions on their faces, and their eyes are especially revealing," Mrs. Woody said.

Engaged in the same kind of work is Gloria Grant, Guntersville, Ala., another deaf girl who is employed in the Computation Center. Gloria can talk a little and read lips, and does not have coworkers who use sign language.

Silent talking in a room full of banging machines has more than one advantage. In an atmosphere where voices are difficult to hear and understand over the racket, talking with hands makes life easier. Then too, the noise that might jar the ears and nerves of others means nothing to Betty, Zelma, Gloria and Linda.

Zelma Grizzard and Betty Williams

One aspect might not be suspected about sign language. It comes in various accents, just as oral language does, probably due to the various schools the girls attended and individual ways of making signs.

Linda and Betty were educated at the Tennessee School for the Deaf in Knoxville, while Zelma's and Gloria's alma mater is the Alabama School for the Deaf in Talladega. All completed business college courses in key punch operation prior to Redstone duty.

Mrs. Woody said they have an almost uncanny ability about sensing when something is wrong with their key punch machines and correctly diagnosing the trouble. All are enthusiastic about key punch operation as a career for the deaf. Proof of their excellence was shown by a Zero Defects award for the Consolidated Supply Unit, which held a 99.8 record for work without error.

Brightness and a cheerful mien are characteristic of each girl. They seem to have an inner glow that fosters cooperation and rapport in an office. One senses, too, a sly sense of humor.

Betty's, Linda's and Gloria's husbands are deaf. Chester Williams and Wade Anderton are employed by local contractors, and Billy Grant is a printer for a Guntersville newspaper.

Gloria Grant

Zelma and Gloria have daughters. Carol Kay Grizzard is 12, and Connie Jan Grant is 9. Connie Jan has been known to accompany her mother on interviews and help with the talking —in essence she is an interpreter.

Assistance from others may be welcomed by the deaf girls, but they have independently made a place for themselves in their career field.

Dunn Takes Deputy Chief of Engineers Post Aug. 1

Maj Gen Carroll H. Dunn will become the Deputy Chief of Engineers, effective Aug. 1, when he succeeds Maj Gen Frederick J. Clarke, who will advance to Chief of Engineers chair upon retirement of Lt Gen William F. Cassidy.

General Dunn has served since 1967 as director of Military Construction, Office of the Chief of Engineers, Washington, D.C. In his new capacity he will double as chairman, Board of Engineers for Rivers and Harbors, and be the principal assistant and adviser to the Chief of Engineers for CE military and civil missions.

During a 30-year military career, General Dunn has held a variety of responsible positions, including director, U.S. Army Waterways Experiment Station, Vicksburg, Miss., and division engineer, 30th Infantry Division in Europe during World War II.

He was area engineer at Thule, Greenland, responsible for constructing facilities for the nation's first Ballistic Missile Early Warning System. Deputy commander of the newly organized CE Ballistic Missile Construction Office at Los Angeles, he also served as director, Titan II Missile System construction.

Following a tour of duty as Southwestern Division engineer at Dallas, Tex., he was assigned to Korea as deputy chief of staff, Eighth U.S. Army. From February 1966 to October 1967, he was director of construction for the Military Assistance Command in Vietnam (MACV). Later he became assistant chief of staff, Logistics, MACV.

General Dunn is a Fellow, American Society of Civil Engineers, and a member of the Society of American Military Engineers.

Maj Gen Carroll H. Dunn

Wyatt, Burchette, Clarke Win MERDC CO Awards

MERDC CO AWARD WINNERS and participating dignitaries at 12th Annual Awards Program are from left, bottom row, Glynn E. Burchette and Maj Gen William C. Gribble Jr.; William T. Wyatt Jr. and Dr. Marvin E. Lasser; William R. Clarke and Maj Gen Charles C. Case. Back row, from left, are Lt Col Jess E. Baldwin, acting CO of MERDC; Robert Beal, director of Engineering at the Center; William B. Taylor, technical director of the Center; and Lt Gen A. W. Betts, Chief of Research and Development.

Distinction eminently respected by U.S. Army Mobility Equipment R&D Center employes was conferred May 23 on William T. Wyatt Jr., Glynn E. Burchette and William R. Clarke as winners of the annual Commanding Officer's Scientific, Technological and Leadership Achievement Awards.

Department of the Army Chief of R&D Lt Gen Austin W. Betts was the guest speaker at outdoor ceremonies at Fort Belvoir, Va., attended by hundreds of coworkers of the winners and many visiting dignitaries.

Army Chief Scientist Dr. Marvin E. Lasser presented the Scientific Achievement Award to Wyatt, 26, a physicist. Maj Gen William C. Gribble Jr., CG of the Army Engineer Center, conferred the Technological Achievement Award on Burchette, 40, an engineer. Maj Gen Charles C. Case, CG of the U.S. Army Mobility Equipment Command, honored Clarke with the Leadership Award.

Each of the winners received a plaque-mounted medal certifying to his achievements. Wyatt was selected for advancing knowledge of the electromagnetic pulse (EMP) effects resulting from nuclear explosions. Burchette was credited with advancing the state-of-the-art on turbo-alternators. Clarke's choice was based on supervision of the MERDC Pictorial Support Division.

Wyatt was a nominee for the same award in 1967 when the winner was Dr. Maxine Savitz, recognized for her work in fuel cells development. In 1966 he was awarded the annual scientific achievement award of the Belvoir Branch of the Scientific Research Society of America (RESA).

Employed presently in the Electromagnetic Effects Laboratory, Wyatt conducted research on EMP effects, part of the complex nuclear weapons effects environment to which military systems would be exposed in the event of nuclear conflict.

As a result of his work, the citation states, a new insight into the EMP generation mechanism has provided more exact and flexible methods of representing the gamma and X-ray outputs of modern nuclear weapons in the calculation of the EMP which these agents produce.

A 1964 graduate of the University of Virginia with a BS degree in physics, Wyatt worked during summer vacations at the Nuclear Power Field Office (now the U.S. Army Engineer Reactors Group) at Fort Belvoir. He entered Civil Service in 1965 and worked at the David Taylor Model Basin until January 1966 when he transferred to the MERDC.

BURCHETTE is a senior mechanical project engineer in the Turbo-Alternator Division, Electrotechnology Laboratory. He is responsible for major portions of advanced gas turbine engine development and advanced concept turbo-alternator power source development programs, such as the new 10-kw. system.

Burchette received a BS degree in mechanical engineering from North Carolina State in 1951 and since then has been employed at Fort Belvoir except for active military duty in 1953–55.

CLARKE has been employed at Fort Belvoir since 1941, except for service in the Marine Corps during World War II (1942–45). As chief of the Pictorial Support Division, he guided his personnel in providing varied and complex photographic and visual aid support for the MERDC and tenant agencies.

"Through judicious use of personnel, timely coordination with users, and an intense recruiting and training effort, he successfully accomplished a highly important support program for the engineers, scientists, and staff elements." He was a nominee for the same award in 1962, when the winner was Dr. Robert S. Wiseman.

Army Aviation Systems Command Appoints 2 to Advisory Group

Former Director of Army Research Maj Gen Chester W. Clark (Ret.) and Dr. Enoch J. Durbin, Department of Aerospace and Mechanical Sciences, Princeton University, are newly appointed to the Aviation Scientific Advisory Group, U.S. Army Aviation Systems Command, St. Louis, Mo.

The panel advises Maj Gen John Norton, CG, AVSCOM, on aviation problems related to research, development, test and evaluation.

Dr. Clark is now vice president for research, Research Triangle Institute, Durham, N.C. He brings to the panel a distinguished career as an educator at the University of California and San Francisco State College, plus experience as a research chemist with Standard Oil of California. He held numerous high-level R&D assignments during his Army career.

Dr. Durbin has been on the Princeton faculty since 1953 and is head of the Instrumentation and Control Laboratory. The university's investigator in the Princeton-Pennsylvania Army Avionics Research Program, he is a consultant to the North Atlantic Treaty Organization and is also general editor of the AGARD Flight Test Manual series of volumes.

Army Environmental Hygiene Agency Performs Critical Functions

Responsibility of the U.S. Army Environmental Hygiene Agency, Edgewood (Md.) Arsenal, was delineated clearly by Army Surgeon General Lt Gen Leonard D. Heaton at the dedication of the $3.2 million Wesley Cox Building in October 1967. He said:

"We must never forget that good medicine, both in its preventive and therapeutic aspects, does not begin and end in the hospital. . . . It rests heavily on varied disciplines and functions, including the special services provided by the USAEHA."

The Wesley C. Cox Building serves as headquarters and the principal laboratory facility of the USAEHA. A massive, 4-story, square, brick structure, it is virtually without windows and is topped by numerous stovepipe-like outlets for its various filters for research tasks.

As the operating arm for The Surgeons General in environmental hygiene, USAEHA provides services on an Army-wide basis in maintaining the health of military and civilian personnel of the Army. It is also concerned with assuring that military operations do not adversely affect the environment of nearby civilian communities.

A partial list of disciplines of USAEHA concern would include occupational and preventive medicine, industrial hygiene chemistry and engineering, radiation protection, sanitary engineering, and atmospheric and stream pollution control. Equally important also would be entomology, toxicology, occupational vision and hearing conservation.

In its earlier years, USAEHA's mission was not this broad. Established in 1942 as the Army Industrial Hygiene Laboratory, it was located at the School of Hygiene and Public Health, Johns Hopkins University, Baltimore, Md.

USAEHA's principal function then was to provide industrial hygiene services essential to the control of health hazards at Army installations engaged in industrial activities related to the war effort.

In October of 1945, the agency moved into seven rooms of the U.S. Army Chemical Research and Development Laboratories, Edgewood, Md.

Another move in 1953 installed the agency in a cluster of temporary buildings built during World War II, until the Cox Buildng was occupied.

General Heaton charged the agency with contending with "the recurrence of old problems and the generation of new ones." How the USAEHA meets that challenge is, in effect, a study of modern techniques and successes in the whole field of preventive medicine.

Col Ingalis H. Simmons, CO, stated: "I feel that we have an unusual outfit here. Perhaps nowhere else, within or outside the U.S. Government, is there concentrated in one laboratory such a broad capability for dealing with all aspects of environmental hygiene."

This diversity of talent and facilities is a major source of professional satisfaction to USAEHA's 170 military and civilian scientists and engineers, organized into directorates of Radiation Services, Engineering Services, and Medical Services. Within these are the subdivisions that conduct projects in specific areas.

Radiation Services. Old and new problems in radiochemistry, laser, microwaves and health physics are dealt with in this newest of USAEHA's directorates. Efforts range from laboratory tests and field studies on items containing radioactive material to prevention and reduction of hazards to personnel from medical and industrial

Col I. H. Simmons

X-ray equipment, laser and microwave equipment.

Small teams travel in this country and overseas to field installations, hospitals, medical centers, industrial installations, and other facilities using this equipment. They evaluate the potential radiation hazards created by the use of this equipment, review testing procedures relative to

WRAIR Director Cited for University Faculty Service

Col William H. Meroney, director, Walter Reed Army Institute of Research (WRAIR), was recently awarded the University of North Carolina's Distinguished Service Award. The citation said his "distinguished career and unselfish service . . . at posts throughout the world have added to the luster and prestige of the university and its Medical School."

A native of North Carolina, he has a BS degree from the University of North Carolina and a medical degree from New York University. Entering the service in 1948, he served a medical residency at Walter Reed General Hospital and two years as a Fellow in metabolism at the Yale University School of Medicine.

Col William H. Meroney

Oriented largely to medical research, his professional career has been diversified. He has served in positions of responsibility at medical posts in the United States, as well as in Korea, including duty as chief, Renal Insufficiency Unit, in the Philippines; as general medical officer; in Puerto Rico as U.S. Army Tropical Research Medical Laboratory commander, and as deputy director, Walter Reed Army Institute of Research (1964–68).

After assignments with the Research Division, Medical R&D Command, Washington, D.C., and Personnel and Training Directorate, Office of The Surgeon General of the Army, he returned to WRAIR as director.

Col Meroney has also served on the medical faculty at Georgetown University, University of Puerto Rico, and University of North Carolina. He is a member of the American Medical Association, the American Association for the Advancement of Science, past president of the Washington Chapter of American Federation for Clinical Research, a Fellow of the American College for Physicians, and a Diplomate of the American Board of Internal Medicine. He holds the "A" Prefix signifying the highest level of skill in his military occupational specialty.

its use, and make recommendations regarding its safe use and maintenance of records required by Army Regulations.

For example, operating personnel at such locations could be exposed to excessive amounts of radiation emitted by equipment. Because this could prove harmful, health physics personnel are equipped to detect evidence of possible over-exposure and to recommended preventive measures.

Earth terminals of the Satellite Communications Network (SATCOM), located throughout the world, are considered "microwave emitting installations." Radar scanners and related equipment emit harmful rays that operating personnel must avoid.

The mission of Radiation Services is to keep close watch on equipment used at these sites and to recommend protective procedures against radiation exposure of technicians.

Less exotic items, too, fall in this category, such as watches, clocks and instrument dials whose numbers and hands are coated with radioactive luminous paint. Radioactive sources used by engineers for density measurements also must be surveyed periodically to determine that they are being used safely.

Research and testing using laser and microwave equipment enable the Army to keep pace with the advances in this field, but not without certain risks to operators and maintenance personnel. The laser may be injurious to the human eye, particularly in the form of burns of the retina. Systematic checks by USAEHA teams assist local commands in avoiding potential injury to military and civilian personnel.

Where radioactive materials are used, a potential health hazard results if contamination of table tops, floors, walls and other surface occurs. The presence of radioactive material on such surfaces can be detected by "wipe samples" which are returned to USAEHA radiochemists for analysis, or by a direct-reading instrument that gives on-the-spot indication of surface contamination. If the test indicates a hazardous condition, the surface must be decontaminated.

Similarly, analyses of the room air and the urine or breath of the workers are performed to determine that radioactive particles are not deposited in the body in excess of maximum permissible amounts.

Engineering Services is concerned with the growing impact of pollution of air and water. The Sanitary Engineering Division conducts scheduled visits to installations to examine and evaluate pollution problems—and frequently dispatches teams to answer requests for aid from nonscheduled sources.

The Army Materiel Command (AMC), for example, requested USAEHA to look into a water-pollution problem confronting the U.S. Army Aeronautical Depot Maintenance Center at Corpus Christi, Tex. A 12-man military team from the agency spent two weeks at the Texas installation extracting samples of water from a variety of sources.

Their mission was to characterize the wastes in order to develop new and improved treatment measures for the protection of personnel, not only at the depot but in the surrounding community.

Rapid response by expert teams to the source of the problem characterizes the capability of the staff. Sanitary engineers spend considerable time with troop units in efforts to improve field sanitation conditions and to speed food service.

Industrial hygienists work with other military and governmental agencies in detailed studies of one of man's most constant companions: noise. Millions of dollars are spent annually in the United States in decreasing and minimizing its distracting and harmful influences.

A soldier's effectiveness can be sharply increased if his ears are not being assailed by a cacophony of sound, such as that in a tank or armored vehicle. Experts from USAEHA make continuous studies to recommend steps for reducing the intensity of this and other noises.

Information developed by this and the other USAEHA directorates has been incorporated into a data retrieval system, which includes thousands of sampling results as well as data on a wide variety of subjects in the field of environmental hygiene. Information is available to military units and civilian organizations.

Medical Services. The three divisions within this directorate—Occupational Health, Entomology and Toxicology—respond to what General Heaton pointed out when he said: "The increasing complexity of modern life demands continual reevaluation and adjustment of the basic concepts . . . of preventive medicine."

A vital program being conducted by the toxicologists includes analyses of potentially toxic products created from rocket propellants.

Toxicologists are experimenting with insecticides and insect repellents that will protect the user from mosquitos, lice, chiggers and the whole catalogue of pests that can bring misery to the man in the field. These chemicals must guard against insect attack without toxic effects on man.

Entomologists at USAEHA have developed and are testing a "delayed action" method of stopping or retarding insect growth. Ingredients that vigorously attack the larvae of most insects have been incorporated in a plastic that can be air-dropped in the most remote areas. A slow-release method extends the impact of the pesticide, and the use of plastic as a carrier facilitates pinpoint delivery.

Occupational health personnel are constantly evaluating developments in application of the ever-increasing variety of new materials proposed for use in manufacture of military supplies and equipment.

Training courses in occupational health, as well as in other disciplines within the interest of USAEHA, are offered to Army personnel as well as personnel from other governmental departments on an individual or group basis.

General Heaton touched the pulse of the USAEHA mission when he said, "We intend to keep up with the times and to push progress along whenever we can."

NOISE DEFENSE EARMUFFS are demonstrated by Don Schley, an industrial safety officer in the Industrial Health and Safety Directorate, Fort Detrick, Md., to one of the students who visited the Army installation during the recent Seventh Annual Maryland Junior Science and Humanities Symposium (JSHS) in Baltimore, Md. Twenty-eight students and four teachers toured the facilities as part of the JSHS program, which was initiated in 1958 to motivate talented young people toward careers in science and engineering. The visitors were part of 164 students and 42 teachers who represented 159 schools in 24 Maryland counties, the Archdioceses of Baltimore and Washington and the Association of Independent Schools.

WRAIR Quietly Marks 60 Years of Progress

Walter Reed General Hospital (WRGH), renowned as one of the world's leading medical institutions as well as the U.S. Army's finest, marked its 60th anniversary May 1 without any ceremonial to celebration.

Commanded by Brig Gen Frederic J. Hughes, the hospital has more than 1,200 nationally recognized medical officers heading its departments and services. More than 1,000 civilian employes, including some of the nation's most distinguished medical consultants, serve on the staff.

Accredited by the American Hospital Association, the WRGH is also accredited in 21 of the 24 specialty fields approved by the American Medical Association.

The WRGH Department of Medicine recently designed and constructed one of the nation's most sophisticated coronary care units. From the bedside of the seven patient areas, electrocardiogram charts and the pulse of each patient are sent to a central nurses' station for prompt emergency treatment.

An important research and treatment center for cancer, WRGH works closely with the Armed Forces Institute of Pathology in diagnosing possible malignant tissue. A pneumatic tube between the two facilities allows doctors to send tissues for immediate examination by pathologists while the patient is on the operating table.

The hospital serves also as a referral center for treatment of patients with acute and chronic kidney failure.

WRGH, along with the Walter Reed Army Institute of Research, the Armed Forces Institute of Pathology, Army Audiology and Speech Center, U.S. Army Biomechanical Research Laboratory, U.S. Army Institute of Dental Research, the Army Medical Department and several smaller units comprise the Walter Reed Army Medical Center, commanded by Maj Gen Philip W. Mallory.

Dedicated to the care of the American soldier, the center has been internationally in the news for the treatment it provides for heads of state and high government officials from nations around the world.

Whether the patient is an Air Force jet pilot, Army infantryman or high ranking government official, he is given all the care an excellent medical facility can provide.

Dr. Bekker Authors Terrain-Vehicle Systems Book

Introduction to Terrain-Vehicle Systems, hailed by eminent authorities as a "monumental work" in applying systems analysis methodology to off-the-road locomotion problems, came off the University of Michigan Press Mar. 31 under contract with the Army Research Office-Durham, N.C.

Dr. M. G. Bekker, the author, is world-renowned for pioneering efforts in this field. Among numerous honors conferred upon him is that of becoming the second non-Swedish person to receive Sweden's Royal Military Technical Association Medal for Professional Achievement.

Termed the "father of our off-road and articulated vehicle concepts for travel on rough terrain of the earth and moon," Dr. Bekker was formerly chief of land locomotion research at HQ U.S. Army Tank-Automotive Command, Warren, Mich. He was co-founder of the International Society for Terrain-Vehicle Systems.

Introduction to Terrain-Vehicle Systems is an 846-page document, divided into two parts, "The Terrain" and "The Vehicle," and is on sale at $27.50, University of Michigan Press, Ann Arbor, Mich. 48104.

Dr. Bekker illustrates systems analysis with specific examples of how to design vehicles for various conditions of terrain. He uses mathematical models to compare competitive solutions in a "search for the optimum" of practical engineering.

Acknowledgment is made in the preface to the stimulating influence of various Army scientists in encouraging Dr. Bekker to write the book. Mentioned are Deputy and Scientific Director of Army Research Dr. Richard A. Weiss; Dr. Leonard S. Wilson, chief of the Environmental Sciences Division at HQ U.S. Army Research Office, and Dr. William Van Royen, Army Research Office, Durham (ARO-D), N.C.

Credit is given also by Dr. Bekker for drawing upon his work with the National Aeronautics and Space Administration, Aerospace Industries (particularly the Jet Propulsion Laboratory of California Institute of Technology), George C. Marshall Space Flight Center, and Boeing Co.

Daulton Assigned to Army Standardization Group, London

Newly assigned Senior Standardization Representative, U.S. Army Standardization Group, United Kingdom in London, effective June 15, is Col James O. Daulton, former chief of staff and deputy commander of the 12th Support Brigade at Fort Bragg, N.C.

As head of a group of U.S. Army officers who monitor all British research and development for their army, he will be serving his second tour with the group, the first being from 1954 to 1957. In existence since 1947, under terms of the Basic Standardization Agreement, the program aims to standardize both equipment and doctrine. It has developed the means by which the Quadripartite Armies, U.S., British, Canadian and Australian, can work effectively together in the event of a common emergency.

In 1959 he was assigned to the International Office, Office, Chief of Research and Development, HQ DA, Washington, D.C., as chief, Foreign Developments Branch. Under his guidance the Mutual Weapons Development Program was expanded to 12 NATO countries and the Defense Development Exchange program with U.S. allies in the Far East.

During the OCRD assignment, he conceived the idea of the cooperative development program for a main battle tank between the U.S. and the Federal Republic of Germany, now known as the MBT-70 program. In Bonn in 1962, he served as R&D coordinator with the Military Assistance Advisory Group, Federal Republic of Germany.

In 1965 as director of General Equipment Testing, U.S. Army Test and Evaluation Command, Aberdeen (Md.) Proving Ground, he was responsible for the Army-wide testing program of engineer, ordnance and quartermaster equipment. Since the end of that assignment in July 1968, he has served as chief of staff and deputy commander, 12th Support Brigade.

Col James O. Daulton

'Wheel' Studied for Moon Vehicle

Design of the best type of "wheel" for a lunar vehicle is the goal of a $50,000 study that will be made by the U.S. Army Waterways Experiment Station, Vicksburg, Miss., for the National Aeronautics and Space Administration. The study is to be completed this year, the U.S. Army Corps of Engineers announced.

Project SWAP Changing Pershing 1-A Equipment

Pershing 1–A missile equipment is being exchanged for old Pershing systems in Project SWAP being conducted at HQ U.S. Missile Command.

The first trainload of modified Pershing missiles, including the launchers, programer test stations, generators, radio transmitters, receivers, test items and other equipment, was shipped recently to Fort Sill, Okla. Soldiers at the U.S. Army Artillery and Missile School will be trained to operate the new equipment.

Later this year, battalion-sized "packages" of the new equipment will be loaded aboard roll-on, roll-off ships at Cape Kennedy, Fla., for delivery to Bremerhaven, West Germany. They will go to a staging area where ground support equipment of present Pershing missile units will be "swapped" for the new Pershing 1–A equipment.

Gone will be the familiar tracked vehicles, replaced by new 8-wheeled 5-ton cargo trucks produced for the Army by the Ford Motor Co.

When SWAP is over, all U.S. Pershing battalions will have been completely updated with modern, fast-reacting ground support equipment that will greatly increase dependability and rate of fire. This difficult logistics problem will have been carried out with a minimum of confusion, paperwork or loss of target coverage.

Not to be exchanged is the 34-foot missile itself and other selected pieces of gear that are common to both Pershing 1 and Pershing 1–A.

Cape Kennedy Air Force Station was selected for the innovative supply operation because it provides an adequate industrial-type building and vast outdoor storage facilities where the Pershing 1–A equipment can be marshalled into units. In addition, within close proximity are a good port for overseas shipments and a railhead for Fort Sill shipments.

SWAP operations are being managed by Col Edwin A. Rudd, Pershing project manager, U.S. Army Missile Command, Redstone Arsenal, Ala. Martin Marietta Corp., Orlando Division, prime contractor for the Pershing system, was selected to work with the command on the program.

7th National JSHS Achieves Peak of Success

(*Continued from page 2*)

Participants received a booklet containing abstracts of the students' technical papers presented at regional JSHS. The topics delved deeply into most of the major scientific disciplines and illustrated a high degree of scientific achievement in research projects.

Adult scientists or engineers hearing these presentations could have little room for doubt that science development in U.S. high schools has attained a level of excellence that promises much for future progress in the United States.

Take for an example, selected at random from the impressive 108-page brochure prepared by ARO-D on the 1969 National JSHS, the paper given by Kris-Tina (correct) Apperson, Salt Lake City, Utah, titled: "The Effects of Actinomycin-D as a Photosynthetic Inhibitor in the Chloroplasts of Euglena Gracilis (Z strain)." This presentation reported on an experiment in the basic genetic processes as influenced by the DNA and RNA nucleic acids.

Abstracts of other presentations published in the ARO-D brochure serve to reflect the wide range of the students' scientific interests and the great effort that has achieved notable results in their research.

All in all, the basic theme of the 1969 symposium, "Research in Progress—Science in the Making," was manifested in a manner that effectively served to demonstrate that the joint Army-industrial-academic cooperation supporting the ARO-D Junior Science and Humanities Symposia Program is producing good results for the nation.

Dr. Levy's featured address on the humanities is considered worthy of more space than can be devoted in this edition of the Army Research and Development Newsmagazine. It will be covered in depth in June.

Nike-X Development Office Redesignated at Huntsville

The Armys' Nike-X Development Office, Huntsville, Ala., was renamed May 1 the Advanced Ballistic Missile Defense Agency-Huntsville Office.

Julian Davison, director of the office, said the name will more closely relate his organization with its parent organization, the Advanced Ballistic Missile Defense Agency, headquartered in Washington, D.C. The Huntsville Office is collocated with the Safeguard System Command in Huntsville's Research Park.

The office is engaged in exploring techniques for ballistic missile defense that may be of value in increasing the effectiveness or capabilities of the present Safeguard System. The staff also is responsible for advanced development necessary to insure continued effectiveness of the deployed ballistic missile defense system against more sophisticated threats, and assists in the evaluation of the penetration capabilities of the United States' strategic offensive forces.

The Nike-X Development Office was created in June of 1968 and placed under the direction of the Director, Advanced Ballistic Missile Defense Agency, Washington, D.C.

The Safeguard System Command mission differs in that it is responsible for the development, procurement and installation of the Safeguard weapons system proposed for deployment.

Bombay Scientist Studies Under VRSP at Natick Labs

Under the National Academy of Sciences Visiting Research Scientist Program (VRSP), Sheo Ram Agarwal of Bombay, India, has joined the staff of the U.S. Army Natick (Mass.) Laboratories.

U.S. citizens and foreign nationals qualified for VRSP may spend up to two years in research in biology, biophysics, chemistry, mathematics, physics, organic materials, food and nutrition, geography and climatology, psychology, anthropology or textiles.

Agarwal received a fellowship for his U.S. assignment from the International Atomic Energy Agency (IAEA) and will spend two months studying packaging requirements for foods preserved by ionizing radiation. He has a BS degree from Rajashan University, India, and a BSc (Tech.) from Bombay University.

A member of the Association of Food Technologists of India, he participated in the recent "Survey Project on Irradiation Preservation of Fishery Products," sponsored by the IAEA in Iceland.

He has been serving as scientific officer in biochemistry and food technology at Bhabha Atomic Research Center, Bombay, and also as senior scientific assistant at the Central Food Technological Research Institute, Mysore, India.

Sheo Ram Agarwal

Kudos

MERITORIOUS SERVICE. The Bronze Laurel Leaf Cluster to the Army Meritorious Civilian Service Award (MCSA) was awarded posthumously to *Robert R. Philippe*, one of the Army's pioneer soil mechanics engineers, for his contributions to the U.S. Army Materiel Command (AMC) at a recent ceremony.

Maj Gen Richard H. Free, AMC Director of Research, Development and Engineering, recently presented the award to Mrs. Philippe. Her husband was acting director of the AMC Advanced Materiel Concepts Agency when he died in June 1968.

The citation noted "his highly imaginative concepts regarding the planning and management of research, covering a broad spectrum of technologies, and his unique perception regarding enhancement of the military posture of the U.S. Army through application of results obtained from research, brought singular distinction to himself and the Army Materiel Command."

Robert L. Thornton received the MCSA and Certificate of Achievement from the AMC and Department of the Army upon retirement after 34 years

Robert L. Thornton

of federal service. For more than 25 years he worked at the Army Mobility Equipment R&D Center (MERDC) and its predecessor organizations at Fort Belvoir, Va.

Col Edwin T. O'Donnell, MERDC commander, presented the award for "outstanding achievement in the activation and the organization of the Systems Engineering Laboratory."

The DA certificate cited Thornton for guidance and managerial support . . . development of a family of water purification units that are "producing the bulk of all drinking water for the military forces in Vietnam today."

Leo F. Ingram

The AMC certificate cited him for 34 years of federal service.

Leo F. Ingram received the MCSA for performance as technical director of Mine Shaft, a series of high explosive tests conducted for the Defense Atomic Support Agency.

Employed as chief, Physical Sciences Branch, Nuclear Weapons Effects Division, Waterways Experiment Station (WES), Vicksburg, Miss., Ingram is recognized as an authority on explosive shock propagation in earth materials and water.

He joined the WES staff in 1948 and has been involved in high explosive research since 1951. The Mine Shaft Tests were made to determine intensity of stress waves and ground motions resulting from large explosions near the surface of a rock material.

Ingram directed this program in which technical problems were of "the highest order of difficulty and complexity in relatively unexplored areas of investigation." Measurements of effects of explosions were recorded by high-speed instrumentation systems developed under his guidance.

Ingram also established "perfect public relations" and the mayor of Cedar City, Utah, announced that the

Theodore L. Bailey

entire operation was "a shining example of the way the federal government should operate."

The MCSA was presented to *Theodore L. Bailey*, a physical sciences administrator at the U.S. Army Natick (Mass.) Laboratories, for expediting and coordinating a one-year priority development and procurement program for more than 30 items of clothing and equipment for troops in Vietnam.

Among the items are a pack system for 81mm mortar crews, lightweight load-carrying equipment, an improved tropical uniform, a boot last for Vietnamese soldiers, body armor, spike-protective and blast-protective combat boots, and a sleep suit and camouflage suit for the Marine Corps.

Bailey is employed in the Clothing and Personnel Life Support Equipment Laboratory. Brig Gen Felix J. Gerace, CG of the Natick Labs, presented the award.

Leroy M. Danner, Army Materiel Command (AMC) program management specialist, received the MCSA for R&D which resulted in "advancement of the durability, reliability and maintainability of Army wheeled vehicles and amphibious equipment." In the European Theater of Operations

Publication Recognizes APG Legal Operations Chief

Recognition as one of the "Outstanding Young Men of America" for 1969 was accorded recently to Maj Ronald B. Stewart, chief of Legal Operations at the U.S. Army's Aberdeen (Md.) Proving Ground.

Maj Stewart's name will appear in the 1969 edition of *Outstanding Young Men of America*, a publication similar to *Who's Who in America*.

Maj Ronald B. Stewart

Selection of the former enlisted man, who entered the Army again as a legal officer in 1959 after receiving BS and LLB degrees from the University of Kentucky, was based on his professional and community service achievements during two years of study at Cumberland College, Williamsburg, Ky.

Licensed to practice law in the Court of Appeals in Kentucky, the U.S. Court of Military Appeals and the U.S. Supreme Court, Maj Stewart completed a 9-month advanced course at the Judge Advocate General's School prior to assignment to Aberdeen PG. He also has served at Fort Riley, Kans., HQ Seventh U.S. Army in Germany, and Army Weapons Command, Rock Island, Ill.

during World War II, he later was a military adviser to the Royal Thai and Pakistan Armies, and also served in the Office, Chief of Ordnance, Washington, D.C.

Danner holds the Bronze Star Medal, Legion of Merit and Army Commendation Medal, and has received two AMC outstanding performance appraisals.

LEGION OF MERIT. *Brig Gen Wilson R. Reed,* CG, U.S. Army Computer Systems Command since it was established Mar. 31, 1969, received the LOM (with Oak Leaf Cluster) from Lt Gen Harry W. O. Kinnard, CG of the U.S. Army Combat Developments Command (CDC).

The citation credited him for distinguished service as CG of the CDC Automatic Data Field Systems Command and as AMC project manager for ADSAF (Automatic Data Systems within the Army in the Field), October 1967 to March 1969, stating:

"General Reed expertly applied his wealth of knowledge, rare foresight, and outstanding management abilities in directing his projects to attain the objectives established by the Department of the Army. . . ."

Col Leonard D. Mitchell received the first Oak Leaf Cluster to the LOM prior to retirement after more than 27 years service.

Assigned to AMC in 1965, he was acting deputy comptroller when he retired. The citation stated, "His unique professional abilities and extensive experience in higher level staff procedures . . . contributed immeasurably to creating and maintaining a more effective and responsive programing, budgeting, accounting, and review and analysis function throughout the command. . . ."

BRONZE STAR MEDAL. *Col William A. Akers* received the BSM for outstanding achievement in connection with military operations against hostile force in the Republic of Vietnam.

Since August 1967, he has been chief of the Dermatology Research Program at Letterman Army Institute of Research, San Francisco. The citation credited him for his sincere interest in skin disease problems of the 9th Infantry Division in Vietnam.

Col Akers trained new battalion surgeons and medics to recognize and treat various skin diseases. He made available specialized instruments and medications and developed plans for battalion surgeons to complete experiments under field conditions.

ARMY COMMENDATION MEDAL. *MSgt George K. Brown,* a former Navy man now serving in the U.S. Air Force, has been awarded the ARCOM Medal for service with the Operations Branch of the Engineering Department, Army Engineer Reactors Group, Fort Belvoir, Va.

He was cited for contributions to the U.S. Army Nuclear Power Program from March 1966 to May 1968, "in support of the mission to provide engineering and technical support to the Army, Navy and Air Force for the operation and maintenance of nuclear power plants."

Sgt Ernest F. Bloomfield, now serving with the Adjutant's Office, U.S. Army Research Office, received the ARCOM Medal for his previous assignment with the U.S. Military Assistance Command, Vietnam.

Sgt Bloomfield was cited for outstanding professional competence and devotion to duty that consistently produced superior results and inspired his associates to strive for maximum achievement.

COMMENDATION CERTIFICATES. Director of Army Research Col George M. Snead Jr. recently presented Army Certificates of Commendation for Outstanding Performance to seven Army Research Office personnel during recent ceremonies. Receiving the awards were:

Richard L. Ballard and *Mary K. Pida,* Physics, Electronics and Mechanics Branch, Physical and Engineering Sciences Division; and *Merrill V. Kreipke,* Geophysical Sciences Branch, Environmental Sciences Division; *James W. Sterling,* Research Plans Office; and *Patricia A. Vermette,* Programs Branch, Research Programs Office; and *Clarence T. Smith,* chief, and *Thelma F. Heisler,* secretary, Publications Branch, Data Management Division.

Outstanding Performance Ratings for service with the Office, Chief of Research and Development also were awarded to *Pauline Dorman, Eloise B. Vale* and *Thelda V. Davis; Glenna B. Hester,* Office, Chief Scientist; *Lawrence Cohen* and *Beatric Newkirk,* Office of the Director of Plans and Programs; and *Catherine G. Buranitz,* Programs and Budget Division. *Marsha J. Rotosky,* Technical and Industrial Liaison Office received a Commendation Certificate for Sustained Superior Performance.

SUGGESTION AWARDS. *Lionel P. Hernholm,* equipment analyst at HQ CDC, received a $1,500 check for a suggestion that saved the U.S. Government $15 million.

Hernholm devised a $280 substitute for a $1,700 electronic device used to train gunners in firing the Dragon antitank missile. Electronic tracking gear is attached to Hernholm's dummy Dragon, giving the soldier all the weapon response of actual firing.

MUCOM Appoints Cavell Staff Physical Scientist

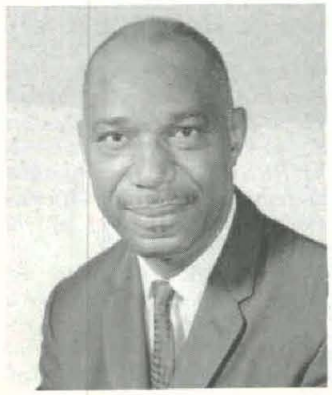
HQ U.S. Army Munitions Command, Dover, N.J., has announced appointment of Winston W. Cavell as a staff physical scientist, with supervisory responsibility over energetics (propellant, explosion and pyrotechnic materials).

Employed since 1946 as a chemical engineer in the Pyrotechnics and Explosives Engineering Branch, Pitman-Dunn Research Laboratories at Frankford Arsenal, Philadelphia, Pa., Cavell also has distinguished himself as an educator, author and inventor.

Graduated from Virginia Union University with a BS degree, he received a master's degree in chemistry from the University of Michigan and completed two years of graduate study at the University of Iowa.

Cavell served as a professor of chemistry at Prairie View (Tex.) State College, associate professor of chemistry and head of the Division of Natural Sciences at Allen University, Columbia, S.C., and as a faculty member of Spring Garden Institute, Philadelphia.

In reporting on his research, he has authored 12 U.S. Government publications and has also written for professional journals. He has three patents in the pyrotechnical field and has four pending.



Winston W. Cavell

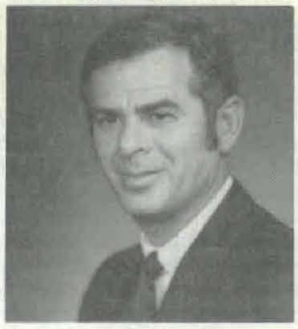
Former Secretary of Defense Robert S. McNamara commended him for his contribution to the manned orbital flight of Faith-7 in Project Mercury. He is a lieutenant colonel in the U.S. Army Reserve.

Among Cavell's professional affiliations are the Scientific Research Society of America, American Ordnance Association, and Frankford Institute. He is a member of the National Steering Committee's Pyrotechnics Division, the Frankford Arsenal Management Association, Military Pyrotechnics Committee, and the Munitions Command Committee on Pyrotechnic Principles and Practices. He was cochairman of the First Pyrotechnic Seminar Technical session, sponsored by the Denver (Colo.) Research Institute in 1968.

BESRL Conducts Human Performance Research for Night Operations

Human performance research in support of the U.S. Army Combat Developments Command's Southeast Asia Night Operations Program is being conducted by the Army Behavioral Science Research Laboratory (BESRL) at the CDC Experimentation Command, Fort Ord, Calif.

Some of the Army's newest night-vision devices are being used in the experiments at the CDCEC Hunter-Liggett Military Reservation. In charge is Jack Sternberg, BESRL Night Operations senior task leader. Extensive logistical support is provided by the Experimentation Command.



Jack Sternberg

Dr. J. E. Uhlaner, BESRL director, plans the experimentation as a logical and timely response to the Army's move toward a more integrated application of behavioral science to the new and expanded interrelationships of men and machines in a systems setting. A foremost requirement is an effective means of testing the values of innovations in a system and of changeovers from one system or subsystem to another.

Development of reliable, quantifiable and practical measures of human performance as it affects systems output is crucial. To develop such measures, an iterative laboratory-field research program is required.

In such a program, operational problems and hypotheses are first identified in the field. Problems are then simulated and investigated in the laboratory where proper scientific controls can best be maintained.

Finally, the principles established in the laboratory are checked in a field environment for practical and situational influences, utilizing as much realism as can be afforded. Additionally, the field environment provides the opportunity for realistic research on problems not amenable to the laboratory approach.

In all cases, such a field environment must be sufficiently controlled to give pragmatic and empirical answers that are capable of replication. The CDCEC environment has repeatedly proved itself to be ideal for this kind of research inquiry and for attainment of mutual objectives of the Experimentation Command and the Chief of Research and Development, HQ, Department of the Army.

The present night operations research effort is typical of BESRL's role in human performance experimentation. In this case, it serves as a bridge between requirements of CDC elements and materiel agencies and the effective utilization of personnel through the capabilities of behavioral sciences.

BESRL's program at the CDCEC has been initiated, therefore, in the interest of expanding the role of behavioral science for a fuller contribution to the success of night operations. New sensors, especially night-vision devices, have been developed to overcome the limitations in performing reconnaissance, surveillance, target acquisition, and coordination and control activities.

Research has been needed to supply military managers with basic human performance information. This knowledge should aid them in making more effective decisions relative to operations and equipment development; also, in changing, as necessary, concepts, doctrine and tactics commensurate with the aims of increased capability for sustained operations.

The initial phase of the BESRL research program at the CDCEC is to observe and evaluate relative performance of enlisted personnel with four passive night-vision devices (Starlight Scope, AN/PVS–2; Miniscope, AN/PVS–3; Crew-Served Weapon Sight, AN/TVS/2; and the Night Observation Device, Medium Range, AN/TVS–4).

The purpose is to determine how performance is affected by target/environmental factors, such as type, movement, distance, and contrast of target under various conditions of ambient illumination.

In addition, such factors as search behavior, prolonged activity and performance with combinations of devices are examined to determine implications for optimal utilization.

BESRL scientists have developed a mobile, fully automated on-line magnetic tape system to record automatically, in real time, the target acquisition responses and search behavior of multiple "players" in the experiments. Data obtained can be analyzed by computer for rapid feedback of information to military users and provides, as well, a magnetic tape library of search behavior for more exhaustive analyses.

One "fallout" benefit of this BESRL effort is that it provides a methodology and experimental instrumentation for larger applied studies that might be conducted by CDCEC. Hence, similar systems are being ordered by the CDCEC and by the Night-Vision Laboratories at Fort Belvoir, Va.

In the BESRL experimental procedure employed since September 1968, enlisted participants (players) provided by CDCEC are given 90 minutes of practice. This is followed by a 4-hour test during which, except for short breaks, they are required to go through continuous search operations.

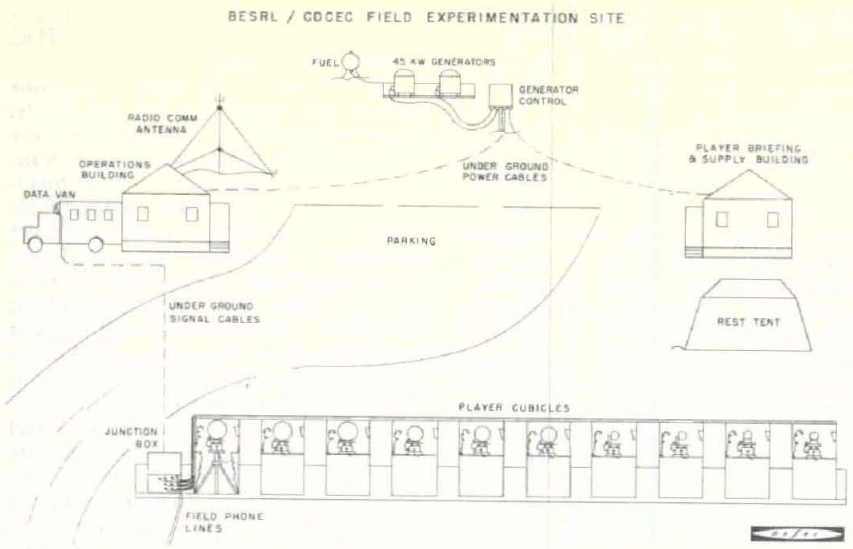
Two human performance measures are used: (1) percent of target presentations detected, and (2) median time for detecting a target. Absolute values obtained reflect performance for the specific targets and terrain used; thus examination of resulting data is best accomplished in terms of relative relationships.

Large differences in performance are found among the devices and for varying levels of ambient illumination. Findings on relative performance with single devices and with combinations of devices have important systems implications for such problems as basis of issue (BOI) and mix.

Failures in target acquisition attributable to the device, as opposed

Dr. Aaron Hyman, the author, has organized and directed the Army-wide program of behavioral science research related to human factors systems at the U.S. Army Behavioral Science Research Laboratory (BESRL) since early 1968. He is now serving as deputy director for Human Performance Experimentation and chief of the Combat Systems Research Division.

Earlier experience includes psychological research with Sperry Rand Corp. and the U.S. Air Force. He holds BS and MS degrees from the College of the City of New York and MA and PhD degrees in psychology from Columbia University, where he did graduate teaching in experimental psychology.



to operator factors, are determined by comparison of performance under free search with that obtained by placing the sight reticle on the target and having the player report the instant the target disappears from view.

The latter procedure provides a measure of target "seeability." Search scores lower than "seeability" scores indicate the difficulty encountered because of the search procedures employed by the players. On the average, for the instruments evaluated, less than half the targets which are "seeable" are found during search.

This finding implies that improved capabilities leading to the rapid detection of targets may be accomplished through analysis and further research on search behavior.

Prolonged use of these devices will be common in an operational setting. Data, therefore, are analyzed to determine if changes over time occur in level of performance. Although players conduct continuous search with their devices for a 6-hour period, except for a few short breaks, no meaningful difference is found between performance at the beginning compared to performance at the end of the testing period.

Data, therefore, indicate that, with correct dioptral setting for the eyepiece and with proper motivation, extended periods of surveillance duty are possible with little fatigue or vigilance decrement. In terms of soldier capability, this finding has implications for operational utilization of night-vision devices as well as for subsequent experimentation.

The findings cited are a sample of results of the initial phase of the BESRL program. Ongoing research will yield more information on improvement of performance through improved search techniques, work methods and procedures, and operational deployment.

With the continued support of the CDCEC, future experimental studies of BESRL for the Army Chief of Research and Development, in response to CDC requirements, will be concerned with active and passive ground and airborne night-vision systems, high-gear systems, and visionic systems. The primary human response criteria will be target acquisition and target acquisition time.

Variables under study will include ambient conditions (e.g., illumination, weather), type of acquisition (e.g., detection, recognition, identification), target characteristics (e.g., type, location, distance, movement, contrast), operator characteristics (e.g., visual acuity, experience, search behavior), and terrain characteristics (e.g., degree of clutter, size of search area).

Further comparisons will be made of relative performance with selected devices to determine target acquisition variance or failure attributable to device and operator factors.

Emphasis will be given to enhancing performance through the development of individual work methods and team procedures. Investigations will include work cycles, search techniques, and the optimum combination of sensors under varied conditions. Effects of continuous (day and night) operations and prolonged (night only) activity on vigilance, fatigue and sensory discrimination, with and without devices, also will be determined in the series of experiments.

OTSG Publishes 'Internal Medicine in World War II'

The present one-year limit on tours of duty in Vietnam is partially the result of a lesson learned in the China-Burma-India Theater in World War II, when American troops had their first experience in fighting in the tropics.

A chapter in the new historical volume on *Internal Medicine in World War II* describes the loss of efficiency, lessened physical ability and lowered reserve stamina that overtook the troops after 8 to 12 months in the moist, tropical heat.

Other chapters that are pertinent to today's medical problems document the Army's experiences with a wide range of infectious diseases, allergies, fungal infections, and dermatologic conditions encountered at home and abroad.

Internal Medicine in World War II is the third and final volume covering infectious diseases and general medicine. It uses a quote from three centuries ago, "To preserve a man alive in the midst of chances and hostilities is as great a miracle as to create him."

Published by the Office of The Surgeon General with Col Robert S. Anderson, MC, as editor-in-chief, it is available from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C., 20402, at a cost of $8.25.

MALLARD Project officials team up to cut a cake marking the second anniversary of the program, launched Apr. 6, 1967, in which four nations are developing an interservice tactical communications system. Slicing the cake, which is decorated with the flags of the partner countries, are (from right) Maj Gen Paul A. Feyereisen, program-project manager for the United States; Brigadier Harry Roper, project and program manager for the United Kingdom; Lt Col Douglas C. Coughtry, Canada's program manager; and Lt Col David J. McMillen, program manager for Australia.

Army Observes Inauguration of Space Age May 11

Twenty of the most momentous years in history, as blazed by the blast of missiles fired from Cape Kennedy (established as Cape Canaveral), Fla., provided the occasion May 11 for a U.S. Army observance of its role in inauguration of the Space Age.

The President established the Long-Range Proving Ground at Cape Canaveral May 11, 1949, and the U.S. Army had a key part in that decision.

When World War II came to an end, a few farsighted Army men continued U.S. missile research born during the war at White Sands (N. Mex.) Missile Range.

Distances the missiles (modified German V–2 rockets and U.S. Army developments) could travel soon exceeded available space at WSMR, leading to the decision to establish Cape Canaveral, where flights could be tracked from islands in the Atlantic Ocean.

The Joint Long-Range Proving Ground Command was formed that fall under the Joint Chiefs of Staff as an Army-Navy-Air Force organization. Col Harold R. Turner, Ordnance Corps, was named to head the Army Command, which in the beginning coordinated all Army activities at Cape Canaveral. Administrative headquarters were established just south of the Cape at nearby Patrick AFB.

Part of Col Turner's responsibilities was the planning of the launch area, specifications for supervision of construction overseen by the Army Corps of Engineers, buying of land, and preparing for early flight tests of Army guided missiles. Today the activity he set up is known as the Department of Army Field Office, Eastern Test Range.

Col William C. Parr, who has served two tours totaling 6½ years, now directs Army activities at the office. Where once there were hundreds of military and civilian members of the Army team, today there are only a handful. The Eastern Test Range is managed by the Air Force.

The Army, however, can look back to that gray, overcast morning of July 24, 1950, with technicians swarming over wooden planks or sloshing through ankle-deep mud when the Bumper 8 missile, developed with General Electric Co., was launched from a 100-foot-diameter slab of concrete. Only a tarpaper and pine shack nestled behind a protective mound of sand, 500 feet away, to break the monotony of the wasteland.

That was the beginning of many historic Army achievements in space, such as the flights of the famed Redstone missile, firings of the Jupiter intermediate range ballistic missile, tests of the Pershing—today the Army's most powerful combat missile—and launching of Explorer I, the Free World's first satellite placed into earth orbit Jan. 31, 1958, along with other early space probes.

Who could have dreamed what the future would bring on that morning of July 4 when a crude Army missile became the first to take off over the Atlantic from that wild piece of landscape on a Florida Beach?

Redstone-Little Joe II Crane Moved From WSMR

Making a move that saves the U.S. Government an estimated $2 million has deprived White Sands (N. Mex.) Missile Range of one of its landmarks—the 160-foot-tall Redstone-Little Joe II gantry crane in Launch Complex 36 that will find a new home 800 miles away at Vandenberg AFB, Calif.

When reassembled at its new site in Vandenberg's Standard Launch Complex No. 2, the relocated equipment will be used in various space programs conducted at the Air Force Western Test Range by the National Aeronautics and Space Administration.

First use of the facility in its new location will be for the launching of a Thor-Delta space test vehicle, scheduled May 29. Subsequently the crane will be used in preparations for launchings of Agena, Delta, Thor and other thrust-augmented, long-tank space vehicles.

The job of dismantling, transporting, reassembling and modifying the gantry is being carried out by NASA contractors at a cost of $1,319,241. NASA officials have determined that building a duplicate at Vandenberg today would cost more than $3,000,000.

Under terms of the agreement between NASA and the Army, the crane will be returned to WSMR some day. If an urgent requirement should develop, the crane must be returned on six months' notice. Also, barring future changes in plans, the gantry will be returned to WSMR upon termination of the programs requiring it at Air Force Western Test Range.

The facility was built in the late 1950s, at a cost of $860,000, for use in the Army's Redstone artillery ballistic missile program. Many of the 69-foot-tall Redstones, liquid-propelled and having a range up to 200 miles, were fired at WSMR from June 1958 through the fall of 1962.

In 1963 the gantry was assigned to NASA for upcoming tests of the Apollo command capsule and launch escape system under the program designated Little Joe II. For this use the crane was modified.

Besides saving around $2,000,000, NASA officials point out, the cooperative effort on this project will enable them to meet critical time schedules for important missions.

Fort Detrick Dedicates 3150 Computer System

Dedication ceremonies marking installation of a third-generation computer system to replace a unit repeatedly modified since 1960 were held recently at Fort Detrick, Md.

Commanding Officer Col E. M. Gershater, addressing a large gathering, said the new Data Control Corp. 3150 system will "provide us with a modernized and greatly improved capability, and will permit better scientific analysis and business data processing."

Maj Gen Frank G. White, CG of the U.S. Army Munitions Command, was among a substantial group of dignitaries who attended ceremonies.

Charles L. Crum, chief, Data Systems Division of the Analytical Sciences Directorate at Detrick, said the system is an integration of 12 machines. Included are the central processing unit, a card reader that scans 1,200 cards a minute, printer control and printer with 1,000 lines per minute capability, tape control with an 8-tape drive capability and two tape transports that read or write 20,850 characters per second.

The CDC 3234 disk control has an 8-disk drive capability. Four CDC 854 disk drives can locate data in an average of 107.5 milliseconds. The 415 card punch processes 250 cards per minute and uses a CDC 3446 card punch control. The 3691 paper tape reader/punch reads at 350 characters per second and punches at 120 characters per second. The 3101 console, typewriter and power control panel enables an operator to control and observe the operation of the central processor.

The dedication program included a presentation by Lee J. Manning, Munition Development Division, Commodity Development and Engineering Laboratories at Detrick, on Aerodynamic Trajectory Plotting.

A. James Dukes, chief, Management Systems Branch, Data Systems Division, demonstrated payroll file retrieval with the new computer. Integrated statistical analysis was demonstrated by Brucy C. Gray, Biomathematics Division. Kurt J. Windlinx, Management Systems Branch, reviewed the professional locator.

R&D Achievement Awards Recognize Services of 45 Employes

(*Continued from page 3*)
significant new microwave device capabilities in the Army in high-power switching, fixed and tunable microwave filters, and in control devices for phased-array antennas."

Dr. Georg H. Hass, director, Physics Research Technical Area, Night Vision Laboratory, was recognized for "demonstrated superior scientific leadership and creativity in establishment of a fundamental research program on the properties and structure of thin films.

"His efforts have resulted in such advances in thin-film technology as to establish his laboratory as the Free World's center in this science and himself as the foremost scientific authority in this regard."

Dr. Hass also was honored for his work on thin films at the U.S. Army Engineer R&D Laboratories (now Mobility Equipment R&D Center), Fort Belvoir, Va., when the first 22 R&D Achievement Award winners were selected in 1961.

John P. Schoening, a 20-year Army scientist, was chosen for achievements in leading a team of highly motivated personnel in developing new and sophisticated electronic devices for use in Southeast Asia.

As director of the Special Sensors Technical Area in the Combat Surveillance and Target Acquisition Laboratory, Schoening organized and "motivated" a large team "to a high level of technical proficiency, dependability and rapid response" in development of a "complex drone surveillance system" and of several new items that "advanced materially the combat surveillance and target acquisition capability of the Army."

U.S. Army Test and Evaluation Command (TECOM), Aberdeen Proving Ground, Md. Two TECOM employes earned awards for their work in research physics and microbiology at White Sands Missile Range (WSMR), N. Mex.

Oscar H. Calderon, a senior microbiologist in the Army Missile Test and Evaluation Activity at WSMR, conducted an extensive microbial research program that determined the manner and severity of microbial corrosion of metals in missile systems.

"Through his research, which constitutes a completely new approach to the corrosion problem," the citation states, "standards have been established by which microbial corrosion of missiles can be identified under field conditions and corrective measures taken. His research has. . .established a scientific basis for subsequent technical improvements of military importance."

William E. Mimmack, a research physicist assigned to the Instrumentation Development Directorate, National Range Engineering at WSMR, was nominated for his part in research, development and testing of a design concept that improves accuracy of optical instruments used to measure trajectory of missiles.

The new design idea "uses special prisms and lenses in an arrangement that provides optical measurement to preclude the mechanical errors which always are associated with tracking devices." Testing of an instrument built using this concept has shown that an order of magnitude accuracy gain over current practice is possible.

U.S. Army Munitions Command (MUCOM), Dover, N.J. MUCOM award winners include two individuals at Edgewood (Md.) Arsenal, one at Frankford Arsenal, Philadelphia, Pa., and three teams at Picatinny Arsenal, Dover, N.J.

Eleanor V. Crabtree, working as a member of a detection research group at Edgewood Arsenal, discovered that certain chemical agents, which exhibit marked incapacitating effects in man, form unusual compounds that could be used for detection purposes.

The discovery resulted in "a detection method that is simple to use, is selective for the more physiologically active chemical agents, is rapid, possesses the highest sensitivity known for the particular class of chemical agents, is of multidisciplinary utility, and has a wide choice of detector reagents."

George M. Stewart, employed in the Biophysics Laboratory, Research Laboratories at Edgewood Arsenal, was cited for innovative contributions that have materially advanced research in body armor. He also helped design a new combat helmet and better foot protection against land mines. The citation states:

"By his work, which considers the armor plus the body as a single complex, he has established a sound research basis for evaluation and design of improved torso armor and eye armor. Stewart is considered one of the world's leading authorities on ballistic eye protection."

Joseph F. Messina, a research chemist at Frankford Arsenal, was recognized for the "valuable and important contributions he has made in development of specialized lubricants for use with Army material. . .helping to solve. . .very serious problems attendant with extreme environment conditions and performance requirements."

Among these are lubricants for extremely rapid fire (6,000 rounds per minute) weapons, stable and nonreactive lubricants for use in liquid-fueled rocket engines, and improved hydraulic fluids for use in Army tanks. Messina has 28 years experience in this field and serves as a consultant to Department of Defense and other U.S. Government agencies.

A 6-man team from Picatinny Arsenal developed and demonstrated a new class of cross-linked nitrocellulose rocket propellants that are smokeless, possess high energy and density, are case-bondable and have an exceptionally low coefficient of ballistic variation with temperature and combustion pressure.

Test results have demonstrated "the most significant practical advancement in smokeless propellants achieved in more than a decade and it can be expected to have a major impact upon solid propellant technology."

Dr. Jean P. Picard, chief of the Propellants Laboratory of Feltman Research Laboratories (FRL), heads the team. Members are Robert G. Wetton, chief, Propellant Composition and Processing Branch of the Propellants Laboratory; Robert P. Baumann, chief, Rocket Propellant Section, and Joseph S. Stack, Benjamin D. Lehman and Eugene F. Bozza, all employed in the Propellant Composition and Processing Branch.

Paul J. Kisatsky and Louis R. Szabo of Picatinny Arsenal teamed in original work that led to development of a technique for the precise measurement of color based on the Chromaticity Coordinate System.

They were further commended for "successful application of this mathematical technique to design and develop a prototype instrument that has been highly successful in accurately measuring the color of time variant sources such as pyrotechnic items."

Application of the instrument has shown for the first time some of the problems associated with poor color production by flare-type items. The development has made it possible to make practical and accurate measurements of the colors.

Kisatsky is a supervisory physicist and Szabo is an electronic engineer in the Electronic R&D Section, Electronics and Photometric Branch, Pyrotechnics Laboratory.

Another Picatinny Arsenal team award recognizes the work of Drs. Samuel F. Trevino and Henry J. Prask "for conceiving, designing, supervising the construction of and perfecting a new type of neutron inelastic scattering spectrometer."

The device incorporates the "best

(*Continued on page 32*)

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features of spectrometers used for two distinct types of experiments into a single higher-resolution instrument useful for all types of neutron scattering experiments. The resolution exceeds materially that obtained with any previous neutron spectrometer and will aid the Army's Explosives Research Program.

"The instrument is already in use, contributing to our knowledge of the spectrum of molecular frequencies in explosives and should be equally valuable in other research areas of interest to the Army, particularly in studying the structure and molecular dynamics of semiconductors, polymers and other important materials, liquids and biological substances."

U.S. Army Mobility Equipment Command (MECOM), St. Louis, Mo. Two MECOM award winners, Jere D. Dando and Karl Steinbach, represent the U.S. Army Mobility Equipment Research and Development Center (MERDC), Fort Belvoir, Va. They were selected for work on electromagnetic pulse nuclear weapons effects and electromagnetic wave propagation.

Dando was chosen for "outstanding research and development contributions in developing methodology for applying state-of-the-art analytical and experimental techniques in the nuclear EMP vulnerability evaluation and hardening of distributed ground systems and in applying this methodology to a critical Army weapon system."

Recognized as an authority in the field of EMP effects, Dando is acting chief, Systems Evaluation and Hardening Division, Electromagnetic Effects Laboratory.

Steinbach, chief of the Research Division, Intrusion Detection and Sensor Laboratory at MERDC, was selected for research results reflecting "his unusual insight into the problem and characteristics of the media and interfaces that are hostile to electromagnetic waves for detection of concealed explosives, munitions or personnel in ambushes or tunnel complexes. . .

"His knowledge and understanding served with catalytic effect on members of his Research Division and made possible an unusually rapid fielding of revolutionary types of prototype detection equipment to Vietnam for personnel, munition or tunnel detection."

U.S. Army Missile Command (MICOM), Redstone Arsenal, Ala. A 2-man team at MICOM was selected for contributions to the field of liquid propulsion technology. An individual award recognized notable research in solid-state physics.

Dr. James A. Murfree Jr., and William A. Duncan were honored for three major contributions to liquid propulsion technology: "a liquid propellant for gas generators; a single-piece, ceramic, monopropellant decomposition bed; and at least two true decomposition catalyses.

"The develpment of an energetic gas generator propellant-decomposition bed-catalyst combination that will meet Army environment requirements and is composed of inexpensive, commercially available materials is a major contribution to the technology of pressurization and attitude control systems."

Dr. Murfree and Duncan are research chemists with the Army Propulsion Laboratory and Center, Research and Engineering Directorate.

Dr. Richard L. Hartman, research physicist with MICOM's Physical Sciences Laboratory, Research and Engineering Direcorate, was selected for "investigations on temperature dependence of spin-lattice relaxation of the dilute trivalent chromium ion in cubic magnesium oxide, which exhibited a large discrepancy between experiment and theory.

"Through the use of novel experimental techniques first introduced in his laboratory, the existing data were extended sufficiently to furnish the first conclusive proof that optical phonons contribute to spin-lattice relaxation."

Additional accomplishments resulting from his studies of crystal interactions include proof that the F-center relaxation in magnesium oxide is dominated by cross relaxation; also, the first experimental proof of an angular dependent Raman process, and the concurrent first discovery of a low-lying energy level of the divalent iron ion in magnesium oxide.

U.S. Army Weapons Command (WECOM), Rock Island, Ill. WECOM is represented among the Army R&D Achievement Award winners by a 3-man team acclaimed for contributions to the conception, planning and conducting of analytic studies in basic and applied research associated with the theory of the mechanics of solids.

Dr. Michael Sadowsky (deceased), Dr. San Li Pu and Dr. Moayyed Hussain conceived and conducted mathematical research on weaponry, with particular emphasis upon cannon and closed breech launchers.

The investigators are credited with three significant advances—obtaining the mathematical solution of a difficult mixed boundary value problem; establishing the region of void formation around an arbitrary elliptic inclusion in addition to the total stress state; and supporting surface energy or tension studies for the strengthening of materials for high-temperature utilization.

U.S. Army Ballistic Research Laboratories (BRL), Aberdeen (Md.) Proving Ground (one of seven central laboratory complexes under the Army Materiel Command). BRL is represented by an individual award for in-house research on advancing theory and methods of applied mechanics.

Herman P. Gay, chief, Applied Mechanics Branch, Interior Ballistics Laboratory, was selected for his personal work and leadership of others in contributing toward major improvements of Army weapons.

He was cited for "pursuance of a vigorous program of employing nonmetallic bands on artillery shells," with outstanding success expected to lead to a significant increase in the probability of a first-round hit in Artillery weapon firings.

He also was recognized for recent contributions in design and development of a miniature, strain-type pres-

DSA Recognizes Junior Officer Role in U.S. Armed Forces

First Lt Rex Bornmann of Picatinny Arsenal is shown with the silver tray he received from the New York Chapter, Defense Supply Association as "outstanding U.S. Army junior officer" in New York's metropolitan area.

Selection led to his nomination for the DSA's Cmdr William S. Stuhr Award, recognizing the junior officer role in all U.S. Armed Forces. Lt Bornmann was runnerup to Marine 1st Lt Francis M. McDonough.

Assigned as chief, Physical Testing Branch, Explosive Ordnance Disposal Center, Lt Bornmann entered the Army as a private in 1958, was commissioned in 1968 and promoted a year later. He has received numerous decorations and awards for service, the most recent being the Bronze Star Medal with "V" Device for heroism in the Republic of Vietnam.

sure gauge, development of an automated pressure-measuring system for monitoring the interior ballistic characteristics of small arms ammunition, and development of techniques for the analog simulation of gun mechanisms.

Harry Diamond Laboratories (HDL), Washington, D.C. HDL is honored by a 7-man team award for development of an airburst fuze for the helicopter-launched M75 grenade on an accelerated basis that produced operational evaluation tests in Vietnam within 18 months from a request for rapid response.

In addition to being "the smallest and most rugged proximity fuze ever developed," it is claimed to be "the first designed for production on automated assembly lines, using automated test equipment. It is by far the lowest-cost proximity fuze ever designed.

"The ingenuity, inventiveness and departure from conventional approaches is considered a significant advance in the state-of-the-art of proximity fuzing."

Credited with this development are P. Anthony Guarino, HDL associate technical director; Clyde D. Hardin, physical science administrator; Evan D. Fisher, supervisory physical scientist; William Marroletti, industrial specialist; Morton A. Barron and Letcher A. Lofgren, mechanical engineers; and Frank Vrataric Jr., electrical engineer.

CHIEF OF ENGINEERS. *U.S. Army Engineer Waterways Experiment Station (WES)*, Vicksburg, Miss. Research successes in hydraulics and soil mechanics gained 3 individual R&D Achievement Awards for WES employes.

Dr. M. Juul Hvorslev, special assistant, Soils Division, is credited with a significant contribution to the literature of soil mechanics in a report titled "The Basic Sinkage Equations and Bearing Capacity Theories."

An exhaustive study of bearing capacity theories has been correlated into a set of extended bearing capacity equations, which gather, for the first time, "all the significant factors that influence the bearing capacity of soils."

Dr. Garbis H. Keulegan, resident consultant to the Hydraulics Division, completed a study of tsunamis (very long waves of low height in deep water), with particular emphasis on their effect on Crescent City, Calif. The 1964 tsunami, caused by the Alaskan earthquake, caused millions of dollars damage and the loss of a dozen lives at Crescent City.

Dr. Keulegan's work was to study the general tsunami phenomenon and provide input information for a hydraulic scale model that will be used to determine the technical feasibility of proposed barrier plans to protect Crescent City from future tsunamis. His procedures and findings are expected to be used in future studies of how to protect other valuable coastline areas from the damaging effects of tsunamis.

John G. Jackson Jr., supervisory research civil engineer with the Soils Division, was cited for his contributions to the field of soil dynamics. His achievements are said to have "resulted in quantitative values to improve the design of missile and hardened facilities against the blast effects of nuclear weapons. Mr. Jackson is in the forefront of the expanding knowledge of design procedures for assessing the vulnerability of our nuclear counter strike capability.

"The investigations are part of a continuing Defense Atomic Support Agency series of research projects combined with site investigations. Concurrently, the research into soil and rock dynamic response to shock loading is providing the hard, reliable numbers for designers and investigators who must meet deadlines for design of new strategic missile facilities."

U.S. Army Topographic Command (TOPOCOM), Washington, D.C. Four employes were selected for scientific investigations at HQ OCE and the Engineer Topographic Laboratories, Fort Belvoir, Va.

A 3-man team was acclaimed for achievements as participants in a 5-year, joint-service program of studies, experiments and analyses, leading to Secretary of Defense approval of a new system for collection of data for mapping, charting and military geographic analyses.

When completely operational, the new system will make possible new mapping and charting products to meet Army qualitative requirements; it is expected to yield multimillion dollar savings in present map production activities throughout the Department of Defense.

Team members are Merritt W. Matthews, detailed as technical adviser to the CG of TOPOCOM; Serenus W. Dossi, detailed as chief, Engineering Applications Division, Directorate of Advanced Systems; Reuben D. Cook, detailed as chief, Research and Technology Division, Directorate of Advanced Systems.

Kent T. Yoritomo was honored for establishing a scientific basis for planning, executing and developing an advanced sensors systems concepts to assist the Army in meeting all-weather mapping capability. "This capability," it was stated, "will be a breakthrough of inestimable value and will provide the Army with an unprecedented military superiority in the field of mapping."

The systems will be realized as a direct result of a team effort led by Yoritomo while serving as chief of the Electrogrammetric Systems Branch, Topographic Engineering Division, Engineer Topographic Laboratories, Fort Belvoir, Va.

U.S. Army Coastal Engineering Research Center (CERC), Washington, D.C. A CERC Army R&D Achievement Award selectee was chosen for extensive studies leading to engineering techniques for construction and stabilization of coastal barrier dunes. The report he coauthored with Prof. J. W. Woodhouse of North Carolina State University was presented at the Eleventh International Conference on Coastal Engineering and will be published in the proceedings of the American Society of Civil Engineers.

Rudolph P. Savage, chief of the General Projects Branch, Research Division, CERC, has been in charge of a 7-year research program studying dune (beach) growth and stabilization by various types and configurations of sand fences, and by vegetation, at an unprotected area on the Outer Banks of North Carolina.

Results show slat-type fencing in a straight line to be the most economically efficient of sand fence configurations and types, although properly designed fabric fences can be effective.

The results also show that a strip of American beachgrass, 50 to 90 feet wide, will catch all sand moving in the area, and create a better stabilized dune generally at lesser cost. Findings will influence design of dunes along open shores, now developing rapidly for recreational and other usage.

OFFICE OF THE SURGEON GENERAL. *Walter Reed Army Institute of Research (WRAIR), Walter Reed Army Medical Center (WRAMC), Washington, D.C.* Two WRAIR nominees were selected for their contributions to notable advances in biochemistry.

Dr. Walter Mertz has established a new trace-metal chromium, CR (III), "as a nutritional requirement which must be maintained in order that normal utilization of glucose and lipids will be maintained.

"His dietary evaluations of this study have established the requirements for CR (III) and have clearly shown the lack of ability of experimental animals to use carbohydrate normally when on a CR (III) depleted diet. The model system established by

(Continued on page 34)

R&D Achievement Awards Recognize Services of 45 Employes

(*Continued from page 33*)

Dr. Mertz has had a broad influence on development of this new area of clinical investigation. . ."

As chief, Department of Biological Chemistry, Division of Biochemistry at WRAIR, Dr. Mertz continues a key role in setting up new evaluation programs in this emerging area of nutritional importance.

Dr. Bhupendra P. Doctor, a research chemist in the Department of Biological Chemistry, Division of Biochemistry, WRAIR, developed a system of assay and purification of nucleic acid materials that has allowed him to isolate, purify and crystallize tyrosine transfer ribonucleic acid (t-RNA).

The citation states "he has completely elucidated the amino acid sequence of this material and has been the first to report the chemical characteristics of this amino acid transfer ribonucleic acid. He has further shown that this essential protein synthesis material is species-dependent for some strains of bacteria and yeast, and has furnished the biological and chemical model for extension of such vital studies to the malarial parasite and to viral diseases."

Armed Forces Institute of Pathology (AFIP), Washington, D.C. Basic research contributions to immunology techniques earned an R&D Achievement Award for one of AFIP's recognized experts.

Dr. Peter A. Ward demonstrated, by immunofluorescent methods during investigation of chemotaxis, that a malarial antigen-antibody complex may form an insoluble protein in kidneys of infected animals. From tests with monkeys, then in human cases of malaria with nephrosis, it was discovered that the immunopathic mechanism of malaria is the formation of immune complexes consisting of malarial antigen and antibody.

Under certain conditions, this circulatory soluble immune complex became deposited in renal glomeruli. This deposit leads to functional and structural aberrations recognized clinically as the nephritis, or nephrosis, or malaria.

This is the first time a precise method for detection of malarial antibody has been described. The military and public health implications are related directly to the high incidence of malaria in Southeast Asia and the development of drug-resistant malarial strains.

Dr. Ward has been designated by the U.S. Army Surgeon General as Army liaison representative, National Institutes of Health Allergy and Immunology Study Section.

Aviation Material Laboratories Evaluate Boron Film Composite

Evaluation of a new boron film composite material for use in certain aircraft construction requirements was announced early in May by the U.S. Army Aviation Materiel Laboratories, Fort Eustis, Va.

Under contract with Norton Research Corp., the composite was developed to provide a high-strength material that is significantly lighter and stiffer than present materials.

AVLABS researchers said it is the only composite that has a "built-in" multidirectional stiffness and strength, which simplifies fabrication.

The film technique differs from the conventional fiber approach to composites in which each strand is adjacent to each other, with layers criss-crossed to get strength and stiffness in several directions.

Engineers said the composite—a laminate of plastic film coated with a hair-thin boron layer—is 30 percent lighter than aluminum and 50 percent lighter than titanium. It is twice as stiff as aluminum and 35 percent stiffer than titanium.

Applications for the qualities of the material are expected in advanced design aircraft, such as vertical and short take-off and landing types, jumbo jet carriers, space vehicles and missiles.

USACDC 'Troika' Conducts Land Combat System-90 Study

Creative concepts envisioned for materiel, organization and doctrine requirements for the U.S. Army of the 1990s are invited from sources within and outside the U.S. Government for incorporation into Phase I of a Land Combat System-90 Study.

The so-called "Troika" of U.S. Army advanced planning organizations—the Institute of Land Combat (ILC) of the Combat Developments Command, the Advanced Materiel Concepts Agency (AMCA) of the Materiel Command, and the Intelligence Threat Analysis Group (ITAG) of the Assistant Chief of Staff for Intelligence—are conducting the study.

AMCA has been charged with the responsibility to use new technology in a more creative way to influence future materiel and to reduce the time required to field new materiel. Accordingly, AMCA is developing a catalog of advanced materiel concepts to fulfill, in part, this responsibility.

The catalog, consisting of conceptual designs of materiel items that could be available by the 1990s, will be used as a "shopping list" from which equipment for the future Army will be selected. The value of the catalog, it was stated, will be directly proportional to the contributions of ideas from government, industry, educational institutions, and individual engineers and scientists.

Descriptions of such concepts from organizations and personnel within and outside of government are invited in the following format: 1) what does it do and how does it work; 2) physical characteristics; 3) performance characteristics; 4) apparent technical constraints; 5) special considerations; 6) resource implications (estimated costs, scarce materials and/or skills).

Queries should be addressed to the Plans and Objectives Branch, Operations Analysis Division, U.S. Army Advanced Materiel Concepts Agency, Washington, D.C. 20315.

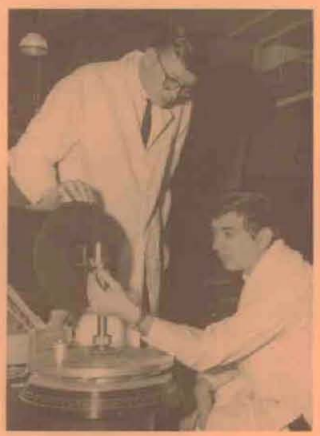
SAM–D Air Defense System Passes Wind-Tunnel Tests

Advanced development of the SAM–D new air defense missile system passed another milestone recently with completion of an extensive 12-month wind-tunnel test program.

Five tests of the scale missile model in three different wind tunnel facilities provided force and moment data, air load distribution measurements, and heat transfer data to verify the aerodynamic design of the missile. Tests were run by Martin Marietta Corp. at NASA Langley Research Center at NASA Ames Research Center, and in tunnels of the Air Force Arnold Engineering Development Center.

Force and moment measurements incorporate a unique control system for remotely positioning the missile control fins at various angles during the test runs. Hinge moment measurements were made with strain-gauge instrumentation built into the fins.

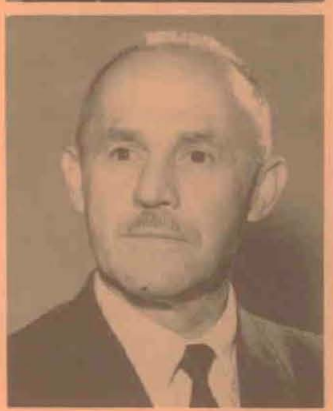
The SAM–D is directed by the U.S. Army Missile Command, Redstone Arsenal, Ala., with Col James C. Miller as project manager. Martin Marietta, subcontractor to Raytheon Co., is responsible for the missile and its shipping-launching canister.



R&D Achievement Award Winners

(For photos of other winners and the laboratories with which they are associated, see pages 34 and 36. Story begins on page 1.)

Counterclockwise from right: (1, 2, 3) ***Louis R. Szabo*** and ***Paul J. Kisatsky***; seated, ***Benjamin D. Lehman*** and ***Eugene F. Bozza***; standing, ***Joseph S. Stack, Dr. Jean P. Picard, Robert G. Wetton*** and ***Robert P. Baumann***; standing, ***Dr. Henry J. Prask***; kneeling, ***Dr. Samuel F. Trevino***, Picatinny Arsenal, Dover, N.J. (4) ***Herman P. Gay***, U.S. Army Ballistic Research Laboratories, Aberdeen Proving Ground, Md. (5, 6, 7) ***Dr. Michael Sadowsky, Dr. San Li Pu*** and ***Dr. Moayyed Hussain***, U.S. Army Weapons Command, Rock Island Arsenal, Ill. (8, 9) ***George M. Stewart*** and ***Eleanor V. Crabtree***, Edgewood Arsenal, Edgewood, Md. (10, 11) ***William E. Mimmack, Oscar Calderon***, White Sands Missile Range, N. Mex.



R&D Achievement Award Winners

(For photos of other winners and the laboratories with which they are associated, see pages 34 and 35. Story begins on page 1.)

Counterclockwise from left: (1, 2, 3) *John P. Schoening, John P. Agrios* and *Dr. George H. Hass*, U.S. Army Electronics Command, Fort Monmouth, N.J. (4, 5) *Kent T. Yoritomo, Merritt W. Matthews, Serenus W. Dossi* and *Reuben D. Cook*, U.S. Army Topographic Command, Washington, D.C. (6) *Rudolph P. Savage*, U.S. Army Coastal Engineering Research Center, Washington, D.C. (7) *Dr. Peter A. Ward*, Armed Forces Institute of Pathology, Washington, D.C. (8, 9) *Dr. Walter Mertz* and *Dr. Bhupendra P. Doctor*, Walter Reed Army Institute of Research, Washington, D.C. (10) seated, *Letcher A. Lofgren, Evan D. Fisher, Morton A. Barron*; standing, *P. Anthony Guarino* and *Clyde D. Hardin*, Harry Diamond Laboratories, Washington, D.C. (11) *Joseph F. Messina*, Frankford Arsenal, Pa. (12) *Dr. R. L. Hartman*, U.S. Army Missile Command, Redstone Arsenal, Ala.

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