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Directors' Reports Indicate Success of Army ILIR Program

Army In-House Laboratories Independent Research (ILIR) achievements in an FY 1966 program funded at $11.2 million, involving 459 research tasks at 46 R&D activities, again carry hearty endorsement of lab directors.

Unanimous acclaim of the program for the fourth consecutive year is contained in annual reports of work in progress and significant results. Reports were submitted for review by the Assistant Secretary of the Army (Research and Development).

An Ad Hoc Committee appointed by the then Acting ASA (R&D), Charles L. Poor, reviewed the reports in an Aug. 22–23 meeting to consider requests for FY 1967 funding of the ILIR Program. Requests totaled $11,365,000; available funding for FY 1967 is $10.2 million.

The committee included: Dr. Ralph E. Fadum, vice chairman, Army Scientific Advisory Panel and Dean of Engineering, North Carolina State University; Dr. Joseph Sternberg, ASAP member and assistant direc-

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President Appoints Industrial Executive ASA (R&D)

Newly appointed Assistant Secretary of the Army (R&D) Dr. Russell D. O'Neal is a distinguished industrial scientific leader, known for achievements in basic research and in development of radar, computer and weapon systems.

President Lyndon B. Johnson announced appointment of Dr. O'Neal to fill the vacancy created June 24 by resignation of Mr. Willis M. Hawkins, who earned two Distinguished Civilian Service Awards during nearly three years of service.

Secretary of the Army Stanley R. Resor administered Dr. O'Neal's oath of office at an Oct. 3 ceremony in the Pentagon, Washington, D.C.

Since 1963 Dr. O'Neal has achieved

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Dr. Russell D. O'Neal

ASAP to Review Nike-X, Other Army Air Defenses

Army air defense development—Nike-X in particular—will be reviewed firsthand Oct. 31–Nov. 1 at Fort Bliss, Tex., and White Sands (N. Mex.) Missile Range by the Army Scientific Advisory Panel (ASAP).

The first ASAP meeting in FY 1967 will be attended by the new Assistant Secretary of the Army (R&D), Dr. Russell O'Neal, who became an ASAP executive committeeman with his recent appointment.

General Frank S. Besson, Jr., CG of the U.S. Army Materiel Command, Lt Gen A. W. Betts, Army Chief of Research and Development, and Lt Gen Ben Harrell, CG of the Army Combat Developments Command, also plan to participate.

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MBT-70s Tests Scheduled Under New U.S. Manager

Testing and evaluation of the Main Battle Tank–1970s, a United States-Federal Republic of Germany design and developmental project, will be done concurrently in both countries, with Maj Gen Edwin H. Burba as the new U.S. program manager.

Appointment of General Burba to succeed Maj Gen Welborn G. Dolvin, now assigned to command the 3rd Armored Division in Germany, was announced Oct. 5 by the U.S. Army Materiel Command, Washington, D.C.

General Burba, commander of the "Big Lift" of the 2nd Armored Division from Fort Hood, Tex., to Germany in 1963, assumed his new duties at AMC Headquarters, Washington, D.C., upon completion of a tour of duty as chief of the Joint Military Assistance Advisory Group (MAAG) in Korea.

General Dolvin, the first U.S. program manager for the MBT–1970's, won recognition for guiding the design and development of single MBT acceptable to both the U.S. and the

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Maj Gen Edwin H. Burba

Featured in This Issue . . .

Army R&D Newsmagazine

Vol. 7, No. 9 October 1966

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Anticipation—the Mother of Invention

By Maj Gen Roland B. Anderson

Commanding General, U.S. Army Weapons Command

Teddy Roosevelt once advocated a national policy in his famous quotation, "Speak softly, but carry a Big Stick." It is my contention that the epitome of this policy is superior weaponry.

Another great American, General of the Army Douglas MacArthur, made this statement: "A good soldier, whether he heads a platoon or an army, is expected to look backward as well as forward, but he must think only forward."

The U.S. Army Weapons Command Staff combines "Thinking Forward" with the "Big Stick" in research and development. Results of our completed R&D programs, we believe, have led to the most advanced weapons in the world today. Prototypes of the current R&D program, which are not yet in production, are expected to provide superior weaponry for the fighting men of tomorrow.

Today in Viet Nam, our soldiers are fighting with modern weapons developed by the Weapons Command. New individual weapons, such as the M79 40mm grenade launcher, have proved extremely effective. A new crew-served weapon, the M60 7.62mm machinegun, has also played a vital role. New artillery in use includes the M102, a helicopter-transportable 105-mm howitzer, and the M107, a self-propelled 175mm gun.

All of these weapons have been developed since the Korean conflict to meet a requirement for lighter weight, greater firepower, and increased mobility. In addition to new weapons, standard combat vehicles have been modified to meet the peculiar qualitative requirements growing out of experience gained in Viet Nam. The M113 armored personnel carrier is the principal vehicle involved in these modifications.

The Communists' use of conventional warfare was defeated in South Korea. This led them to employ guerrilla warfare in Viet Nam and other areas of the world. Armies using conventional warfare equipment and techniques have not proved to be wholly effective against a strong insurgency movement. Consequently, guerrilla warfare in Viet Nam created a requirement for new weapons and new techniques.

Necessity was the "mother of invention." Today, the Army has its first Air Mobile Division as well as new equipment, tactics and techniques that proved quite effective in South Viet Nam. As President Johnson recently stated, "The tide has turned."

What is behind the turning of the tide of guerrilla warfare? One of the major contributing factors is the new and dynamic concept of air mobility . . . mobility of both manpower and firepower. The mobile firepower is provided by the Weapons Command in the form of aircraft armament. This is one of the most progressive of AWC's R&D programs.

As early as 1958, it was determined that our helicopters could effectively employ firepower in a defensive role. The first aircraft armament consisted of "off the shelf" items such as the M37 caliber .30 machinegun and the M60 7.62mm machinegun mounted in a fixed position on the H13 helicopter. Later, the M60C machinegun was used to arm the UH–1B helicopter, the current workhorse in Viet Nam.

Why was it necessary to use a machinegun developed for ground use in an aircraft armament role? Because of a lack of R&D effort in this area, no armament hardware existed for helicopter use! There was a lack of R&D effort due to the lack of a requirement.

Necessity generated a requirement which has been met dynamically with modern weapons such as the M5 helicopter armament subsystem, a flexible, remote controlled system which employs an automatic 40mm grenade launcher. Designed specifically for use on helicopters, this completely new weapons system was introduced in Viet Nam in May 1965.

Another new system soon to be introduced in Viet Nam is the XM21, which provides a good example of still greater improvement in aircraft armament. The XM21 system has two miniguns and two 2.75-inch rocket pods. The minigun is a 7.62mm machinegun using the old Gatling gun concept. When compared to the M60C machinegun it replaces in the aircraft armament role, the minigun will provide a notable increase in the rate of fire by a ratio of 3 to 1.

Other ultramodern weapon systems, incorporating the most advanced technology available, are on the drawing

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Directors' Reports Indicate Success of Army ILIR Program

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tor, Research and Advanced Concepts, Martin Co.; Dr. Herbert L. Ley, Jr., ASAP member, who recently resigned as Associate Professor of Epidemiology and Microbiology, Harvard University, to become Director of Medicine, U.S. Food and Drug Administration;

Also, Dr. Richard A. Weiss, Deputy and Scientific Director of Army Research and chairman, The Army Research Council (TARC); Brig Gen Tobias R. Philbin, Jr., Deputy Director of Research and Laboratories, U.S. Army Materiel Command; and Col K. C. Emerson (PhD), Assistant for Research to the Assistant Secretary of the Army (R&D).

Impetus for establishment of the program originated in a study report claiming the overall capability standard desirable for Department of Defense in-house scientists and engineers had not kept pace with the rapid growth in research and development requirements since the Korean War.

In an October 1961 memorandum to Secretaries of the Army, Air Force and Navy, Secretary of Defense Robert S. McNamara expressed "profound concern for the maintenance of a vigorous program and the highest morale within the laboratories througout the Department of Defense.

"The work which they have accomplished in the past and which they are now doing is of great importance. The technical standards for the laboratories must be raised and maintained at the highest level."

Under that guidance, the Army, Air Force and Navy set up separate ILIR Programs. Secretary McNamara further outlined his views by saying:

"Depending upon the mission and nature of the work of the particular laboratory, a fraction of the annual laboratory budget shall be set aside for work judged by the laboratory director to be of promise or imporance, without need of prior approval or review at higher levels. The results of this work shall be reviewed by the Assistant Secretaries for Research and Development of the Military Departments."

Army Regulation 705–55 stipulates that the special investigative effort may be correlative to approved projects and tasks in the regular R&D program. However, funds specifically cannot be used to compensate for deficiencies in regular funded programs or to support outside work, except where such outside or contract work is deemed necessary to support tasks of in-house personnel.

Freedom of action is implicit in guidance for the ILIR Program. AR 705–55 requires that selection of tasks be based on "some definite promise of yielding results beneficial to the Army. Projects of only marginal return will be eliminated. . . . Each laboratory or activity will have a principal mission or objective area in which it is expected to concentrate, lead and excel.

"New and challenging tasks," representative of creative thinking of a high order, are stressed for ILIR. In addition to increasing competence of researchers, by enabling them to do work suited to their professional interests, the program aims to provide a source of funds to counter "job-shop" operations, thereby enhancing overall balanced R&D effort.

The hard core of the ILIR Program, also considered the secret of its success to date, is the provision that laboratory and technical directors are not subjected to an advance review process of research proposals at higher levels. Their decisions must be justified later—by the results.

Scientists and engineers are responsible for designing their work plan in proposing projects, the resources required, and the necessary authority to accomplish their plan. The laboratory director is responsible for holding them to account for results, for evaluating their competency, and for program planning.

As delineated in six operational policies in AR 705–55, a "positive manpower management program . . . [calls for] exploiting every reasonable means for attracting and retaining creative, energetic, efficient and conscientious scientific and technical personnel; for using them productively; and for advancing their professional development."

Army General Staff responsibility for establishing and assuring implementation of ILIR policies and for the management and control of R&D laboratories rests with the Chief of Research and Development, Lt Gen A. W. Betts. Within his guidance, the U.S. Army Materiel Command Commanding General, The Surgeon General, and the Chief of Engineers are charged with implementing the program.

SUMMARY OF FY 1966 ILIR PROGRAM: Difficulty of major magnitude would be encountered in

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ASAP to Review Nike-X, Other Army Air Defenses

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Deputy Director of Defense Research and Engineering for Strategic and Space Systems, Daniel J. Fink, will be the featured after dinner speaker at Fort Bliss. He reviews, analyzes and evaluates all DoD space programs and the major missile test ranges.

ASAP Chairman Dr. Harold M. Agnew, leader of the Weapons Division, Los Alamos (N. Mex.) Scientific Laboratory, will conduct the regular business session designed to bring the ASAP up to date on its various tasks.

The keynote of this session will be the final report of the ad hoc group on Combat Vehicle Weapons Systems. Currently this report is in the process of review by the Department of the Army staff and major Army commands for development of a coordinated Army position and subsequent presentation to Dr. O'Neal and the Chief of Research and Development. Chairman of the ad hoc group is Dr. William C. Tinus, vice president of Bell Laboratories, Inc., Whippany, N.J.

At Fort Bliss, the ASAP will be briefed on the long-range program for Nike-X, including employment, training and logistic concepts. Although emphasis will be on the Nike-X, other weapon systems will be reviewed, such as Sam-D (surface to air missile-development), Chaparral, Vulcan, and Redeye.

At White Sands, the ASAP will be shown the "heart" of the Nike-X system, the Multifunction Array Radar (MAR), and missile control facilities of the range. Test firings of Army missile systems are scheduled.

Daniel J. Fink

Directors' Reports Indicate Success of Army ILIR Program

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attempting to evaluate comparatively those tasks, out of the total of 459 reported, which are considered most outstanding.

Significant ILIR progress has been achieved in many completed investigations and in other studies that may continue two or three years. Notable results of numerous ILIR activities have been reported in the *Army R&D Newsmagazine* during the past year—far too many to enumerate here.

One of the most recent examples is the feature that appeared on page 14 of the September edition, titled "Army Airborne Radar Probes Depth of Greenland Icecap to 10,600 Feet." Extensive testing of various possibilities of new drugs for highly resistant strains of malaria in Southeast Asia also was aided by ILIR research, as reported in that same edition.

Results of many 1966 ILIR achievements, as reported in evaluations of the worth of the program by laboratory directors, are consistently laudatory.

Take, for example, the statement of Dr. Robert E. Weigle, technical director, Benet Research and Engineering Laboratories, Watervliet (N.Y.) Arsenal:

"In addition to the publication of significant technical information, the ILIR Program has contributed in a large measure to the development of the scientific and engineering competencies of the Benet Laboratories. It has been through this program that many interesting research efforts have been initiated that have led to the attracting of advanced degree level personnel.

"As one looks back over the years that this program has been in effect, a rather startling change in the professional complexion of these Laboratories can be seen. For example, during the early part of calendar year 1962 (prior to the FY 1963 inauguration of the ILIR Program), these Laboratories had the following distribution of professional personnel: PhD level, 7; master's degree, 15; bachelor's degree, 65. Total, 87. Today the distribution is as follows: PhD level, 21; master's degree, 37; bachelor's degree 98. Total 156.

". . . The fact that funding support was provided without a detailed plan or program required at the outset has permitted the degree of flexibility to be achieved which is so necessary to maintaining and improving the professional environment.

"Particularly in the case of the advanced degree members of the staff, the ILIR Program has been singularly effective in securing their interest. Once having attracted a nucleus of such professionals, it becomes relatively simple to attract others and so the laboratory staff has been strengthened. Add to this the fact that the level of work has also improved, and the significance of continuing such a program within the Army can be readily recognized."

Out of a total of 24 ILIR studies at the Benet R&E Laboratories, 10 achieved "significant results," including stress aging in materials; investigations of interfacial energy of materials; high temperature vaporization—"whiskers" studies; anelastic relaxations; mechanics of impact in metals; electronic structure and transport properties of metals; and Bauschinger Effect in metals.

Walter Reed Army Institute of Research (WRAIR), Washington, D.C., with its field units, listed 23 tasks in its FY 1966 ILIR Program. Results in several areas were sufficiently outstanding for application to current Army mission requirements and tasks were transferred to regular R&D funding. Many of the tasks are related to welfare of U.S. Forces in Viet Nam.

Some of these studies concerned the quantitative aspects of growth of malaria parasites in terms of rate of synthesis of proteins, lipids and nucleic acids; antigenic analysis of Dengue Viruses; epidemiologic studies related to susceptibility or resistance to selected epidemic diseases; physical and psychological stress experienced by military personnel;

Also, cytogenetic and metabolic determinants in evolution of cell populations following injury; intestinal lesions of tropical sprue and infectious hepatitis, and identification of virus particles; and improved methods of treatment of patients in severe refractory shock from whatever cause, but primarily due to injury or infection.

The Surgical Research Unit at Brooke Army Medical Center, Fort Sam Houston, Tex., conducted an ILIR study to determine the rate of loss of fluid from the vascular compartment postburn, to correlate this with the extent and depth of burn.

At Fitzsimons General Hospital,

ARO-D Sets Up Environmental Sciences Division

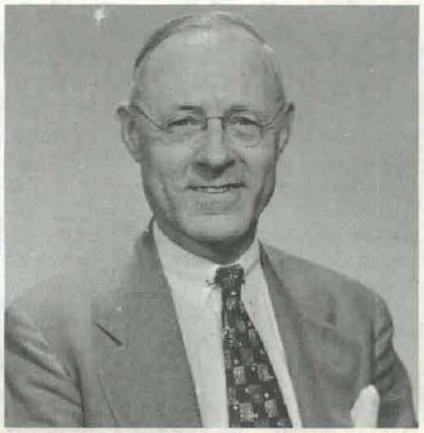
Activation of an Environmental Sciences Division in the Army Research Office–Durham (N.C.), headed by Dr. William Van Royen, distinguished American geographer, has been announced by Director of Army Research Col Robert E. Kimball.

Appointed to the Army Scientific Advisory Panel in 1958, Dr. Van Royen was vice chairman until recently and has served as a member and as a consultant. In 1944 he joined the University of Maryland faculty as professor of geography and since 1951 has headed the Department of Geography.

As Supervisor of Research for the *Atlas of World's Resources*, he worked in cooperation with the Bureau of Agricultural Economics, U.S. Department of Agriculture, U.S. Bureau of Mines and Department of the Interior. He was a consultant to the Office of the Army Quartermaster General for four years and since 1959 has been a consultant to the Department of Commerce.

Graduated in 1926 from Rijksuniversiteit Utrecht, The Netherlands, he received a PhD degree in geography at Clark University in 1928. After two years as under secretary of The Netherlands Chamber of Commerce in New York, he was assistant professor of geography at the University of Nebraska from 1930 to 1940. He then became professor of economics at Brooklyn (N.Y.) College.

The Army Research Office–Durham (ARO–D) assignment will put Dr. Van Royen in charge of ARO–D research in the terrestrial and earth sciences, as related to problems of mapping, mobility, remote sensing of the physical landscape, target location, communications, missile flight and control and environmental stresses on men and military materiel.



Dr. William Van Royen

Denver, Colo., the Medical Research and Nutrition Laboratory studies funded by the ILIR Program totaled nine tasks. Included were morphologic changes in tissue ultrastructure associated with nutritional disorders; development of germfree animal facilities and techniques for application to nutrition studies and related investigations; and the possibility of stimulating host production of immune antibodies which will inactivate or destroy antibodies which the same host will produce against a subsequently transplanted tissue.

The Medical Research Laboratory, Fort Knox, Ky., conducted studies to detoxify snake venoms and other poisons without eliminating their immunogenic properties and to elucidate the enzymology, chemistry and toxicity of fractionated venom components. Other studies dealt with the causative agent of infectious mononucleosis; effects of radiations on animal performance; and effects of methylphenidate on cellular activities and structures.

The Medical Equipment R&D Laboratory, Fort Totten, N.Y., engaged in nine ILIR tasks in FY 1966, including: a program to develop a safe, effective mechanical surgical ventilator suitable for new-born infants; modifying standard hypodermic jet injectors (particularly foot-powered units) to make them suitable for delivery of antimalarial repository drugs under development; and development of lightweight, portable and economical dental components for use in military field dentistry.

Medical Biomechanical Research Laboratory (Washington, D.C.) ILIR tasks included a program to synthesize and evaluate tissue adhesive for use in nonsuture closure of a variety of tissues; development of a hand prosthesis incorporating automatic proportional control of grasp; and synthesis of cross-linked biodegradable polymers which are tissue-receptive and can be fashioned into internal body prostheses.

Institute of Dental Research (Washington, D.C.) activities in the ILIR Program included various investigations concerned with improving the oral health of military personnel, and screening of about 300,000 inductees for the presence of oral disease. Studies to develop preventive oral health education programs also were conducted.

Research Institute of Environmental Medicine (Natick, Mass.) ILIR investigations involved basic research on thyroid metabolism, biochemistry and psychophysiology. Experimentation in thyroid metabolism, though reported "extremely laborious and requiring elegant surgical preparation and implantation techniques," is considered of significant importance if successful.

The Biological Center, Fort Detrick, Md., conducted intensive ILIR studies into the processes which control aging in plants; also, biochemical research directed to isolation and characterizing the toxic components from the *Gonyaulax species*, with highly successful results reported. In all, the Center engaged in 13 tasks.

Army Chemical Center (Edgewood, Md.) Laboratories engaged in a very extensive ILIR effort of 28 tasks, including four in organic chemistry, five in physical chemistry, five in physics, nine in biochemistry, three in physiology, and two in psychology.

Numerous publications in scientific journals evolved from this effort. Three of the seven technical papers presented by Arsenal personnel at the 1966 Army Science Conference resulted from ILIR work. The director's report stated:

"The knowledge that all scientists have a chance to enter the program and that no one has a vested interest to continue indefinitely is a driving force to think and produce."

Natick (Mass.) Laboratories ILIR activities also produced three of the papers presented at the Army Science Conference and much of the work for a fourth paper awarded a Certificate of Achievement also was ILIR effort. The Laboratories engaged in 26 tasks funded at about $400,000.

Natick effort was widely diversified, including research on food preservation, nutrition, materials, lightweight protective armor, biodegradable detergents, dynamic strain, organic compounds, and effects of high pressure and/or temperature on chemical reactivity.

In the opinion of Natick Scientific Director Dr. Dale H. Sieling: "The ILIR Program at NLABS has been valuable as a pilot model in the management of in-house research programs."

Electronics Command Laboratories at Fort Monmouth, N.J.

The ILIR Program, in the opinion of technical directors, resulted in solid

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President Appoints Industrial Excutive ASA (R&D)

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additional stature in the Nation's scientific community as vice president, Aerospace Systems, and group executive of Bendix Corp., after serving about 2½ years as vice president for Engineering and Research. From 1956 to 1960 he was general manager, Systems Division, following a year as director of Systems Planning.

With the Consolidated Vultee Aircraft Corp. from 1952 to 1955, he served a year as assistant manager, Fort Worth Division of Convair before he was promoted to director, Aircraft Nuclear Propulsion Program.

From 1949 to 1953, Dr. O'Neal was a consultant to the Research and Development Board, Department of Defense, and in 1958-59 was a member of the Study Group on Guided Missiles.

After World War II, in 1945, he worked on developing computer equipment for Eastman Kodak Co., and in 1949 moved to the University of Michigan as head of Systems Analysis. Later he became director of the Willow Run Research Center.

Dr. O'Neal was in charge of the University team, which in conjunction with the Boeing Airplane Co. conceived and designed the Bomarc weapon system. This work included the development, construction and test of track-while-scan radar systems, guidance computers, and special display equipment. New techniques were developed for rocket throttling and propellant storage.

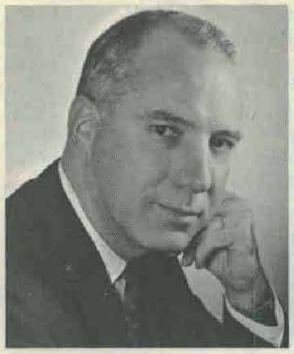
Graduated from DePauw University in 1936 with a BA degree in mathematics and physics, he received a PhD in nuclear physics from the University of Illinois in 1941. From 1936 to 1942 he taught physics at the University, until he joined the Radiation Laboratory staff at Massachusetts Institute of Technology.

As section chief and later group leader at MIT, he was engaged in the development of microwave radar equipment. He was credited with developing the first radar corner reflectors, directional couplers, and FM test sets for measuring radar performance. During research at the University of Illinois, he worked on a project which led to the discovery of tritium by bombardment of beryllium by deuterons.

Dr. O'Neal has published 10 papers in nuclear physics journals and is the author of numerous other papers in a variety of fields.

A Fellow of the American Physical Society and Institute of Electrical and Electronic Engineers, he is a member of the American Nuclear Society, American Institute of Aeronautics and Astronautics, American Association for Advancement of Science, American Institute of Management, and a director of the Atomic Industrial Forum. He is listed in *American Men of Science, Who's Who in Engineering*, and *Who's Who in America*.

3 HDL Scientists Attain International Award for Fluid Amplifier



Billy M. Horton

Raymond W. Warren

Dr. Romald E. Bowles

Invention of the fluid amplifier has won for three Harry Diamond Laboratories (HDL) scientists places among such immortals as Mme. Curie, Edison and Marconi on an international awards roster started in 1816.

Billy M. Horton, Raymond W. Warren and Dr. Romald E. Bowles have joined scores of eminent scientists and inventors who, during the past 150 years, have received the John Scott Award, honoring the memory of a wealthy Scotch chemist. In 1961 the HDL scientists received Army R&D Achievement Awards for teamwork in developing fluid amplification controls.

Horton is the HDL technical director and holds the first basic individual patent for the original concepts of fluid amplification controls technology. Fluid controls have attracted worldwide attention for industrial applications and are being used in HDL's continuing development of the Army's experimental heart pump.

Warren is a research and development supervisor known also for his work in other scientific areas. Bowles resigned as a member of the HDL scientific staff in 1962 to found the Bowles Engineering Corp., Silver Spring, Md., which he heads.

The John Scott Award, consisting of a medal and $1,000 premium for each, will be presented at some future scientific or professional meeting not yet specified. Announcement of the award was made by individual letter to the scientists from the Board of Directors of City Trusts, Philadelphia, Pa., administrators of the John Scott memorial.

As noted in "Handbook of Scientific and Technical Awards," page 350, the John Scott Medal is a "Copper medal and a sum of money for inventions useful to mankind in the development of chemical, medical or any other science or development of industry in any form; to a man or woman of any nationality."

Listing of recipients in the Handbook begins with the year 1900 and reads like a Who's Who in international scientific accomplishment. (The medal trust was administered from 1834-1919 by the Franklin Institute.) Famous inventors, engineers and scientists—Vannevar Bush, Sir Alexander Fleming, Orville Wright, Lee De Forest, Irving Langmuir—are listed through the years.

During certain years, 1930 and 1935 for example, no awards were made, presumably because accomplishments did not meet the standards of the Advisory Committee which recommends recipients to the Philadelphia board of directors.

Behind the development of the fluid amplifier is technology similar to that of an electrical amplifier. The fluid amplifier does for weak pressures of gases and liquids what an electronic amplifier does for a small amount of electrical current. It gives them power to make things move.

In fluid amplification, entire fluid circuits have been developed similar in function and purpose to electrical circuits. As an electrical charge may be built up at points in an electrical circuit, fluid pressure is built up at corresponding points in fluid circuits.

Many scientists and engineers foresee increased use of fluid amplifiers in many systems because they are simple, have no moving parts, require little servicing and are not affected by radiation or vibration.

BILLY M. HORTON joined HDL, then the Diamond Ordnance Fuze Laboratories (DOFL), when they were established in Washington, D.C., in 1953. Through progressively notable achievement, he rose to the top position of technical director in 1962.

In 1960, he received the highest award of the Instrument Society of America, the Arnold O. Beckman Award, also based on his achievements in fluid amplification. He was honored again in 1965 with the Army Decoration for Exceptional Civilian Service.

Horton joined the National Bureau of Standards in 1951 after four years as a physicist at the Naval Research Laboratories. He is a 1941 graduate of the University of Texas with a BA degree in physics. He served as a radar officer with the Army Signal Corps in France, receiving his radar training at Harvard University and MIT in 1942-43 and a master's degree in physics (1949) from the University of Maryland.

RAYMOND WARREN was an engineer at the U.S. Naval Bureau of Ordnance before joining HDL in 1953. He is a graduate of the University of Rhode Island in 1937 with a BS degree in mechanical engineering. During World War II he rose to the rank of lieutenant colonel in Army Ordnance. In 1965, he received the Decoration for Meritorious Civilian Service for his part in fluid amplification development.

Warren is a registered professional engineer and a member of the American Society of Mechanical Engineers.

ROMALD BOWLES received BS, MS and PhD degrees in engineering from the University of Maryland. Before he joined the HDL staff he served as a mechanical engineer at the Naval Ordnance Laboratory, was senior engineer at the Applied Physics Laboratory, Johns Hopkins University, and was research scientist at Redstone Arsenal, Ala.

He also received the Decoration for Meritorious Civilian Service for fluid amplification work and the 1965 Achievement Award of the National Fluid Power Association. He is a registered professional engineer and a member of several professional organizations including the Institute of the Aeronautical Sciences, American Nuclear Society and the American Ordnance Society.

McBride Nominated for BG Rank

George H. McBride, project manager of the Hawk air defense missile system at the U.S. Army Missile Command, has been nominated for the rank of brigadier general by President Lyndon B. Johnson.

The nomination of McBride, who is now serving his third tour at Redstone Arsenal, Ala., has been sent to the United States Senate for confirmation.

Dr. Wikner Takes DASA Deputy Director Post

Dr. Nils Frederick Wikner took office Sept. 1 as Deputy Director, Scientific, Defense Atomic Support Agency (DASA), succeeding Dr. Theodore B. Taylor, under whom he had served as scientific assistant since July 1965.

DASA Director Lt Gen H. C. Donnelly, USAF, announced the appointment. DASA is the joint service organization that plans and coordinates Defense nuclear weapons programs, monitors the nuclear weapons stockpile, and conducts nuclear effects research and underground tests.

The agency also maintains the U.S. readiness capability to resume other types of nuclear testing should the Limited Nuclear Test Ban Treaty be broken or national security warrant resumption.

Dr. Wikner obtained his PhD in physics from the University of California in Berkeley in 1957 and was employed by the Aerojet Corp. as a physicist in charge of reactor physics, nuclear analysis and the critical assembly program for the Army's gas-cooled nuclear power plant development effort.

Dr. Nils F. Wikner

In 1958 he joined the General Atomic Division of General Dynamics Corp., where he made major contributions to research and power reactor development programs. In the three years prior to his appointment to the Defense Atomic Support Agency, Dr. Wikner gained experience in the effects of nuclear explosives and ballistic missile systems.

TARC Member Becomes Deputy Director of ECOM Lab

Known for his work in organizing the nationwide tornado forecasting service operated by the U.S. Weather Bureau, Kenneth M. Barnett recently became deputy director of the Atmospheric Sciences Laboratory, U.S. Army Electronics Command, Fort Monmouth, N.J.

A member of The Army Research Council (TARC) since 1965, Barnett has 25 years of experience in atmospheric sciences and was formerly chief of the Atmospheric Sciences Research Division at Fort Huachuca, Ariz.

After graduating from the University of Kansas in 1941, cum laude, with a bachelor's degree in mathematics and physics, he became an observer for the U.S. Weather Bureau. Entering the Navy in 1942, he served as an aerological officer until 1946, then returned to the Weather Bureau as a forecaster.

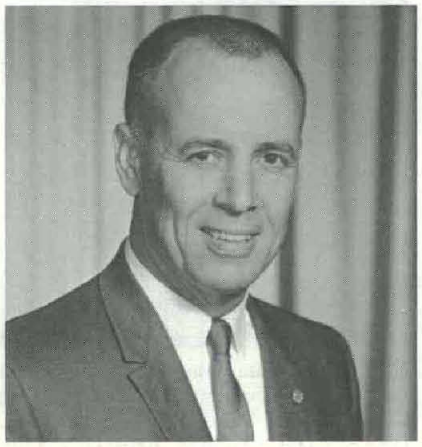
A meteorological officer with the Irish Meteorological Service at Shannon International Airport from 1947 to 1949, he then served with the U.S. State Department in Germany until 1952 as a member of the Allied Meteorological Board.

With the U.S. Weather Bureau from 1952-54, he was engaged in building up the special service which has attained a high degree of accuracy in the difficult task of predicting and sending out warnings of advancing tornadoes—or of conditions likely to produce them. The service, now known as the National Severe Storms Forecasting Center, has its headquarters in Kansas City.

In 1954, Barnett accepted a position in meteorological research and management at Fort Huachuca, with what was then the Army Signal Corps. He was engaged in developing military meteorological programs, radiological fallout studies, organizing meteorological teams, and in conducting advanced research in micrometeorology — which deals with sharp differences in weather that may occur within small areas.

In addition to his bachelor's degree, Barnett holds a certificate in meteorology from the University of Chicago and has completed advanced courses with the Graduate School, University of Arizona.

Cited for outstanding performance by the U.S. Weather Bureau, he was given the Army's Meritorious Civilian Service Award in 1959, and a Certificate of Achievement by the Assistant Secretary of the Army for Research and Development earlier this year.



Kenneth M. Barnett

Alum Plays Defense Role As Filler for Test Ammo

Alum, the compound most commonly used in baking powders, dyes, manufacture of paper—and in aftershave styptic "pencils"—has found an important use as the filler for practice and test ammunition.

Milton Roth, a chemist at Picatinny Arsenal, Dover, N.J., spent two years seeking an economical, ballistically sound filler for practice ammunition that is compatible with TNT, RDX and HMX explosives.

Some of the exacting requirements that had to be met included duplication of the weight and volume of the actual explosive, stability under a wide variety of conditions, capability of being loaded in the same way on the same equipment as the explosive, and ease of cleaning after firing to permit reuse of the shell casings.

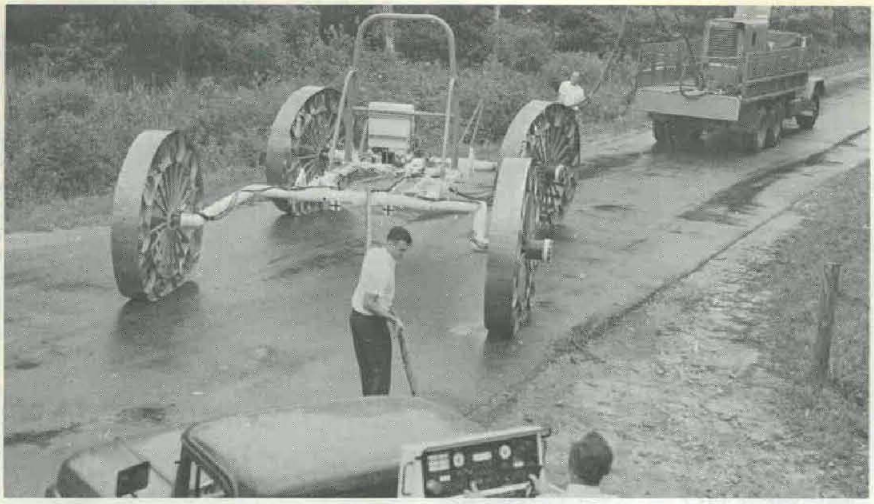
An alum-based filler is Roth's solution. It has survived storage in 175mm test shells for two years, is stable, odorless, nontoxic, and water-soluble so that it can be cleaned easily from shell casings.

Manufacturing and loading demonstrations of the new filler were held successfully at Aberdeen Proving Ground, Md., the Lone Star Army Ammunition Plant in Texas and Picatinny Arsenal.

Significant savings in material and labor costs are anticipated by use of the alum filler base instead of fillers currently in use.

Dr. Yovitz Joins Ohio State Staff

Dr. Marshall C. Yovitz, former executive director and adviser for the biannual Military Operations Research Symposia (MORS), is now chairman of the Division of Information Sciences at Ohio State University, Columbus. Since 1961, he has been director of the Naval Analysis Group, Office of Naval Research, Washington, D. C.



MOBILITY TEST ARTICLE (MTA) undergoes hard-surface tests on the Development and Proof Services dynometer course at Aberdeen Proving Ground, Md. The lunar-surface vehicle is put through its paces by remote control from the vehicle at the rear. The lead vehicle supplies power to the MTA through umbilical cables. Note wheel deflection of the test vehicle.

APG Testing 2 Concepts of NASA Lunar Vehicle

Two concepts of a vehicle designed for NASA research on lunar surface mobility are undergoing hard-surface tests by Development and Proof Services (D&PS), U.S. Army Test and Evaluation Command, Aberdeen Proving Ground, Md.

The Mobility Test Article (MTA), a 4-wheeled, 1,760-pound vehicle, weighs about one-sixth as much as Molab (mobile laboratory), the lunar vehicle it was designed to represent. The weight permits wheel-load simulation of the complete vehicle on the moon where gravity is one-sixth that of Earth.

The vehicle is undergoing road-load tests, power output, rolling resistance and steering tests. Power requirements and other mobility characteristics are being measured on varying degrees of slopes up to 60 percent.

The MTA was constructed by Bendix Systems Division, Ann Arbor, Mich., and was shipped to D&PS from NASA's Marshall Space Flight Center in Huntsville, Ala. It is 24 feet 3 inches long, 14 feet 8 inches wide, and 10 feet 8 inches high, with a 211-inch wheelbase.

In its stripped-down configuration, the MTA consists of a tubular aluminum chassis, wheels, suspension systems, drive mechanism and a driver station. Power for the vehicle is furnished by batteries on board or by an umbilical cable.

The 80-inch diameter wheels, with aluminum spokes, are made of small spring titanium circles arranged around a larger ring, with another larger ring serving as the "tread" on the outside perimeter.

Each wheel has its own drive motor, which permits the driver to turn "on a dime" by making the wheels on the right turn in one direction and the other two wheels turn in the opposite direction.

Individual suspension systems enable the vehicle to go up or down in crossing ditches and obstacles. It can travel forward, backward, up steep inclines, over obstacles and down hills at a steep lateral angle.

On the driver's instrument panel, the primary controls are two levers. The left-hand lever increases vehicle speed as it is tilted forward and applies brakes when tilted back. The right-hand lever tilts to right or left for turning the vehicle.

MTA program manager Herbert Schaefer discusses tests with Maj Gen Leland G. Cagwin (left), USATECOM CG, and Brig Gen John K. Boles, Deputy CG, USATECOM.

The second concept, a 6-wheeled unit that will undergo similar tests by D&PS, is a product of General Motors. Upon completion of the hard-surface tests, both vehicles will be shipped to Yuma Proving Ground, Ariz., for soft-surface and further evaluation testing.

Mobility test data obtained from the evaluations will be used for design of a Local Scientific Survey Module (LSSM), a vehicle astronauts could use in traveling the moon's surface on exploration missions.

Design of Experiments Set For Joint Agency Conclave

The Twelfth Conference on the Design of Experiments in Army Research, Development and Testing will be held Oct. 19–21 at the new quarters for the National Bureau of Standards (NBS) in Gaithersburg, Md.

Sponsored by the U.S. Army Mathematics Steering Committee, the annual conference will be hosted jointly by NBS and the Army's Harry Diamond Laboratories. Designed to foster the use of statistical methodology in Army research and developmet, it includes technical sessions on unsolved problems and pre-design stage experiments.

Technical papers will be presented by nationally known scientists and eminent statisticians. Prof. Brian W. Conolly, Virginia Polytechnic Institute, will discuss "Operations Research" and Dr. John Mandel, NBS, will speak on "Real Statistical Analysis."

Prof. W. G. Cochran, Harvard University, is scheduled to present "Planning of Observational Studies of Human Populations." Prof. Norman L. Johnson, University of North Carolina, will discuss "Order Statistics."

The winner of the 1966 Samuel Wilks Memorial Award will be announced. This award memorializes the late Princeton University professor as one of the Nation's great mathematicians, responsible for exceptional contributions to both theoretical and applied mathematics.

Dr. Frank E. Grubbs of the Army Ballistic Research Laboratories, Aberdeen Proving Ground, Md., the "initial" recipient of the award, is chairman of the conference and the Wilks Award Committee.

Prof. John W. Tuckey, world-renowned statistician of Princeton University, was the first award winner in 1965 under criteria established by a committee appointed by the American Statistical Association.

Army Standardizes First Man-Portable Field X-Ray Unit

For the first time in military medical history, a man-portable open-air X-ray field unit has been accepted by the Army as standard equipment for medical units serving isolated battlefields.

Approximately five years of research and development of the revolutionary field unit ended Sept. 22 when it was type-classified "Standard A" and placed in the supply system by the Army Medical Service Materiel Technical Committee.

The self-contained polaroid radiograph apparatus was conceived by Benjamin D. Pile, technical director of the Army Medical Equipment Research and Development Laboratory (MERDL), Fort Totten, N.Y. Last year, he received the Decoration for Exceptional Civilian Service from the Secretary of the Army for his work as project engineer.

Transportable by a 3-man team, the X-ray unit is contained in three neoprene-coated foam-cushioned cases which total 100 pounds. The heaviest, 40 pounds, contains the power unit with built-in battery and charger and the timer. The encased tube-transformer weighs 25.5 pounds and the package containing the camera stand, film and cassette weighs 34.5 pounds.

MERDL Technical Director Benjamin D. Pile demonstrates portable field X-ray unit which he designed and developed. Assisting are (standing, from left) SFC Erwin Patzke, Sgt Richard Messing and Sp-4 Dennis Sexton.

A spring-driven polaroid film processor weighs 21.5 pounds and can be carried by a fourth man if daylight on-the-spot developing of the X-ray film is desired.

The complete apparatus can provide forward-area medical units with radiographs (roentgenographs) in a few minutes to aid diagnoses by determining the exact location of foreign matter or fractures in any part of the body.

As demonstrated in field tests, three or four men can unpack and assemble the apparatus, ready for use, in seven minutes. One man requires 18.5 minutes. Cushioned containers permit air-drop of the unit.

The apparatus contains a specially designed nonspill lead-acid storage battery and recharger which operates on 110-volt conventional power lines or vehicular power systems. One charge will provide 1,200 seconds of exposure. Exposure for each radiograph varies from a fraction of a second to several seconds, depending on the part of the body being photographed.

The X-ray tube operates on 110 kilovolts and a current of two milliamperes furnished by a 400-cycle transformer. Both tube and transformer are housed in a small gas-insulated container.

The electrical factors of high voltages and low current reduce the amount of radiation to which the patient is exposed and reduce the power and weight requirements of the unit.

Earlier developmental efforts to produce a lightweight battlefield X-ray unit were unsuccessful because the apparatus could not withstand field conditions. Units currently in use weigh some 1,200 pounds.

The new machine was developed at the Fort Totten laboratory under contract with Bracke-Seib X-ray Co., Inc., Pelham Manor, N.Y.

Fitzpatrick Heads Medical R&D Command Nuclear Unit

Lt Col Jack C. Fitzpatrick has been assigned to the U.S. Army Medical R&D Command in Washington, D.C., as chief of the Nuclear Energy Division and consultant to The Surgeon General in nuclear medicine.

Col Fitzpatrick served from 1959-61 as assistant to The Surgeon General's special assistant for nuclear energy and as deputy to the chief, Nuclear Energy Division. From 1962-65 he was director, Department of Nuclear Science, Medical Field Service School, Brooke Army Medical Center, Fort Sam Houston, Tex.

The colonel attended the Universities of Kansas and Texas for premedical training and received an MD degree from Southwestern Medical College, Dallas, Tex., in 1946.

He served his internship at Baylor University Hospital, Dallas, from 1946-47 and was a resident physician in internal medicine at the U.S. Veterans Administration Hospital in Dallas, the Queen's Hospital in Honolulu, and the Los Angeles County General Hospital. He also served a residency in pulmonary disease at Fitzsimons General Hospital, Denver, Colo.

In 1956-57 he studied radiation biology and nuclear physics at Reed College, Portland, Ore. He also is a graduate of the Medical Field Service School, the Command and General Staff College and the U.S. Army War College. In 1965 he was awarded the Legion of Merit.

Among his professional papers is a chapter on "Radiation Induced Disease" in *Diseases of Medical Progress*, 1964. He is a Diplomate of the American Board of Internal Medicine, a Fellow of the American College of Physicians, and is a member of the American Medical Association and the Association of Military Surgeons.

Lt Col J. C. Fitzpatrick

300 U.S. Scientists, 8 Nations Linked in Nov. 12 Eclipse Study

Scientists from eight or more nations will use a "day of darkness" in an effort to throw light on several areas of solar and atmospheric phenomena during a total solar eclipse over part of the southern hemisphere Nov. 12.

U.S. participation, involving more than 300 scientists in 60 projects, is being coordinated by the National Science Foundation under the direction of Dr. Robert Fleischer, deputy head of International Scientific Activities. Argentina, Bolivia, Brazil, France, Italy, Japan, The Netherlands and other nations will participate.

The Defense Atomic Support Agency (DASA) is funding a major series of observations to determine what happens to the ionosphere—the part of the earth's atmosphere that makes radio transmission possible—when the solar radiation that creates it is materially blocked by an eclipse.

DASA activities will be carried out by the U.S. Army Ballistic Research Laboratories (BRL), the Air Force Cambridge (Mass.) Research Laboratories (AFCRL), Naval Ordnance Laboratories and private institutions.

Dr. Warren W. Berning of BRL is serving as technical director of the DASA Eclipse Expedition to South America, organized as a joint U.S.-Brazil research project to make upper-atmosphere measurements.

BRL will conduct experiments as well as provide logistic support for the DASA effort. BRL rocket payloads will include a Langmuir probe to measure electron density and temperature, a propagation experiment to measure absorption, a partial reflection test, and a blunt probe to measure conductivity.

The U.S. Army Electronics Command, Fort Monmouth, N.J., will make measurements of the ionosphere D-region absorption and will study geomagnetic effects of the eclipse. ECOM scientists also will fire 12 rockets to study atmospheric circulation response.

Data will be collected to determine a set of reaction rate coefficients for reactions occurring in the ionosphere D- and E-regions.

Detailed measurements of these regions during a solar eclipse are especially revealing for a study of the reaction time because of the short-lived nature of the event. Observation of the time constant furnishes information about attachment, detachment, and recombination processes.

As another part of the DASA project, USAF Cambridge Research Laboratories plan to fire four Nike-Javelins. Payloads will include a mass spectrometer to measure positive ion species, an RF impedance probe to measure electron density, and a retarding potential probe to measure positive ion density and temperature.

Rocket probes will carry Geiger counters to measure coronal X-rays and Lyman alpha detectors to measure ultraviolet light.

The Naval Ordnance Laboratories, White Oak, Md., will participate in the DASA project by studying the effects of the eclipse upon LF-VLF radio propagation, high altitude ozone changes, polarization and airglow.

Other observations by U.S. agencies will include studies of the chromosphere, photosphere, and corona of the sun; coronal X-rays; airglow; solar neutrons; magnetic, telluric and ionospheric phenomena; the stratosphere, magnetosphere and ionosphere; and such ground phenomena as the behavior of animals during an eclipse.

Many of the observations, particularly the rocket probes, will be conducted from the southeast coast of Brazil.

The path of the eclipse, beginning at sunrise in the Pacific Ocean west of the Galapagos Islands, will touch Peru, Chile, Bolivia, Argentina, Paraguay and Brazil. A partial eclipse will be visible over the extreme southeastern part of the United States, in addition to most of Central America, the West Indies, all of South America, part of Antarctica, and the southern part of Africa.

MICOM Woman PhD Studies Wind for Missile Design

Weather, particularly the Alabama variety, accounts for the Army Missile Command's sole woman employee with a doctorate degree in science.

Weather as it pertains to the course of missiles and missiles design is the primary concern of Dr. Dorathy A. Stewart, a professional meteorologist, but weather as it exists in Alabama influenced her decision to take a job at Redstone Arsenal.

Dr. Stewart was teaching school, the first year after receiving her bachelor's degree in physics from the University of Tampa, when she heard of a national scholarship for those interested in studying for advanced degrees in meteorology.

"I didn't get the scholarship—there were only two or three awarded nationwide," she relates, "but a professor in the Meteorology Department of Florida State University saw my name on the list of scholarship applicants and offered me a graduate assistantship there."

Backed by master's and doctor's degrees in meteorology from Florida State, she considered job offers from various parts of the country. To avoid harsh winters, as well as because of the challenge of the job, she recently selected an offer from the Aerophysics Branch of the R&D Directorate's Physical Science Laboratory at Redstone.

Dr. Stewart currently is studying data on windshear—the difference in wind velocity at two altitudes divided by the altitude increment. Atmospheric conditions through which missiles are to travel in flight have a direct bearing on how they are to be designed and developed, so information of all phases becomes an integral consideration.

Dr. Dorathy A. Stewart

500 Expected at Conference On Failures in Electronics

Factors contributing to degradation or failure in electronic materials and devices will be the subject of some 30 technical papers to be presented at a symposium Nov. 15-17 at Battelle Memorial Institute.

About 500 research and development scientists and engineers are expected to attend the Columbus, Ohio meeting, the fifth in a series of annual symposia on the "Physics of Failure in Electronics."

The program is cosponsored by the Rome (N.Y.) Air Development Center of the U.S. Air Force Systems Command's Research and Technology Division, and the Columbus Laboratories of Battelle.

Dr. W. J. Reals

Dr. Gustav Dammin

Dr. Ivan L. Bennett

Dr. John R. Carter

AFIP Appoints Four Members to Advisory Board

Appointments of members of the Scientific Advisory Board of the Armed Forces Institute of Pathology, Washington, D.C., as announced recently, extended the terms of two members for five years.

Doctors Ivan L. Bennett and Gustav Dammin were reappointed and Doctors William J. Reals and John R. Carter were named as new members.

The Board advises the AFIP director regarding the scope, character and adequacy of research and training programs; use of pathologic material, techniques and equipment; and selection of key personnel.

Dr. Bennett, who received AB and MD degrees from Emory University, Atlanta, Ga., is a professor of pathology and chairman of the Department of Pathology, Johns Hopkins University School of Medicine, and director of pathology, Johns Hopkins Hospital, Baltimore, Md.

He also serves as counselor of the International Academy of Pathology and is a member of the Committee on Pathology, National Research Council, the Pathology Advisory Council of the Veterans Administration, and the President's Science Advisory Committee.

Dr. Carter, professor and chairman of the Department of Pathology and Oncology, University of Kansas, is vice president of the American Association of Pathologists and Bacteriologists. A member of the Pathology Advisory Council of the Veterans Administration and of the Pathology Training Committee at the National Institutes of Health in Bethesda, Md., he recently became chairman of the Department of Pathology, Western Reserve University, Cleveland, Ohio.

Dr. Carter received a BS degree at Hamilton College, Clinton, N.Y., and MD at the University of Rochester, New York.

Dr. Dammin, pathologist-in-chief at Peter Bent Brigham Hospital, Boston, Mass., is president of the Armed Forces Epidemiology Board and a member of the President's Science Advisory Committee. An Army Reserve colonel, he received BA and MD degrees at Cornell University.

Dr. Reals, pathologist and director of laboratories, St. Joseph Hospital, Wichita, Kans., is a nationally recognized medical leader. He serves as national consultant in pathology to the Air Force Surgeon General and is a Reserve colonel in the USAF Medical Corps.

He is the consultant pathologist to the Surgeon of the Federal Aviation Agency, secretary-treasurer, College of American Pathologists, and a member of the Pathology Advisory Council, Veterans Administration. He received BS, MS, and MD degrees at Creighton University, Omaha, Neb.

FDA Names ASAP Member to Head Bureau of Medicine

Dr. Herbert L. Ley, Jr., member of the Army Scientific Advisory Panel and formerly of the Harvard University faculty, recently was named director of the Bureau of Medicine, U.S. Food and Drug Administration.

Dr. Ley was chief of the Medical and Biological Branch and acting chief of the Scientific Analysis Branch at the Army Research Office, Arlington, Va., from 1961 to 1963. He transferred to the Harvard School of Public Health as an associate professor and became chairman of the Department of Microbiology.

From 1958 to 1961, he was a professor of bacteriology, microbiology and community health and department chairman at George Washington University, Washington, D. C.

Dr. Robert J. Robinson, who served as acting director of FDA's Bureau of Medicine since the resignation of Dr. Joseph Sadusk in March 1966, is now acting deputy director.

Graduated cum laude from Harvard Medical School in 1946, Dr. Ley served his internship at Peter Bent Brigham Hospital in Boston and entered the Army Medical Corps in 1947. While in the Army he earned a master's degree (cum laude) in 1951 at Harvard School of Public Health.

From 1955 to 1958, he was chief of the Preventive Medicine Research Branch, Research and Development Division of the Office of The Surgeon General. Continually active in medical research, he has performed field work in Malaya, Korea and Viet Nam.

He is the author or coauthor of more than 30 articles published in scientific journals and medical textbooks. Much of Dr. Ley's work has been in the use of antibiotics in treating typhus and typhoid.

Dr. Levy was appointed to the ASAP in 1965. He serves with several commissions of the Armed Forces Epidemiological Board and is a member of many professional societies.

Dr. Herbert L. Ley, Jr.

MRC Lists Professional Staff for Academic Year

Thirty-eight prominent mathematicians—nine from foreign countries—have been appointed as staff members for the 1966-67 academic year at the Mathematics Research Center (MCR), U. S. Army, Madison, Wis.

The MRC was established in 1956 at the University of Wisconsin, as a contract agency to perform research in applied areas of mathematics as they relate to military requirements.

Staff members furnish assistance and guidance as requested by authorities at all Army installations. Educational opportunities are offered to Army mathematicians through orientation lectures, symposia, advanced seminars and extended residencies at the Center.

Effectiveness and competence of the MRC is enhanced by the systematic use of temporary staff members, on leave from educational institutions, who keep interests of the Center current with regards to the newest mathematics trends.

Under direction of Stephen C. Kleene of the University of Wisconsin Mathematics Department, acting for MRC Director Dr. J. Barkley Rosser, members of this year's staff and their major fields of interest are:

Louis B. Rall, numerical analysis, integral equations, functional analysis; J. D. Church, decision theory, stochastic processes; Colin W. Cryer, numerical solution of partial differential equations; Donald Greenspan, numerical solution of differential equations;

Thomas N. E. Greville, approximation theory and actuarial mathematics; Bernard Harris, probability and statistics; Herman Karreman, operations research and economics; Rudolph E. Langer, differential equations; Henry Mann, number theory and statistics; Ben Noble, integral equations and numerical analysis;

Michael Papadopoulos, numerical analysis, integral equations, functional analysis; J. Ben Rosen, nonlinear programing and optimal control theory; Isaac Schoenberg, analysis and approximation theory; Peter Wynn, continued fractions. The above are all from MRC.

Foreign members of this year's staff include Ludwig Arnold, application of probability theory, Tech. Hoch., Stuttgart, Germany; C. R. Illingworth, fluid dynamics, University of Manchester, England; S. T. Kuroda, perturbation theory, University of Tokyo, Japan;

J. J. Mahony, applied mathematics, University of Western Australia; Johannes Michalicek, Markoff processes, University of Vienna; George W. Swan, elasticity and magneto-hydro-dynamics, English Electric Ltd., England;

H. Umegaki, information theory, Tokyo Institute of Technology, Japan; S. K. Zaremba, time series, University of Wales; J. Wong, functional analysis of differential equations, University of Alberta, Canada.

From the University of Wisconsin are the acting director, Kleene, logic and automata theory; the director, Rosser, logic and numerical analysis; Irwin Guttman, decision theory; and Klaus Ritter, operations research.

Others are Philip M. Anselone, functional analysis, Oregon State University; A. T. Bharucha-Reid, probability theory-stochastic processes, Wayne State University, Mich.; James W. Daniel, gradient methods, IBM, Palo Alto, Calif.; T. C. Hu, network theory, IBM, Yorktown Heights, N.Y.;

J. W. Jerome, approximation in function spaces, Purdue University; William F. Lucas, game theory, Princeton University; Theodore W. Palmer, unbounded operators, Harvard University; Georg Schmidt, scattering theory, and Larry Schumaker, spline functions, both of Stanford University;

E. Zarantonello, functional analysis, differential equations, University of California (Berkeley); John H. Halton, stochastic processes-Monte Carlo methods, Brookhaven National Laboratory, Upton, N.Y.

Dr. Rosser will be on sabbatical leave for the 1966-67 academic year. All questions and requests for assistance should be directed to the Acting Director Stephen C. Kleene, Mathematics Research Center, U.S. Army, University of Wisconsin, Madison, Wis. 53706.

Argentine Officials Study U.S. Tech Info Processing

Two Argentine defense officials toured U.S. Government facilities in Washington, D.C., area recently to learn about the latest developments and procedures for storing, reproducing, and distributing scientific and technical information.

The Clearinghouse for Federal Scientific and Technical Information, U.S. Department of Commerce, in Springfield, Va., and the Defense Documentation Center (DDC) at Cameron Station, Va., were primary stopovers.

Comodoro (Colonel) Luis Pastor and Dr. Augustin Duranona y Vedia also visited the U.S. Army Research Office, Arlington, Va., during their briefings on the United States' scientific and technical information program.

Comodoro Pastor is chief, Documentation Center, Argentine Armed Forces Research and Development Board. Dr. Duranona is director of the Board's Operations Research Group.

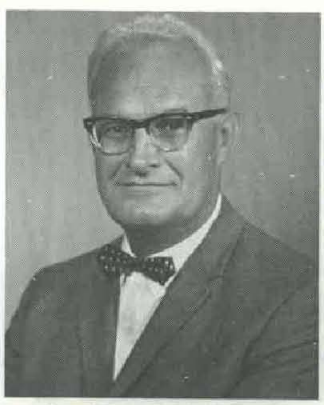
The officials are preparing to establish an Argentinian documentation center similar to this Nation's recently consolidated and centralized facilities at the DDC and the Clearinghouse for Federal Scientific and Technical Information.

The project is backed by the Armed Forces R&D Board and the National Research Council of Argentina.

AFRRI Selects Dr. Wycoff as Deputy Director

Dr. Harold O. Wycoff, internationally known for radiation research, recently assumed duties as deputy scientific director of the Armed Forces Radiobiology Research Institute (AFRRI).

Dr. Wycoff is responsible for overall management of the current programs of the four AFRRI research departments and for initiating new phases of the radiobiology research program of the Institute. Until he transferred to AFRRI, he was chief of the X-ray Standards Section, U.S. National Bureau of Standards.



Dr. Harold O. Wycoff

Dr. Wycoff has BS and PhD degrees from the University of Washington. He is a member of the Radiological Society of North America, the American Association of Physicists in Medicine, the American Physical Society, the Health Physics Society, the Radiation Research Society, the Philosophical Society of Washington, and the American College of Radiology.

Dr. Wycoff serves on several government and international committees related to radiobiological research and is the author of numerous papers dealing primarily with radiation protection and measurement.

OCE Directs Feasibility Study of Unattended Reactor System

A feasibility study of the Terrestrial Unattended Reactor Power System, an advanced mobile nuclear reactor concept, is being directed by the U.S. Army Corps of Engineers under a 9-month $286,898 contract.

The study involves a conceptual design prepared by the Martin Co., for the U.S. Air Force, of a 100-kilowatt, direct-conversion reactor power system that would operate unattended five years without refueling.

Designed to fill numerous Armed Forces requirements, the proposed TURPS power plant employs a new development in the state-of-the-art of nuclear reactor control which eliminates the need for mechanically operated control rods.

Primarily, it is intended for use in remote areas, such as radar sites around the world, the majority of which are now powered by diesel generators requiring frequent servicing.

Control of the new type reactor as shown in the conceptual design is accomplished solely through the migration of hydrogen into and out of the fuel element from a reservoir at the bottom of the fuel element.

The system operation is based on the natural circulation of a liquid coolant, tetraphosphorous-trisulfide, an especially good heat transfer liquid relatively immune to radiation. Heated by the reactor until it vaporizes, the coolant rises into the thermoelectric generator. There it condenses on one side of the wafer-thin thermoelectric plates. The opposite sides of the plates are kept at a lower temperature by an air blower assembly.

A direct electric current is produced in the plates and is converted by a power-conditioning module. Meanwhile, gravity causes the condensed coolant to flow back to the reactor, completing the cycle.

The reactor portion of the 19-foot cylindrical system would be encased in a metal container filled with earth and installed underground. The thermoelectric system would remain above ground.

Radiation shielding is to be provided by the earth surrounding the reactor. A lead relocation sleeve providing additional shielding would permit a TURPS relocation within 24 hours after shutdown.

The unit could be disassembled into two separate packages and shipped by conventional cargo aircraft or trailer truck. Designed for field installation, using standard military equipment, the plant could be placed in operation in approximately seven hours, designers estimate.

The feasibility study contract is with the Nuclear Division, Martin-Marietta Corp. Work will be directed by the newly formed Research and Technology Department of the Nuclear Power Field Office (NPFO), a Corps of Engineers' agency at Fort Belvoir, Va.

ARO Civilians Enter Avanced Training Program

Two U.S. Army Research Office civilian employees, David O. Cochran and Roy D. Greene, have been granted a year leave of absence to take advantage of Civil Service and Department of Defense programs for advanced education.

Cochran is a Scientific and Technical Information Division systems analyst who entered the Government service as a management intern in 1960. He has been appointed a Federal Fellow in a program sponsored by the Civil Service Commission in conjunction with the American Political Science Association's Congressional Fellowship Program.

Each candidate is nominated by his agency to the Civil Service Commission. Final selection is made by a panel composed from the Commission and the American Political Science Association.

Participation is limited to career employees in grade GS–12 to GS–16 or equivalent who hold managerial or executive positions, or are likely to be so assigned in the future. Preference is given to those taking part in an agency's executive development program.

One of 22 Fellows selected from 16 Government agencies, Cochran graduated from the University of Washington, at Seattle, with a degree in mathematics and geophysics. Then he taught these subjects for three years at Oregon State. His first Government assignment was with the Strategic and Tactical Analysis Division of the Office of the Deputy Chief of Staff for Military Operations, followed by duty in the Office of the Economic Advisor, Office of the Secretary of Defense.

ROY D. GREENE entered Federal service as a management intern. He is participating in a program initiated three years ago by the Secretary of Defense for a long-range program of education for civilian as well as for military employees.

Commands and agencies were requested to establish and fund the program which provides that the study be more than six months in duration and of a flexible nature. The recipient may use the funds to take special courses which may or may not be applied toward a degree.

With the Office of the Chief of Research and Development since he joined the Government in 1959, Greene leaves his position with the Research Programs Office to study public administration. He will use his grant to obtain a master's degree in this field from American University, Washington, D.C.

Picatinny Develops BLU-7 Bomblets for Air Force

Hundreds of miniature bombs that can be parachuted en masse onto armor targets from fast-flying aircraft is a new U.S. Air Force weapon developed by the Army at Picatinny Arsenal, Dover, N.J.

Now in production, the BLU–7 bomblets and tube-dispensing device were engineered primarily for high-performance tactical aircraft. Each dispenser (normally two dispensers will be mounted underneath each aircraft) carries sticks of more than 300 bomblets.

The bomblets each weigh approximately one and a quarter pounds and contain a half pound of high explosive.

Each bomb is fitted with a plastic container which is forced open by the air stream to release an 18-inch-wide 4-panel nylon parachute. The parachute drag arms the bomb and rotates and stabilizes the descent for maximum blast effect.

Project engineer Kenneth Anderson of Picatinny Arsenal displays unusual chute for BLU–7 aircraft bomblets.

TOW Undergoing Engineering Service Tests

Engineering service tests of TOW, the Army's heavy antitank guided missile system, began this autumn under severe simulated tactical situations and extreme environments at five locations in the United States and at Panama, C.Z.

Results of these tests will provide the basis for determining whether the tube-launched, optically tracked, wire-guided missile is ready for type classification—the last step before procurement and delivery to the field.

Engineering tests will be conducted on three sites at White Sands (N. Mex.) Missile Range (WSMR). Other tests, some slated concurrently, will be at Fort Greely, Alaska; Fort Clayton, Panama; Yuma (Ariz.) Proving Ground; Fort Bragg, N.C.; and Aberdeen (Md.) Proving Ground.

The Service Testing Agency, Fort Benning, Ga., is test program monitor. Coordinator is the Antitank Division, Land Combat Directorate of the Army Missile Test and Evaluation, WSMR. Lt Col James N. Lothrop, Army Missile Command, Redsone Arsenal, Ala., is TOW project manager.

The 160-pound TOW system can be carried and fired from the ground by a crew of three or four men or it can be mounted on an M–113 armored personnel carrier, the M–151 jeep or the M–274 Army "Mule." It is air-transportable and can be adapted to the UH–1B helicopter.

A launcher which employs a stabilized sight also is being developed for the UH–1B helicopter. This will permit firing of the same missile employed with the ground system.

The weapon is designed to give the Infantryman heavy firepower against armor and reenforced emplacements. In Redstone Arsenal tests, TOW gunners have scored direct hits on tanks at more than a mile.

TROOPS conduct tactical loading exercise with Army's TOW antitank guided missile system mounted on the M–274 Army Mule. Considered as an ideal vehicle for TOW, the 4-wheeled platform can navigate rough terrain and can be guided by the driver using a snap-down steering wheel.

The electronic guidance system reduces human error to a minimum. With the cross-hairs of the sight held on the target, the wire-guided missile is automatically adjusted in flight to score a hit.

The 40-pound TOW missile is factory-sealed and transported in an expendable fiberglass container loaded with the missile into the launching tube and discarded after firing. The 2-stage solid-propellant missile is ejected from the launcher by the first motor, then the second ignites to take the warhead to the point of impact.

Six major assemblies comprise the TOW system: launching tube, traversing unit, tripod, sight sensor, electronic guidance unit and the missile. The tube can be pivoted through a 360-degree field of fire.

In the test program, TOW will be fired at fixed and moving targets from various distances under extreme environmental conditions at the widely spread test sites. Simulated tactical conditions include firing at night while under multiple attack by heavy armor.

Feasibility studies of TOW began in January 1962 and the first contract of $2.85 million for development was awarded in 1963 to Hughes Aircraft Co., Culver City, Calif. During development TOW has been subjected to critical tests, and additional funds have been allocated under contract with Hughes for continued development to the present prototype test stage.

ATAC Studying Integral Shipment of Battery Acid

Various methods of shipping acid needed to activate a dry-charged battery, as an integral part of the battery, are being studied by the U.S. Army Tank-Automotive Center (ATAC) in Warren, Mich.

At present, the electrolyte (acid and water mixture) is shipped and stored in a separate package about one-third the size of the battery package.

The idea of combining the acid as part of the battery was conceived in the ATAC Instrument-Electrical Laboratory. A feasibility study by Globe-Union Inc., Milwaukee, Wis., under an ATAC contract, resulted in a "substantial promise" evaluation of the concept.

Successful completion of the development efforts would result in savings in shipping costs to the Government and decrease the hazards connected with handling acid. Deterioration in activated batteries installed in vehicles kept in depot storage also could be minimized, researchers report.

ATAC is studying proposals to ship the acid as an inert gel within the battery or in a plastic container inserted into the battery. At the destination, the battery would be activated by adding water to the gel or by adding water and then puncturing the plastic container.

The major difficulty found in this concept is fitting of the electrolyte into the battery. A plastic container large enough to hold the presently required volume of acid would not fit into the open space between the plates and the case.

Among possible remedial measures are proposals to decrease the amount of electrolyte required at activation by leaving more acid in the plates in the production process, or to make the battery case thinner.

Another proposal is for reduction of the electrolyte concentration. This will decrease the battery's effectiveness at temperatures colder than 40° below zero, but would add appreciably to the life of the battery.

Fluid Amplifier System Guides Missiles in WSMR Test Firing

Missile guidance and control by a fluid amplifier system with no moving parts was demonstrated successfully during a recent test firing from a tactical launcher at White Sands Missile Range (WSMR), N. Mex.

Three new components—an inertial quality gyro with pneumatic output, a pneumatic computer, and a hot-gas-fired reaction control valve—were involved in the firing. The test was the first of a series designed to prove the feasibility of new techniques in missile guidance and control.

Under development by the Army Missile Command's Inertial Guidance and Control Laboratory, the new components were designed, fabricated and tested in facilities at Redstone Arsenal, Ala. The guidance and control section then was shipped to WSMR where it was mated with a standard tactical missile airframe and propulsion unit.

The control system put the missile near the predicted impact point, and all three components operated satisfactorily in the missile flight environment, test reports said.

MICOM Traces Payoff of TOW Rivalry

How Army missilery has benefited from the 1963 competition for the TOW antitank missile contract is evidenced by the recent release of the first photos of MAW and concept development details of the medium antitank assault weapon.

The information came from the Army Missile Command HQ at Redstone Arsenal, Ala. The development chronology of MAW shows that:

- In 1963, in competition with McDonnell Aircraft Corp., Hughes Aircraft Co. won a $2.85 million contract to develop TOW (tube-launched, optically tracked, wire-guided) heavy assault antitank missile.
- As an outgrowth of McDonnell's initial work for the TOW contract, however, the wire-guided MAW—a short-range version of TOW — emerged to win for that corporation a $2.72 million contract for exploratory development of the medium antitank weapon.
- At the same time, MICOM was developing in-house a DC–MAW (directional control-MAW) that can be guided without wires. The McDonnell wire-guided MAW was selected in 1965 over the in-house concept because it held the "most immediate promise." Two contracts totaling $1.95 million for engineering development were awarded to McDonnell.
- MICOM is continuing in-house development of the DC–MAW for possible future application in MAW as well as other weapon systems.

Engineering development of MAW by McDonnell means that frontline soldiers are nearer to having the first guided missile system light enough to be carried by one man and shoulder-fired with a warhead large enough to kill most armor and infantry targets on the battlefield.

MICOM reports that tests have proved the new MAW will be "far superior in range, accuracy and lethality to the 90mm recoilless rifle which it will replace." The 90mm is a 2-man weapon that may be mounted on small vehicles.

Similar to the long-range TOW, now well along in the research and development cycle, the MAW weapon system employs a line-of-sight guidance system. The recoilless launcher is a smooth-bore fiberglass tube which is discarded after firing.

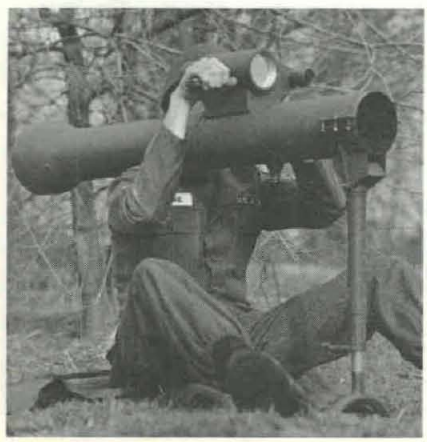
The rear end of the launcher is enlarged to contain a propellant and breech. The missile, never seen by the gunner until it is fired, is prepackaged within the launcher.

The tracker, a telescopic sight with sensor device and electronics package, is attached to launcher for firing.

The missile of MAW contains several pairs of small rocket motors mounted in rows about the missile body which is attached to the tracking device by two thin wires. As the missile is launched by the gunner, who holds the target in the sight, the sensor-electronics devices send command signals which cause the rocket motors or side-thrusters to fire. The missile is automatically guided throughout flight by these forces.

Project manager Lt Col John H. Boyes foresees MAW as a desirable weapon for airborne and airmobile operations and in situations where only the foot soldier can navigate. MAW will be used at platoon level.

TOW, big brother of MAW, has been successfully test-fired at Redstone Arsenal with targets more than a mile away. It is the first supersonic missile guided by a wire link between gunner and missile.



MAW Tank Killer

Johnson Names Jones for Star

President Lyndon B. Johnson has nominated Col M. McD. Jones, Jr., for promotion to brigadier general. Col Jones is project manager of General Purpose Vehicles located at the Michigan Army Missile Plant in Warren, Mich. Promotions from the list consisting of 68 other colonels began early this month.

USAEPG Plans New Emphasis on Quality Assurance

Projected schedules for the U.S. Army Electronic Proving Ground at Fort Huachuca, Ariz., indicate that quality assurance testing of electronic production items will receive increased emphasis.

Forecasts call for a 200 percent increase in the number of tests over the next three years—strong evidence that results have proved their value.

When a specific item of equipment has been designated for quality assurance testing, samples are selected at random from Army supply channels. A variety of engineering bench tests determine if the equipment meets electronic specifications. Further tests may include environmental exposure, shock or "life" tests.

Tests have revealed such factors as errors in assembly, excessive sensitivity to moisture, electric shock hazards and insufficient tolerance in components.

A high rate of failure may indicate unsatisfactory quality control practices on the part of the manufacturer. Repetitive failure of a given circuit may reveal a previously undetected design deficiency.

The tests also may provide valuable data for the design of better engineering evaluation for items under consideration for purchase.

Infantry Grenade Launcher Enters Production

Production has begun on a light mortar-type grenade launcher that can be atached to the M-16 rifle to give frontline Army infantrymen a powerful combination weapon against point or area targets.

A new dimension to the tactical needs and firepower of the soldier will be added when the new 2.8-pound 40mm XM148 rifle launcher is delivered to the field in the near future. Using the standard family of launch ammunition available for the M79 grenade launcher, the XM148 single-shot aluminum-barreled device can lob a grenade a maximum of about a quarter of a mile.

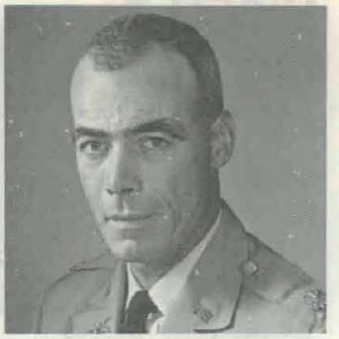
Designed for the M-16 (5.5mm XM16E1) rifle, widely used in Viet Nam, the launcher is attached to the underside of the rifle barrel and can be fired without impairing soldiers' mobility or accuracy.

XM148 Rifle Launcher

Lt Col D. S. Meredith III

Lt Col C. E. Preble, Jr.

Lt Col W. V. Rock



Lt Col T. R. Woodley

12 Officers, 2 Civilians Assigned to OCRD

Nine lieutenant colonels, three majors and two civilians comprise the list of newcomers to the Office of the Chief of Research and Development (OCRD) in the Pentagon and Army Research Office (ARO) in Arlington, Va.

LT COL HENNING (Frank A.) is assigned to the International Office following duty in the Plans Office, G3, Seventh Army HQ. Executive officer with the 24th Infantry Division (1964-66), Col Henning graduated in 1950 from the U.S. Military Academy (USMA). Following a year's study at the Army Language School, he returned to the Academy and taught Portuguese.

LT COL MEREDITH III (David S.) joined the Programs and Budget Division. He is a 1950 graduate of the USMA, the Command and General Staff College (C&GSC), 1961, and holds an MBA degree from the University of Alabama (1966). He was battalion executive with the 222nd Mountain Infantry Battalion with the German Army (1964-65) and has served in airborne units and as an instructor in military science.

LT COL NACY (John D.), newly appointed staff officer in the Special Warfare Division, served with the 4th Infantry Division, Fort Lewis, Wash., following duty in Viet Nam. A 1945 graduate of the USMA, he holds an MS degree in electrical engineering from the University of Pennsylvania (1951).

He has attended the Advanced Artillery Course at Fort Sill, Okla., the C&GSC and the Armed Forces Staff College (AFSC). He served with the 3rd Armored Division and the V Corps in Germany from 1957-59 and holds the Bronze Star and the Army Commendation Medal with two Oak Leaf Clusters (OLC).

LT COL PREBLE, Jr. (Charles E.), assigned as deputy senior military adviser to the Research Analysis Corp., McLean, Va., came from the U.S. Army Pacific Command, where he has served since 1963. He completed the regular course at the C&GSC in 1958 and remained on the faculty until 1962.

Col Preble has received a BS degree from the University of Maryland and is working toward a master's degree. He began his military career in 1944 as a platoon leader in Italy and holds the Bronze Star Medal.

LT COL RICHMOND III (Allen P.) is with the Programs Branch, Programs and Budget Division, as a staff officer. He was the former deputy chief of the Combat Developments Agency, Alaska. Col Richmond received a BS degree in electrical engineering from the University of New Hampshire (1944) and an MA degree in industrial engineering from New York University (1955).

The colonel has served with the U.S. Army Corps of Engineers in Tucson, Ariz. (1960-63), and in New York City (1958-60). He was assistant adviser to the Nationalist Chinese Military Construction Commission, MAAG, Taiwan (1957-58) and budget

26-Year-Old Zoologist Becomes Youngest PhD in ARO

"Are you Dr. Lowe?" many visitors ask, trying to mask surprise.

The petite young woman at the desk smiles and answers "yes."

Dr. Ann Lowe is a newly appointed staff biological scientist in the Human Factors and Operations Research Division, U.S. Army Research Office. The first woman PhD degree employee in the Office of the Chief of Research and Development, she is also the youngest doctor in the 10-year history of the organization.

Dr. Lowe received her doctorate in zoology from Howard University, Washington, D.C., this past June, two months before her 26th birthday. She also earned a master's degree from that institution.

Since she joined the Army Research Office staff Aug. 29, she has been gaining an overview of her duties, which include acting as technical consultant on biological aspects of human factors to the branch and division chiefs. She also will assist in planning and initiating the basic research program.

Meanwhile, she continues her doctorate dissertation research on protozoa in the evenings at Howard University.

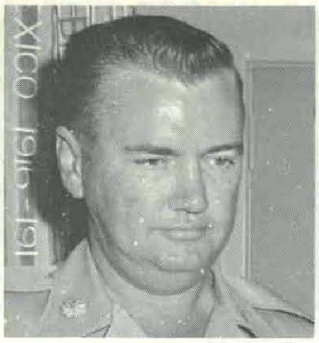
Dr. Lowe was born in Richmond, Va., and lived most of her life in Ashland, Va., where her parents are on the faculty of a girls' school.

Her interest in biology was fired by a teacher at John M. Gandy High School in Ashland. Graduated as valedictorian, she entered college on scholarships and fellowships and later taught graduate courses in molecular biology at Virginia State College, Petersburg, Va., her alma mater.

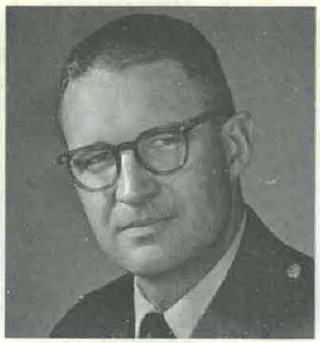
Dr. Lowe is a member of Beta Kappa Chi and an associate member of the Society of Sigma Xi. Her master's thesis, "Silverline Patterns in Vorticella Convallaria and Vorticella Microstoma," was published in *American Zoologist*, and she is preparing her dissertation for publication in the *Journal of Protozoology*.

Dr. Ann Lowe

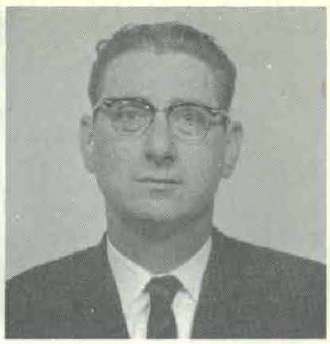
Lt Col A. P. Richmond III



Lt Col H. A. Bigham



Maj C. H. Hess



Dr. S. Magram

officer at Fort Leonard Wood, Mo. (1955-57).

He also served with the Engineer Supply Control Office in Germany from 1951-54, and holds the Purple Heart and the Army Commendation Ribbon with two OLC.

LT COL ROCK (Warren V.), assigned as a military adviser to the Social Science Research Division, ARO, has a BA degree in political science from the University of Omaha and has attended the C&GSC. A recipient of the Bronze Star, he has served for two years with the 14th Infantry, taught at the U.S. Army Special Warfare School and served as an adviser in Viet Nam.

LT COL WOODLEY (Thomas R.) is a staff officer in the Midrange Plans Branch, Plans Division. Formerly commanding officer of the Third Reconnaissance Squadron, 2nd ACR, Col Woodley also has served with the Armor Board, Fort Knox, Ky.

Graduated from the USMA in 1951, he returned to join the faculty in 1958. He holds an MS degree from the University of Illinois and studied at Columbia University, the Armor School, and the C&GSC.

LT COL WOOLLEY (Joseph L.) has joined the Combat Arms Branch, Combat Materiel Division, as a staff officer. A 1945 graduate of the USMA, he received a BS degree from the Georgia Institute of Technology in 1961, has taken the advanced course at the Artillery School, Fort Sill, Okla., and attended the C&GSC.

He has served with the 2nd Battalion, 34th Artillery, with War Plans, Logistics Division in Germany, and with the Aviation Test Board, Fort Rucker, Ala. He holds the Bronze Star and the Army Commendation Ribbon.

LT COL BIGHAM (Harral A.), ARO staff officer with the Medical and Biology Branch, Life Sciences Division, served until recently with the Office of The Surgeon General, HQ, U.S. Army Viet Nam, executive officer and chief of Plans and Operations.

He holds a BS degree in pharmacy from the University of Texas (1947), an MBA degree from St. Mary's University of Texas (1964), and has completed courses at the Army Medical Service College and the C&GSC.

Enlisted in 1942, Lt Col Bigham served in the Southwest Pacific through 1945, in Korea (1951-52), was assigned to Fort Sam Houston, Tex., (1961-64), and recently completed a tour in Viet Nam. He has earned the Silver Star, Bronze Star with OLC, Commendation Medal with three OLC, Combat Medical Badge and Unit Citations.

MAJ HESS (Carl H.), recently admitted to candidacy for a PhD in industrial engineering at the University of Michigan, is a staff officer in the Review and Analysis Division. He has an MS degree in industrial administration and an MA degree in mathematics from the University of Michigan as well as an AB degree from Princeton University.

Military schooling includes courses at Fort Sill, Okla., and Fort Bliss, Tex. Overseas tours include duty as a battery officer in England and Germany from 1956-58.

MAJ LEACH (Robert W.) came to the Special Warfare Division from Viet Nam, where he was assistant sector adviser. He received a BS degree from the USMA in 1952, later returned to serve as an assistant professor, holds an MS degree from the University of Southern California, and has taken the regular course at the C&GSC and courses at Fort Sill, Okla. He served in Korea and Japan and holds the Bronze Star.

MAJ NORD (Allan A.) has been assigned to the Nuclear, Chemical-Biological Division as a project officer. He received a BS degree in chemistry from South Dakota State University and BA and MA degrees from Oxford University. Military schooling includes the Chemical Officers' Career Course and the C&GSC. He holds the Bronze Star, the Air Medal with OLC and the Army Commendation Medal with OLC.

DR. MAGRAM (Sidney), has returned to ARO as chief, Energy and Conversion Branch, Physical Engineering Sciences Division, after 30 months in Germany, as chief of the Chemistry Branch of the U.S. Army Research and Development Group, Frankfurt. He had previously worked with ARO as chief, Chemistry and Materials Branch.

Dr. Magram, who holds a BS degree in chemistry from the University of Pittsburgh (1937) and a PhD from New York University (1940), began his Government service in 1940 with the Chemical Corps at Edgewood Arsenal.

He has authored publications on pyrotechnics, colored smokes, screening smokes, incendiaries, aerosols, fuel cells and radiant energy. He is a member of the American Chemical Society, the American Association of Advanced Science, Sigma Xi, and the Faraday Society.

WYNE (Roy F.) joined the Contracts and Grants Branch of the Research Programs Office, ARO, after seven years in contract administration work with the Air Force and the Defense Supply Agency. He has studied business at Strayer Junior College of Finance and George Washington University as well as at various U.S. Air Force Schools.

USEUCOM Slates Relocation In Germany by March 1967

Relocation of HQ, U.S. European Command from Camp des Loges, France to Stuttgart, Germany, has been announced by the Department of Defense as a move to "streamline" the military structure in Europe.

The previously announced merger of HQ, U.S. Seventh Army with HQ, U.S. Army Europe at Heidelberg, Germany, to be completed by December 1966, will leave Army facilities at Stuttgart available for the European Command. It will be operational in Stuttgart by March 31, 1967.

General Lyman L. Lemnitzer has been U.S. Commander-in-Chief, Europe since November 1962. His deputy is U.S. Air Force General David A. Burchinal.

HDL Staff Development Program Encourages Professional Upgrading

By Dr. Maurice Apstein

A generally conceded fact of a research and development career is that the "half life" of a scientist or engineer, in terms of education, is about 10 years. In an editorial in the *IEEE Spectrum*, January 1965, J. D. Ryder has estimated that about half of our engineering population needs a new education.

Ryder's article points out that evening classes after eight hours of work must compete with the varying demands placed upon the individual by family, community responsibility and other personal interests. One answer to this problem is an employer-sponsored training program which encourages professional upgrading.

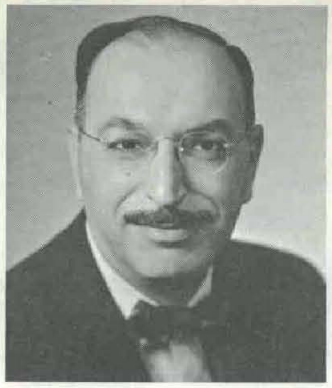
To be effective, at least some of the training should be made available during normal working hours. Such a program can easily be accommodated within the provisions of the Government Employees Training Act and Department of the Army policy. One such program is the Staff Development Program of the U.S. Army Materiel Command's Harry Diamond Laboratories.

History. The HDL Staff Development Program originated in 1951 when a trainee program for some 35 summer students was initiated under the National Bureau of Standards (NBS). In 1953 the Diamond Ordnance Fuze Laboratories were established with a nucleus of NBS personnel, and in 1962 the name was changed to Harry Diamond Laboratories. All through the past 15 years this portion of the program has grown steadily.

In about 1956, a need for managerial training of technical talent became apparent and a program with George Washington University was initiated in the field of engineering administration. With the passage of the Government Employees Training Act, the program was expanded to encompass all phases of technical and professional staff development.

Policy. The HDL staff development policy is based upon six major principles.

1. *Top Management Participation.* The program is administered by a Staff Development Committee (SDC) chaired by the HDL associate technical director who, for this particular function reports directly to the commanding officer. The SDC consists of the chiefs of the nine technical laboratories, a senior representative of the administrative staff, the civilian personnel officer who serves as the executive secretary, and the employee development officer who is a staff resource. In this fashion, the top operating executives of the HDL staff are associated closely with the Staff Development Program.



Dr. Maurice Apstein, HDL Associate Director, joined the Federal Government in 1949 as an electronic scientist with the National Bureau of Standards, following 18 years of research and development experience in private industry. In 1953 he was transferred to the U.S. Army Diamond Ordnance Fuze Labs, predecessor to the Harry Diamond Laboratories.

During 1961 he received a Secretary of the Army Research and Study Fellowship, "to study the proper balance between in-house and contracted effort in Government laboratories." He also served as staff assistant to the President's Science Advisory Committee during preparation of the Bell Report. He is chairman of the HDL Staff Development Committee and serves as an adjunct professor at American University, in the School of Public Administration.

He was awarded the Department of Commerce Gold Medal, "for outstanding contributions to technology in the fields of aviation ordnance and national and international standardization of weapons."

The author received a BS degree in electrical engineering from the College of the City of New York in 1931, an MEA degree from George Washington University in 1949, and a PhD degree from American University. He is a Fellow of the Washington Academy of Sciences and a member of the Washington Philosophical Society and the American Ordnance Association.

2. *Summer Student Feed-In At Bottom.* A major characteristic of HDL Staff Development is the Summer Student Trainee Program, currently involving about 100 trainees. These are superior students recruited from Civil Service registers strictly on a quality basis. They represent a pool of high-caliber talent from which we can expect to recruit additions to our permanent staff.

A major attraction to this class of recruit is the opportunity for graduate study during later employment. By feeding in new recruits at the lower grade levels to replace senior retirees and normal losses, grade escalation is avoided and modern approaches to technology are continually introduced into HDL technical programs.

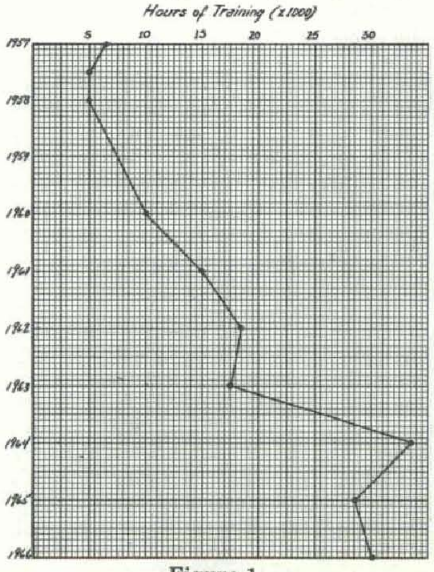


Figure 1.
Staff Development Program—Growth of Participation.

One feature of this Summer Student Program is believed unique. All students are given career-conditional appointments, which save the Government reappointment costs such as new security clearances, medical examinations, etc.

Since the students are considered "seasonal employees," there is no additional cost in the form of health benefits or life insurance. This practice provides an additional morale builder, in that the students feel they are regular Civil Service employees who receive leave to continue their studies. Consequently they are less susceptible to industrial recruitment when they return to school.

3. *Mission Oriented Courses.* The emphasis in all sponsored course work is toward material which will further the accomplishment of the HDL mission. Since the mission is rather broad in terms of its requirements for scientific background, no serious difficulty has been encountered in justifying desired courses.

Although it is recognized that the acquisition of a degree is not the prime purpose of graduate study, the earning of a degree requires performance of a recognized standard in the scientific community. Therefore, participants are encouraged to structure

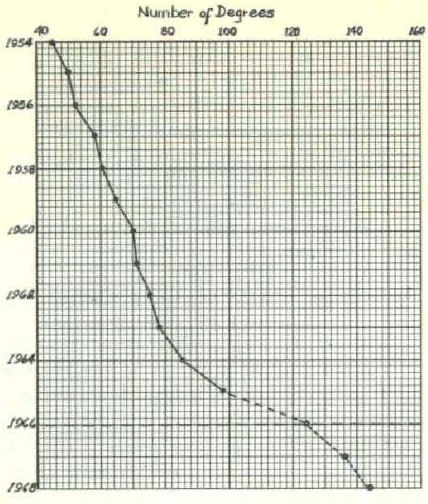


Figure 2.
Growth of Advanced Degrees—Master's.

their courses of study so that they will qualify for advanced degrees.

4. *Part-Time Fellowships.* The large majority of graduate students participate under part-time study. Time off up to 20 hours a week is allowed with approval of the SDC, which reviews the qualifications and educational goals of each applicant.

By assuming the cost of tuition, related educational fees and authorizing time off for classes and study, HDL relieves a good deal of the burden of an employee who is continuing his education. Because the employee continues to work while maintaining an academic load similar to a full-time student, the employee shares the burden.

The key to the program is that self-development is beneficial to employee and Government alike.

5. *Full-Time Fellowships for Special Cases.* Where graduate students have demonstrated exceptional performance in both daily work and graduate study, and have progressed sufficiently to be within reach of completion of a graduate degree, provision is made to relieve them of their normal duties to permit them to attend school full time.

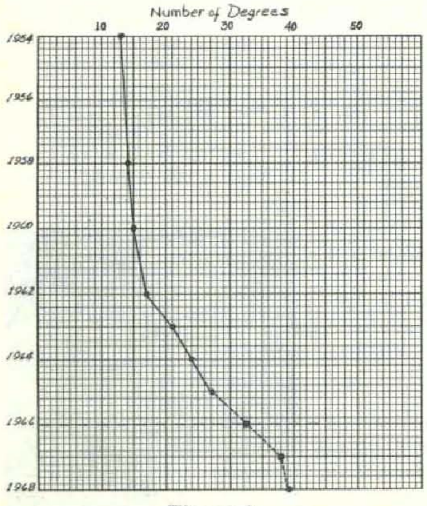


Figure 3.
Growth of Advanced Degrees—PhD's.

6. *Specialized Contract Training as Required.* Certain types of training are either not available at local universities or are accomplished more efficiently as specialized courses given at HDL.

Examples are Advanced Solid-State Technology and Molecular Electronics, developed for HDL by Westinghouse Electric Corp., and Defense Procurement Management for Technical Personnel given by Rensselaer Polytechnic Institute.

In addition, certain standard courses such as supervisory training for both technical and administrative personnel are given by selected members of the senior staff on a continuing basis.

Results. Figure 1 shows the growth of participation in the program. A sharp rise started in 1961, which is about the time that the Government Employees Training Act began to have its effect.

Figure 2 shows the growth of the number of master's degrees in the last decade, with the dotted line being a projection based upon the present number of degree participants.

Figure 3 shows equivalent information for holders of PhD degrees and candidates. *Figure 4* summarizes the results of the program since 1954. It is noteworthy that results were accomplished without grade escalation. Between 1960 and 1965, the average grade of the agency remained constant within 0.3 of a grade.

Summary. HDL Staff Development Program demonstrated advantages include:

- It provides access to a pool of superior summer students who would not ordinarily be attracted to Government service.
- By continuing education after recruitment, it assures that the technical staff will be kept up to the state-of-the-art as regards new technology.
- It assures a continuing influx of young personnel with fresh creative ability to replace retirees and losses among the senior staff. In this way, promotional opportunity within the agency can exist without grade escalation.

The Program recognizes that employee development is fundamentally self-development. But it also recognizes the vital HDL interests at stake. In this climate of rapidly changing technology and inevitable obsolescence of training, it is imperative to encourage continuing education.

At HDL all levels of management recognize the need for training and actively support the program. Students recognize the commitment of management and find that the programs offered are designed to benefit them at minimum cost. The results speak for themselves.

Figure 4.
Results of Program.

- Forty percent of entering professionals since 1954 were summer students.
- *No grade escalation*—average grade remained practically constant.
- Quit rate is exceptionally low—average 6 percent per year.
- *Upgrading of technical staff*—by 1969 the number of master's degrees will have tripled and the number of PhDs will have tripled (3 per year average).
- *Training for the future*—average of HDL supported masters, 29.8 years; PhDs, 35.2 years.
- *Retention*—87 to 92 percent of those taking part in program remain in Government.
- *Cross Fertilization*—since 1956 HDL has trained for higher headquarters: 18 professionals for other Army agencies (8 to HQ), 15 professionals for other DoD agencies (DDRE, ARPA, etc.).

Technical Data Facility Opened At Engineer R&D Laboratories

Facilities for microreproduction, storage and a retrieval of technical data and an instantaneous data link with the Army Mobility Equipment Center, St. Louis, Mo., have been opened at the Army Engineer Research and Development Laboratories (ERDL), Fort Belvoir, Va.

Microfilming of drawings and other engineering data is expected to reduce paper-work volume by 95 percent and save more than $200,000 annually, based on past technical data distribution of 115,000 copies a month.

Information can be transmitted as hard-copy print-out or as punched-card duplicates to ERDL's parent command in St. Louis, where procurement packages on equipment are distributed to bidders and contractors.

Army RDT&E Contracts Exceed $291 Million

U.S. Army contracts for research, development, testing, evaluation, and procurement since the last Newsmagazine listing totaled $291,169,027.

Chrysler Corp. received the largest amount of $47,500,000 in two contracts. One was $44,000,000 for M60A1E2 tanks, M728 combat engineer vehicles, and armored vehicle launcher bridge chassis; the other, $3,500,000 for XM37 turret trainers.

Bell Helicopter Co. received $45,462,266 in two contracts—$44,337,858 for UH–1D helicopters and $1,124,408 for rotor rudder blades for the UH–1 helicopter.

Remington Arms Co., Inc., gained a $26,994,303 modification to an existing contract for loading, assembling and packaging miscellaneous small arms ammunition and components.

For reactivation activities and production of 105mm projectiles at the St. Louis Army Ammunition Plant, General Motors is receiving $21,566,188.

Day & Zimmermann, Inc., won a $21,154,859 modification to a previously awarded contract for loading, assembling and packing miscellaneous medium caliber ammunition and components.

A $16,060,281 modification of an existing contract for loading, assembling and packing miscellaneous illuminating shells and signals went to Thiokol Chemical Corp.

The Hercules Powder Co. added a $13,922,955 modification to a previous contract for loading, assembling and packing of miscellaneous propellants and explosives and for operation and maintenance activities.

Fairchild Camera and Instrument Corp. was awarded a $7,800,000 definitization of a previously awarded letter contract for countermeasure sets (AN/GLQ–3) and miscellaneous items. Eureka Williams Co. received a $7,183,679 contract modification for 500- and 750-pound bomb components.

Northrop Corp. was awarded $6,134,156 for Hawk missile launchers, and Amron Corp. received a $5,540,353 addition to a previous contract for 20mm brass cartridge cases. Mobile floating assault bridge transporters valued at $5,174,944 were ordered from Space Corp.

Control Data Corp. received $4,345,758 for developing, designing, fabricating and testing equipment necessary to provide an experimental automated Tactical Operations System for the Seventh U.S. Army. A $3,693,849 contract modification for cartridge launchers was issued to Brunswick Corp.

Raytheon Co. received two awards totaling $3,526,000 for contract definition phase for the SAM–D surface-to-air missile system and metal parts (T45E9) for aerial bombs. Bethlehem Steel Corp. was awarded a $3,500,000 modification to a letter contract for forgings for the 175mm gun.

Silas Mason Co. was awarded a $3,479,535 contract addition for loading, assembling and packing 500-pound bombs. Two modifications totaling $3,318,000 were issued to Harvey Aluminum Co. for 20mm projectiles and detonating fuzes. Hughes Aircraft Co. received $3,024,532 for contract definition phase for the SAM–D missile system.

Awards totaling $3,157,467 went to Cessna Aircraft Co. for M172E Trainer Aircraft, data, training and spare parts and for modernizing and modifying the O–1A aircraft to the O–1G configuration.

A $3,000,000 contract was awarded to McDonnell Aircraft Corp. for continued engineering development for the medium antitank/assault weapon.

Radio Corp. of America was awarded $2,974,995 for contract definition phase for the SAM–D missile system. Martin Marietta Corp. received a $2,623,609 definitization of a letter contract for canisters.

Bermite Powder Co., Saugus, Calif., won a $2,403,120 contract modification for fuze assemblies for 20mm cartridges. Philco Corp. received a $2,310,000 contract for completing development of XM30 helicopter armament subsystem.

A $2,173,200 definitization of a letter contract for XM27 mines and loading of XM2 canisters went to Atlantic Research Corp. American Machine & Foundry Co. received a $2,168,750 contract modification for 750-pound bomb fin assemblies.

Twelve-volt storage batteries valued at $2,143,420 were ordered from General Motors Corp. A $2,078,125 contract modification with R. G. Le Tourneau, Inc., is for fin assemblies for the 750-pound bomb. A contract with Midvale Heppenstall Co. was increased by $2,050,000 for tube forgings for the 175mm gun.

AVCO Corp. was issued a $1,245,599 delivery order for turbine rotor blades for T–53 engines for the UH–1 helicopter. Gould National Batteries, Inc., received $1,221,326 for 12-volt storage batteries and Union Carbide Corp. won a $1,100,146 contract for dry batteries for a portable radio receiver.

Modifications to previously awarded contracts: L. T. Industries, Inc., $1,988,382 for fin assemblies for 750-pound bombs; Goodyear Tire & Rubber Co., $1,963,685 for shoe assemblies for combat vehicles;

Also, Chamberlain Corp., $1,598,170 for metal parts (XM151) for the 2.75-inch rocket; Mansfield Tire & Rubber Co., $1,484,102 for 42,162 pneumatic tires; Wilkenson Manufacturing Co., $1,127,237 for 60mm cartridge fin assemblies; Z. D. Products of Wells Marine, Inc., $1,104,040 for detonating fuzes;

Also, Presto-Lite Co., $1,026,638 for 25-ampere generators for ¼-, ¾- and 2½-ton trucks; Independent Lock Co., $1,005,552 for adapter boosters (T49E9) for aerial bombs; and Admiral Corp., $1,000,806 for components for radio receiving sets, AN/ARC–54.

Army Orders 27 UH–1E Aircraft

Production of 27 UH–1E helicopters has been authorized by the Army Aviation Materiel Command at a cost of $1,872,000. The contract with Bell Helicopter Co. of Fort Worth, Tex., brings to 58 the total number of aircraft of this type under order. July 1967 through January 1968 is the performance period specified in the new award.

Col Levin Joins Natick Labs as Technical Plans Chief

Col William B. Levin has been assigned to the U.S. Army Natick (Mass.) Laboratories following four years in Frankfort, Germany, as deputy chief, U.S. Army Research and Development Group, Europe.

As chief of the Technical Plans Office, he is responsible for developing long-range plans for combat materiel requirements and for mission-oriented research programs. This includes technical intelligence, mutual weapons development among NATO nations, and materiel standardization involving the U.S., Canada, Great Britain and Australia.

A 24-year military veteran, Col Levin earned a BS degree in chemical engineering from Oregon State University in 1940. In 1952 he received an MS degree in food technology from Massachusetts Institute of Technology, where he was assistant professor of military science and tactics.

Col W. B. Levin

Col Robert W. Samuel

Lt Col C. W. Kingsbury

Lt Col L. G. Hergert, Jr.

Lt Col J. J. Doody

4 Army R&D Officers Attending Industrial College

Four R&D officers are among 49 Army personnel in a class of 180 attending the 10-month course at the Industrial College of the Armed Forces (ICAF), Fort Lesley J. McNair, Washington, D.C.

Col Robert W. Samuel was selected while serving as chief of the Research Plans Office, U.S. Army Research Office (USARO), Office of the Chief of Research and Development. Others from OCRD are Lt Col Louis G. Hergert, Jr., R&D Coordinator, Plans Division, and Lt Col John J. Doody, staff officer, Combat Materiel Division.

Another student, Lt Col Clarence W. Kingsbury, was chief of Plans and Operations for an R&D unit in Bangkok, Thailand, under the Office of the Secretary of Defense, Advanced Research Projects Agency (ARPA).

Operating under the direction of the Joint Chiefs of Staff, the ICAF is considered the capstone of the U.S. military educational system in the management of logistic resources for national security.

The joint educational institution conducts courses in the economic and industrial aspects of national security and in the management of resources under all conditions. Due consideration is given to the interrelated military political and social factors affecting national security in the context of national and world affairs.

Studies are designed to prepare selected military officers and key civilian personnel for important command, staff and policy-making positions in the national and international security structure. During the lecture series at the College, students are addressed by high-level Government and industry executives.

COL SAMUEL, a graduate of the U.S. Military Academy, holds an MS degree in mechanical engineering from the University of Michigan. He is a graduate of the Artillery School, the Field Artillery School and the U.S. Army Command and General Staff College.

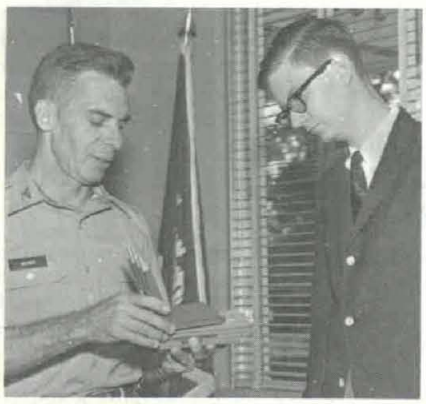
In 1961 he was assigned as deputy director for Engineering Testing at Aberdeen Proving Ground, Md., where he served until he became project and executive officer under ARPA in Saigon, Viet Nam.

LT COL KINGSBURY, a graduate of the U.S. Military Academy and the Command and General Staff College, earned an MS degree in engineering from Purdue University. Before assignment to Thailand, in 1965 he was with the U.S. Army Combat Developments Command, Nuclear Group, Fort Bliss, Tex. (1961-65); the U.S. Army Ordnance Depot, ASCOM, Korea (1960-61); and at White Sands (N. Mex.) Missile Range (1956-59).

LT COL HERGERT graduated from the U.S. Military Academy in 1950, received a master's degree in business statistics from the University of Alabama at Tuscaloosa in 1964 and has completed the Command and General Staff College course. He served as a battery officer in Korea (1951-52 and 1964-65) and in Hawaii (1956-59) and was a member of the Combat Development Department of the Artillery School at Fort Sill, Okla. (1953-55). This is his second tour as R&D coordinator at the Pentagon, the first being from 1960-62.

LT COL DOODY is a 1948 graduate of the U.S. Military Academy and was stationed in Korea from 1950 until 1954, when he was transferred to Germany. In 1957 he returned to the U.S. and was an ROTC instructor at the University of Connecticut. After attending the Command and General Staff College, Fort Leavenworth, Kans., he returned to Korea in 1962 as secretary of the General Staff, Eighth U.S. Army. Transferred to Fort Lewis in Washington as battalion commander, 2d Infantry Division, he served until joining OCRD as a staff officer in 1965.

ISF Winner Visits ERDL



SUPERIOR AWARD winner Robert L. Jeffcoat, 18, is welcomed by commanding officer Col Frank Milner to a visit to the Engineer R&D Laboratories at Fort Belvoir, Va., where he spent a week touring facilities and becoming acquainted with Army R&D mobility programs. During the trip, awarded for his exhibit at the 1966 International Science Fair, Robert also visited South Carolina Congressman R. T. Ashmore and Senator D. S. Russel on a tour of Capitol Hill.

New AFIP Executive Officer Wins Fellowship in ACHA

Following closely upon his recent assignment as executive officer of the Armed Forces Institute of Pathology (AFIP), Col Ralph G. LeMoon was advanced to Fellowship status in the American College of Hospital Administrators (ACHA).

The ACHA membership comprises 6,900 administrators and assistants in hospitals in the United States and Canada.

Since 1961, Col LeMoon has been assistant chief of Officer Procurement and chief, Special Projects Office, Office of The Surgeon General, Washington, D.C.

Col Vincent P. Verfuerth, the AFIP executive officer until his retirement from the Army, has assumed an executive position with the Science Information Exchange, Smithsonian Institution. Most of his 30 years in the Army were in hospital administration.

International Atomic Energy Agency Prevails Upon U.S. Army's Dr. Goresline to Extend Food Research

One of the U.S. Army's foremost food scientists, Dr. Harry E. Goresline, has entered a fourth year with the joint Food and Agriculture Organization (FAO)/International Atomic Energy Agency (IAEA), United Nations.

After serving the legal limit of three years' leave of absence from the U.S. Army Natick (Mass.) Laboratories, he was transferred recently to the international agency with the approval of the U.S. Army Materiel Command. He has Army reemployment rights under U.S. Civil Service regulations.

The scientist is on duty in Vienna, Austria, with the joint FAO/IAEA Division of Atomic Energy in Agriculture, formed Oct. 1, 1964. He was first assigned Aug. 1, 1963 to the United Nations' FAO in Rome. Dr. M. Fried is director of the FAO/IAEA Division.

Dr. Goresline's "unique talents" in the field of food irradiation, were praised by FAO Deputy Director-General Oris V. Wells from FAO Headquarters in Rome.

The FAO official cited the Army's pioneering since 1953 of the research on the use of ionizing radiations for the preservation and treatment of food products. He stated that there seems "no doubt" but that industrial use of this method will begin "in the near future."

The FAO of the United Nations and IAEA are attempting, he said, to apply the results of the Army's research on a "truly international basis" and Dr. Goresline "has pushed this work forward until it is one of the most active areas."

During three years' work with FAO and the joint international organization, the FAO deputy stated that Dr. Goresline served as the technical officer on the United Nations Special Fund project in Turkey.

A radiation pilot plant for the control of insects in grain is now under construction in Turkey. It will be ıe world's first continuous commercial-type grain irradiation plant and will be used as an international demonstration and training unit.

Dr. Goresline will continue to supervise the technical details of the plant "to bring it through the testing and analytical stages to demonstrate internationally the value of this peaceful use of atomic energy."

Located at Iskenderun, a grain-handling port, the plant will have a capacity of 30 tons per hour and will use 163,000 curies of cobalt 60.

Dr. Goresline was also cited for his work in organizing legislative panels to advise on the movement of irradiated products in international trade where uniformity of legislation is needed to control the irradiation process of trading countries.

One panel was the Technical Basis for Legislation on Irradiated Food. Another, comprised of experts from 12 countries, concerned Microbiological Specifications and Testing Methods for Irradiated Food.

Wells said reports of these meetings will be presented to United Nations members for voluntary use in preparation of legislation on irradiated food, adding: "We expect to see legislation on irradiated food in several countries in the next three years and the beginning of international trade in irradiated foods."

Dr. Goresline joined the U.S. Department of Agriculture in 1930 and began international work in food preservation problems in June 1936. He represented the U.S. Department of Agriculture at the Second International Congress of Microbiology in London, England.

Dr. Harry E. Goresline

In 1939 he chaired the U.S. delegation to the Sixth International Chemical and Technical Congress for Agricultural Industries in Budapest, Hungary. In 1952 he transferred to the Armed Forces Food and Container Institute, Chicago, and five years later received the National Civil Service League Merit Citation. In 1956, he won the Research Achievement Award, Poultry and Egg National Board.

One of the founders of the Institute of Food Technologists, and author of scores of publications on food technology, he received a BS degree in chemical engineering from Oregon State College in 1926, and MS and PhD degrees in sanitary bacteriology in 1928 and 1931 from Iowa State College. He is a member of numerous professional and scientific societies.

CSC Starts Advanced Course In Operations Research Nov. 16

Techniques and Methods of Operations Research, a U.S. Civil Service Commission course to be conducted Nov. 16-18, will emphasize the mathematical and statistical approaches to decision making.

Open to full-time Federal employees, GS–9 and above or equivalent, the program will provide participants an opportunity to work with various operations research techniques.

Nominations will close on Oct. 31. They should be submitted on Optional Form 37 to the ADP Management Training Center, Office of Career Development, U.S. Civil Service Commission, Washington, D.C.

Anticipation—The Mother of Invention

(Continued from page 2)

boards and will soon be available for Viet Nam. The quick reaction of Weapons Command personnel in meeting the challenge of new requirements generated by necessity has been truly outstanding.

The key question is: Will the future permit us to react adequately to requirements *generated by necessity?* I personally feel that the answer is *no!* In a world of rapid technological advances, we are currently being challenged by a formidable opponent. In the field of weaponry and the exploration of space, we are hard-pressed to retain our position of technological leadership.

For the world of tomorrow, we must think forward with our research and development programs. We must make anticipation rather than necessity the mother of invention. Not only must we be prepared to meet the Communist challenge in nuclear warfare, conventional warfare, and guerrilla warfare. We must *anticipate* a fourth type of warfare and be prepared to turn the tide of communism there! What new type of warfare will the space age produce? What will we use for a Big Stick?

The Big Stick must be superior weaponry . . . achieved through the early exploitation and development of technological advances. We must maintain a dynamic research and development program in the field of weaponry to assure that our country is not second best on any battlefield.

Army Exceeds Cost Reduction Goal by 17 Percent

Continued improvement in Department of the Army management and economy of operation, despite impact of the Southeast Asia conflict, resulted in Cost Reduction Program savings of $1.36 billion in FY 1966.

This is approximately 17 percent above the $1.16 billion goal for the year. In FY 1965, the Army Cost Reduction Program achieved a saving of $1.17 billion, about 25 percent above the $934 million goal.

When the Department of Defense Cost Reduction Program began in FY 1963, the Army goal was $459 million; savings totaled $678 million—50 percent more. The FY 1964 goal was $818 million and savings were over $1 billion, a "bonus" of 23 percent.

Of the 31 areas of effort in the Army Cost Reduction Program, the Office of the Chief of Research and Development monitors value engineering (VE) to eliminate "goldplating," and technical data and reports.

VE contributed $2.5 million to the total $3.6 million of realized funds saving (RFS), FY 1966 funds that can be reprogramed in research, development, test and evaluation (RDTE). RFS for FY 1965 in RDTE totaled $4.1 million, to which VE contributed $128,000.

Total reported RDT&E savings for FY 1966 exceeded $13 million, consisting of the $3.6 million RFS and the remainder classified as "cost-avoidance" actions—i.e., use of new ideas that reduced original cost estimates.

Numerous examples of imagination and ingenuity among cost-conscious military and civilian employees of the Army are shown in itemized savings in FY 1966 Cost Reduction Program Progress Reports. Included are these examples:

An in-house effort at Picatinny Arsenal, Dover, N.J., in redesigning the XM91 primer for the Sheridan/Shillelagh weapon, made automated mass production possible with a gross saving of $934,560. Picatinny also saved $310,000 by a study that led to cancellation of the development project on the XT-4188 Field Tester for nuclear warhead section fuzes.

Springfield (Mass.) Armory eliminated unnecessary environmental requirements for hydraulic motors in helicopter armament subsystems to save $121,259.

In the Lance Missile System, for example, efforts by the contractor resulted in unit cost reductions totaling more than $445,000 during the first quarter of FY 1966. Casting an aluminum alloy injector housing, instead of forging it, reduced machining costs. A change in manufacture of the Lance booster thrust chamber and a variation in fabrication procedures for tank shells contributed to the total.

Representative of VE savings were eight items in the TOW antitank missile system, for total savings of $283,472.

Substitution of a lightweight engine-generator set for the gas turbine of the AN/TSC-54 prime-power subsystem met performance requirements, with improved system capability. Savings of $501,200 resulted from weight reduction, quadrupled time between major overhauls, increased prime-power reliability, and in maintenance, fuel logistics and spare parts provisioning.

Frankford Arsenal, Pa., designed modifications to a commercial paper-tape typewriter (Dura-Mach 10), enabling it to perform the basic functions of the Army Chemical Typewriter (ACT). A net saving of $132,750 for nine units was reported.

Originally it was planned to provide ACT for all users in the Army Chemical Information Data System (CIDS). However, it was found that some users have a lighter input load that can be served as effectively with the Dura-Mach 10 costing more than $14,000 less per unit.

12 Medical Officers Enroll In WRAIR Advanced Class

Two lieutenant colonels, eight majors and two captains comprise the Walter Reed Army Institute of Research's 14th class of Military Medicine and Allied Sciences, the country's longest Medical Corps course.

Designed to prepare military doctors as teachers and directors, the course began Aug. 22 and ends June 10, 1967. Col Hinton J. Baker course director and assistant commandant of Walter Reed Army Institute of Research, has termed it "the most advanced thing the Army has done in teaching."

The 12 members of the class, 11 from throughout the Army Medical Corps and one from the Air Force Medical Corps, will receive postgraduate education for research and evaluation of medical information and teaching.

Members of the 14th class are Lt Cols Carlos M. DeCastro, Jr., and Edmund A. Krekorian; Majs Joseph L. Alexander, Walter D. Durden, Forrest D. Garretson, George A. Griggs (USAF), Alexander G. Juden, Jr., Patrick D. Tisdale, Jack M. Valpey, Derek W. Williams, and Capts H. I. Keller and Alva L. Strickland.

Col Meroney Assigned As OTSG Training Deputy

Col William H. Meroney, MSC, is the new deputy director of Personnel and Training in the Office of The Surgeon General, U.S. Army.

Major assignments include: chief, Research Division, U.S. Army Medical R&D Command (1964-65); deputy director, Walter Reed Army Institute of Research (1961-64); and chief, Department of Metabolism, WRAIR, and Walter Reed General Hospital (1953-57).

In addition, he has served at the Renal Insufficiency Center in Korea and the U.S. Army Tropical Research Medical Laboratory in San Juan, Puerto Rico.

Col Meroney holds a BS degree from the University of North Carolina. As associate editor of various research publications, he has authored about 60 articles published in professional journals during his 20 years military service.

Army Medic's Achievements Earn Highest 'A Prefix' Award

The Army Medical Service "A Prefix," the highest AMEDS award for professional achievement, was presented recently to Col James L. Hansen, assistant chief of the Department of Pathology.

In presenting the award, Brig Gen Joe M. Blumberg, director of the Armed Forces Institute of Pathology (AFIP), stated that "few officers demonstrate the outstanding qualifications and exceptional ability which are the criteria for this award."

Col James L. Hansen

Col Hansen is also chief of the Pathology and Allied Science Office, Office of the Surgeon General. His particular interests are associated with neoplasms and thyroid diseases and he served three years as director of the U.S. Army SEATO Medical Research Laboratory, Bangkok, Thailand.

He earned an MD degree in 1944 from Duke University, has received the Legion of Merit, and is a member of the American College of Pathology, American Association of Pathology and Bacteriology, and the American Society of Clinical Pathologists.

USAMRL Complex Copes With Soldiers' Physical, Mental Stress

This is the third in a series of articles on research in U.S. Army Medical Service laboratories. The first, in the June issue, explained the missions of the U.S. Army Institute of Dental Research, Washington, D.C.; the second, September issue, reviewed the U.S. Army Medical Unit at Fort Detrick, Md.

The U.S. Army Medical Research Laboratory (USAMRL) was established in 1942 at Fort Knox, Ky., "to study the physical and mental stresses placed upon the soldier in the operation of armored vehicles, with the object of improving safety and efficiency."

Today, USAMRL is the second largest Class II medical research laboratory administered by the U.S. Army Medical Research and Development Command (USAMRDC).

The laboratory occupies 35 buildings, totaling over 125,000 square feet of floor space. Equipment valued in excess of $1.8 million is available for one of the Army's most up-to-date medical research and support facilities. The annual operating budget is in excess of $1.5 million. Personnel include 134 civilians and 76 military.

The laboratory has five research divisions and one research support division. The research divisions are: Biochemistry, Biophysics, Blood Transfusion Research, Pathology and Experimental Psychology.

The USAMRL mission is: To conduct research on a wide range of military medical problems, with emphasis on human sensory capacity to determine performance limitations; to conduct basic and applied research directed toward the development of reliable reagents, equipment and methodology relating to the collection, processing, preservation, and transfusion of blood within the military services; and to train officers and enlisted men in all phases of military blood banking.

Col Robert J. Hoagland
USAMRL Commanding Officer

The Experimental Psychology Division, directed by Dr. George S. Harker, is engaged in the following activities: elucidation of the nature of the stereoscopic cue in depth perception; study of the visual capability of humans; classification and quantification of the color vision capabilities of Army personnel;

Also, investigation of the psychophysiological correlates of acoustic stimulation, and the effects of intensive noise on auditory sensitivity as well as preventive measures for minimizing the detrimental effects of noise stimulation;

Also, study of the contributions of motivation and personality factors to performance of strenuous physical activities; and investigations of the causes, nature and extent of the effects of spatial disorientation upon performance by examining vestibular-visual interactions.

The objective of psychophysiological research is to provide current information on the capabilities and limitations of man and on the interface between man and his environment. The two efforts are integrated and represent a coordinated whole.

Information is developed on human sensory capacities and skilled and physical performance in relation to current and projected military activities. While the primary emphasis is on the human being, animal research is performed whenever comparable human research is not possible (as in production of permanent damage) or to clarify basic mechanisms.

The need for human subjects in psychophysiological studies is served through a "Medical Participants' Program." Fifteen trainees are temporarily assigned to the laboratory for voluntary participation in the research programs of the Psychology Division.

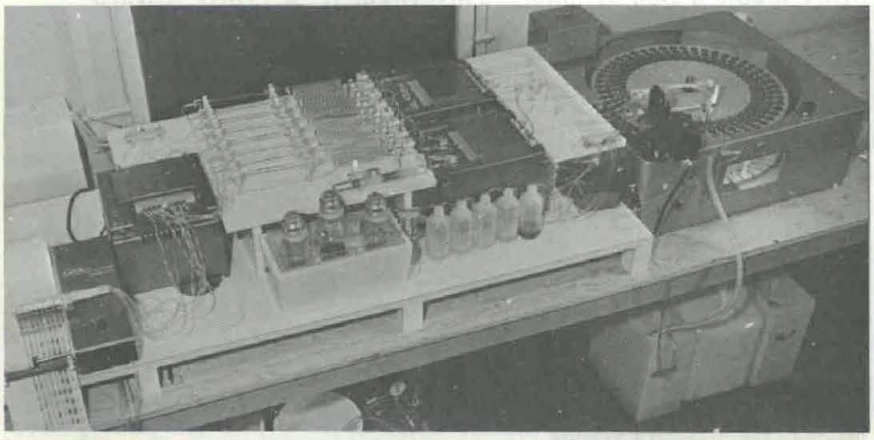
The Biophysics Division, directed by Dr. Edward S. Spoerl, is engaged in the following projects:

- Evaluation of the biological effects of Laser (with particular attention being given to effects of Laser on the corneal epithelium).
- Systematic manipulation of the angular subtense of the Laser flash by presenting the flash in Maxwellian view through a series of simple lenses, thereby illuminating the retinal surface area.
- Investigations of the chemical and physical phenomena associated with the absorption of Laser radiation by molecular and subcellular systems.
- Studies of the effect of Laser radiation on antibody enhancement and antibody formation.

The effects of ruby Laser radiation on individual blood elements of whole blood and bone marrow also are being studied. In the near future studies in this area will include lasing of whole blood *in vivo* and utilizing an extracorporeal circuit in an effort to produce blood dyscrasias.

Laser studies have been accomplished with a ruby Laser apparatus. A new high-energy CW C02 gas Laser has been procured which is expected to extend greatly knowledge of Laser hazards. A problem of increasing concern is flash blindness. Currently, the Biophysics Division is considering approaches to research in this area.

The Blood Transfusion Research Division was organized at USAMRL



COMMERCIALLY AVAILABLE automatic machine capable of processing blood for transfusion to include cell grouping, serum grouping and cell typing at the rate of 120 samples per hour at U. S. Army Medical Research Laboratory.

July 1, 1965, under the direction of Lt Col Frank R. Camp, Jr., to conduct research and development and training activities; also, operations related to blood banking and blood typing. During a year fellowship in blood banking, three Medical Service Corps laboratory officers are trained in blood banking and immunohematology. Bleeding teams also will be trained in the near future.

Research efforts of this division relate to studies of bank blood preserved in ACD and ACD with adenine to prolong and improve red cell preservation. Initial observations of *in vivo* studies have been encouraging.

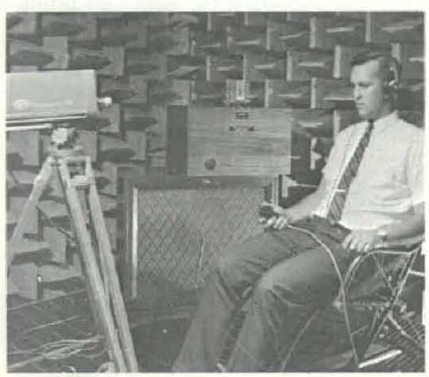
Other research pertains to improvements in blood grouping (using semi-automation and full automation) and identification of Universal Donors among Group O individuals by defining safe limits of anti-A and anti-B isoagglutins, hemolysins and immune anti-A and anti-B antibodies.

The Biochemistry Division, directed by Dr. Walter F. Kocholaty, currently is studying the mechanism by which adrenal steroids regulate protein and nucleic acid metabolism and the biochemistry of snake venoms to produce nontoxic agent which can be used to elicit antibodies *in vivo*. Chemical fractionation of venom and use of agents to detoxify venom are the chief objectives of venom research.

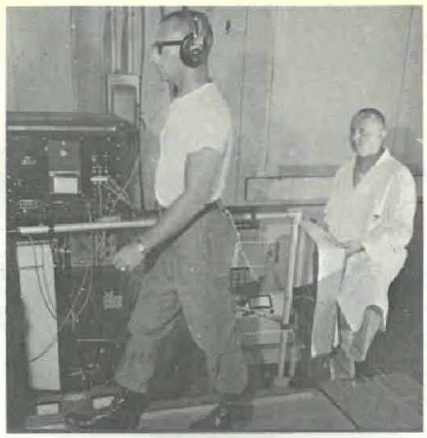
Venoms have been detoxified by a novel method by which the relatively harmless toxoid is capable of stimulating antibody production. These antibodies protect the mice against severalfold lethal doses of venom.

By varying temperature and pH, changes sufficient to cause practically complete detoxification of the venom, with no loss in the immunogenic properties, are produced. Experiments are in progress to prepare multivalent antisera which could be "tailored" to various areas of the world.

Fractionation of snake venoms has resulted in the separation of several intensely toxic products and also nontoxic low-molecular fractions, which may have therapeutic and pharmacologic potential.



ELECTRICAL DISCHARGES are used to simulate the high intensity sounds of gun fire for psychophysiological tests conducted at USAMRL.



TWENTY-MILE HIKE, without gaining a yard, is made in Medical Research Laboratory treadmill which matches speeds of the walker. The tests are designed to record soldiers' behavior under varying physical stress.

The Pathology Division, directed by Capt David Hysell, employs clinical, gross and microscopic examinations of living and dead animals in its preventive medicine responsibility for the research animal colony. Continuous effort is directed to detecting actual and potential health hazards. The work insures that the researcher has a healthy animal with which to work.

This division is concerned with identifying and treating sporadically occurring diseases found in laboratory animals, with emphasis on diseases that might be communicable to man. It has worked closely with the Biochemistry Division on the snake venom detoxification project.

The Research Support Division provides a myriad of services to the researcher. Personnel include highly skilled artisans to provide essential services such as glassblowing, model-making, air conditioning and refrigeration, carpentry, photography and medical illustration, machine shop, and electronics and electricity shops.

A medical research library containing over 10,000 volumes and 360 journals and periodicals provides the scientist with ready references when needed.

From its meager beginnings some 24 years ago, the USAMRL has emerged as one of the foremost contributors to military medical research. The six divisions of the laboratory, separately and in a cooperative effort, have kept pace with progress in their ever-expanding areas.

U.S. Army Engineer School Names Glasgow as Assistant Commandant

Col William M. Glasgow has assumed duties as assistant commandant of the U.S. Army Engineer School at Fort Belvoir, Va., after a tour in Viet Nam as chief of staff, 1st Infantry Division.

The colonel is a 1943 graduate of the U.S. Military Academy, the Supply Management School, Industrial College of the Armed Forces, and management program for executives at the University of Pittsburgh.

MICOM Awards 3 Contracts for SAM-D

Army Missile Command work on SAM–D entered a 5-month Contract Definition Phase, the last step before development contracts are let, with the award of three contracts totaling $8.49 million.

Chosen to detail their proposals to develop the surface-to-air missile system for the 1970s are: Hughes Aircraft Co., $3,024,532; Radio Corp. of America, $2,974,995; and Raytheon Co., $2,500,000.

Awarded by the Army Missile Command (MICOM), Redstone Arsenal, Ala., the contracts call for definitive action to show eactly how each contractor intends to develop a missile system capable of simultaneously acquiring, tracking, identifying and destroying multiple aerial targets.

In May 1967, if no further definition is required, one or more of the prime contractors will be selected to receive development contracts.

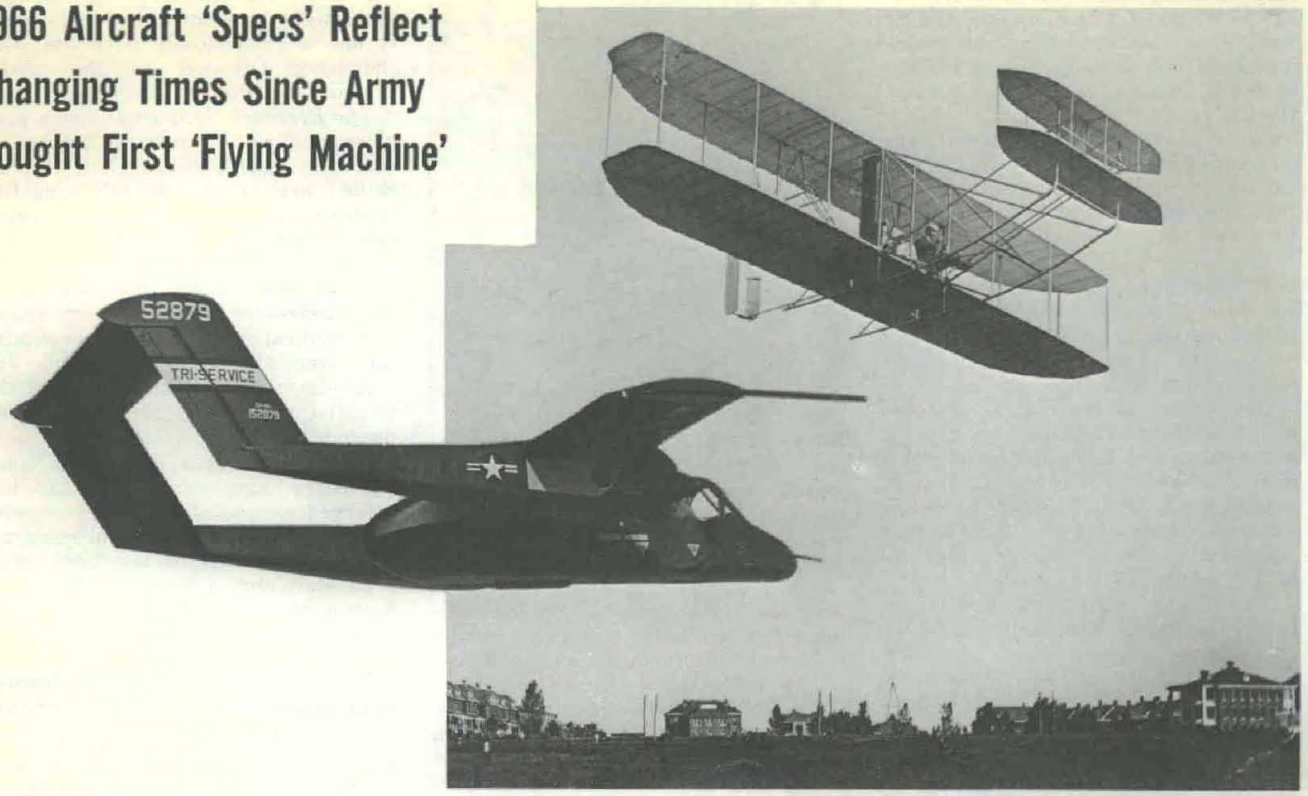
SAM–D is being planned to provide a continental and battlefield air defense role against low-, medium- and high-flying aircraft, and short-range missiles. Eventually it will replace the Nike Hercules and a portion of the Hawk air defense systems now operational in the U. S. and overseas.

A SAM–D battery will be a highly mobile firing unit mounted on tracked or wheeled vehicles. Mobile launchers will carry several solid-propellant missiles in launching-shipping containers.

A multifunction phased-array radar will detect and track targets, and issue guidance commands to the SAM missiles. A Battery Control Center, which will also serve as a communications center, will coordinate firing operations within the battery.

The U.S. Navy is participating in the development of SAM–D and the Department of Defense expects that a system will result which is fully acceptable to Army needs yet contains components adaptable to the environment of a ship at sea.

1966 Aircraft 'Specs' Reflect Changing Times Since Army Bought First 'Flying Machine'



TRI-SERVICE OV–10 of 1966 is superimposed on this photograph of Orville Wright test-flying the Wright Brothers plane of 1908 the first "flying machine" to be bought by the Army — at Fort Myer, Va.

One legal-length page was all the Army needed 59 years ago to specify what it wanted in "a flying machine supported entirely by the dynamic reaction of the atmosphere and having no gas bag."

Today, "a flying machine"—using the OV–10 tri-Service COIN/LARA (Counterinsurgency Light Armed Reconnaissance Aircraft) now undergoing contractor evaluation as a remotely comparable example—requires *85 pages* of detailed specifications.

The one-page "Advertisement and Specification for a Heavier-Than-Air Flying Machine" is one of the most popular documents in the National Archives, Washington, D.C. Archivists report thousands of requests through the years for copies of the Army "Signal Corps Specification, No. 486." The paper is on display in the North Carolina case in the Archives building's exhibit hall.

North Carolina enters the picture because it was Wright brothers-developed version of the 1903 Kitty Hawk (N.C.) aircraft that met, then exceeded, the Army specifications for a speed of "at least forty miles per hour in still air."

Orville and Wilbur Wrights' bid of $25,000 was chosen from three bids submitted in February 1908. As the ingenuity of the Wrights had produced the first heavier-than-air flight on Dec. 17, 1903, at Kitty Hawk, they plunged into an historic task with vigor.

In July 1909 Orville flew a redesigned machine 42.5 miles per hour to win a $5,000 bonus. With an Army lieutenant as passenger, he flew the final test from Fort Myer, Va., to Alexandria, Va.—five miles—and remained aloft 1 hour, 12 minutes and 40 seconds to establish a "world record."

(The Army lieutenant is retired Maj Gen Benjamin D. Foulois, chief of the Army Air Corps in the 1930s and one of the last of the early aviators. He is nearly 90 years old and lives at Andrews Air Force Base, Md.)

The aircraft was formally accepted by the Army on Aug. 2, 1909, the first flying machine purchased by a military service.

The OV–10's purchase price is approximately $300,000—depending on the quantity procured by the services and the "specs" call for a maximum level-flight speed of 265 knots, or about 305 miles per hour.

The range required of the early flying machine was 126 miles. The OV–10's specified range is 1,200 miles.

The 1907 specification stated: "It is desirable that the flying machine should be designed so that it may be quickly and easily assembled and taken apart for transportation in Army wagons. It should be capable of being assembled and put in operating condition in about one hour." This is not required of the OV–10.

Over the signature of Brig Gen James Allen, then Chief Signal Officer of the Army, the 1907 aircraft requirements called for a machine that "should be sufficiently simple in its construction and operation to permit an intelligent man to become proficient in its use within a reasonable length of time."

The Army called for price proposals based on 40 miles per hour as 100 percent of the contract price. The scale descended at the rate of 10 percent per mile an hour to a cutoff point: "less than 36 miles per hour rejected." The scale of proposed cost also ascended at the rate of 10 percent per mile above 40 miles an hour—thus, by attaining 42-plus miles per hour the Wright brothers claimed 20 percent of the basic contract price.

The $25,000 tag on the Wright's flying machine is about the price of *one engine* for the OV–10. For that, it could hardly get off the ground.

Services Test Prefab Mats for Airfields

Four new types of aluminum mats, prefabricated for the construction of military airfields, are undergoing tests by the U.S. Army, Marine Corps and Air Force at Dyess Air Force Base, Abilene, Tex.

Fort Leonard Wood, Mo., provided 120 Army Engineers and equipment of the 5th Engineer Combat Battalion for the construction and dismantling portions of the tests. Twenty-six Dyess-based C–130s airlifted the Engineers to the test site last August.

A 6,000-foot runway, taxi strips and airfield facilities are expected to be completed by the end of October. Tests of the airfield by a wide variety of military aircraft, including the heavy Air Force C–141, will extend into 1967. The Marine Corps will use aircraft carrier-configured F4B and F4C fighters with arresting hooks.

Three types of extruded aluminum mats (MX–18B, MX–18C, AM–2) and a lightweight honeycombed aluminum composition (MX–19) are being installed on a membrane covering a soft grade of soil. (See July-August 1966 edition of the *Army Research and Development Newsmagazine*, p. 16.)

Tests will run the full gamut of a field installation, aircraft takeoffs, landing and servicing to the final recovery and disposition of the materials involved.

By agreement between the Army Chief of Engineers and the Army Materiel Command, the Army Engineers Waterways Experiment Station (WES), Vicksburg, Miss., has been assigned the Army responsibility for developing airfield and surfacing materials. WES conducted the initial design tests on the industry-produced landing mats now under test.

WES is providing laboratory facilities and technicians during the tests for soil-stability studies, evaluating materials and concurrent investigation of the use of chemical dust palliatives.

Engineering test responsibilities have been assigned by the Army Test and Evaluation Command, Aberdeen (Md.) Proving Ground, to the Army General Test Activity, Fort Lee, Va. Service tests will be conducted by the Armor and Engineer Board, Fort Knox, Ky., which also serves as the Army executive agent. Lt Col Frank M. O'Quinn, member of the board, is the Army project officer.

The Department of Defense has assigned HQ, U.S. Air Force as executive agent for the project and the Tactical Air Command, Langley Air Force Base, Va., is Air Force agent.

Army Accepts Hipar Units For Nike Defense System

Mobile high-power acquisition radar (HIPAR) units for use with the Nike Hercules air defense system in the field have been accepted by the Army Missile Command (MICOM), Redstone Arsenal, Ala.

The General Electric Co. factory at Syracuse, N.Y., is producing Hipar units to be transported in five vehicles instead of the 20 carriers presently required for fixed Nike Hercules sites.

Nike Hercules project manager Col R. M. Colquitt, Jr., accepted the production-line equipment from GE. It was delivered to Col W. E. Saunders, president, Army Test and Evaluation Command's Air Defense Board, for confirmatory testing before assignment of Hipar to selected field units.

Mobile HIPAR consists of three vans housing the radar transmitter, receiver and control equipment, and two semitrailers which haul the 43-foot-wide fan-shaped antenna and power generators. The more compact radar equipment will give Army air defense units in the field the same target detection capability that now exists at fixed sites.

The 2-stage solid-propellant Nike Hercules is deployed in key areas throughout the United States and overseas. The system is effective against high-performance aircraft and short-range ballistic missiles.

Hipar searches the sky with a 360-degree sweep. When an enemy target is detected, its location is transferred to the target-tracking radar which pinpoints it for intercept. The tracking radar sends guidance and burst orders from the computer to the Nike Hercules missile, which has a range of more than 75 nautical miles.

Metzler Assigned to DASA Post

Col Howard C. Metzler, a 1944 graduate of the United States Military Academy, recently replaced Col George E. Hesselbacher, Jr., upon his retirement from the Army, as chief, Blast and Shock Division, Defense Atomic Support Agency.

Col Metzler has a master's degree in civil engineering from Iowa State College and recently completed studies at the National War College, Fort McNair, Washington, D.C.

NBS 65-Year Role Told in 'Measures for Progress'

Measures for Progress, a 700-page history of the National Bureau of Standards published recently, describes the critical role the Bureau has played in the Nation's growth in technology, industry and commerce during its 65-year existence.

Historian Dr. Rexmond Cochrane prepared the text under the editorial direction of the late science editor, James R. Newman. Secretary of Commerce John T. Connor commented on the book:

"The history of the National Bureau of Standards shows a striking parallel with the development of American science and industry in the same period. The growth in our industrial accomplishment was based upon an unprecedented increase in our ability to measure accurately and reliably. And it was NBS which pioneered in this measurement capability."

Measure for Progress describes how the neon sign was invented; how this country's optical glass industry was born; how the weight of hydrogen was determined, with all its implications in an atomic age; how Standards research in alternate current radio circuits put radio in every home; how it succeeded in putting direction-finding radios in aircraft; the development of the magnetic fluid clutch that became a multimillion dollar industry; the development of the World War II proximity fuze by the U.S. Army which contributed greatly to Allied victory; and the development of the Navy "Bat," the first guided missile used in warfare.

The book is available through the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C., 20401, at $5.25 a copy.

Col Crosby Named Executive Of Medical R&D Command

Col Leonard A. Crosby, Jr., assumed duties as executive officer in the U.S. Army Medical Research and Development Command, Washington, D.C., following completion of the regular course at the U.S. Army War College, Carlisle Barracks, Pa.

Commissioned in 1943 at Camp Barkeley, Tex., Col Crosby holds a BS degree in military science from the University of Omaha (1962) and a master's in international affairs from George Washington University (1966).

From 1963-65 he was assigned to the Logistics Division at HQ, U.S. Army Europe, following a tour as instructor at the Command and General Staff College. He is a 1958 graduate of the college.

In the Army Surgeon General's Office he has served as plans and policies officer; chief, Army Aviation Section; operations officer; assistant chief, Organization and Allowances Branch; and assistant chief, Organization and Combat Development Br.

Kudos

LEGION OF MERIT. Service as chief, U.S. Army Medical Research Team, Viet Nam, from September 1965 to June 1966 earned the Legion of Merit for Lt Col Robert J. T. Joy, MC. Chief of Staff Brig Gen Richard J. Seitz, U.S.A., Viet Nam, made the presentation. The citation states:

Lt Col R. J. T. Joy

". . . He was responsible for direction of medical research in Viet Nam on matters of major military significance, including malaria, plague, enteric disease, combat stress and surgical shock. His definitive evaluation of Dapsone as a supplement to existing prophylaxis against malaria under combat conditions confirmed the usefulness of the drug, leading to substantial decrease in the incidence of malaria in American troops."

Lt Col Joy also was credited with study of the stresses of heat and water loss on Mohawk pilots, leading to measures to increase their efficiency and to modify the aircraft cockpit ventilation without resort to costly air conditioning of the aircraft. The citation noted his "inspiring leadership."

The Legion of Merit was awarded recently to Brig Gen Oscar J. Ogren, director of Dental Activities, Walter Reed Army Medical Center, for his exceptionally meritorious service from July 1961 to July 1964 when he retired from the Army Sept. 1.

"Military personnel and their dependents were assured of the finest possible professional dental care through his technical skill and profound concern for all patients," the citation stated. "The Nation is grateful for his leadership in a specialized area of medicine and for the productive team spirit that he fostered throughout the health field which contributed materially to the health of mankind and to the welfare of the United States and the Armed Forces."

General Ogren also received the Army Medical Service Medallion for his over 30 years service.

The Legion of Merit was presented to Lt Col Thomas G. Muller, now chief of Project Team II, U.S. Army Combat Developments Command Experimentation Command, Fort Ord, Calif. The citation was for his exceptionally meritorious service as chief of the Technical and Industrial Liaison Office, Office of the Chief of Research and Development, Department of the Army. He was particularly commended for establishing a Research and Developments Information-for-Industry Program.

MERITORIOUS CIVILIAN SERVICE. Dr. Theodore B. Taylor, outgoing deputy director (scientific), Defense Atomic Support Agency, received the Department of Defense Meritorious Civilian Service Medal. Taylor resigned Aug. 31 from the position he had held two years.

The citation, signed by Defense Secretary Robert S. McNamara, stated that Taylor's "original approaches to both concept and execution exerted a lasting influence upon the entire nuclear weapons program. . . . Dr. Taylor's dynamic leadership, enthusiasm and dedication have been an inspiration to his associates. His distinguished performance reflects the highest standards of citizenship and public service. . . ."

Merrill V. Kreipke, Environmental Sciences Division, Army Research Office, was presented the Meritorious Civilian Service Award, the Army's second highest award, Aug. 25. The certificate noted that Kreipke's "outstanding performance as procurement supervisor of the Quadripartite Standing Working Group on Ground Mobility was a major contribution to the success of the program . . . and reflects great credit to himself and the United States Army."

CHIEF OF R&D Lt Gen Austin W. Betts presents Meritorious Civilian Service Award to Merrill V. Kreipke, Environmental Sciences Division, ARO.

THE NIKE-X PROJECT MANAGER since 1962, Ivey O. Drewry, Jr., beams at Mrs. Drewry as Maj Gen John G. Zierdt, commanding general, U.S. Army Missile Command, pins a silver star denoting new rank of brigadier general. Nike-X is the Army's highest-funded R&D program, totaling nearly $400 million last fiscal year. The project has developed a multiple-function phased-array radar, the first of its kind in the Free World, and a high-acceleration guided missile for defense against intercontinental and submarine-launched ballistic missiles.

BRONZE STAR. Heroic action in Viet Nam earned a Bronze Star for valor for Capt Ralph E. Newman, now with the Combat Developments Command Experimentation Command's 194th Armored Brigade. In Viet Nam he was adviser to the 3rd Battalion, 45th Infantry Regiment, 23rd Infantry Division.

"While on an extended operation in which his unit was outnumbered by Viet Cong," the citation states, "he moved to a position from which he could observe the insurgents' activities and direct artillery fire and air strikes against their positions, exposing himself to intense fire. Disregarding the danger, he also moved about the area to assist wounded comrades to safer positions and to where they could receive medical treatment."

Capt Newman also received a First Oak Leaf Cluster to his Bronze Star for meritorious service in connection with ground operations against an hostile force.

Lt Col Stewart S. Giffon, Jr., executive officer of CDCEC's General Support Group, also received a First Oak Leaf Cluster to his Bronze Star for his part in ground operations against the enemy.

Other CDCEC officers who received

Bronze Stars for meritorious service in Viet Nam are Maj Hayward B. Allen, Capt George R. Henry, and Capt James F. Norman, Jr.

Maj Allen, now Assistant Secretary, General Staff, CDCEC, served as senior adviser to the 42nd Republic of Viet Nam Regiment from July 1965 to June 1966.

Capt Henry was honored for outstandingly meritorious service as Battalion Adviser to the 3rd Battalion, 41st Army of the Republic of Viet Nam Infantry June 1965 to May 1966.

Capt Norman, now CDCEC's Maintenance Officer for 5th Squadron, 9th Cavalry, received his Bronze Star for meritorious service during the period June 1965 to June 1966 when he served as assistant adviser to the Regional and Popular Forces and Training Center Adviser.

Maj Frederick S. Holmes, action officer in the Communications Branch, Communications-Electronics Division, OCRD, was awarded the Bronze Star for meritorious service in connection with military operations against hostile forces in Viet Nam.

Maj Al Smith Medlock, recently assigned to the Hawk Project Office at U.S. Army Missile Command Headquarters, Redstone (Ala.) Arsenal, received the Bronze Star Medal for outstanding meritorious service in Viet Nam during the past year. A native of Coosa, Ga., Medlock enlisted in the Army in 1944 and has served in Europe, Japan and Korea.

Maj Harral A. Bigham received an Oak Leaf Cluster to the Bronze Star. Recently assigned to the Life Sciences Division, OCRD, he was cited for service with the Office of the Surgeon, U.S. Army Viet Nam, where he was executive officer and chief, Plans and Operations.

OCRD Director of Plans and Programs Brig Gen Thurston T. Paul awards Commendation Certificate to Lawrence Cohen, deputy chief, Programs and Budget Division. Others in the division who received the award are R. B. Murray, Jr., program specialist, and Ivis E. Marston, secretary.

M/Sgt Kenneth Jones received an Oak Leaf Cluster to the Army Commendation Medal. Chief of Research and Development Lt Gen A. W. Betts made the presentation for his work as an aircraft first line supervisor of the Kestrel P1127 Evaluation Squadron, Royal Air Force, West Raynham, England, during the period November 1964 to February 1966.

Lt Col Allen P. Richmond, Programs and Budget Division, OCRD, recently received a third Oak Leaf Cluster to the Army Commendation Medal for service as deputy chief, Combat Developments Agency, Alaska.

A Purple Heart was presented to Lt Larry D. Peterson of CDCEC's 194th Armored Brigade for wounds received in Viet Nam Jan. 15.

OUTSTANDING PERFORMANCE. Kenneth D. Robertson, a research physicist with the U.S. Army Engineer Geodesy, Intelligence and Mapping Research and Development Agency Research Institute, Fort Belvoir, Va., received Outstanding and Sustained Superior Performance awards. He was cited specifically for his research in connection with the use of a Laser and for making original contributions to portable instrumentation for color measurement in the field.

Four engineers at the U.S. Army Mobility Equipment Command's Engineer Research and Development Laboratories, Fort Belvoir, Va., received Outstanding Performance Certificates for work in developing engineer equipment.

James H. Horton, chief, Engine Division, was cited for his work in the management and development of advanced high-performance industrial engines and gas turbines. Edward J. Dowgiallo was honored for the design and construction of a vehicle duty cycle load simulator for evaluation of a hybrid fuel cell energy storage system and other complex energy storage systems.

Otis R. Pannell received his certificate for the development of specialized equipment for installation of military marine terminal systems, and George A. Gariepy was cited for work in the development of military fuels decontamination equipment.

David C. Hardison, scientific adviser to the U.S. Army Combat Developments Command (CDC), Fort Belvoir, Va., received an Outstanding Performance Award. Hardison joined CDC June 20, 1964, after 12 years with the U.S. Army Ballistic Research Laboratories, Aberdeen Proving Ground, Md., where he was a weapons system expert.

A Certificate of Achievement was presented to Dr. David F. Cope, an official of the Atomic Energy Commission, Oak Ridge, Tenn., and a colonel in the U.S. Army Reserves. The honor was for his leadership of the Army's Nuclear Science Seminar, of which he is director.

Lawrence F. Ayers, Jr., an engineer with the U.S. Army Engineer Geodesy, Intelligence and Mapping Research and Development Agency, Fort Belvoir, has been made a Fellow of the National Institute of Public Affairs. Ayers was one of several Department of the Army employees chosen by the Institute in a nationwide competition to receive a grant for graduate school studies in public affairs.

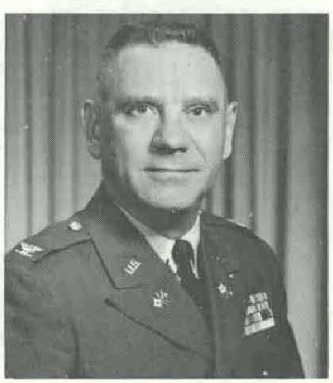
SATCOM Names Col Datres Deputy Commander

After advancing in four successive echelons since 1963 in the Army Satellite Communications (SATCOM) Agency, Fort Monmouth, N.J., Col Eugene B. Datres recently was named deputy to SATCOM Commander Col Mitchel Goldenthal.

Following a tour in Germany as CO, 102nd Signal Battalion, Col Datres served SATCOM as chief, Systems Engineering Division; assistant director, Materiel Department; and director of the Operations, Control & Evaluation Directorate.

Earlier assignments: chief, Plans and Operations, Signal Division, U.S. Army Europe; branch chief, Signal Office of the Army Ballistic Missile Agency and Army Ordnance Missile Command; assistant chief, Applications Engineering Branch, R&D Division of the Office of the Chief Signal Officer; and assistant S–3, 71st Signal Battalion, Japan.

Col Datres' first assignment after World War II service was as senior signal instructor at Texas A&M College. He entered the Army in 1941 after receiving a BS degree in electrical engineering from Carnegie Institute of Technology. He holds the Bronze Star Medal and the Army Commendation Medal.



Col Eugene B. Datres

The Army Technical Committee System

By Lt Col Charles T. Anders

To many people engaged in Army research and development, "technical committee" is a term associated only with the type classification that their product must undergo before it can be approved for use, produced and issued to the Army. Actually, the Army's technical committees have a number of functions aside from type classification, all of which play an important role in the development and use of materiel.

The Army dictionary defines technical committee as "a committee established and maintained by the chief of a developing agency to effect coordination among the developing and using agencies during research, test, type classification and procurement activities."

Prior to the 1962 reorganization of the Army, each of the seven Technical Services had its own technical committee. Four technical committees are now authorized—one each for the U.S. Army Materiel Command (replacing those of Ordnance, Transportation Corps, Signal, Quartermaster and Chemical Corps), Chief of Engineers, Surgeon General and Army Security Agency. By mutual agreement, however, the AMC Technical Committee also serves the Chief of Engineers.

Since the great bulk of all materiel used by the Army is the development and logistic responsibility of the Materiel Command, only the functions of the AMC Technical Committee (AMCTC) will be described. The other two committees operate in much the same way.

The AMCTC is composed of one representative each from the Materiel Command (chairman); Chief of Research and Development, Department of the Army (also represents the Secretary of the Army and the Army General Staff); Combat Developments Command; Chief of Engineers; The Surgeon General; Army Security Agency; and Army Strategic Communications Command (for agenda items pertaining to strategic communications and communications security equipments only).

In addition to these voting members, a number of authorized observers usually attend meetings. Given the privilege of written comment and oral discussion, but no vote, observers represent USCONARC, U.S. Marine Corps, Departments of the Navy, Air Force and Army, Department of Defense, other U.S. Government agencies, and the Australian, British and Canadian Armies.

Operations of the AMCTC are facilitated by subcommittees, including one for each commodity branch (i.e., Mobility, Electronics, Weapons, Missiles, Aviation, Chemical-Biological and Nuclear) of the Development Division and another for the Research Division of the Development Directorate, Headquarters, AMC. An ad hoc subcommittee for each project has a project manager reporting directly to Headquarters, AMC (i.e., not through a commodity command).

Subcommittees are composed of representatives of all AMC Headquarters elements assigned responsibility for the activity or materiel item being considered. Their duty is to insure that agenda items within their functional scope of responsibility are technically accurate and adequate; also, that a firm AMC position has been established for each item before it is placed on an AMCTC agenda.

Two general types of actions are considered by technical committees—formal and read-for-record. A formal action is one which requires the concurrence of all interested members of the committee or the approval of higher authority.

Formal actions include project or task initiation, reorientation or termination, approval of technical characteristics, actions which will require modification of a QMR (Qualitative Materiel Requirement) or SDR (Small Development Requirement) and type classification or reclassification of materiel.

A read-for-record action records a Department of the Army staff decision or other actions requiring neither the concurrence of all interested agencies nor the approval of higher authority, but which is of sufficient importance to be duly recorded according to committee procedures.

Examples of read-for-record actions might be changes in Federal stock number or nomenclature of materiel items and approvals of Limited Production (LP) type classifications.

Probably the most important technical committee action, and certainly the most complex, is type classification (Standard A, Standard B, Contingency and Training, Obsolete). Assigned to an item of materiel, the classification is basically the indication of the degree to which the item fulfills an operational requirement.

This degree is determined by the results of engineering and service tests conducted by AMC's Test and Evaluation Command. Thus an item that meets the QMR is type classified as Standard A, and existing comparable but less satisfactory items are usually reclassified to a lower type.

An additional type of classification is Limited Production, reserved for assignment to items under development, commercially available or available from other Government agencies for which an urgent operational requirement exists. These items appear to fulfill an approved QMR or be promising enough to warrant initiating procurement in limited quantities, for a limited period of time, for operational use prior to completion of development and test and adoption as one of the Standard types.

Since the type classification assigned to materiel affects the extent to which it will be produced, procured, stocked, issued, used and supported, and since the costs involved sometimes totals hundreds of millions of dollars, a number of conditions must be met and a number of factors must be considered before the type classification is approved.

As an example, the item must meet the essential requirements of the QMR, be suitable for mass production, and not materially affect the procurement of other items already type classified. Repair parts, special tools and test equipment, and maintenance literature must be available prior to initial issue of the item. Trained personnel to operate and maintain the item must be available concurrently with delivery of the item.

The type classification proposal must provide assurance that everything necessary for procurement, production, stockage, issue, use, maintenance and support of the item has been or will be accomplished by the AMC readiness date. This is the date when the first item will be accepted and is available for delivery to an operational or training activity.

Let us trace the path of a type classification proposal from the proponent to final approval by the technical committee:

- A type classification proposal is initiated by the developing agency at the same time that the report of service test, including a statement as to the suitability of the materiel for type classification, is forwarded to the Chief of Research and Development, Department of the Army.
- After coordination with other interested AMC agencies, the proposal is forwarded to Headquarters, AMC

at least two months prior to the date that type classification is due, since a routinely handled technical committee action normally requires that amount of time for processing, coordination and approval.

- At AMC Headquarters, the proposal goes directly to the technical committee secretariat. There it is examined for compliance with pertinent regulations and forwarded to the appropriate subcommittee. (This step is eliminated for materiel developed by a project manager reporting directly to the commanding general, AMC, since the project manager is the proponent and has his own ad hoc subcommittee.)
- After approval by the subcommittee, the proposal is returned to the secretariat to be placed on the agenda for the next scheduled monthly technical committee meeting.

Usually covering about 100 separate actions, and consisting of an average of 625 pages, an agenda is printed by the Defense Printing Plant in two to three weeks and distributed in approximately 600 copies to various Army agencies, to the Navy, Air Force and Marine Corps, and to representatives of the British, Canadian and Australian armies.

Recipients have from two to three weeks to review the agenda and to submit comments on the various agenda items of concern to them.

Comments of Headquarters, Department of the Army staff sections are forwarded to the DA representative, who resolves differences and arrives at a coordinated Army General Staff position relative to each agenda item.

Comments of the various Combat Developments Command field agencies are likewise resolved by the CDC representative and a coordinated CDC (or user) position is determined prior to the meeting.

Comments from other sources are sent to the secretariat and an attempt is made to resolve all outstanding differences prior to the meeting.

At the technical committee meeting, each formal agenda item is considered by the voting members, remaining differences are reconciled where possible, and the item is either approved, withdrawn or deferred. Read-for-record items are also considered and, when appropriate, recorded.

Final approval on all formal actions is granted by order of the Secretary of the Army, represented by the Army General Staff member of the committee. Minutes of the meeting, given the same distribution as the agenda, indicate the action taken on each item.

The AMC Technical Committee is involved in the entire life cycle of all materiel developed by AMC. For any given materiel item, the AMCTC records approval of the QMR, approves initiation of the development project and major changes thereto, approves technical characteristics, and records results of the in-process reviews. Finally, it approves type classification and reclassification and the ultimate phasing out of materiel as obsolete.

In the aggregate, files of technical committee actions on the materiel serve as the official history of the item. Files maintained by or available to the secretariat include those of the old Technical Service technical committees that date back to 1919.

In many cases, these files constitute the only remaining official information about an item of materiel or a research or development project. They are constantly being researched by one Government agency or another.

In view of the time required for type classification through technical committee action, one might logically think that there must be a better way to accomplish it. And there is for any single type classification action. But even here certain parts of the technical committee system, viz., the secretariat, the subcommittee, and the minutes of the "special" (no actual) meeting that considered the proposal, are involved.

In general, a type classification proposal can receive the necessary coordination and be approved by Headquarters, Department of the Army, in two weeks—provided only the one proposal is involved and provided further that the proposal is hand-carried to and from each of the agencies with which it must be coordinated.

Indeed, this hand-carrying method is used when it is urgent that type classification be accomplished immediately, as is the case when a new item of equipment is needed for current military operations.

This method would break down if it were attempted for the 40 or more type classification proposals that are usually considered each month by the AMCTC. Requirements for individual staffing and coordination would be prohibitive in terms of manpower and time.

Some other method of processing the approximately 60 actions other than type classification that the technical committee handles each month also would have to be devised.

In view of these basic functional considerations, it appears that the present system affords the quickest and most efficient means of accomplishing the coordination and approval required at various points during the development and use of materiel.

Former GE Lab Director Takes ARPA Missile Post

Dr. Patrick J. Friel recently was appointed director of Ballistic Missile Defense for the Advanced Research Projects Agency (ARPA), Office of the Director of Defense Research and Engineering.

Dr. S. J. Rabinowitz, who held that post, has returned to Columbia University. Until appointed to succeed him, Dr. Friel was manager of the General Electric Co. Aerospace Physics Laboratory in Philadelphia, Pa. He will be responsible for all ARPA programs concerning all phases of ballistic missile defense, including penetration aids.

Dr. Friel, 38, received a PhD degree in physical chemistry from the University of Pennsylvania in 1954.

Lt Col Charles T. Anders is the new chief of the Program Review Branch, Review and Analysis Division, Office of the Chief of Research and Development, after serving as a staff officer in that branch since August 1965.

He also serves as the Army General Staff member of the various Army Technical Committees, except AMEDS (Army Medical Service).

Lt Col C. T. Anders

Col Anders was plans officer and aviation officer of the Test, Evaluation and Control Group (Project TEAM), Fort Benning, Ga., in 1964-65. Other assignments include Battalion commander, 5th Missile Battalion, 41st Artillery, Fort Sill, Okla.(1962-63); deputy Aviation officer, EUSA, Korea (1962); staff officer, Artillery Branch, Officers Assignment Division, ODCSPER (1957-61); and deputy Aviation officer, Seventh U.S. Army, Germany (1954-56).

Educational qualifications include a BA degree in biology and BS in education from Ohio State University, and completion of the Artillery Advanced Course, Command and General Staff College and the Armed Forces Staff College. He wears the Air Medal with four Oak Leaf Clusters, the Purple Heart and the Army Commendation Medal.

Selection and Classification Research in Korea

By Dr. Leo J. Kotula

Historically, the classification testing program in the Republic of Korea Army (ROKA) began in 1955 with the development of a general classification test, the Korean Mental Qualification Test (KMQT).

Most of the research that went into the development of this test and subsequent tests was conducted by the Research and Development Division, ROKA Adjutant General. Some assistance was given by the Korean Military Advisory Group (KMAG) and by Korean universities.

On the assumption that skills and abilities required for ROKA jobs are much the same as for U.S. Army jobs, the early tests were close adaptations of the tests used in the Army Classification Battery (ACB).

A preliminary survey conducted by U.S. Army Personnel Research Office (USAPRO) in the fall of 1962 pointed to a need for a classification testing system, based on research, which was more appropriate for the Korean culture and for ROKA personnel management needs than a system based on the ACB model.

The application of the ACB model had resulted in an overemphasis on verbal and technical skills—this in a country characterized by a relatively low level of education and by a limited development of technical knowledge and skills.

Measures less dependent on schooling and mechanical experience were needed for effective assessment and placement of available personnel.

Further, the procedural framework in which the tests were used did not correspond even roughly to the U.S. Army Aptitude Area System for which the tests had been designed.

The tests in the KCB are applied in classification in "successive hurdles" fashion on input which undergoes virtually no screening except on physical standards while the ACB is designed for use as a differential classification battery following initial mental screening.

In the successive hurdles system, preinductees are classified by branch of service at local classification units representing village and city districts. The tests in the KCB are applied at induction one year later to check on qualifications for training in each branch of service with different tests applying to the various branches.

There was no assurance that ROKA was using its recruits in jobs for which their aptitudes best qualified them as in the U.S. Army Aptitude Area system.

A broadly conceived research program was initiated in February 1964, under advisement of USAPRO, leading to the development and validation of a new system of classification testing. This report summarizes the progress made in the research program, which is described in detail in four ROKA Psychological Research Reports printed by ROKA AG.

In the course of the research program, ROKA research personnel were trained on requirements for test development and research conduct.

A firm base was established for research scheduled for 1965. However, the amount of statistical analysis that could be considered in the research program was limited by the small size of the staff—an officer and three civilian psychologists—and by lack of data processing and test scoring equipment.

Technical assistance on the part of USAPRO continues to be needed particularly with respect to statistical analysis requirements in research in progress.

Considerable progress was made in the development of the KCB by January 1964. Six tests were in operational use and four additional tests were being developed. With these tests, all tests of the U.S. Army ACB were represented except a personality inventory and a general information test which were applied as selectors for Combat Arms.

Serious consideration was being given at this time by ROKA AG to effecting a transition from the successive hurdles system of classification to an aptitude area system, patterned after the U.S. Army system, on the basis of a long-range validation study of all the operational and experimental tests.

In the opinion of USAPRO, a complete reevaluation of the classification system and the KCB was advisable before considering any transition to an aptitude area system.

ROKA plans for the validation study were postponed until a refined test battry could be developed which would be more appropriate for ROKA induction input than the current battery.

To this end, a research program was formulated to include the following phases: a systematic evaluation of the current KCB; development of a qualification battery for identifying illiterates and personnel of marginal ability for the military service; and development and validation of a refined classification battery to replace the current KCB.

Research to Evaluate the Current Classification System — This research included a statistical analysis of item and test data obtained systematically in induction samples and an analysis of KCB test validities in school samples.

Most of the tests, particularly the mechanical information tests and the pattern analysis test, were found to be too difficult for ROKA recruit input.

Of particular interest was the finding that KMQT–4 was more highly correlated with years of education (.79) and with other KCB tests than is its counterpart in the U.S. Army personnel system, the Armed Forces Qualification Test. The magnitude of these test correlations tended to indicate that most of the predictive effectiveness of the KCB tests was assocated with verbal, technical, and numerical skills acquired by education and measured by KMQT–4. Findings from a validation study of operational KCB tests in ROKA school samples supported this conclusion. In this study, KMQT–4 was found to be the most useful selector for all ROKA schools with validity coefficients ranging from .27 to .68. There were no

Dr. Leo J. Kotula joined USAPRO in 1957 and in 1964–65 was detailed as chief of the U.S. Army Human Factors and Operations Research Unit in Korea sponsored by the Chief of Research and Development. The unit's mission was to provide advice on psychological measurement and selection tests appropriate for the Korean culture to the Office of the Adjutant General, ROKA.

After his return to USAPRO, he headed the Cadet Leader's Task, a USAPRO study concerned with behavior of U.S. Army junior officers. His experience in personnel research began while he was still in uniform during World War II. From 1952–57, he was a research scientist with the American Institute for Research. He received his undergraduate degree from the University of Buffalo and MS and PhD from Pittsburgh U.

indications in this study that the mechanical information tests had any classification value when combined with KMQT–4.

These studies indicated that the "successive hurdles" system, as applied, served no useful purpose. The main hope of improving the system lay in the development of new tests which could be effectively combined with KMQT–4 as special selectors for the various schools.

Basic Considerations in Test Development—In March 1964, a substantial improvement was made in the ROKA personnel system. Preinduction processing, including initial classification, was centralized at preinduction stations established in each of the 10 Korean provinces.

An occupational classification system, corresponding generally with the U.S. Army occupational area system, replaced the branch classification system. At the same time, KMQT–4, the most effective test in the KCB, was designated for use in initial classification at preinduction. The remaining tests continued to be applied at induction in "successive hurdles" fashion.

The stage was set for the use of KMQT–4 as a qualification test at preinduction rather than as a classification test and for the transfer of all classification activities from preinduction to induction. A prerequisite for this system was the development of effective replacement tests for KMQT–4 and other tests of the KCB.

The research program included the development of a qualification battery consisting of two tests and a classification battery consisting of eight tests.

The qualification battery was designed for use in preinduction to check on qualification for the military service. The classification battery was designed for use at induction either within the current successive hurdles framework or within the framework of an aptitude area system.

An infantry study conducted in April 1964 provided some guidelines for the test development effort, particularly with respect to mental screening needs and to the development of selectors for Infantry assignments.

A special selection problem existed in the Infantry inasmuch as ROKA policy was to assign to this branch the bulk of inductees in the low range on KMQT–4 (Category IV and V personnel). In the infantry study, 83 percent of the strength of one infantry division was found to be selected from a rural population in the low KMQT–4 range.

Results obtained in the study indicated that selection could not be materially improved by setting screening standards on KMQT–4 or on other KCB tests because of their low correlations with infantry performance in the low mental range. A basic ability test was considered necessary to supplement KMQT–4 in identifying personnel of marginal ability for the Infantry and for the military service in general.

A test of general military adjustment, covering such personal characteristics as *motivation for the Army, willingness to obey orders,* and *trustworthiness,* was also considered to be potentially useful. These characteristics were considered by NCO and officer raters to be more important in distinguishing between effective and ineffective infantrymen than such special qualities as *physical skill* and *stamina, social skills, keeping calm in emergency situation,* and *leadership ability.*

Development of the Qualification Battery—Two tests have been developed for use in mental screening: KMQT–5, a revision of KMQT–4, and the Korean Basic Ability Test, KBAT–1. Screening norms will be established on both tests when the necessary phases of tryout administration, validation, and standardization have been completed.

KMQT–5 contains a spatial relations subtest in addition to the standard vocabulary, arithmetic reasoning, and cube counting subtests incorporated in KMQT–4.

Addition of the spatial relations subtest was expected to lower KMQT correlation with years of education and with tests of the KCB and to improve precision of measurement in the low mental categories.

The Basic Ability Test is designed to provide finer discrimination of basic abilities in the low mental range than KMQT–4. It provides for a literacy check and a check on memory ability. It has been scheduled for a final tryout administration to determine whether one of the subtests, *Chart Memory,* contributes sufficiently to total test validity in the low mental range to be included in the final form.

Development of the Classification Battery—A total of eight tests was considered necessary for classification purposes in ROKA. The eight tests were designed to provide coverage of ability and skill requirements in six broad occupational areas:

General Maintenance, Motor Maintenance, Technical Maintenance, Clerical, General Technical and Combat Arms. The final goal was to constitute an aptitude area system covering the six areas and providing maximal discrimination of abilities and skills required in each area.

Two-test composites hypothesized to be applicable to each area were developed. Composites for the Clerical, General Technical and Motor Maintenance aptitude areas are comparable to U.S. Army composites for those areas.

The composite for the Combat Arms area includes a personal inventory designed to measure general military adjustment and an information test similar in measurement objective to the General Information Test found to be an effective selector for combat assignment in the U.S. Army.

The General Maintenance and Technical Maintenance composites include subtests of mechanical ability, spatial relations and attention to detail designed to discriminate between trade-level and technical-level ability in the mechanical domain.

This discrimination was considered necessary before any attempt was made to define more specialized or refined areas, such as Graphics, Military Crafts, Electronics and Radio Code.

In the test development effort, two procedures were used to minimize test correlation with KMQT–4 and years of education: heavy reliance was placed on pictorial item content; and where verbal tests were considered necessary, reading requirements were kept to a minimum.

A comprehensive validity analysis of the experimental classification battery was undertaken in 13 school samples representing all ROKA schools. Data collection was initiated at the schools in October 1964 with experimental testing of men in their first week of training. Arrangements were made to collect school performance data (final course grades) upon completion of training. Data collection was completed by the end of January 1965.

Data collection was designed to permit evaluation of the tests as selectors for the occupational area for which they were specifically developed within the framework of the current successive hurdles system or an aptitude area system.

Results of the validation study should lead to implementation of new selectors for the various occupational areas. Operational considerations favor a gradual rather than an abrupt transition to a differential classification (aptitude area) framework.

New selectors will replace current selectors for specific occupational areas until major difficulties in implementation of the framework can be resolved, such difficulties as: increased demands which an altered system would impose on induction centers—processing, testing, test scoring; enlarged and improved testing facilities to permit administration of a large battery of tests; and provision of increased funds for the maintenance of

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Selection and Classification Research in Korea

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the system. While the transition is being effected, research to refine experimental and operational tests will continue.

SPECIAL SELECTION AND TEST VALIDATION PROBLEMS—In a study conducted in the fall of 1964, no special selectors could be identified which would be useful for the large segment of the Korean Army assigned to the Korean Augmentation to the U.S. Army (KATUSA).

A possible exception was a test of general military adjustment. Data collected from ROKA raters strongly suggested that English proficiency is of minor importance for effective performance in the KATUSA program. In their evaluations of effective and ineffective ROKA personnel in the KATUSA program, ROKA raters attached much more importance to personal characteristics related to general military adjustment, than to special skills such as *English proficiency.*

A similar set of personal characteristics had previously been identified by NCO and officer raters as being related to effective performance in infantry assignments.

It was in the KATUSA study that cultural factors leading to difficulties in test validation were first noted in the overall research program.

Considerable resistance was encountered in three units in the collection of peer ratings from ROKA personnel in spite of considerable prodding from ROKA examiners. The resistance was so strong and so generalized as to indicate that peer ratings are inappropriate in the Korean culture. This finding raises questions about the adequacy of rating procedures in general in the Korean culture.

In previous attempts at test validation, no difficulties were encountered in collecting ratings from officers and NCOs. In this respect, supervisory ratings can be considered more appropriate than peer ratings. However, more research information is needed on the reliability of supervisory ratings and on any cultural factors influencing the ratings before any further test validation, utilizing ratings, is planned.

Special problems that need clarification are views existing in the culture concerning peer ratings and supervisory ratings and the weight given by raters to job proficiency factors, grade, age, social status, and other background factors which may be quite different in the Korean culture than in other cultures.

Consideration must also be given in subsequent test validation research to the development and use of other types of criterion measures to supplement information obtained from raters.

GENERAL IMPLICATIONS FOR SELECTION AND CLASSIFICATION RESEARCH IN OTHER CULTURES—Many years of research are needed to develop an adequate selection and classification system adapted to a particular culture. Such cultural characteristics as the general educational level in the culture, technological level of development, ethnic origins, language structure, social structure, general economy, military strength and structure, and value systems must be considered.

Only to the extent that cultures are similar in these respects can comparable selection and classification tests be expected to apply to them. There is, in the general case, however, no immediate solution such as the wholesale adoption of a system found to be effective in another culture.

There is no evidence—certainly not from the ROKA research effort—that a common-core selection and classification could be developed which would be applicable to all cultures.

It is hypothesized that a transition from an initial classification system based on general ability, education, experience and other background factors to a differential classification testing system is necessary.

The U.S. Army, which started with a general classification test, has found that the differential aptitude area system results in a more efficient use of its available manpower.

In ROKA, however, an attempt to go directly to a differential classification testing system, patterned almost entirely after the U.S. Army system, without any basis in research, proved to be premature.

These considerations provide a general framework for classification research in other cultures, particularly cultures characterized by a low educational level and a low level of technological development.

In these cultures, initial research could most profitably be expended on the development of an appropriate general classification test. Such a test, in conjunction with background factors, could be applied as an initial selector for all critical military training programs until additional selectors could be developed. The test would also be useful for identifying personnel of marginal ability, who would tend to be ineffective in the service.

Subsequent work on the development of additional selection or classification tests should be guided for the most part by an intensive study of the culture and the military system operating in that culture.

Particular attention should be paid to input and assignment requirements within the military system since selection and classification tests have to be specifically designed for use with the population available for service.

In the test development effort, the basic problem will be to determine what types of tests will be most appropriate to measure the mechanical, technical and clerical abilities of the military input. Tests should be adapted to the level of technological development in the culture, which is necessarily reflected in the language.

An overemphasis on technical content, particularly in the mechanical and scientific domain, will undoubtedly result in high test correlation with general intelligence and education, as was the case in Korea, with little likelihood that the tests would have any value for differential classification.

Special consideration must be given to the value systems operating within the culture, because they have a considerable impact on the type of personality characteristics and even on the type of abilities which are required for effective performance within the culture.

Personality tests and ability tests may be valid in one culture and not in another culture simply because different criteria are applied in evaluating performance in the cultures.

In the ROKA research effort, limited progress was made in identifying personality characteristics, values and skills which were unique to Korea and which consequently would deserve special attention in test development, because of lack of cross-cultural data.

In test validation, most reliance is being placed on academic performance criteria until questions pertaining to the usefulness of rating procedures in the Korean culture, particularly peer ratings, have been resolved.

As a pioneer study in cross-cultural research on selection and classification problems, the ROKA research effort provides some general guidelines for similar research in other countries.

However, in view of the general need for cross-cultural information in all cultures, it would be extremely desirable to formulate such research so that cross-cultural comparisons could be made with respect to abilities, and to personality characteristics, value systems and evaluation procedures found to be acceptable in each culture.

Such a program would provide additional guidelines for selection and classification research in all cultures.

Greenland Ice Cores Reflect 10,000-Year History

Ten thousand years of polar history are recorded in ice cores representing a vertical profile of the Greenland Icecap to a depth of 4,562 feet, obtained by Army scientists under a National Science Foundation grant.

Conducted by agreement with the Government of Denmark, the thermal drilling operation was done at Camp Century, the Army's much-publicized "City Under the Ice" 140 miles out on the icecap from Greenland's upper northwest coast.

Cosmic dust is falling onto the earth at a rate three times that of 700 years ago, the preliminary analysis of ice cores has revealed. Further analysis is expected to shed light on many climatological factors, such as precipitation and temperature.

The study is expected to furnish clues to many other interesting speculations, such as, for example, whether the land under the ice was ever exposed to the air free of ice, or if it lay under the sea at any time in history. Samples at the 4,562-foot depth brought to the surface intermingled sand, gravel and stones from a depth 12 feet below the ice sheet.

Findings of the study to date were reported at a Sept. 20 press conference in the Pentagon, Washington, D.C. Temperature at the bottom of the icecap was recorded at 9 degrees above F., for example, and analysts are seeking data on the composition of the ice, salt nuclei content, and the frequency of volcanic eruptions through the ages.

Dr. Chester C. Langway, Jr., of the Cold Regions Research and Engineering Laboratory, Hanover, N.H., an element of the U.S. Army Materiel Command, is directing analysis of the ice cores obtained this summer by a CRREL team headed by B. Lyle Hansen.

An electrically heated hollow drill head melted its way through the ice around a 5½-inch core up to five feet long. During the final coring operations, an electromechanical drill, a new development with a hollow rotary head equipped with small bits, was used.

"Ice containing silt bands and small pebbles was encountered on July 2 at a depth of 4,495 feet," Hansen reported. "On July 4, after drilling through 55 feet of this material, the interface at the bottom of the icecap was reached at a depth of 4,550 feet. The bottom material is frozen sand, gravel and stones, and 12 feet of this material was recovered. The total depth of the hole is 4,562 feet."

He noted that ice cores recovered from the 1,800-foot level fell as snow about the time Jesus Christ was born.

ECOM Device Gives Visibility in Fog, Smoke, Snow

Visibility in fog, smoke, snow and heavy rain to distances of 1,000 feet appears possible with a simple, inexpensive, experimental system that uses millimeter waves to produce images similar to those on a TV screen.

Dr. Harold Jacobs, Lt Ronald C. Hofer and George Morris are making feasibility demonstrations of the equipment at HQ Army Electronics Command, Fort Monmouth, N.J.

Dr. Jacobs, a senior scientist in the Electronic Components Laboratory, points out that ordinary light is not very effective against fog because even the strongest beams are quickly scattered and absorbed. Even the densest blanket of fog, however, can be penetrated by radio waves, including the extremely short millimeter-range waves used in the new device.

Though the penetrating power of millimeter waves was known, no one has previously come up with a simple scheme to use millimeter waves to produce images similar to those on a TV screen to see through fog. The closest approach is millimeter radar.

For the uses the Army scientists have in mind (in military trucks and small aircraft), even the smaller sets of millimeter radar are too bulky and costly, and frequently require a skilled operator to interpret detected objects.

Designed so its use would require no training, the ECOM device has a small dish-shaped illuminator (like a searchlight with an invisible beam) which transmits the millimeter-wave signals. Upon striking a fog-hidden object, part of the wave energy is reflected to the collection lens. This focuses on a panel gridded with germanium semiconductors and backed by a fine wire mesh.

The panel, a key figure of the device, uses a recent discovery that if an arrangement of conductors with the desired conductive properties is cut to a precise thickness for handling a certain wavelength, nearly all the millimeter-wave energy feeding into it will be absorbed.

If the conductivity is increased by a small amount of light, the waves are shunted out of the panel. In the new device, the signals reflected from objects are at first absorbed by the panel, but a closely synchronized rotating light sweeps the back of the panel. This increases the conductivity of the semiconductors and literally kicks out the image-bearing impulses. After further processing, including amplification, the signals are patterned on the television-like viewing screen.

The Army scientists have not yet obtained the quality they are seeking in the screen displays, but are confident that with further research they will be able to produce distinct images of fog-shrouded objects.

AMEDS Mercury Flights Leader Gets R&D Command Assignment

Col John A. Sheedy, head of the Army medical team during the Mercury space flights conducted by the National Aeronautics and Space Administration, is the new chief of the Medical Research Branch, Army Medical Research and Development Command, Washington, D.C.

Col Sheedy recently completed the Army War College course at Carlisle Barracks, Pa., and from mid-1959 through 1963 was Chief, Medical Corps branch, Office of The Surgeon General. Concurrently, he was Army project officer for the pre-Gemini flights conducted by NASA.

During 23 years duty he has served with the Hepatitis Research Center, Europe; the Hemorrhagic Fever Center, Korea; as CO of the 7th Medical Battalion and division surgeon of the 7th Infantry; and as chief of medicine at the 2nd General Hospital, Landstuhl, and the U.S. Army Hospital, Munich, Germany.

Col Sheedy received a BS degree from the University of Notre Dame in 1942, MD degree from the University of St. Louis in 1945, and an MS degree from Northwestern University in 1949. He is a graduate of the Army Medical Service Career Course and Command and General Staff College.

He has been certified by the American Board of Internal Medicine, is a Fellow of the American College of Physicians, a member of Sigma Xi, and is the author of technical papers on internal medicine, infectious disease and field medicine.

He holds the Bronze Star Medal with Oak Leaf Cluster, the Army Commendation Medal, Medical Badge and the Flight Surgeon's Badge.

Batte to Get Star in Korea Post

Nominated for the rank of brigadier general, Col James H. Batte, commander of the U.S. Army Edgewood (Md.) Arsenal since May 1965, has been assigned as senior logistics adviser with the U.S. Army Advisory Group, Korea. Prior to his departure next month for headquarters in Seoul, Col Batte is attending a course at the Military Assistance Institute, Arlington, Va.

Can Prophets Yield Profits in R&D Management?

By Dr. William J. Kroeger
(Deceased—see note below.)

In the management of a research and development establishment, the element most crucial to its ultimate destiny is selection of problem areas, where solutions will further established mission objectives.

Major errors in problem selection can be fatal to an R&D organization. Since managers have an instinct for self-preservation (and organizations yearn for immortality), many tend to avoid a major miscalculation by selecting many small problems.

If located within a subordinate command, close contact of managers with its daily urgencies lends much opportunity to do this. By this means, timid managers can avoid making fatal errors.

The result is that the R&D installation may tend to wither through lack of big new projects. Also, this gradual demise may not be readily apparent during the tenure of a single manager. The organization can "coast" with a portfolio of outdated programs based on past achievements until unexpected stress, arising from any one of a variety of causes, exposes its weaknesses to searching inquiry, perhaps extending to *raison d' etre.*

This natural caution of managers, easily transformed to outright timidity, can be a severe impediment to progress, greatly extending the time delay between scientific discovery and an effective technology. In the past, dramatic means were often required to pass the bottleneck of timid management.

Official channels refused to take nuclear energy seriously until Einstein brought the matter to the direct attention of the President.

Adm Rickover reportedly endangered his career by arguing for the development of the nuclear submarine. Some causes never found their champion; e.g. Robert Goddard was assigned work on "urgent requirements," while another nation exploited the guided missile technology he had founded.

Breakthroughs are of no use to technology if management will not direct its best talent to evaluate the application of new discoveries, however remote such application appears at first sight.

Management should also be wary of discarding research in new areas as lacking relevancy. The keystone of the electronic industry is the electron, which was identified by J. J. Thomson and Lenard, while fiddling with electrical discharges in gases, as the entity connecting cathode rays and photoelectricity.

The basic interactions of orbital electrons with electromagnetic radiation were studied through the medium of optical spectroscopy—the most fashionable activity in experimental physics laboratories during the early part of this century. At the time, this activity was regarded as having few applications outside of chemical analysis.

Yet these early studies have been basic to the development of the entire electronic and electro-optical series of instruments and devices, which are today fundamental to our military technologies of target acquisition and detection, battlefield surveillance, communications, fire control, guidance, night vision and Laser rangefinding.

Considerable mileage has thus been made on the electron and the quantum, now "producible by anyone in copious quantities under field conditions with relatively little supervision." The neutron, identified more recently, is somewhat harder to produce, but has already expanded military technology in two decades by many orders of magnitude.

We are aware now of many elementary particles. Although these are much harder to produce, and their governing laws not understood, some of their influences on our business can already be recognized.

Indirectly, particle detection techniques are advancing the technologies of pattern recognition and storage, radio frequency, more sensitive detection of light, infrared, ultraviolet and X-rays; and high-speed electronics; also, directly, in the irradiation of materials by antiparticles, and the possibilities for neutrino signaling through the earth's core.

It appears, therefore, that risk-taking is a necessary part of good management. Although a policy of no risk-taking leads to gradual death of an R&D organization, making wild choices can lead to quick death. Choices, therefore, should not be made on the basis of chance, intuition or crystal-ball gazing.

How is one to avoid the laws of blind chance and still take the necessary risk of plunging into the unknown? Ideally, this brings into play the gift of prophecy. The Bible tells us that there are two kinds of prophets, the true and the false. False prophets claimed supernatural powers by which they could foretell events. However, their forecasts turned out to be self-serving, catered to their sponsors' hopes, and were applicable to any possible outcome.

The selection rules of the Scriptures state that equivocation, the "observable" of the powers of evil, can never be found in the states of true inspiration.

True prophets, on the other hand, were men of heroic virtue; they depended upon careful analysis of the world scene, combined with inspiration. Their writings are replete with reasoning from cause to effect, that is, how moral degeneration can lead to national weakness.

Prophecy in the R&D business means careful evaluation of the scientific scene plus an inspired view of the future in the light of present theories of physical behavior. As in biblical times, the boundary between true and false prophecy depends on the moral fiber of the prophet.

For example, controlled nuclear fusion has not been achieved as rapidly as some had hoped. Does this fact call for a lessening or an increase in the effort? Do the large stakes involved to insure an adequate energy supply for future civilization warrant the cost of following a myriad of possibly false leads?

To answer this question, management must not only count the dollars but try to visualize a fully automated

EDITOR'S NOTE: The September edition of the Army Research and Development Newsmagazine *carried a story on the death of Dr. William J. Kroeger at age 60, closing a distinguished scientific career capped by his service as Senior Scientist at Frankford Arsenal, Philadelphia, Pa.*

The article recounted his numerous major contributions to research and development, including his "scientific rationale" for interior ballistics design of the recoilless rifle, numerous other weapon systems, aircraft ejection devices, and his establishment of the Institute for Research at Frankford Arsenal.

The editor had requested that Dr. Kroeger prepare an article on his philosophy regarding sound principles of research programing. This article, dated June 18, 1966, was forwarded by Frankford Arsenal following Dr. Kroeger's death. It hits hard at a critical problem.

society a few hundred years hence stagnating for want of electricity to operate its machinery.

A situation also lying in the future is that pertaining to antimatter. It is now over 30 years since the first antiparticle (the positron) was discovered. Antiprotons are now manufactured routinely by accelerators. A complex antinucleus (the antideuteron) has been found in the lab.

It is postulated that normal matter and antimatter exist on a one-to-one basis, with whole galaxies of antimatter present in the metagalaxy; even within a single galaxy that the arms of a nebula could alternately be composed of normal and antimatter.

The possibility that antimatter in bulk may at times have been present in the solar system has not been overlooked. For example, a careful study was made to determine the lower limit of the postulated antimatter content of a meteorite, that is known to have caused extensive damage in Siberia. It is also known that antimatter is constantly being produced at the top of our atmosphere when energetic cosmic rays impinge upon it.

The greatest possible release of energy on a per gram basis occurs when normal matter annihilates antimatter. A package of matter and antimatter is both the most efficient possible bomb and the highest calorie fuel.

Megaton effects could be produced by the mass equivalents of our larger small-arms projectiles, kiloton effects by the mass equivalent of the 5.56mm bullet. The effects of our largest shell, loaded with conventional explosives, can be equated to micrograms of antimatter.

Since technology is predictable only on the basis of complete scientific knowledge, one can only speculate that antimatter foreshadows the potential to compress the scale of major weapon systems to the dimensions of a small-arms cartridge.

Here we have a case where the problems of production, manufacturing, storage and utilization cannot even be formulated on the basis of today's knowledge. Yet antimatter exists; the annihilation (and creation) process is observed in nature. These appear to represent the ultimate energy source for both military and peaceful purposes.

At what point in the history of civilization should hard-headed R&D managers take an interest in these phenomena? The answer can be supplied only if the R&D manager is willing to exert his prophetic powers. If he is not willing, one day he will find his organization trying to get on board an already filled bandwagon.

ERDL Responds to Urgent Viet Nam Bridge Need

One month after an urgent request came from U.S. Army field commanders in Viet Nam, where crossing of canals and deep gullies frequently hampers heavy vehicle operations, the Army Engineer R&D Laboratories, Fort Belvoir, Va., filled the need.

Rapid mobility under deep jungle or other difficult terrain conditions often is the key to successful operations in Viet Nam. Often bridges must be constructed in a minimum of time to move men and equipment where needed.

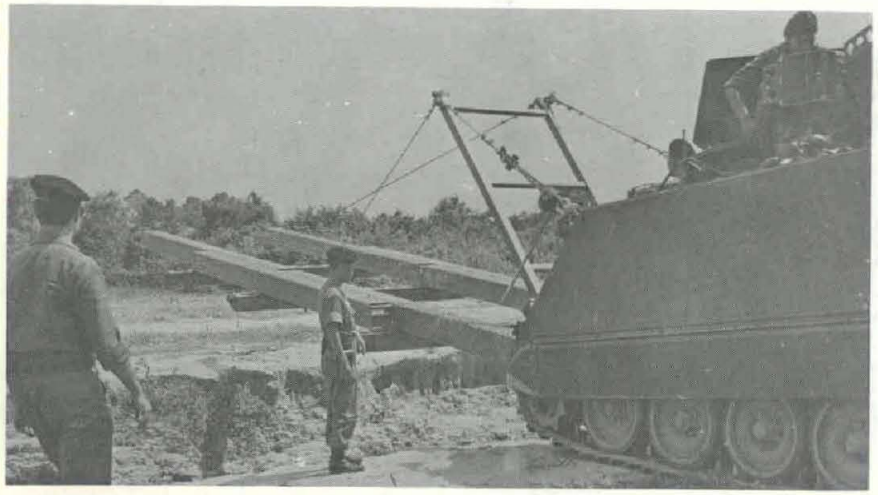
The solution, as designed by Corps of Engineers specialists at Fort Belvoir, is a 30-foot span bridge that can be operational, using field-available materials, in 12 minutes.

USAERDL experts report that formerly a comparable bridge, suitable for crossing a column of 12 armored personnel carriers (APC) or M-41 tanks, required about four hours to construct.

The bridge designed for the 13-ton APC consists essentially of two 27-inch treadways, each composed of five 9-inch square, 15-foot long aluminum balk (beams) spaced to accommodate tracks of the vehicle. In transit, the disassembled components are stowed on two APC's or tanks.

The launcher is a field-fabricated H-frame boom mounted on the towing eyes of the vehicle. Two balk are added to increase the load-carrying capacity for the 26-ton tank and a field-fabricated adapter is used with the APC launching mechanism.

The bridge is assembled on the ground and raised to the boom by chain hoists. Moved to the desired site by the APC or tank, it is launched by slackening the hoists and backing the vehicle away. The bridge may be recovered in the same manner.



LAUNCHED by an armored personnel carrier, the 30-foot-span bridge designed by Corps of Engineers specialists for an urgent Viet Nam need can be operational (using field-available materials) in approximately 12 minutes.

SCIENTIFIC CALENDAR

Meeting of the World Medical Association, Manila, P.I., Nov. 6–14.

8th Liquid Propulsion Symposium, sponsored by the Interagency Chemical Rocket Propulsion Group, Cleveland, Ohio, Nov. 7–9.

Meeting of the Association of Military Surgeons, Washington, D.C., Nov. 7–9.

Annual Meeting of the Society for Experimental Stress Analysis, Pittsburgh, Pa., Nov. 7–9.

Fall Joint Computer Conference, sponsored by AFIPS, ACM and IEEE, San Francisco, Calif., Nov. 8–10.

Meeting of the Geological Society of America, San Francisco, Calif., Nov. 14–16.

19th Annual Conference on Engineering in Medicine and Biology, sponsored by ISA and IEEE, San Francisco, Calif., Nov. 14–16.

International Symposium on the Use of Isotopes in Hydrology, Vienna, Austria, Nov. 14–18.

5th Annual Symposium on the Physics of Failure in Electronics, sponsored by Rome Air Development Center and Battelle-Columbus Laboratories, Columbus, Ohio, Nov. 15–17.

15th Conference on Prevention of Microbiological Deterioration of Military Materiel, sponsored by AMC, Natick, Mass., Nov. 15–17.

12th Conference on Magnets and Magnetic Materials, sponsored by IEEE and AIP, Washington, D.C., Nov. 15–18.

International Conference on Characterization of Materials, University Park, Pa., Nov. 16–18.

Meeting of the American Medical Association, Las Vegas, Nev., Nov. 27–30.

American Society of Mechanical Engineers Winter Annual Meeting and Energy Conversion Exposition, N.Y.C., Nov. 27–Dec. 1.

3rd Annual Meeting and Technical Demonstration of the American Institute of Aeronautics and Astronautics, Boston, Mass., Nov. 28–Dec. 2.

Wire and Cable Symposium, Atlantic City, N.J., Nov. 30–Dec. 2.

Symposium on the Structure of Surfaces, sponsored by ARO–D, Durham, N.C., Nov. (date undetermined).

AMC Completes Revision of Industrial Information

Changes in the Army-Industry Information Program announced recently by the U. S. Army Materiel Command are a modification of the major revision of this program initiated in mid-1963.

The program was totally implemented in June 1965 with the publication of Qualitative Development Requirements Information (QDRI) Volumes by all AMC major subordinate commands.

A new edition of the *Contractors Guide* was published in March 1966. The NIC brochure, "Inventions Wanted by the Armed Forces," published by the National Inventors Council with Army, Air Force and Navy input, was discontinued about three years ago.

"Opportunities for Industry" are pamphlets describing how to qualify for participation in the U. S. Army Materiel Command QDRI Program.

QDRI volumes are now published in classified and unclassified versions. Some of the unclassified material formerly was published in the old series of *R&D Problems Guides* published by the former Technical Services. Part of the information formerly incorporated in the NIC brochure is now also published as unclassified QDRI problems.

All companies, nonprofit institutions, and some individuals who are qualified by AMC as having an R&D capability may obtain QDRI volumes. Classified versions are restricted to those having the proper security clearance.

QDRI volumes are published by each of the major AMC subcommands and Independent Laboratories. The subcommands are responsible, at the present time, for distribution of QDRI volumes, and changes or additions thereto, to about 2500 participating companies.

A single volume presents information on the independent laboratories. The U. S. Army Natick Laboratories coordinates the consolidation and publication of this volume.

Every AMC installation provides a QDRI manager for coordination with industry representatives. The program also provides background information to contractors and an opportunity to meet with people who will interpret the potential user's ideas and needs.

The intent is to tell industry about Army requirements so that researchers may work along lines of interest to the Army instead of independently at random. The program tries to make AMC responsive to industry's needs for information about its R&D requirements.

When possible, the subcommands will attempt to fund development of ideas in the exploratory and advanced development category and sometimes to engineering development. Unavailability of funds, however, may mean that an idea must wait at least until the next year, or to when it may be programed.

Future improvements in the Information-to-Industry Program center around the establishment of RODATA (a central data bank), including a master file of all qualified participating companies according to their fields of interest.

This will enable an installation to check a company's qualifications even if it is registered with a distant and somewhat unrelated installation, as well as provide other services for the QDRI Program.

Additional information program improvements will be an expansion to include a listing of new problems.

Abernathy Takes Over New Duties at MICOM

Col Sterling H. Abernathy recently assumed duties as comptroller and director of programs for the Army Missile Command at Redstone Arsenal, Ala., succeeding Col David Marcell, now assigned to Office of the Comptroller, Department of the Army.

For the past year, Col Abernathy has served as director of Military Services at the U.S. Army Finance School, Fort Benjamin Harrison, Ind. He was an Infantry officer in Europe during World War II and in Korea. In recent years he has been comptroller at Fort Benning, Ga., and at Fort Wayne in Detroit.

Col Abernathy is a graduate of the Command and General Staff College. He was cited with the Silver Star and the Bronze Star for his service in Europe and the Legion of Merit while in Korea.

Detrick Tests Soap Bubbles to Fight Fires

Soap bubbles have proved effective and safe in extinguishing fires in laboratories and barns, where carbon dioxide flame killers might harm animals or humans, in recent tests at Fort Detrick, Md.

Fort Detrick Safety Division officials knew that high detergent foam had been used in England for a number of years to combat certain types of fires, but information was lacking on how animals having a different lung capacity than man might be affected.

Sealed in a room during the Fort Detrick tests, monkeys, mice and guinea pigs emerged from the engulfing foam with no ill effects. Safety Director Dr. Arnold G. Wedum said a little redness of the eyes was the only indication of reaction to the bubble bath.

Foam used in the tests was generated by a bubble machine designed on much the same principle as the child's old-fashioned bubble wand used with everyday soap. The machine quickly fills a room with fire-smothering bubbles. In less than an hour, under normal conditions, the foam evaporates into nothing—or at most into a fine granular film.

The type of detergent used for the tests is already on the market and was provided by the Mine Safety Appliances Co. of Pittsburgh. For use in laboratories, it has the feature of avoiding damage to expensive equipment.

'SUPERSUDS' engulf Charles Matthews (left) and Dave Bulman during recent Fort Detrick fire-fighting tests.

Directors' Reports Indicate Success of Army ILIR Program

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achievements in some areas and commendable progress in others.

The Atmospheric Sciences Laboratory worked on seven tasks, concerned with atmospheric density, the possibility of modification of the electric field in a thunderstorm by chaff seeding, and the influence of atmospheric processes upon electromagnetic transmission.

The Communications ADP Laboratory reported on six ILIR tasks, including a study of Field Laser Theory concerned with development of a new optical modulation-detection system for digital communications, design of a small and rugged low-cost portable field computer, and study of how discrete linguistic elements are encoded into the continuous acoustic signal called speech.

The Electronic Components Laboratory's 13 ILIR studies were concerned with the thermo-photovoltaic energy conversion system, pulsating galvanic cells, improved batteries, design of electron guns for high-power linear beam tubes, ultra-low-noise traveling-wave tubes, electron injection Lasers, and development of original circuit design techniques using transistors and diodes at microwave frequencies.

The Electronics Warfare Laboratory ILIR studies involved radar modifications and investigations to determine and evaluate a technique to counter a basic problem inherent in any electronic countermeasures operating against a rotating polarization, conical-scanning radar system.

The Institute for Exploratory Research reported on eight ILIR tasks. Included are studies of electrical and optical properties of new materials, global measurements of VLF phase and amplitude anomalies of stabilized transmissions, and acoustic propagation phenomena at infrasonic frequencies over long distances through the atmosphere.

Other Institute efforts included studies to determine if airborne radar in-depth soundings of the Arctic are as accurate as those taken by conventional seismic methods; dielectric properties of ice, natural and synthetic, for communication; and electronic properties of semiconductors as a function of stable isotope composition.

Army Missile Command Laboratories reported on 14 ILIR tasks. Most of the work was concerned with problems of missile design, propellants control, tracking, communications, collection and processing of data, environmental factors, physical properties of atomic systems, and special materials for missile requirements.

ATAC studies included protective devices for human vision against Laser radiation, thick coating of titanium on carbon steel, the optical lighting pattern required by a vehicle crew, high-voltage pulsing techniques for charging batteries at low temperatures, energy sources for environmental control of military vehicles, seismic listening techniques, environmental servos and other hydraulic control mechanisms.

The Engineer R&D Laboratories' 11 tasks funded by ILIR included studies of treating brackish waters and sea-water distillation equipment, heat transfer characteristics required to obtain water from engine exhaust gases and treatment to make it potable, utilizing the turbosupercharging principle to develop greater capability for 10- and 20-hp. Military Standard engines, and fundamental solid-state and liquid-state properties of explosives.

The Engineer R&D Laboratories also reported on advancement of fuel cell electric vehicle propulsion systems; fuel cells geared to special requirements in Viet Nam; study of optimum conditions for the use of night-vision equipment on beach operations, small boats and material handling; and a program to design, fabricate and test a bridge structure using the load-carrying surface of the bridge to carry the primary compressive stress, thereby reducing weight and mass of the overall structure.

Army Aviation Materiel Laboratories', ILIR studies were concerned with a 24-foot Parawing glider's performance, structure and load-carrying ability; fuel cell emulsions as an effective means of reducing the fire potential in event of an aircraft crash; and tests to determine feasibility of an Automatic Light Aircraft Readiness Monitor System (warning system for pilots).

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Student Trainees Receive HDL Awards

SIX STUDENT TRAINEES at the Harry Diamond Laboratories (HDL) received recognition for outstanding summer projects reported at the seventh annual Summer Student Technical Symposium. The HDL program includes students selected on a highly competitive basis from leading colleges and universities across the Nation. The Technical Symposium provides them with an opportunity to report on their summer projects to the HDL professional staff. Papers of all symposium participants are published in the *HDL Summer Student Technical Symposium Report* and first-place winners in both graduate and undergraduate divisions receive $50 cash awards. Pictured above, from left, are HDL Technical Director Billy Horton; David Rodkey (Johns Hopkins University), first place, undergraduate division; L. V. Covello, HDL employee development officer; Kenneth Lutz (Johns Hopkins), second place, graduate; Philip Gallman (Yale University), honorable mention, graduate; Tobin Marks (Massachusetts Institute of Technology), first place, graduate; James Beard (University of Maryland), second place, undergraduate; HDL Commanding Officer Col M. S. Hochmuth; HDL Associate Director Dr. Maurice Apstein. Not shown is Shea Rutstein, the honorable mention undergraduate winner.

Directors' Reports Indicate Success of Army ILIR Program

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GIMRADA (Engineer Geodesy, Intelligence and Mapping Research and Development Agency) at Fort Belvoir, Va., engaged in 13 ILIR tasks in FY 1966. The diversified effort was related to astro-geodesy, a lunar satellite camera, surveying and mapping with electronic equipment, instrumentation to measure absolute acceleration of gravity with an accuracy of one part in ten million (10^7), and Laser investigations.

Waterways Experiment Station, Vicksburg, Miss., is like GIMRADA an agency under the jurisdiction of the Army Chief of Engineers. WES engaged in 19 ILIR studies in FY 1966, covering a wide range of investigative interests.

Included were studies to increase competence in protective construction against nuclear and thermal radiation; effectiveness of discontinuities in soil in attenuation of ground shock from explosions; thermal stabilization of soils; feasibility of fiberglass as a reinforcement for concrete; a mechanical method to determine magnitude of free-field stress and/or strain in the in-situ material adjacent to a high-yield explosion;

Also, improved reinforced concrete beams; feasibility of using small-scale models to study effects of creep and shrinkage on long-time deflections of 2-way simply supported (all four edges) reinforced concrete slabs; mathematical relations between bed roughness characteristics and the vertical velocity distribution in streams; improvement in the soft-soil performance of pneumatic tires; plastic and rubber-based coatings which can be used to eliminate rubbing, waterproofing and painting of concrete surfaces.

CRREL (Cold Regions Research and Engineering Laboratories), Hanover, N.H., is one of the Army Materiel Command's central laboratories, along with the Ballistic Research Laboratories, Aberdeen Proving Ground, Md.; Harry Diamond Laboratories, Washington, D.C.; Chemical and Coating Laboratory, Aberdeen PG; Human Engineering Laboratories, Aberdeen PG; Materials Research Agency, Watertown, Mass.; Natick (Mass.) Laboratories; and Nuclear Defense Laboratory, Edgewood Arsenal, Md.

CRREL investigations under the ILIR Program in FY 1966 involved 11 tasks, including high-altitude environmental stresses pertinent to military operations in the mountains; development of a numerical or analog technique suitable for predicting transient temperatures within the shallow layer of earth affected by annual cyclic climatological patterns; effects of radioactive contamination on plant growth;

Also, techniques to determine stress-optical constants of ice; feasibility of airborne sensing of radioactivity to obtain terrain information; mathematics of unified vector and tensor analysis in Euclidean spaces for application in study of large deformations of material; design, construction and test of a thermal probe to measure conditions at various icecap depths; characteristics and behavior of soils at very low temperature.

The Harry Diamond Laboratories (Washington, D.C.) reported on 13 ILIR tasks, concentrated mainly in the area of fuze development for which HDL has achieved worldwide recognition.

Other HDL studies concerned damaging levels of Laser radiation on human vision and protective devices; development of design criteria for fabricating novel transistors for pulsed oscillator operation; semiconductor acoustic delay; new guidance and target acquisition techniques; development of thin-film components for vacuum-deposited microcircuits; and design and fabrication of a prototype of a range counter with front panel digital readouts.

Ballistics Research Laboratories' 16 ILIR tasks in FY 1966 represented a broad range of investigations in the ballistics, rocket design and propellants and target acquisition field funded at $775,000.

Tasks included X-ray and special armor studies; the chemical kinetics of fast reactions, reaction of energetic chemical species pertinent to upper atmosphere science; and the chemical and physical properties of organic chelate complexes of transition metals;

Also, gaseous discharges and their afterglows under predetermined conditions; an experimental method of analyzing highly ionized flows by optical interferometry; the effect of surface winds on small ground-to-ground rockets; and a program to develop capability of solving axially symmetric, nonsteady, nonreactive hydrodynamic flow problems by use of the BRL Electronic Scientific Computer (BRLESC).

CSC Offering 2 Courses for Scientists, Engineers

Two interagency training courses for Federal Government scientists and engineers have been scheduled by the U.S. Civil Service Commission.

"Management Institute for Supervisory Scientists and Engineers" will be presented in February and again in May 1967. A 5-day program for GS–11 through GS–14 scientists and engineers being trained for supervisory positions in research and development, the course will present traditional management practices and show how they can be adapted for the management of scientific groups.

The progam will examine the managerial job in research and development organizations by identifying the unique motivational characteristics of scientific personnel and by discussing the impact of organizational structure of the productivity of scientific groups.

It will also explore the leadership patterns best designed to cultivate scientific creativity.

Topics will include the flexibilities of the Federal personnel system in managing scientific groups and career development concepts applicable to scientific personnel. Administrative and financial practices which permit the most effective direction and control of scientific groups also will be studied.

Speakers from universities, industry, Government and private organizations will be followed by general discussion. Each participant will receive a syllabus and reading materials.

For junior-level scientists and engineers, "An Introduction to Science and Engineering in Government" will be presented in November 1966 and March 1967. It is designed to help GS–5 through GS–11 participants develop an understanding of the total scientific and engineering efforts of the Government and how its broad policies affect them at operating level.

The program will utilize resource personnel from Federal agencies and universities, as it has since its inception in 1965.

Any employee interested in taking any interagency course must complete Optional Form 37 and OCSA Form 30 and send them through his supervisor to the Training and Development Branch, Staff Civilian Personnel Division, Office, Chief of Staff, Army.

Chemical and Coating Laboratory ILIR studies sought to determine whether certain chelates effective as corrosion inhibitors in a solvent can be modified to be effective for other solvents, and to determine whether hydrophilic-lipophilic properties of chelates and/or solvents are pertinent; also, a method of estimating individual contributions of polar and nonpolar energies as well a hydrogen bonding to cohesion in liquids.

Human Engineering Laboratories. HEL scientists participated in seven ILIR tasks related to the design and development of equipment with built-in man-machine compatibility qualities. One study aimed to determine whether the human middle ear muscle is conditionable so that it can be made effective in protecting the ear from impulse noises (explosion of ammunition).

Other HEL investigations included an effort to develop parametric analysis of the stimulus conditions underlying adaptation to long-term stress; an attempt to define and analyze the social, cultural and anthropological variables which mitigate effective use and maintenance of weapon systems; a program to develop psychological principles involved in the processing and transmission of small bits of information; and specific color responses of the Striate Cortex.

Army Materials Research Agency. AMRA, located at Watertown, Mass., reported that one of the most significant achievements in its ILIR Program, involving 13 tasks, was in the study of dendritic solidification of alloys. The resultant report fulfilled the investigator's requirement for a PhD degree.

Intensive studies were made on aspects of material fracture related to AMRA's requirement for continuing improvement in material utilization with no sacrifice in reliability, as presented by ever more demanding design problems. The objective is much stronger, more reliable and lighter materials.

One AMRA study delved into atomic forces in solids. Others sought to determine conditions under which superplasticity exists in steels and whether superplasticity can be utilized practicably to improve the formability; a study of the phase diagram of the titanium-hydrogen system, with emphasis on the high-temperature high-pressure portion of the system; and the feasibility of simulating meteoritic impact on lightweight, high-modulus structural material for space applications.

Pitman-Dunn Institute for Research, Frankford Arsenal, Philadelphia, Pa. Twenty-two ILIR at the Institute constituted an expansive investigation of a variety of disciplinary areas. Six completed tasks achieved stated objectives and substantial progress was reported in others.

The Frankford plan requires each investigator to prepare at least two progress reports a year and to give an oral presentation before a group consisting of knowledgeable scientists and engineers. Younger ILIR researchers can pursue interests under guidance of a senior scientist.

Completed studies included micro-yielding of age-hardened aluminum; radiolysis of propulene in the critical region; feasibility of using electrostatic methods to detect motion; design criteria for a radioisotope ferroelectric battery; electromagnetic particle acceleration techniques; and investigation of new materials.

Other studies concerned unsolved difficulties in design of artillery fuzes for high-spin application; improvement of cool gas generators; effects of nuclear and space radiation on fractive properties of optical materials; use of PAD gas generators and their controls for instantaneous release of safety stores energy through slots in airfoils to restore circulating airflow over stalled profiles in wind tunnels;

Also, effects of spin on performance of several pure fluid logic elements; investigation of the effects of locating the rocket motor in an aircraft ejection seat so that the origin of thrust is ahead of the center of mass; effects

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MBT-70s Tests Scheduled Under New U.S. Manager

(Continued from page 1)

Federal Republic of Germany (FRG) from the time of the international agreement in August 1963.

The German counterpart of General Burba is Col Helmut Schoenefeld. Together they form a 2-man Program Management Board, which will work closely with Col Jack P. Libby, research and development coordinator with the Armor Materiel Testing Directorate, U.S. Army Test and Evaluation Command, Aberdeen Proving Ground, Md. Col Libby heads the Systems Test Manager's Office established by TECOM in August 1966.

MBT tests are scheduled at various TECOM installations, including Aberdeen; Dugway Proving Ground, Utah; Yuma Proving Ground, Ariz.; the General Equipment Test Activity, Fort Lee, Va.; and the Arctic Test Center, Fort Greely, Alaska.

Joint U.S./FRG environmental tests will be at Fort Greely, Dugway and Yuma. Radiological tests will be at White Sands Missile Range, N. Mex., and Oak Ridge (Tenn.) National Laboratory. German prototypes will be tested at the German Army proving grounds at Trier, Munster-Lager and Meppen.

The U.S./FRG Main Battle Tank-70 Program is the first of its kind. Both governments share costs and decision-making and furnish personnel and support facilities to joint organizational elements of equal strength. The mutually acceptable Main Battle Tank will be built of components built in either the U.S. or Germany but producible in both.

The new systems test manager is also responsible for directing activities of U.S. observers in Germany at Koblenz and the proving grounds. A German observer group will have representatives stationed at Aberdeen and other test sites. They will join test teams when the prototypes are delivered.

Chief technical adviser for the U.S. test program is Emerson L. Foote, mechanical engineer specializing in research development, test and evaluation at Aberdeen for the past 18 years.

Shift in MBT management from Germany to Warren, Mich., for the fabrication of pilot models at the General Motors Technical Center near Detroit has been completed (see *Army Research and Development Newsmagazine*, June 1966 edition, page 11). U.S. prototypes are being built at the Cleveland (Ohio) Army Tank-Automotive Plant. FRG is constructing an equal number of prototypes in Germany.

GENERAL BURBA graduated from Oklahoma University in 1933 and was commissioned a 2nd lieutenant, Field Artillery Reserve, through the university's ROTC program. He went on active duty and transferred to the Regular Army in 1935.

During World War II, General Burba served with Armor units in North Ireland, Tunisia, France and Germany. Assignments have included: General Staff G–3, Department of the Army; commanding officer, Combat Command "B," 4th Armored Division; CO, Seventh Army Training Center, U.S. Army Europe; and deputy director for Operations (J–3), Joint Chiefs of Staff, Washington, D.C.

He holds the Silver Star, Legion of Merit wtih Oak Leaf Cluster, Bronze Star Medal with Oak Leaf Cluster, Purple Heart, Distinguished Unit Badge, Combat Infantry Badge and the European-Asia-Middle East Ribbon with four Battle Stars.

Directors' Reports Indicate Success of Army ILIR Program

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of an electric field on propellant combustion as a means of control;

Also, velocities obtainable in light gas small-diameter (1mm) ballistic systems; comparison of moment of inertia configurations of several Army rifles; and a study to determine magnitude of electric currents that can be delivered to external loads by battery, consisting of a radioisotope that generates electric charge in a ferroelectric material.

Picatinny Arsenal, Dover, N.J. Through the Ammunition Engineering Laboratory, the Feltman Research Laboratories, and the Nuclear Engineering Laboratory, Picatinny ILIR researchers engaged in a total of 20 tasks. Studies were concentrated in the areas of liquid propellant rocket systems, explosives, new mortar fuzes, a telemetry system to obtain terminal ballistic data for fuze systems, bonding of metal and plastic surfaces by liquid adhesives;

Also, utilizing properties of pressure induced phase transition in ferroelectrics to develop an improved power source; design and initial engineering for a new type of ampoule to be used to contain electrolyte for a projectile battery; and design and development of a Solid State Delay Line capable of varying the delay-time electronically through use of variable DC voltage.

Rock Island (Ill.) Arsenal Laboratories engaged in 15 ILIR tasks, including effects of hydrogen gas in cast aluminum alloys; fracture mechanics of five carburizing-grade steels under heat treatment; minimizing obscuration in the immediate area of artillery firings; solidification characteristics of certain copper-base alloys; evaluating the photoelastic coating method of stress analysis for artillery carriage components;

Also, distribution and wear characteristics of molybdenum disulfide in dry-film lubricants; feasibility of preparing wood-plastic combinations by means of irradiation and impregnation to provide improved properties for possible use as gunstock material; means of improving heat sealability, fuel and weather resistance of coated fabrics;

Also, evaluation of properties and characteristics of commercially available glass-reinforced plastics for application to small arms weapons; evaluation of fiberglass for major artillery carriage components; exploratory development on an artillery weapon incorporating the fire out-of-battery soft recoil principle; concept and engineering design and development of a 20mm automatic fully powered weapon system for use against low-flying subsonic aircraft.

Springfield (Mass.) Armory Laboratories' report on seven ILIR tasks stated "very satisfactory results" were achieved in energy conversion, as reported in a technical paper presented at the 1966 Army Science Conference.

Other studies included theoretical analyses of shock wave velocities; evaluation of fiber metal mat inserts as a filler material in resistance welding or brazing; the fuzed salt bath method of electro-depositing metals such as nickel, chromium, binary alloys and dispersions;

Also, structural stability and high-temperature transformation points for high-strength refractory alloys; possibilities for generation of electrical energy using chemical explosives; and dispersions of diamond, thoria, and/or zirconia particles in chromium plate to augment wear and corrosion resistance for weaponry use.

White Sands (N. Mex.) Missile Range laboratories engaged in an ILIR program of 13 tasks. Work was representative of more than 20 scientific and technological fields, including aerodynamics, atmosphere physics, microbiology, electronic and electrical engineering, telemetry, structural engineering, reprography, infrared and ultraviolet detection, nuclear instrumentation, radioactivity, optics, solid mechanics and solid-state physics.

The White Sands technical director, Nathan Wagner, reported that "WSMR is well-pleased with the initiative, inventiveness, and studiousness which can only be achieved in an atmosphere created by this program."

Dugway (Utah) Proving Ground's laboratories diversified ILIR effort included 27 tasks, representative of medicine, bacteriology, measurement of antibody antigen reactions, chem-

Brig Gens Davisson, Durrenberger Take New Posts

Confirmed by the U.S. Senate for promotion to 2-star rank, Brig Gen Horace G. Davisson has succeeded Maj Gen John M. Cone (deceased) as CG of White Sands (N. Mex.) Missile Range, after serving less than four months as CG of the Army Weapons Command at Rock Island (Ill.) Arsenal.

Brig Gen William J. Durrenberger vacated responsibility as Deputy CG of the U.S. Army-Tank Automotive Center, Warren, Mich., to become CG of the Weapons Command. Both reassignments were effective Oct. 15.

Maj Gen L. G. Cagwin, CG of the U.S. Army Test and Evaluation Command, Aberdeen Proving Ground, Md., announced General Davisson's selection to relieve Col Karl F. Eklund, deputy, who served as acting commander following General Cone's death in April 1966.

Graduated from the U.S. Military Academy in 1937, General Davisson served from April 1964 to June 1966 as CG, Eighth Army Support Command in Korea. Under his leadership, the Command was reorganized into COSTAR (Combat Service Support to the Army) to improve the logistic base in Korea.

General Durrenberger served at Rock Island as deputy commander of the Ordnance Weapons Command from August 1961 until the Army Weapons Command was established in August 1962. He then served as WECOM chief of staff.

Reassigned as commanding officer of Springfield (Mass.) Armory in July 1963, he served until promoted in September 1965 to brigadier general and moved to the Tank-Automotive Center.

Brig Gen H. G. Davisson

Brig Gen W. J. Durrenberger

ical warfare agents, effects of environment on host-parasite relationships, evaluation of Laser spectroscopy, insecticides, isolation and testing of antibacteria material, calorimetric analysis of malathion and parathion using fluoboric acid, and various other disciplinary areas.

Arctic Test Center, Fort Greely, Alaska. This is an Army Test and Evaluation Command element, as are Dugway Proving Ground, White Sands Missile Range, and the Tropic Test Center, Panama Canal Zone.

The five ATC tasks funded by the ILIR Program included quantitative and qualitative mapping of major terrain elements of selected contrasting segments of the northern automotive test course at Fort Greely; human factors related to performance of test personnel during evaluation of materiel undergoing testing in the Arctic;

Also, feasibility of sound ranging for detonation of mortar shells in ice fog; techniques for enabling test personnel to use instrumentation required for acquiring data under arctic conditions; and an effort to determine the nature and explanation of ice fog developing during firing of weapons at test sites.

Tropic Test Center. Three ILIR tasks were focused on problems of vision in the jungle, jungle acoustics, and the anthropometry of the work force of 15 Latin American countries.

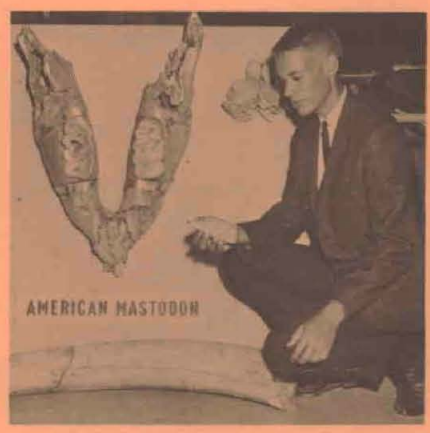
Army Personnel Research Office. Under the supervision of the Army Research Office, Arlington, Va., the Personnel Research Office was involved in five ILIR tasks. Work was concentrated in areas of decision processes in military operations; effects of phase-shifting on perception of simple and complex signals as related to improving oral communication; and computer technology and operations research.

Nuclear Defense Laboratory, Edgewood Arsenal, Md. Two ILIR studies considered feasibility of measuring characteristics (dose and dose rate) of the initial nuclear-radiation pulse from a nuclear detonation by radiation-chemical techniques, including study of the properties of short-lived transient species produced by the radiolysis of water and aqueous solutions; and to determine whether response of selected gamma-radiation dosimeters is dose-rate dependent, to establish the significance of observable effects, and to assess potential application of findings to nuclear weapons effects information.

Aeromedical Research Unit, Fort Rucker, Ala. Two tasks concerned urinary hormone levels in free-fall parachuting and the lift generated by the human body in free-fall parachuting.

Army Laboratories Host International Science Fair Winners

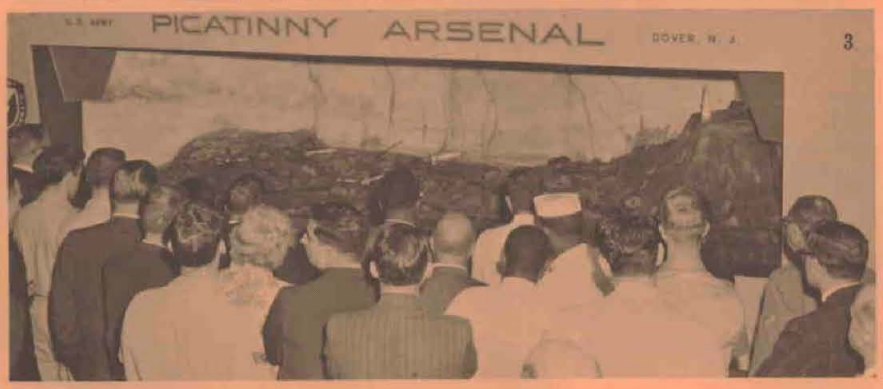
ONE OF TEN Army Superior Award winners at the 17th International Science Fair (ISF) in Dallas, Tex., last May, Beth Romanowich, 17, uses a fluorescent microscope at Walter Reed Army Institute of Research (WRAIR), Washington, D.C. An electrophoresis exhibit, improvised from refrigerator trays and vegetable bins to conduct the analysis of blood serum proteins, won her the Army award. Findings in the 4-year project were reported in a paper titled "Establishing a Blood Group System in the Laboratory Rat," presented to hematologists, virologists and microbiologists at WRAIR.



YOUNG SCIENTIST Steven P. Lund, 16, Army Superior Award winner at the ISF, views jawbone and tusk of an early mammal found during excavation at Vicksburg, Miss. The mastadon skeleton is being restored at the Waterways Experiment Station at Vicksburg, where Steven spent a week as a guest of the U.S. Army. As the result of his ISF entry, Steven also is Army alternate to the Japanese Student Science Awards which will be held at Tokyo in November. His ISF project also earned him a trip to the Army Science Conference at the U.S. Military Academy, West Point, N. Y.

ISF MERITORIOUS AWARD winner Robert L. Shuler observes operation of the Ballistic Research Laboratories Electronic Scientific Computer (BRLESC), explained by Dr. John H. Gies, chief, Computing Laboratory, U.S. Army Ballistic Research Laboratories, Aberdeen Proving Ground, Md. The 15-year-old Greenwood, Miss., youngster earned a week-long visit to the laboratory for his winning project at the ISF. During his visit he had opportunity to compare his project (self-constructed digital and analog computers) with high-speed BRLESC developed at Aberdeen Proving Ground.

AT EDGEWOOD ARSENAL, Md., James A. Bennett, 18, ISF Meritorious Award winner, examines slides in the Neuroendocrinology Laboratory. For his winning exhibit, Bennett visited the laboratory where he worked with Dr. Russel J. Reiter, supervisor of the Neuroendocrinology Section. Bennett's science project, to which he has devoted six years of work, is a study of how drugs or hormones act to determine sex reversal. The work culminated in a paper titled "A Masculinization Analysis of Methyltestosterone Administered Lebistes Reticulatus," which earned the visit.



1. Maj Gen Floyd E. Hansen, CG of USAMUCOM, tours Pentagon concourse exhibits, accompanied by Maj Margaret Dougherty. 2. MUCOM exhibit. 3. Picatinny Arsenal Battlefield Panorama exhibit. 4. Maj Gen R. B. Anderson, OASA (I&L) director of Procurement, flanked by Col C. A. Sanford (left), special asistant to the director, and Col W. G. Willmann, assistant director of Procurement. 5. Col H. D. Kight, AMC information officer, Maj Dougherty, and Jack W. Askins. 6. Col J. S. Chambers, Picatinny Arsenal CO (second from right) and Maj W. G. Baldwin, E. H. Holloway (left) and K. C. Smith.

Picatinny Arsenal (Dover, N.J.) exhibits "starred" in an impressive show held in a 30x60-foot prime location on the concourse of the Pentagon, Washington, D.C., Sept. 12-16.

Ten exhibits depicting the mission and functions of the U.S. Army Munitions Command were displayed for thousands of DoD civilian employees, military personnel, staff members of the U.S. Senate Select Committee on Small Business and the House of Representatives Small Business Committee, and other visitors.

The idea of inviting MUCOM to tell its story in the Pentagon originated with Jack W. Askins, Army Small Business and Economic Utilization Policy adviser, OASA (I&L), who provided overall coordination for the project with assistance from Maj Margaret E. Dougherty, MUCOM information officer, and Elton H. Holloway, Small Business and Labor Surplus adviser, Picatinny Arsenal. Department of the Army coordinator was Maj Willard G. Baldwin, Office, Chief of Information.

Planned and erected by the Picatinny Arsenal Technical Exhibits Unit, directed by Kenneth C. Smith, exhibits included the Battlefield Panorama, completely animated with soldiers, vehicles, missiles and aircraft; Safety Exhibit, illustrating safety equipment; Munitions Command Exhibit, a 44-foot-long depiction of the missions and commodities of each MUCOM subcommand; Small Business Exhibit, which photographically listed individuals involved in DoD small business activities.

Picatinny also showed the Combustible Cartridge Case Exhibit; the Packaging Exhibit for munitions and warheads; M16 and M18 Mine Exhibits, showing operation and effects of antipersonnel mines; the Carousel Exhibit, a turntable displaying munitions items developed at Picatinny; Cluster Bomb Unit Exhibit, showing CBU Aircraft Bomb and Dispenser; and the Firepower in M60 Tank Exhibit, containing various types of antitank ammunition and samples of armor plate showing effects of each.