ARMY RESEARCH AND DEVELOPMENT

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Realignment of COSATI Establishes Eight Panels Along Functional Lines

Realignment of the structure of the Federal Council for Science and Technology's Committee on Scientific and Technical Information (COSATI), effective this month, provides for establishment of a subordinate organization of eight panels.

COSATI Chairman Lt Gen William J. Ely, Deputy Director of Defense Research and Engineering (Administration and Management), announced the plan for reorganization in a memorandum to members of the Federal Council for Science and Technology.

Expanding functions of COSATI require virtually a full-time chairman and General Ely is relinquishing this additional position he has held for two years.

William T. Knox, vice president of ESSO Corp. until he joined the staff of Presidential Science Adviser to Dr. Donald F. Hornig in September 1964 as a technical assistant for scientific and technical information, will take

(Continued on page 3)

Larsen Relieves O'Brien As Chairman of ASAP

Former Assistant Secretary of the Army (R&D) Dr. Finn J. Larsen takes over Apr. 16 as chairman of the Army Scientific Advisory Panel.

Dean Murrough P. O'Brien, who has served as the ASAP chairman since July 1961 and is one of the 10 original members appointed in 1951, will continue to serve as a member of the new Senior Advisory Council.

Creation of this Council is part of a realignment of the ASAP approved by the Secretary of the Army, Stephen Ailes, and forwarded late in March for approval of the Assistant Secretary of Defense (Administration). Other members are Dr. K. T. Keller, a member Emeritus of ASAP since August 1960, and Dr. Charles C. Lauritsen. Both are original members of ASAP.

Dean Emeritus of the College of Engineering, University of Califor-

(Continued on page 18)

Drug-Resistant Malaria in Asia Prompts Acceleration of Army Medical Research

Increasing incidence of drug-resistant malaria among U.S. and allied forces in Southeast Asia has prompted a marked acceleration of the U.S. Army's malaria research program, The Surgeon General reports.

U.S. and allied forces in Vietnam, Thailand and Malaysia are experiencing a previously unrecognized type of falciparum malaria which is not responding promptly to any known prophylactic or therapeutic measure. Recently, cases have been reported from the Upper Volta Region of Africa. The disease also is suspected to exist in Latin America.

Treatment of this drug-resistant form of malaria is becoming progressively more difficult, the Office of The Surgeon General reports, and heroic medical measures are now required to save lives.

Drug-resistant falciparum malaria has the potential of incapacitating entire operational units, by death, evacuation or prolonged hospitalization. The nature of this drug resistance is unknown.

Through an acceleration of the ma-

(Continued on page 4)

Bulge Veteran Takes Over As Army Under Secretary

Stanley R. Resor

The new Under Secretary of the Army, Stanley R. Resor, is a New York City attorney appointed in mid-

(Continued on page 5)

Featured in This Issue . . .

NASA, Army Approve Joint Research Plan

An agreement providing for Army participation directly in support of National Aeronautics and Space Administration low-speed aeronautical research in which a mutual interest exists was announced Mar. 26.

The U.S. Army Materiel Command will provide up to 30 professional and supporting personnel at the NASA Ames Research Center, Moffett Field, Calif., to be added to the work staff in such areas as low-speed aerodynamics and handling qualities of advanced aircraft.

In addition, the Materiel Command will provide about 15 personnel, including five for the administrative staff, and will have responsibility for operation of one of the two 7 x 10-foot wind tunnels at Moffett Field. Facilities there include a 40 x 80-foot wind tunnel, flight testing and simulator equipment, and other laboratories, some of which may be used

(Continued on page 3)

Army R&D Newsmagazine

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Betts Informs Congress on Army AE Goals

Progress on the Army Nuclear Power Program was reviewed by Maj Gen Austin W. Betts, Deputy Chief of Research and Development, in a recent presentation before the Joint Committee on Atomic Energy, First Session, 89th Congress.

General Betts limited his review to the Army's general interest in nuclear power plants to support land operations, and to a brief summary of major portions of the development program. Since his presentation, the ML-1A funds have been dropped from the FY 1966 program because of budgetary stringency. Excerpts from General Betts' review follow:

Within the Department of Defense, the Army has been assigned primary responsibility for research and development in this area. Accordingly, in addition to the AEC-DoD nature of the program, we maintain very close coordination with the other Services through assignment of Navy and Air Force personnel to the Army Program and the centralized technical support and training of operators which the Army Program conducts for all the military plants.

In regard to the Army's interest in future nuclear power development programs, the joint AEC-DoD study submitted to the Committee in February of last year continues to represent our general position. To summarize and up-date the information contained in this study, our interest in stationary and portable plants continues to be concerned in most cases with economics.

Presently available plants of this type can only be economically employed at very remote sites where petroleum delivery is extremely difficult and expensive.

Therefore, for general applications, only advanced technology plants which will eventually provide a low-cost nuclear unit are being considered for detailed investigation and development. Studies of advanced technology plants are being conducted both within the DoD and the AEC at the present time.

An exception to the need to achieve economic parity for application of this type of nuclear power plant is the case where the non-air-breathing characteristics make nuclear power a unique choice. An example of this situation would be an underground facility where the power plant could operate without a continuous supply of combustion air.

As noted in the AEC-DoD study, the Army has prepared a standard plant design, including complete specifications and procurement package, for a portable type plant. The procurement package will permit the procurement, as required, of portable plants on the open market with a minimum of additional design effort for site adaptation. At the moment, we have no firm requirements for additional portable plants.

The work on the gas-cooled mobile reactor program has continued with the objective of providing sufficient information to support the procurement of a service test model. The ML-1 engineering test model has now accumulated considerable operating time.

We have not yet identified specific applications for the gas-cooled system. However, the Army's Combat Developments Command is currently conducting a comprehensive study on the electrical power requirements of the field army of the future. After completion of this study next year, we should be in a position to evaluate the application of the mobile gas-cooled power plants against specific field army electrical power requirements.

Within the Army, the Combat Developments Command has the general responsibility for identifying the Army's needs for materiel and translating those needs into development objectives and requirements. Upon approval by the Chief of Research and Development, these development objectives and requirements form the basic guidance for development programs such as those conducted for nuclear power.

The remaining major reactor project being conducted in support of the Army's program is the Military Compact Reactor. As was indicated in the joint AEC-DoD study, the Military Compact Reactor Technology Program was continued by the AEC in FY 65 in order to provide a sound base for initiation of a reactor development program upon establishment of the total feasibility of the Nuclear Powered Energy Depot, currently under study by the Department of Defense.

Funds for continuing the Military Compact Reactor Technology Program are not now included in the Commission's FY 66 budget. The feasibility work on the Nuclear Powered Energy Depot is continuing as outlined earlier to the Committee.

(Continued on page 25)

COSATI Realignment Provides for Panels, Chairman

(Continued from page 1)

over as chairman of COSATI.

Col Andrew A. Aines, Director of Army Technical Information until he moved to the staff of Defense Director of Technical Information Walter M. Carlson in June 1964, will continue as executive secretary of COSATI. He will be physically relocated from the Pentagon to the White House Executive Office Building.

Created to operate along functional lines "to provide for wider and more continuous coverage of areas of common interest to the Federal agencies," the COSATI panels are: Information Generation; Operational Techniques and Systems; Information Users; Information Processing Technology; International Activities; Budgets and Statistics; External Relationships; Education and Training.

Dr. Hornig has indicated that he desires a closer working relationship between the Office of Science and Technology, of which he is director, and the committee, particularly COSATI, of the Federal Council of Science and Technology, of which he is chairman.

The House Select Committee on Government Research, chaired by Rep. Carl Elliott, in a report to the

William T. Knox

89th Congress titled *Documentation and Dissemination of Research and Development Results*, recommended that COSATI be provided with "teeth to enforce" cooperation between Federal agencies for more effective integration of scientific information activities.

"A possible solution," the report stated, "might be for the White House Office of Science and Technology to implement decisions based on COSATI recommendations, the former being closer to the seat of Executive authority."

In his memorandum to the Federal Council for Science and Technology, General Ely explained that "no fundamental organizational changes" had been made in COSATI since it was established and that the realignment now is the result of extensive study of future needs to improve its effectiveness.

To make way for the new structure of COSATI panels, present work groups will be discontinued as soon as their tasks are completed, or if work remains to be done they will be phased into the new panels.

Each of the Federal agencies concerned has been asked to nominate appointees to the Panels, each of which will consist of five to seven members chosen for competence in specific fields. Performance of the panels will be reviewed annually by COSATI to determine changes that may be desirable.

The plan of operation for the panels calls for the use of outside consultants if deemed necessary, and Federal agencies will be expected to support such requirements. Functions of each Panel will be spelled out in detail when they are organized.

Federal agencies which have been asked to submit nominations for the COSATI Panels include the Atomic Energy Commission, Department of Agriculture, Department of Commerce, Department of Defense, Federal Aviation Agency, Department of Health, Education and Welfare, Department of Interior, National Aeronautics and Space Administration, National Science Foundation, Veterans Administration and the Department of State.

USAMC to Support NASA Aeronautics

(Continued from page 1)

under the joint working agreement on Army-oriented research.

The tunnel to be operated by the Materiel Command has been in a standby status for about 10 years and will require some maintenance and modernization. Negotiations leading to the agreement have been conducted for almost a year. The agreement is in line with the current Department of Defense drive to encourage joint use of research facilities where practicable.

The cooperative program was initiated because of a realization that accelerated research in the low-speed flight regime is necessary if the low-speed and V/STOL aircraft systems are to keep pace with new aircraft mobility requirements. The Army has a special interest in this research.

Joint use and support of NASA facilities involved at Moffett Field is expected to achieve tangible economies and make possible more comprehensive study of aerodynamics problems of subsonic aircraft, particularly the V/STOL (Vertical/Short Takeoff and Landing) aircraft of primary Army interest.

Former STI Director Earns Commendation

Col Andrew A. Aines, executive secretary of the Federal Council of Science and Technology's Committee on Scientific and Technical Information (COSATI), recently received the first Oak Leaf Cluster to the Army Commendation Medal.

Lt Gen William J. Ely, Deputy Director of Defense Research and Engineering (Administration and Management), presented the award.

The citation recognized Col Aines for exceptionally meritorious service as director of Army Technical Information and as chief of the Scientific and Technical Information Division, U.S. Army Research Office, from Sept. 4, 1962 to June 1, 1964.

During this period he was responsible for the establishment and implementation of the current Army Scientific and Technical Information Program. The citation states, in part:

"As a result of his direction and guidance, the Army attained and maintained DoD leadership and gained national recognition, particularly through the implementation of programs such as the Army Chemical Information and Data System. The Army Scientific and Technical Information Program continues to serve as the prototype for implementation of the Defense Program."

Oak Leaf Cluster to Army Commendation Medal is presented to Col A. A. Aines, executive secretary of FCST Committee on Scientific and Technical Information, by Lt Gen William J. Ely, Deputy Director of Defense Research and Engineering.

Drug-Resistant Malaria in Asia Prompts Research

(Continued from page 1)

laria research program, U.S. medical research personnel hope to find means to cope with this problem. The ultimate solution will depend upon mastering the fundamental mechanisms of the drug resistance.

Questions that need to be answered through long-term fundamental research include:

Are the resistant parasites recent mutants or have they existed unrecognized for long periods of time? Has the marked increase of travel into and out of previously remote areas spread and brought recognition of drug-resistant disease which may have been affecting small remote population groups for centuries?

Has the intensive use of antimalarials for the past two decades resulted in mutations or other phenomena leading to altered metabolic pathways in the parasite rendering it resistant to the pharmacologic actions of the antimalarials?

Has the reduction in the prevalence of vivax malaria by chemotherapeutic and mosquito control measures rendered man more susceptible to falciparum malaria?

In addition, there are many other precise clinical questions to be answered.

U.S. Army elements presently engaged in the Army Medical Service Research Program on Malaria include the Walter Reed Army Institute of Research, Washington, D.C., and its overseas facilities; U.S. Component of the SEATO Medical Research Laboratory, Bangkok, Thailand; U.S. Army Medical Research Unit, Kuala Lumpur, Malaysia; U.S. Army Environmental Hygiene Agency, Edgewood, Md.

ONE HORSEPOWER PER POUND, a goal long sought by designers of rotating electrical machinery, is displayed by Spec 5/c R. A. Bemis holding lead wire to an ultra-high-speed 5 hp. motor weighing 5 pounds. Operating at 62,000 r.p.m., the motor is being developed along with many other families of high-speed motors, generators and alternators at the U.S. Army Engineer R&D Laboratories at Fort Belvoir, Va.

Malaria is a group of very complex parasitic diseases transmitted from man to man through the bite of certain female Anopheles mosquitoes. The types of malaria and the specific mosquito transmitting the disease usually exist in a subacute or chronic form; thus native populations maintain a constant source for infection of mosquito vectors.

When individuals from nonmalarious areas, such as the United States Forces, are introduced into malarious regions, they experience an acute form of the disease.

In man, malaria is four different diseases, each caused by a different parasite. From a military point of view, two of these are of major importance: benign tertian malaria (vivax malaria) and malignant tertian malaria (falciparum malaria). The remaining two types of malaria in humans are uncommon and of much less importance.

Vivax malaria, the most common, is rarely fatal. Falciparum malaria is the second most frequently encountered form of malaria, causing alarming clinical symptoms; it is often rapidly fatal if not treated quickly and effectively.

During World War II, the ratio of vivax to falciparum malaria in U.S. Forces was 7 to 1, but falciparum malaria killed almost twice as many troops as did vivax malaria.

Malaria has played, and continues to play, a key role in the evolution of civilization, including its detrimental effect on the development of the United States until the 20th Century. Even as recently as 1933, some counties in the Southern United States reported over 80 percent of the school children had malaria.

More than one billion people live in malarious areas within the tropical and subtropical countries of the world, it is estimated.

In spite of the intensive control and eradication programs of recent years, about 100 million people have malaria today and approximately one million people die of the disease each year.

The disease is hyper-endemic in many areas, that is, prevalence rates are continuously high. Malaria also occurs in epidemic form; for example, an epidemic occurred in a 100,000-square mile area of Central Ethiopia in 1958 causing 3,000,000 cases with 150,000 deaths.

Malaria in all its forms has played a major role in decreasing fighting strength of United States Forces. Col Theodore Roosevelt stated that malaria was the chief enemy in the Spanish-American War, not the Spanish.

During World War I, in which combat occurred mainly in nonmalarious areas, only 15,555 cases of malaria were reported among American troops. Enforced use of mosquito nets, screening of quarters and hospitals, drainage of breeding waters and oiling of standing waters all helped to control the disease.

In World War II, however, malaria was the single most serious military medical problem. Enormous amounts of the antimalarial drug, Atabrine, insecticides, repellents and other control measures were used to reduce the prevalence and severity of the disease.

Approximately half a million U.S. troops developed malaria. With exemplary medical care and use of quinine and Atabrine, only 302 deaths from malaria were reported. In spite of all the control methods used, 6½ million man days were lost because of malaria in U.S. Forces alone.

In the South Pacific area, malaria caused more than five times as many casualties as did combat. On Guadalcanal, the disease threatened the success of the military operation.

Malaria incidence rates for personnel in the Pacific and China-Burma-India Theaters reached what the Medical Corps described as "fantastic heights" on occasion.

In the 1943 Sicilian Campaign, from July 9 to Sept. 10, 21,482 American soldiers were hospitalized with malaria, contrasted to 17,375 battle casualties. Soon after D-Day, large numbers of troops were evacuated back to England with relapses of malaria, first acquired in North Africa and Italy.

During the Korean Conflict (1950-53), 39,026 cases of malaria in U.S. Army personnel were reported in spite of continuous improvement in control measures.

Present-day control, prophylactic and therapeutic measures are considered adequate to prevent vivax malaria from becoming a decisive factor in the outcome of military operations in heavily infected areas. Drug-resistant falciparum malaria, however, has the potential of rapidly replacing vivax malaria as the most important military disease because of its drug resistancy and clinical seriousness.

General Dick to Explain Army Research to JSHS Conferees

Speakers, seminars, tours and discussions have been firmed up for the Third National Junior Science and Humanities Symposium (JSHS), Apr. 29-May 1, at the U.S. Military Academy, West Point, N.Y.

Chief of Research and Development Lt Gen William W. Dick, Jr., will speak on "The Broad Base of Army Research," following a welcome address by Maj Gen James B. Lampert, superintendent of the Academy. Col Amos A. Jordan, professor of social sciences at the Academy, will present an address on the humanities.

About 130 high school students, 22 science teachers, 15 state supervisors of science, and directors who participated in 22 regional JSHS will attend. The national as well as regional symposia are sponsored by the Chief of Research and Development.

Cadets Joseph Anderson, Thomas C. Barron, and R. A. Hallenbeck will discuss "Operation Crossroads Africa." J. Carlton Ward, Jr., chairman of the Board of Advisors, Industrial College of the Armed Forces (ICAF) and chairman of the Engineering College Council, Cornell University, will discuss "The Role of Engineering and Technology in History and in our Future."

The second day of the symposium will be devoted to a series of seminars on the sciences and the humanities. In the sciences area, seminars will include dislocations in metals, the polar aurora, plants of the sea, the history of mechanics during the last 20 years, and optical spectroscopy of ions in crystals.

Topics falling within the humanities areas include the universality of Shakespeare; T. S. Elliot and the theme of loneliness; reason and tradition in Herodotus' histories; the gift of tongues-languages and linguistics in the national interest.

Dr. Robert Oppenheimer, director of the Institute of Advanced Study, Princeton, N.J., will be the keynote speaker at a banquet Apr. 30. His subject is "Science in the Making."

The conferees will spend the morning of May 1 at the United Nations and in addition to making a tour of the UN building will hear three addresses.

Lt Gen Thomas W. Dunn, CG, First U.S. Army, will speak on "Leadership"; Dr. Ernst W. Nagelstein, chief of the Research Division of the UN Special Fund, "Science as a Catalyst for Development"; Dr. Frank Porter Graham, UN representative for India and Pakistan, "United Nations in Perspective and Hope (spiritual, historical, and humanitarian aspects)."

Dr. Robert J. Lontz, U.S. Army Research Office-Durham (ARO-D), N.C., is chairman of the Symposium Program Committee. Other members include Lt Col Dallas Knoll, associate dean of the U.S. Military Academy (USMA) and also director of the Third Annual Symposium; Col Elliott Cutler, professor and head of the Department of Electricity, USMA;

Dr. Sherwood Githens, Jr., professor of science education at Duke University; Dr. Marlin S. Reichy, senior educational advisor and director of instruction, ICAF; Dr. I. B. Holley, professor of history, Duke University; A. Neal Shedd, specialist for science youth activities, U.S. Office of Education, Department of Health, Education, and Welfare.

Lt Col William W. Chandler, associate professor of electricity, USMA; Arthur A. McDonald, scientific services coordinator, Duke University; and Maj Lawrence P. Monahan, Jr., executive officer, ARO-D.

Bulge Veteran Takes Over As Army Under Secretary

(Continued from page 1)

March to succeed Paul R. Ignatius, elevated Dec. 23 to Assistant Secretary of Defense (Installations and Logistics).

From 1955 until his appointment, Mr. Resor was a partner in the law firm of Debevoise, Plimpton, Lyons and Gates, specializing in corporate law. Graduated from Yale University with an A.B. degree in 1939, he was commissioned a second lieutenant.

World War II interrupted 2½ years at Yale Law School and he reported Feb. 26, 1942, for basic training at Fort Bragg, N.C. Assigned to the 420th Armored Field Artillery Battalion, 10th Armored Division, Fort Benning, Ga., he later commanded C Battery, was promoted to captain in February 1944, and attended the Officers Advanced Course at the Field Artillery School, Fort Sill, Okla.

With the 10th Armored Division he went to Europe in September 1944 and during the next six months served in the Ardennes, Rhineland and Central Europe campaigns, achieving the rank of major. He was awarded the Silver Star, Bronze Star and the Purple Heart. His unit received the Distinguished Unit Citation for the defense of Bastogne during the Battle of the Bulge.

Resor returned to the United States in October 1945 and, on separation from the service in January 1946, was promoted to lieutenant colonel. He accepted a commission in the Organized Reserve and returned to Yale Law School, from which he graduated with an LL.B. degree.

Resor is a member of the American Bar Association, the Association of the Bar of the City of New York, the Yale Club, and has been a director or officer of various Yale alumni and New York civic groups.

The late Lt Gen John P. Daley, who helped create the U.S. Army Combat Developments Command in 1962 and served as its first commanding general, recently was honored posthumously at USACDC, Fort Belvoir (Va.). An oil portrait of General Daley was presented to the Command by the USACDC Ordnance Agency, Aberdeen (Md.) Proving Ground, on behalf of the artist, Louis R. Hegler. Shown (l. to r.) during presentation of the painting are Lt Gen Dwight E. Beach, CG, USACDC, who accepted the painting; Maj Gen Charles Billingslea, Deputy CG, USACDC; Col Ralph M. McMahon, CO of the Ordnance Agency, who made the presentation; and Maj Gen Kenneth C. Wickham, CG, USACDC Combat Service Support Group, Fort Lee, Va.

WSMR Modernization Program Projected Over 5-Year Period

Modernization is an increasingly critical work at White Sands (N.Mex.) Missile Range, the Nation's largest all-land missile range, where approximately $10 million is allocated this year for new equipment, plus $5 million for R&D of instrumentation.

Advances in missile technology, presenting a requirement for highly sophisticated tracking, reporting and control instrumentation, have imposed upon White Sands a need for an estimated $50 to $75 million for modernization over a projected 5-year period. Planners are motivated by due regard for urgency.

WSMR is a tract of desert and mountain land about 100 miles long and 40 miles wide, with a unique leasing arrangement adding a 40 by 40-mile strip at the northern end, supplemented for testing purposes by a 125,000-acre launching site 240 miles away, at Fort Wingate, N. Mex., and an 8,500-acre launching site at Green River, Utah, 495 miles distant.

Take any given period during the year and, on the basis of the current work load, you will find 100 or more major testing projects being conducted. Involved are the Army, Navy, Air Force, Advanced Research Project Agency, National Aeronautical and Space Administration, and other Federal agencies.

Many of the testing projects carried on by these agencies are classified as "exotic," meaning that they require the most advanced instrumentation—some of it so advanced it still has to be invented or redesigned. That explains why about $5 million is being spent this year on research and development to determine more precisely what instrumentation is needed.

In seeking to meet the requirements of modern missile technology, WSMR is taking a double-forked approach—contracting with industry to meet many of the requirements, but relying heavily on expanded in-house laboratory facilities. The in-house laboratories at WSMR simulate various electronic and radiation environments for testing purposes, including structural experiments, quality control, vibration and other conditions.

Maj Gen John F. Thorlin
WSMR Commanding General

An important part of the modernization effort is a new concept known as ARTRAC (Advanced Range Testing, Reporting Control). It calls for extremely accurate data very soon after testing is completed or concurrently with control of the missile.

"Real time data" is the term applied to the requirement for data essential to instantaneous action—that is, to determine where a missile might impact if destroyed at a precise instant, or to send instructions to correct its course. ARTRAC involves split-second reporting of data and centralized control of operations.

More than 2,000 missiles and rockets are launched at WSMR in an average year. Records show a total of more than 21,000 launchings since the first atomic bomb was fired in July 1945, followed on Sept. 25 by WSMR's first missile launching, a modified "Tiny Tim."

Current operations include the Army Pershing surface-to-surface missile, ARPA's anti-ICBM tests, known as the ARPAT Project, the Air Force space reentry studies, the NASA "Little Joe" tests of the escape mechanism for the Apollo space program, and the Navy's Aerobee rocket probes of upper atmosphere, primarily meteorological research.

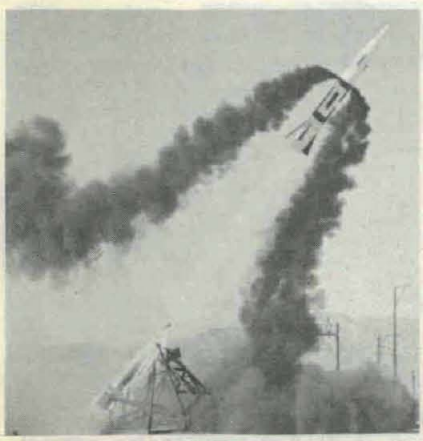
Projects range from testing advanced electronic instrumentation to tests of surface-to-air, surface-to-surface, air-to-air and air-to-surface missiles and manned airplane bombing—a list by no means complete.

Missiles may be launched from Green River, Utah, 495 miles away, or from Fort Wingate, 240 miles distant, and impacted at WSMR. For

Lance Meets All Objectives in Test Firing at WSMR

Lance, the U.S. Army's first missile to use prepackaged, storable liquid propellants, met all test objectives last month when the first component development flights were conducted at White Sands Missile Range, N. Mex.

Lance is designed to fulfill requirements for a mobile weapon system which will replace Honest John and possibly Little John missiles. The system would complement division tube artillery and extend division commander capabilities for nuclear and non-nuclear supporting fire.



LANCE missile trails smoke as it leaves nontactical launcher in firing test to prove out effectiveness of new modified inertial guidance and control system at WSMR, N. Mex. The dark smoke is a normal function of devices used to spin the missile as it leaves the launcher.

The Lance missile uses a new modified inertial guidance and control concept which was conceived and developed in the U.S. Army Missile Command's Directorate of Research and Development at Redstone Arsenal, Ala. Major components of the missile include a warhead section, a guidance package, fuel tankage and a rocket engine.

Major ground support equipment for the system includes a self-propelled launcher, a fully mobile lightweight launcher and a transporter loader.

Prime mover for the highly mobile missile system is a modified M-113 personnel carrier. The entire firing unit is self-contained and self-sustaining on two tracked vehicles.

In airmobile operations, the lightweight launcher and the missile can be carried into the battle zone by Army helicopters. They can also be carried on a fixed-wing aircraft and air-dropped by parachute.

Lance has been picked for high priority project management with Lt Col W. E. Mehlinger, U.S. Army Materiel Command, directing the program from the U.S. Army Missile Command.

Ling-Temco-Vought was selected as prime contractor by the Army in November 1962. Further system development work is under way at the Michigan Army Missile plant near Detroit.

example, the Air Force launches ABRES/Athena missiles for space reentry studies from the pads at the Green River site.

When more than WSMR's normal length of 100 miles is needed for experiments, ranchers in a 1,600-square mile tract at the north end of the range receive an evacuation notice, under a unique cooperative plan.

About 25 families then move into nearby motels or other quarters during the tests, for which per diem is allowed plus an annual lump sum payment for the use of their property. If property should be damaged, which usually is avoided by precise control of the missile's impact point, the Government makes restitution.

WSMR constitutes well over a $100 million investment in facilities and equipment. The total work force is just shy of 16,000, including about 4,000 WSMR Civil Service employees, 2,000 military officers and enlisted men, some 1,450 employees of contractors, and approximately 8,500 employees of agencies engaged in test operations.

Test collection and analysis utilizes a wide variety of high precision equipment. However, the rapid acceleration of missile technology has a way of proportionately increasing the obsolescence of equipment because it is not sufficiently accurate or fast enough to meet changing requirements.

A recent tabulation of equipment currently in use shows 32 ballistic cameras, 91 cinetheodolites, 11 computers (1 IBM 7094, 2 IBM 7044, 8 IBM 1401), 6 doppler velocity and position transmitters, 15 record stations, 37 receiver stations, 6 electronic sky screen equipment, 365 fixed cameras, 6 geodetic systems (baselines), 2 integrated trajectory systems, 2 miss indicator systems, 28 photographic printers, 5 program single axis mounts, 45 radars, 7 velicimeters and 134 tracking telescopes.

Other equipment includes 12,080 circuit miles of wire, 32,000 circuit miles of cable, 240 microwave voice channels and 14 communication centers.

WSMR also boasts an ultramodern nuclear effects laboratory, which began operations late in 1964 and has a neutron generator capable of one billion free neutrons per pulse.

In June 1961 a modern calibration laboratory was established to calibrate regularly all WSMR measuring equipment, in the interest of insuring the reliability of test data as measured.

Requirements for the 5-year instrumentation modernization program now under way were studied by a special subpanel of the Army Scientific Advisory Panel during a visit to WSMR in September 1963.

The group included such distinguished experts as Dr. Charles C. Lauritsen, Professor Emeritus of the Kellogg Radiation Laboratory, California Institute of Technology, and one of the 10 original members of the ASAP appointed in 1951; Dr. Henrik W. Bode, vice president of Bell Telephone Laboratories; Wilbur S. Hinman, former Deputy Assistant Secretary of the Army (R&D); Dr. Edward C. Stevenson, Associate Director for Research at the Laboratories for the Engineering Sciences, University of Virginia.

Dr. Craig M. Crenshaw, chief scientist of the U.S. Army Materiel Command; Dr. W. W. Carter, chief scientist of the U.S. Army Missile Command; A. W. Rogers, chief engineer of the U.S. Army Electronics Command; and Col Benjamin S. Goodwin, special assistant to the commanding general, Army Test and Evaluation Command.

When the proposed modernization program is completed, dependent upon continued funding at approximately the current level over a 5-year period, WSMR is expected to be capable of measuring space position and velocity of test vehicles with an accuracy of plus or minus one foot and plus or minus of one percent of velocity over the entire 4,000-square mile range.

Natick Appoints Dr. Landowne Medical Sciences Director

The U.S. Army Natick (Mass.) Laboratories have appointed Dr. Milton Landowne as director of the Division of Medical Sciences at the U.S. Army Research Institute of Environmental Medicine.

Dr. Landowne will direct basic and applied research on the physiological, biochemical, pharmocological, and clinical effects of heat, cold, terrestrial altitude, and exercise related to the performance of combat soldiers in environmental extremes.

From 1957 until assuming his new position, Dr. Landowne was medical director at the Levindale Hebrew Home and Infirmary, Baltimore, Md. During this time, he was also assistant professor of Medicine, Johns Hopkins University; head of both the Cardiovascular Disease Division and Chronic Disease Division, Department of Medicine, Sinai Hospital, Baltimore; and attending physician at Sinai and Baltimore City Hospitals.

A native of New York City, Dr. Landowne received a B.S. degree from the College of the City of New York (1932) and an M.D. from Harvard Medical School (1936). He served a 3-year internship at Mt. Sinai Hospital, New York City, and in 1939 was named Emanuel Libman Fellow in Cardiovascular Research at Michael Reese Hospital, Chicago.

In 1941 he was an instructor in the University of Chicago Department of Medicine, leaving there as assistant professor in 1948 to become chief, Cardiovascular Research Unit, Mt. Alto VA Hospital, Washington, D.C. He was appointed assistant chief, Gerontology Section, National Heart Institute, National Institutes of Health, Bethesda, Md., and Baltimore City Hospitals in 1949.

Dr. Landowne is a member of many professional societies including the American Physiological Society, American Society for Clinical Investigation, Society for Experimental Biology and Medicine, Phi Beta Kappa and Alpha Omega Alpha.

Dr. Milton Landowne

Capt Wangensteen Assumes Medical R&D Command Post

Capt Stephen L. Wangensteen recently joined the U.S. Army Medical R&D Command in Washington as assistant chief of the Surgical Research Branch, succeeding Dr. Martin S. Litwin.

A native of Minneapolis, Minn., the Captain earned B.A. and B.S. degrees from the University of Minnesota (1955), and his M.D. from Harvard Medical School (1958). His surgical internship and residency training were taken at Columbia Presbyterian Hospital in New York City.

Last January he entered on active duty and attended the Medical Field Service School at Brooke Army Medical Center, Fort Sam Houston, Tex. before joining the Command.

He has authored numerous professional publications dealing with gastrointestinal physiology and is a candidate for membership in the American College of Surgeons.

AMC Role in Quadripartite Standardization Program Explained

Seventeen years ago this month, the American, British and Canadian armies launched the ABC Standardization Program for mutual development of weapons, ammunition, field equipment, tactical doctrine and military procedures. The notable results reflect the continuing success of that joint effort.

Australia became a full-fledged member in January 1963, just five months after the U.S. Army Materiel Command became operational. Since that time the role of the USAMC in international research, development and standardization programs has never been explained in this publication. Since the ABCA is the grandfather of these programs, its 17th birthday is a propitious time for such an explanation.

With the reorganization of the U.S. Army in 1962, the USAMC was assigned the major responsibilities for international programs concerning materiel matters previously scattered among the seven Technical Services.

Under the USAMC, management of the international programs is centralized in the Mutual Security Office (MSO) headed by Brig Gen C. C. Haug. Within the MSO, the International Development Division directs and coordinates USAMC's part in all international research, development and standardization programs.

Included in the International Development Division mission is responsibility for all strategic trade and export control matters. Other elements of the MSO are concerned with grant aid, coproduction and cooperative logistics, and sale of materiel to allied countries.

Col D. W. Hayes is chief of the International Development Division, which is organized in two branches—the Data Exchange Branch, concerned primarily with bilateral weapons development, and the Standardization Branch, concerned with multilateral activities such as ABCA and NATO.

Headed by Col W. J. Bromley, the Data Exchange Branch manages five international program areas: Mutual Weapons Development Program (MWDP), Mutual Weapons Development Data Exchange Program (MWDDEA), Defense Development Exchange Program (DDEP), U.S.-Canadian Defense Development Sharing Program, and Cooperative R&D Program.

A new program managed by the Data Exchange Branch is that of training young German scientists and engineers at U.S. Army laboratories and installations.

Under the MWDP, bilateral agreements established development projects which provide U.S. financial as well as technical assistance to selected allied nations that have the capability of working on highly promising R&D projects.

Since inception of the program, eight countries have cooperated on more than 100 projects. Currently, about 20 projects involve France, Greece, Italy, Norway, the Netherlands, Turkey and the United Kingdom. These funded projects are gradually being phased out. Joint efforts will be conducted in the future under the new Cooperative R&D Program, to be described later.

ABCA Reception Marks 17 Years of Joint Program

Chief of Research and Development Lt Gen William W. Dick, Jr., and Mrs. Dick were hosts to about 230 Department of Defense officials and American - British - Canadian - Australian Army Standardization Program officers and wives at the annual ABCA reception.

Held at the Fort McNair Officers Club, the reception marked the 17th year of cooperation among ABC countries in improving allied field Army combat readiness through the establishment of common doctrine and equipment. The Australian Army accepted membership in the program in February 1963 and since then has been a full participating member.

Cooperation of the four nations emphasizes mutual interests in research and development and in technical and operation improvements. Major emphasis is placed on obtaining the greatest economy of effort and efficient use of resources by the four countries through teamwork in the solution of common problems.

General Dick is represented in the ABCA Standardization Program by his Deputy for International Programs, Brig Gen William T. Ryder, who is the U.S. Army member of the Washington Standardization Officers (WSO). Comprised of one high ranking officer of each of the four Armies, the WSO group is responsible for overall supervision of the Program.

Other members of the WSO are: *United Kingdom*—Maj Gen Roger St. John, Military Attache and Commander of the British Army Staff, Washington; *Canada*—Brig John A. W. Bennett, Canadian Military Attache and Commander, Canadian Army Staff in Washington; *Australia*—Col Norman Nicholls, Australian Military Attache.

Among notables at the reception were Assistant Secretary of the Army (R&D) Willis M. Hawkins, Army Chief of Staff General Harold K. Johnson, and Vice Chief of Staff General Creighton W. Abrams, Jr. Other dignitaries included commanding generals of the major Army Commands and other high ranking officials of the Quadripartite Armies.

QUADRIPARTITE ARMY HOSTS—Lt Gen William W. Dick, Jr., Chief of R&D (right) and Mrs. Dick stand in receiving line at ABCA reception held at Fort McNair. Also pictured are (left) Maj Gen Roger St. John, Military Attache and Commander of the British Army Staff, and Mrs. and Brig Gen William T. Ryder, Deputy Chief of R&D and the U.S. Army member of the Washington Standardization Officers Group.

Bilateral agreements under the MWDDEA and DDEP Programs provide for the exchange of technical R&D information between scientists and engineers in the U.S. and the allied countries. Financial assistance is not involved.

About 250 exchange agreements, under USAMC monitorship, exist with 15 countries in Europe and the Far East including Belgium, Denmark, France, Germany, Greece, Italy, the Netherlands, Norway, Turkey, Australia, China, Japan, the Philippines, Korea and Malaya.

To maintain cognizance of policy and overall management of the project and data exchange agreements, the chief of the USAMC Data Exchange Branch serves as project officer for each agreement. He is assisted by staff officers in the commodity areas, which include weapons, munitions, electronics and mobility.

Responsibility for monitoring the technical aspects of the projects and data exchange agreements rests with a technical project officer, usually named by and operating under the supervision of the USAMC subordinate agency concerned.

Implemented by an agreement between the U.S. and Canadian Armies in 1960, the U.S. Army-Canadian Development Sharing Program is recognized as an outstanding example of cooperation between two countries in the sharing of ideas, concepts and resources in the development of materiel of mutual benefit.

Funding arrangements vary under about a dozen projects for U.S. developments in Canada to fulfill U.S. requirements. In some, the Canadian Government has funded the whole development cost in Canada. In others, the U.S. funds jointly with the Canadian Government. In a few cases, the Canadian firm conducting the development shares in the development cost.

The U.S. Army-Canadian Development Sharing Program consists of R&D projects performed by Canadian prime contractors. Projects are designed to meet specified Department of Defense research and development requirements and are jointly funded by the U.S. and Canada (U.S. share not less than 25 percent). The U.S. developing agency is design authority for projects under this program.

Current projects under the U.S. Army-Canadian Development Sharing Program include the XM–571 utility carrier; CV-7A transport aircraft; Lance lightweight launcher; Mauler infrared acquisition unit; AN/GRC–103 radio relay set; AN/MPQ–40 radar; foam-in-place shelters; and a 1-ton amphibious, off-highway, air-transportable vehicle.

The newest program for strengthening R&D activities with allied nations is the Cooperative R&D Program, in which a small number of projects have been established and others are under consideration.

Objectives of the program, established to date with West Germany, France and Italy, are: To make the best equipment available through joint effort to meet the common requirements of the U.S. and its allies in the most timely manner; eliminate wasteful duplication of effort; achieve maximum exchange of scientific and technical information; and secure maximum standardization of equipment.

The criteria for cooperative R&D (not applicable to MAP Grant Aid Countries) are as follows:

- Foreign R&D financed by U.S. must be aimed at U.S. need.
- Cooperative R&D funding will be RDT&E.
- U.S. participates in jointly funded development only if design and production rights are received.

Balance of payments considerations dictate preference be given to projects that: Provide for investing foreign funds in U.S. R&D; offer good prospects for U.S. sale of items or components to second or third foreign parties; capitalize on unique foreign technical capabilities and offer savings in U.S. time and money in R&D or production; enable the U.S. to assist foreign second parties without jeopardizing U.S. sales to third countries.

The Standardization Branch, headed by Col F. N. Allwine, is responsible for USAMC International Standardization Program policy and planning and directs the activities of the NATO Section and the ABCA Section.

Established in 1947, the American, British and Canadian Standardization, expanded now by the addition of Australia, is the oldest of the international cooperative programs which grew out of the need demonstrated in World War II for common doctrine and procedures, together with maximum interchangeability of materiel and interoperability of forces.

The program is administered by the U.S. Army Chief of Research and Development through the Washington Standardization Officers (WSO), comprised of commanders of quadripartite army staffs in Washington, D.C.

The WSO officers are Brig Gen William T. Ryder, Deputy Chief of R&D for International Programs and the U.S. Army member; Maj Gen Roger St. John, Great Britain; Brigadier John A. W. Bennett, Canada; and Col N. A. M. Nicholls, Australia.

The WSO is assisted by the Primary Standardization Office (PSO), which monitors activities of Quadripartite Standardization Committee by arranging for WSC meetings, reviewing progress, recording mutual arrangements and actions, and informing the WSO of any differences between the armies.

Functions of the ABCA Army Standardization Program are administered through the developing agencies—U.S. Army Materiel Command (USAMC), Office of the Chief of Engineers, U.S. Army Security Agency, and the Office of The Surgeon General.

Standardization objectives are accomplished primarily by committee action and conferences, the principal areas in which USAMC functions. The Command provides the U.S. member and, in an international capacity, the secretariat for the following 6 of 10 standardization committees: Armaments, Electronics, Engineer, Mobility, CBR and Quartermaster.

These committees review requirements for standardization of materiel and equipment for armies of the ABCA countries: monitor progress of standardization on projects established and under development in participating countries; maintain and review lists of all items on which at least two or more armies have achieved a degree of standardization.

The committees also monitor the progress of numerous standing working groups and ad hoc working groups in their respective areas as follows:

Standard Working Groups—area communications systems, combat communications equipment, technical armor, safety and test procedures for mines and demolitions, clothing and equipment, field service equipment, foods and rations, chemical warfare, biological warfare, radiological defense, night vision.

Ad Hoc Working Groups—short-range reconnaissance drone system, night vision aids for engineer use, proof testing, medium mortar, heavy mortar, vehicle rapid fire weapon system, radio relay set-low traffic capacity, laser range-finding devices.

Coordination and information exchange is accomplished with the ABCA countries through U.S. Army Standardization Offices maintained by OCRD in England, Canada and Australia. (See *Army R&D Newsmagazine*, March 1962, p. 16, and May 1964, p. 34.)

Direct communication channels are used for appropriate matters between those offices and USAMC head-

(Continued on page 22)

SATCOM Satellite Telephone Call Spans 3 Continents, 2 Oceans

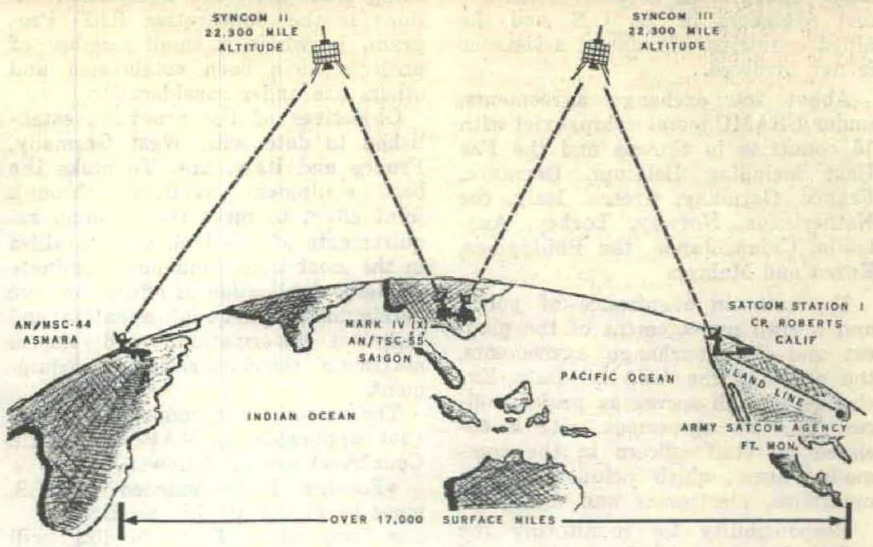
A phone call spanning three continents and two oceans recently set a new record as the longest satellite communication link ever established across the face of the earth.

Credited as the first double-hop link ever established between two synchronous orbit communication satellites, the experimental call was made from the U.S. Army Satellite Communications Agency (SATCOM), Fort Monmouth, N.J., to Asmara, Ethiopia.

As part of the normal test mission of SATCOM, the conversation was held between SATCOM commander Brig Gen J. Wilson Johnston and one of his test conductors, Lt David H. Thornton on duty in Asmara.

"We are taking part in an historic communications achievement," General Johnston told Lt Thornton. Serving as satellite communication technical adviser to the U.S. Army Strategic Communications Command in Asmara, which will man and operate a newly installed satellite communications station there, Lt Thornton was conducting the operational readiness testing of the terminal.

As their voices traveled across more than 17,000 miles of the earth's surface, Lt Thornton replied: "I can hear you just as clearly as if you were just next door, Sir, even though we're being relayed through two space satellites and three SATCOM surface terminals."



The experimental call was made possible by two highly successful experimental communications satellites SYNCOM II and SYNCOM III, developed for the National Aeronautics and Space Administration by Hughes Aircraft Co. NASA launched and positioned both satellites in space 22,300 miles above the earth, with SYNCOM II over the Indian Ocean, and SYNCOM III over the international date line in the Pacific.

The voice test was relayed by SYNCOM II from Asmara to Saigon, where the SATCOM Agency is testing two small, highly transportable satellite communication terminals. Located side-by-side, but operating in opposite directions, the terminals could relay the signals from SYNCOM II to SYNCOM III over the Pacific Ocean. From there the circuit returned to earth at SATCOM Station No. 2, Camp Roberts, Calif., and was sent by conventional land lines to the SATCOM Agency Test Operations Center at Fort Monmouth.

The experimental circuit erased a record set last June for the longest satellite communications link, which covered over 8,000 land miles between SATCOM stations in the Philippines and at Fort Dix/Lakehurst, N.J. At that time NASA was moving SYNCOM II westward from its former Atlantic Ocean position. The old record was set just as SYNCOM II was passing over the horizon out of line-of-sight with Fort Dix.

The first communications link utilizing two satellites involved two different types of communications satellites and spanned a relatively short distance. From the SATCOM shipboard terminal on the USNS Kingsport, then off Africa, a test circuit was established in 1963 through SYNCOM II to Lakehurst, N.J., then by land line to an ITT terminal at Nutley, N.J., for relay through NASA's medium altitude satellite "RELAY II" to South America.

The Army SATCOM Agency, a project manager activity under the Army Materiel Command, is responsible for the Army's portion of the Defense Satellite Communications Program—research, development and testing of the surface communications facilities needed to communicate with planned Department of Defense satellites. The Defense Communications Agency exercises overall integration of the program, and the Air Force will develop and launch the communications satellite.

The satellite communications stations are operated by the U.S. Army Strategic Communications Command, under Maj Gen Richard J. Meyer. His command will continue to be responsible for manning the satellite communication system ground stations for the Army after the network has progressed from the R&D phase into a fully operational status.

The newly installed terminal in Asmara was developed by Bendix Radio for the Army SATCOM Agency. Called the AN/MSC–44, it was formerly located at Fort Dix, N.J., as a part of SATCOM Station No. 1. This terminal played a key role in the first SATCOM experimental network established across the Atlantic using SYNCOM II in July 1963.

USAEPG Completing Tests On Miniature Helmet Radio

Engineering tests on the Army's pint-sized helmet radio, designed to provide an electronic communications link between a squad leader and squad members are nearing completion at the U.S. Army Electronic Proving Ground, Fort Huachuca, Ariz.

The AN/PRR–9 radio receiver and AN/PRT–4 transmitter are manufactured by Delco Radio, Kokomo, Ind. The AN/PRT–4 broadcasts in the 47-57 mc. range and weighs approximately 20 ounces. The AN/PRR-9 weighs only half a pound and is fastened to the rim of the combat helmet or can be carried in the pocket. Both operate on small batteries.

The system enables the squad leader to both talk and listen and members of the squad to hear instructions. The Army considers that the system will make the infantry squad more effective in combat and may save lives because there will be less need for arm and hand signals which can draw enemy fire.

Additional tests will be conducted to determine how well the radios work with other Army communications equipment without creating mutual interference.

AAFSS Enters Project Definition Phase

The Advanced Aerial Fire Support System (AAFSS) has entered the Project Definition Phase (PDP) with award of a $900,000 Army contract.

Lockheed California Corp. was selected along with the Sikorsky Aircraft Division of United Aircraft Corp., from among 12 contract proposals, to perform the 6-month phase. The U.S. Army Transportation Research Command, Fort Eustis, Va., awarded the Lockheed contract and is preparing the Sikorsky contract.

The Project Definition Phase is a formal step preceding full-scale development, during which preliminary engineering and contract and management planning are accomplished in an environment that encourages realism and objectivity.

The AAFSS was conceived as a stable, manned aerial weapon platform equipped with a variety of weapons to provide the Army with the capability of escorting troop-carrying helicopters and associated fire support.

The integrated aerial fire support system will include armament, avionics and fire control equipment. It will have a vertical takeoff and landing capability and will be designed to be maintained in the forward area of the combat zone.

At the completion of the Project Definition Phase and after the two contractors' reports and engineering development proposals have been evaluated, the Army will make one of the following alternative recommendations to the Department of Defense:

Undertake full scale development, undertake further exploratory or advanced development of key components, defer or abandon the development effort, proceed with further project definition, proceed with the development by an alternative source.

In addition to its weapons, vertical takeoff, and forward area capabilities, AAFSS performance characteristics include a cruising speed of 195 knots, dash speed of 220 knots, and an endurance of 3 hours for a 2-man crew.

TRECOM Awards XV-9A Contract

The U.S. Army Transportation Research Command, Ft. Eustis, Va., recently awarded the Hughes Tool Co., Aircraft Division, Calif., an $886,000 research contract to conduct a design study of a 12- to 20-ton payload hot-cycle rotor system and to conduct a 20-hour flight test program using the XV-9A hot-cycle research aircraft at Edwards Air Force Base, Calif.

SATCOM Official Discusses Satellite Terminals

The evolution of Army satellite communication terminals was traced last month by Samuel P. Brown, technical director, U.S. Army Satellite Communications (SATCOM) Agency, Fort Monmouth, N.J.

Speaking at a 4-day Unmanned Spacecraft Meeting of the American Institute of Aeronautics and Astronautics (AIAA) in Los Angeles, Brown described terminal development from 1946 to the present, saying in part:

"The next generation of ground stations for satellite communications is concentrated on developing the design bridge to the future—small, lightweight, long-life, inexpensive, high-capacity terminals capable of rapid deployment to meet all military contingencies. There has been a natural progression in surface terminal design from fixed installations to a more flexible surface environment responsive to military needs."

As examples of this trend, he detailed the evolution in such Army transmitting and receiving facilities from Project DIANA in 1946, which initiated space communications and employed the moon as a passive satellite, through the use of the first active satellites in Projects SCORE and COURIER in 1958 and 1960.

Continuing, he described the terminals developed for the next project, ADVENT, from 1960-62, and those now in use with NASA's SYNCOM satellites launched in 1963 and 1964.

Describing air-transportable terminals now being developed under the direction of the SATCOM Agency for use in the Defense Communications Satellite Program, he listed two types. The larger AN/MSC-46 (Mark 1b), scheduled for completion this year, will serve the Defense Communications System in long-haul applications. The smaller Mark IV type terminals built in 1963-1964 will continue to provide a base for the future development of terminals suitable for tactical applications.

Future improvements in terminal design "will be made in the areas of increased reliability, greater transportability, greater communications capacity, survivability, and reduced costs," he stated.

Brown credited the SATCOM Agency's participation in Project SYNCOM and the preparation for its station development and communications testing mission in the Defense Communications Satellite Program with stimulating present and future improvements in terminal design and capability. Under a NASA/DoD agreement, the SATCOM Agency provides the stations and conducts the communications tests with the SYNCOM satellites.

He also commented on future developments needed in communications satellites, noting the requirements imposed on terminals by the low effective radiated power (ERP) of satellites now in use. The latter improvement may require the use of nuclear power to increase transmission from the satellite to the terminal, according to Brown.

"The most critical link in conventional communications satellite systems is the down link, which, to date, has required the use of sophisticated techniques in the surface terminals to offset the low ERP of the satellites," he said.

The prospects for satellite improvement are good, he said, "based on the lessons learned from the SYNCOM spin-stabilized and the approaches planned for the DoD's Initial Defense Communications Satellite Project and NASA's Applications Technology Satellite Program."

Coauthor of the paper presented by Mr. Brown is Mr. Rollin G. Keyes, SATCOM Agency assistant technical director.

A charter member of the SATCOM Agency, Brown has been closely associated since 1946 with developments in military radio relay, tropospheric scatter, time division multiplex, and satellite communication systems. Recipient of a number of Outstanding Performance Awards, he is a member of the AIAA, a senior member of the Institute of Electrical and Electronics Engineers and is the author of many technical papers.

Samuel P. Brown

Clark Retires as USARJ CG, Fellenz Named as Successor

Former Director of Army Research Maj Gen Chester W. Clark, who departed in August 1963 for his present assignment as commanding general of the U.S. Army Japan, is scheduled to retire from the Army Apr. 30.

Maj Gen Lloyd E. Fellenz, currently director of Chemical-Biological-Radiological and Nuclear Operations in the Office of the Assistant Chief of Staff for Force Development (ACSFOR), Washington, D.C., will succeed General Clark.

Associates esteem General Clark as a trained educator whose scientific and administrative talents served the Army well when he was called into military service in World War II. Actually, his Army training began as a Reserve second lieutenant in 1927.

Born July 18, 1906, in San Francisco, Calif., General Clark attended the University of California, earning a B.S. degree in chemistry (1927) and an M.S. in chemistry and physics (1929). His Ph. D. degree was earned at the University of Leyden, the Netherlands, in 1935.

For six years he taught mathematics and chemistry at the University of California and San Francisco City College; and for one year following World War II was on the staff of the Johns Hopkins University, where he did research in cryogenics (low-temperature physics).

He was also a consultant and physicist at the Naval Research Laboratory in Washington, D.C., where he helped initiate the low-temperature research program.

From 1947 to 1954, he was assistant director of the Ballistic Research Laboratories at Aberdeen Proving Ground, Md., and later director of R&D activities at Picatinny Arsenal, Dover, N.J.

After a tour as Deputy G-4 of the Eighth Army in Korea (1954-55), he joined the R&D Division, Office, Chief of Ordnance. First he served as chief of the Guided Missile Systems Branch, next as chief of the Division in June 1958, then as assistant chief of Ordnance for R&D until he was assigned as Director of Army Research in the Office, Chief of Research and Development in April 1962.

MAJ GEN LLOYD E. FELLENZ, the incoming 53-year-old USARJ commander, graduated from the U.S. Military Academy with a B.S. degree in 1934. Prior to his ACSFOR assignment, General Fellenz was commander of Deseret Test Center, Fort Douglas, Utah.

Maj Gen Chester W. Clark

Maj Gen Lloyd E. Fellenz

He previously served with the Infantry until 1940, when he transferred to the Chemical Corps and was assigned to Edgewood Arsenal, Md., with the Industrial Engineering Division and Chemical Warfare Board. Leaving the Arsenal in 1943, he participated in the Sicilian Campaign in the Mediterranean Theater of Operations.

Upon returning to the States, he was assigned to the War Department General Staff until 1946 when he became the post commander of Camp Detrick, Md. After completing the National War College course, he was assigned to the Office of the Joint Chiefs of Staff.

In 1952, he was assigned to Fort Bragg, N.C., as commander of the 81st Chemical Group and the Chemical Officer, 18th Airborne Corps. After a year at Fort Bragg, he was assigned to Fort Monroe, Va., as Chemical Officer of the Continental Army Command.

In 1956, he was assigned to the Army Chemical Center, Md., as deputy commander and later as commander of the Chemical Warfare Laboratories. Appointed assistant chief Chemical Officer for Planning and Doctrine in 1959, he later served as director for Military Operations in the Office of the Chief Chemical Officer until he became commanding general of the Army Chemical Center in 1961.

Army Mathematicians Slate Meet at Frankford Arsenal

The Conference of Army Mathematicians at Frankford Arsenal, Philadelphia, Pa., June 9-10, will attract representatives of almost every major Army installation in the United States.

Sponsored by the Army Mathematics Steering Committee (AMSC) on behalf of the Chief of Research and Development, the conference is the eleventh of a series initiated in 1954 under sponsorship of the former Office of Ordnance Research.

The meetings are designed to provide a forum for problems currently facing mathematicians throughout the Army, to elicit possible approaches to solutions to the problems, and to acquaint outside mathematicians with pending problems of Army concern.

Approximately 60 delegates will participate. The 2-phase program will be highlighted by a speech on "Mututal Applications of Graphs and Matrices" by Prof. Frank Harary, University of Michigan.

The first part will include about 20 presentations of 30-minute papers contributed by Army and university personnel. This enables Army and university mathematicians to share findings of their scientific research.

The second phase includes three 20-minute papers of a clinical nature on particularly difficult problems presented by Army scientists. Through the clinical approach, the speakers presenting the problems get the benefit of discussion and suggestions made by the conferees.

Joseph Weinsten of the U.S. Army Electronics R&D Laboratories, Fort Monmouth, N.J., is program chairman and Henry Kahn, Frankford Arsenal, Philadelphia, Pa., is chairman of local arrangements.

April 23 is the deadline for the submission of papers, which should be directed to Dr. Francis G. Dressel, Mathematics Division, Army Research Office-Durham, Box CM Duke Station, Durham, N.C. Formal invitations will be issued about May 12.

Costa Rica Study Uses Life Zone Plant Classification System

A natural life zone system for classifying plant associations is being evaluated in Costa Rica for the Advanced Research Projects Agency (ARPA) under a $280,000 contract managed by the U.S. Army Research Office.

Titled "Research on a Bio-Ecological Classification for Military Environments Found in Tropical Latitudes," the study is being performed by Wilson, Nuttall, Raimond Engineers Inc., Chestertown, Md.

Dr. L. R. Holdridge, principal investigator for the project, developed the natural life zone system of classifying plant associations, which is based on the relationship that exists between climate and vegetation.

The Holdridge bioecological classification of plant associations has already been partially validated in the tropics where such organization is most needed. The system was previously used in mapping life zones in Guatemala, El Salvador, Honduras, Nicaragua, Panama, Colombia, Equador and Haiti. Venezuela is also being mapped, and Bolivia has requested mapping.

Investigative teams are conducting the research project at 11 Costa Rican study sites that represent eight life zones including: tropical wet, tropical moist, tropical dry, subtropical wet, subtropical rain, lower montane rain, and montane rain.

The ultimate goal of the study is to make possible the identification of classes of vegetation associations by means of remote sensing devices and thereby, through knowledge of these relationships, determine the values of other significant environmental characteristics.

More detailed goals of the field study are to:

- Identify the zonal vegetation associations for a number of tropical life zones at the 11 sites to describe their characteristic physiognomy and life forms and catalog their dominant species, and to describe fully the corresponding zonal soils and moisture regimes.
- Identify and describe fully a number of non-zonal associations and their sites and to identify the site factors apparently responsible for the non-zonal configurations.
- Suggest ground and air identification "keys" for the several zonal and non-zonal associations.
- Describe each stand of each association fully in terms of the current WES/MEGA vegetation and soils measurement systems.
- Examine, in terms of the WES/MEGA measurements, the kinds and degrees of internal, structural and site consistency of phytoecologically equivalent vegetative communities.

An interim data report has been prepared by the contractor covering results of the investigations through the wet season of the project in Costa Rica. A final report integrating dry season and wet season data will be prepared at the conclusion of the contract, scheduled for October.

Dr. Kotula Directs Cadet Leader Task at USAPRO

Cadet Leader's Task, a U.S. Army Personnel Research Office study concerned with behavior prediction of U.S. Army junior officers, is now headed by Dr. Leo J. Kotula, who recently returned from a year of duty as a consultant to the Republic of Korea Army.

Major research in this task currently deals with prediction of resignations at the U.S. Military Academy, a problem which has been receiving USAPRO study for a number of years.

As a USAPRO senior staff member who joined the organization in 1957, Dr. Kotula served with and later became chief of the U.S. Army Human Factors and Operations Research Unit in Korea.

Organized to assist the Office of the Adjutant General, Republic of Korea Army, in developing improved Korean Army selection and classification procedures, the Unit is sponsored by the Office of the Chief of Research and Development, U.S. Army.

Dr. Kotula's specific mission was to provide advice on psychological measurements and selection tests appropriate for the Korean culture. In the past, the Korean Army used tests which were primarily copies of U.S. Army instruments. These tests were judged to be of limited value in a culture characterized by a relatively low educational level and by a limited development of technical knowledge, skills and language.

Present chief of the Korean unit is Lt Col Paul N. Casper. Initial director was Dr. E. Kenneth Karcher, chief, Social Sciences Branch, Human Factors and Operations Research Division, U.S. Army Research Office.

Dr. Leo J. Kotula

Under Dr. Kotula's advisement, a comprehensive research program was initiated by the Korean Army Adjutant General in February 1964. It resulted in development of a new qualification test battery and a new classification test battery. Korean research personnel were indoctrinated on the various requirements for test development and validation.

Progress made in the research program in 1964 was covered in four Psychological Research Reports, the first to be printed by Korean Army Adjutant General's Office. Prior to Dr. Kotula's departure from Korea, a firm base was established for research programed during 1965, when work on the validation of the two test batteries is expected to be completed.

In addition to the ROTC problems involved in Cadet Leader's Task, which recently have become more pressing, greater attention is being concentrated on selection of individuals for MS I (freshman year in college).

Also included in the task will be the development and standardization of new measures for selection of cadets for advanced ROTC. A relatively new problem is development of techniques for identifying high school students suitable for two and four-year scholarships in ROTC.

Dr. Kotula received his undergraduate degree in 1947 from the University of Buffalo and his M.S. in 1949 and Ph.D. in 1951 from the University of Pittsburgh. His experience in personnel research goes back to World War II days, when he was involved with personnel research while in uniform. From 1952-57, he was a research scientist at the American Institutes for Research.

YUH-1B Sets Level Flight Record

A YUH-1B helicopter recently achieved level-flight speeds of 250 m.p.h., eclipsing all known world speed records for rotorcraft. Modified by addition of wings, auxiliary turbojet engines and a streamlined fuselage, the research Iroquois was flown by Bell Aircraft test pilots.

The Earth Sciences: From the Neptunist to the Isotope Geologist

by Dr. Leonard E. Wood

Research in Review...

Dr. Leonard E. Wood, who holds B.S. and M.S. degrees in geology from the University of Kentucky and a Ph. D. from Michigan State University, joined the Geophysical Sciences Branch, Environmental Sciences Division of the U.S. Army Research Office in January 1963. Prior to joining USARO, he served as a geologist with the International Mineral and Chemical Corp., Chicago, Ill.; the Wabash Iron Co., Montreal, Canada; the Military Geology Branch of the Geological Survey; and with the Mobile Oil Co. in West Texas, Venezuela, and Libya. He is a member of various professional organizations and societies, and has published articles on sedimentary petrology in technical journals.

Dr. Leonard E. Wood

The earth came into being at 9:00 a.m. the 26th of October, 4004 B.C., according to a statement made in 1654 by the Reverend James Usher. He did not say how it happened—whether it grew from a cloud of dust, was cast from the sun as a gaseous quasi-molten mass, or emerged from a pod.

Nevertheless, for over a century it was heresy in the Christian world to assume more than 6000 years for the formation of all geologic features, and in those times all geologic features were considered to be of catastrophic origin, that is, born through a sudden and violent event, rather than by slow, orderly evolution.

Not until 1785 did the Scottish gentleman farmer-geologist James Hutton argue his doctrine of uniformitarianism. His theory was that the present is the key to the past and that, given sufficient time, the processes now at work could have produced all of the geologic features on the globe.

What Hutton may not have realized is that many of our geologic features are second or third generation; that they have been destroyed by erosion and rebuilt or rejuvenated on more than one occasion.

Nevertheless, he did recognize that the earth is a complex mechanism, so much that he was moved to say that, "We find no vestige of a beginning, no prospect of an end."

Today, geologists and geophysicists base their work on this premise—the present is the key to the past—in seeking evidence of ancient shorelines, climates, magnetic poles and topographical features. The answers to many of our most profound problems in geodetics, geomagnetism, or even nuclear blast detection lay in phenomena which occured in or on the earth millions of years ago.

The birth of the geological sciences is traced far beyond Usher and Hutton. The Greeks gave considerable thought to the earth's features. In fact, the "wise men of Greece," who later became known as philosophers, speculated on the origin of the universe.

Of the many ideas which evolved, some held that all things had their origin in water, others thought they were derived from air, while still others theorized that fire was the essential principle of the universe.

The Greeks Aristotle and Strabo, and later the Romans Pliny and Cato, were among the many who wrote voluminously of the geologic phenomena of the earth. Generally these men related the earthly phenomena to actions of the stars rather than to forces within the earth itself.

It was Agricola (George Bauer) who set forth the first sound theories on the origin of rocks and minerals in his treatise "De Re Metallica" in the 1500s. In spite of his progressive theories, many ideas in the geological sciences that persisted for years related rocks to birds, animals, plants, trees, vegetables and stars. In fact, some of the early Greek students of the earth sciences thought that male and female rocks existed and had the power of reproducing their kind.

The state-of-the-art developed rapidly in the 1700s and 1800s, with major growth centered in England, Germany and the United States. The strong German influence in the science is reflected in the German origin of much of the geologic terminology. As the science developed, it was discovered that the present actually did provide clues to the past; thus many of the geologic theories based either on superstition or poor reasoning were discarded.

During the latter part of the 18th and the first quarter of the 19th century, the era of imagination and wonder stories ended and geology was elevated to the rank of a real science. The battle between the Neptunists, led by Professor Werner at the University of Freiberg, and the Plutonists, who were led by Hutton at the University of Edinburgh, was fought during this period.

In essence, Werner thought that all rock was derived through precipitation out of the primeval seas which covered the entire world, and that these seas eventually "vanished," leaving the earth's great complexity of rocks and structures.

The Plutonists argued that fire (igneous and volcanic) and water were major factors in development of the earth's geologic succession. In the nearly 30 years that it took the Plutonists to prove their case, a great amount of field investigation took place and the geological sciences became firmly entrenched among modern sciences.

Growth of the earth sciences has in general developed with the evolution of industry. Where the need grew for a mineral product such as iron, coal or oil, the science provided means of finding and extracting commercial quantities. On the other hand, some industries may relate their existence to a newly discovered mineral or to a geologic technique.

The need to exploit our mineral wealth has spurred not only greater efforts in the search for mineral deposits; it also has created a need for a better understanding of the dynamic forces within and acting upon the earth. New techniques adapted to finding and analyzing mineral resources have subsequently been utilized to provide basic knowledge valuable to our missile guidance, communication, electronics and detection systems.

The breed of geologist also has changed rapidly. He has evolved from the 18th century gentleman, self-educated in the science because of an intense curiosity, to the scholar of the 19th and early 20th centuries. The latter also learned much of his geology in the field and made his interpretations from what he saw on the earth's surface.

Then came the laboratory geologist, versed in X-ray diffraction and the

pressure bomb, as well as the mathematical and statistical theorist who, in many instances, had the dubious privilege of sampling rock in the field or in a mine for study. In all fairness, however, today's geologist is the most sophisticated and cosmopolitan of the lot.

More stories which stir the imagination have been written or told about the American prospector and his lonely search for wealth in the mountains than probably ever will be written about the modern geologist. The prospector "knew" the rocks. If he found his fortune, it was not always by luck alone, even though he did not fully understand why the rocks were situated the way they were and why mineral deposits came to be.

Many a fortune, however, was lost or never found to begin with because of this lack of fundamental knowledge of the earth and its inherent forces. Nevertheless, many men spent their lives literally grubbing for an existence in the mountains, and they neither knew nor desired any other means of livelihood.

One incident is recalled where two old Appalachian prospectors, who had spent their entire lives working claims, had managed to accumulate a small sum from mining one of World War II's most critical minerals—mica, from the Carolina pegmatites. They concluded that lest they die knowing no other profession, they should strike out across the U.S. to see and do other things. Their travels took them to an Ohio farm where they were engaged to dig potatoes.

The farmer, having put them to work, returned some hours later to survey their efforts. He was somewhat distressed to find a mountain of dirt surrounding a cavernous hole, deep in which both men were digging feverishly. They hastened to tell him that he had one helluva vein of potatoes near the surface, but they had lost it somewhere.

Fortunately, the modern prospector is more cosmopolitan. His background is both diversified and broad. Techniques now run the gamut from airborne magnetometer and infrared surveys of the surface to gravity and seismograph surveys of the deep subsurface layers and are by no means restricted to the search for mineralized areas. They are used to determine, for example, the variations in the gravitational field of the earth by shipborne, airborne and satellite observations.

Perturbations of the gravitational field determined by these methods are yielding significant information about density inhomogeneities in the mantle. Analyses and observations of magneto-telluric currents induced by fluctuations of the earth's magnetic field are made to determine the vertical and horizontal variations of electrical conductivity in the mantel and at depth.

Information resulting from seismological and crustal heat-flow studies has added to our store of knowledge of the interior of the earth, permitting review of its past and prediction of its future.

The Army Research Council Report states that ". . . a better understanding of the physical processes within the earth can result in major advances and improvements in such Army functions as ground mobility, protection of the soldier, guerrilla warfare, surveillance and detection, and strategic and technical planning and operations."

This is not a new concept. It merely reflects the complexities of modern warfare. The importance of utilizing the earth sciences has been recognized since warfare has been recorded. High ground for tactical advantage and caves or natural barriers for protection have been exploited since Genghis Khan was the master stategist in the East.

A more recent instance in which mining and geologic techniques were used in warfare is described by Bruce Catton in his book about the Civil War, "A Stillness at Appomattox." During the summer of 1864, a Confederate stronghold on the outskirts of Petersburg, Virginia, was undermined with a 500-foot shaft dug by the 84th Pennsylvania Regiment, which consisted mostly of coal miners and mining engineers. A charge of 8,000 pounds of powder blew a hole in the Confederate line 60 feet across and 30 feet deep. It created a gap in the Confederate chain of defense 500 yards wide.

Although the tunneling was well conceived and successfully engineered, in this instance the military action that followed was not. Union soldiers, awed by the havoc they had created, were too busy sightseeing and freeing Confederate soldiers from the cave-ins to take advantage of the opportunity presented them.

Trained geologists were used by the military for the first time in the Russo-Japanese war in 1904 when the Russians assigned earth scientists to plan underground structural fortifications. Not many years later, the British used geologists in World War I to locate water-bearing strata that would assure a constant water supply for military operations.

In the latter part of 1944, northwest U.S. and Canadian forests were subjected to mass attack by Japanese incendiary balloons. More than 9,000 were reported to have reached the North American continent via the prevailing winds. Sand recovered from a ballast bag attached to one of the balloons enabled the mineralogist to determine the exact location of the previously secret Japanese launching site. An unverified story tells of a soil scientist locating enemy home airbases from distinctive soils recovered from the boots of downed German pilots.

Since World War II both the Army and the scientific community have recognized the need for research in the earth sciences. After some 20 years of effort, the challenges are still great. The National Academy of Sciences, for example, has recently published a 10-year plan for earth science research. In essence, it says that the earth we live on is still more of a mystery than are the characteristics of the moon's surface some 250,000 miles away.

To plan and conduct its program today in earth sciences, and to bring to bear some applicability to the Army and scientific community from the earthly phenomena, the Army employs more than 125 earth scientists—geologists, geophysicists, geodesists, and geomagnetists in its office and laboratory network.

In addition, and closely allied to this group, are more than 200 physical geographers, soil scientists, photogrammetrists and remote-sensing scientists. More than 200 engineering geologists conduct geological studies of all kinds in the Civil Works and Military Construction Divisions of the Corps of Engineers.

The greater portion of Corps of Engineers geologists are engaged in conducting on-site surveys for dams, aqueducts, missile silos or underround structures. Twenty geologists and geophysicists and 13 engineers, physicists and soil scientists with geological training are physically located at the U.S. Army Engineers Waterways Experiment Station (WES), Vicksburg, Mississippi.

On a priority basis, WES personnel may be asked to perform any geologic investigation or research requested by the Corps of Engineers; however, one of their major efforts is in terrain analysis. Their goal is to perfect a system to quantify the identifying parameters of the landscape so that the impact of a given terrain environment on a militry operation can be evaluated.

Soil mechanics, infrared and radar techniques on soils, X-ray diffraction and spectroscopy, clay mineralogy, sedimentation and blast and shock

(Continued on page 24)

New Personnel Assigned to OCRD

Maj Clair L. Rishell

Earl O. Hannsz

Maj Clair L. Rishell was recently assigned to the Standardization Branch, International Division, OCRD. Earl O. Hannsz joined the Contracts and Grants Branch, Research Programs Office, U.S. Army Research Office, OCRD, as a contract pricing analyst.

Maj Rishell assumed his new assignment after a year in the Personnel Management Office, Office of Personnel Operations, Department of the Army, Washington, D.C., and a year as a programer with the Military Assistance Advisory Group in Libya.

Previous assignments have included, chief, Logistics Purchases Branch and Contracts Division, U.S. Army Electronic Proving Ground (Fort Huachuca, Ariz.) Processing Office, 1961-62; assistant action control officer, Office of the Deputy Chief of Staff for Personnel and Plans Office, Office of the Chief Signal Officer, 1956-58; he also served a year in Germany and a year in Korea in Infantry assignments.

Maj Rishell holds a B.S. degree from the University of Maryland in military science (1955) and a Master of Business Administration from the University of Arizona (1961). His decorations include the Silver Star and Purple Heart with Oak Leaf Cluster. He is coauthor of "A Contractor's Guide to Defense Procurement."

EARL HANNSZ previously served as a supervisory procurement agent with the Defense Supply Agency and a procurement agency and supervisory procurement analyst with the Federal Aviation Agency before his OCRD assignment. He began Federal service in 1939, serving three years with the Department of Commerce, four years with the Reconstruction Finance Corp. and 12 years with the Department of Commerce in accounting and contracting positions.

He holds a B.C.S. degree in accounting and law from Benjamin Franklin University, Washington, D.C. and an M.F.A. degree in financial administration from Columbus University, Washington, D.C. He has also completed graduate work at George Washington University and the University of Toledo.

2 USARO Key Staff Members Assume NSF Posts

Two U.S. Army Research Office key staff members accepted National Science Foundation employment early in April. Dr. Bernard R. Stein became staff associate, Office of Science Resources Planning, and Paul D. Olejar is coordinator for the National Chemical Information Program.

Dr. Stein joined the Army Research Office staff soon after the organization was established, in March 1958, and gained prominence as the author of ARO Status Report No. 1 on Fuel Cells. In addition to distribution to all Government agencies, more than 1,800 copies of this report were sold through the Office of Technical Services, Department of Commerce.

Before transferring in 1960 to the U.S. Army R&D Group, Frankfurt, Germany, Dr. Stein initiated ARO Status Report No. 2 on Fuel Cells. This was coauthored by Ernst M. Cohn, who left USARO for a promotion with the National Science Foundation in April 1962.

While serving in Germany, Dr. Stein was chief of the Chemistry Branch, with responsibility for the contract program in chemistry. He also served as liaison with European scientists in industrial, university and governmental laboratories in Europe.

Dr. Stein obtained his Ph. D. degree from the University of Goettingen in Germany and was a post-doctoral Fellow at the University of Ottawa. He earned a B.S. degree from Northeastern University, Boston, Mass., in 1949 and an M.S. degree in chemistry from the University of Tennessee in 1950, prior to two years of study at Catholic University in Washington, D.C.

PAUL D. OLEJAR joined the Army Research Office staff in November 1963 as chief of the Research and Analysis Branch, Scientific and Technical Information Division. He served as Department of Defense representative on the National Chemical Information Program during the early planning phase and also was one of the project officers for the Army Chemical Information Data System (CIDS).

Another of his major activities while with USARO was service as the principal Army member of a technical working group that developed the automated Department of Defense Form 1498 reporting system for research and technology at work unit level. He also helped to establish the Army Technical Library Improvement Studies (Project ATLIS).

Prior to assignment with USARO, Olejar was chief, Technical Information Division, Edgewood (Md.) Arsenal. Earlier Government service included eight years with the Department of Agriculture and two years with the Department of Interior.

Paul D. Olejar

Kwajalein CO Returns To Redstone Assignment

Col Glenn Crane returned to Redstone (Ala.) Arsenal recently as special assistant to Brig Gen Howard P. Persons, Deputy CG for Defense Systems at the Army Missile Command, after serving a tour of duty as CO of the Kwajalein Test Site in the Pacific.

A veteran of more than 20 years of Army experience, Col Crane formerly served at Redstone as Nike Zeus project manager and earlier was special assistant to Maj Gen John Medaris, then commanding general of Army Ordnance Missile Command.

An electrical engineering graduate of the University of Missouri, he also studied engineering at Shrivenham University in England, then returned to the United States and earned a master's degree in business administration at George Washington University. Col Crane also attended the Industrial College of the Armed Forces in Washington, D.C.

ECOM Appoints Directors Of New Electronics Division

Dr. James D. Meindl and Robert A. Gerhold have been named acting director and deputy director, respectively, of a new working group established at the U.S. Army Electronics Command (ECOM) at Fort Monmouth, N.J.

Known as the Integrated Electronics Division, the new unit was organized to consolidate and broaden microelectronics research and development at the ECOM Electronics Laboratories.

The Division was formed largely by regrouping work in semiconductor integrated circuits carried on in the Solid State and Frequency Control Division, and work in thin films and assemblies formerly conducted in the Electronic Parts and Materials Division.

The Solid State and Frequency Control Division will continue to operate primarily in the areas of microwave transistors and diodes, lasers, parametric amplifiers, atomic clocks, and quarts crystal devices.

The Electronic Parts and Materials Division will now be engaged primarily in passive microwave devices, computer components, materials, cables, nuclear radiation effects, and electro-mechanical devices.

DR. MEINDL, who has been serving as chief of the Semiconductor and Microelectronics Branch, in solid state and frequency control, received his degrees in electrical engineering from Carnegie Institute of Technology.

Prior to obtaining his doctorate (1958), he was a research assistant at Carnegie, and a development engineer at Westinghouse Research Laboratories and North American Aviation. In 1958 he joined the Central Research Laboratories of Westinghouse, where he engaged in advanced solid-state circuit development.

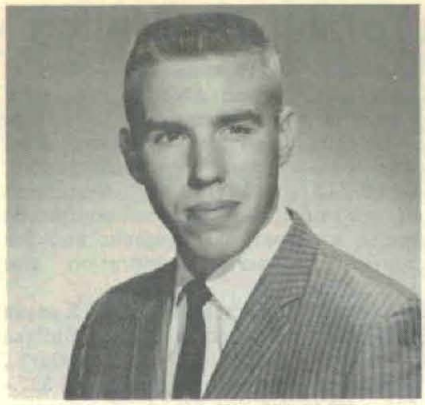
In 1959 he was called to active duty as a first lieutenant and served at the Electronics Laboratories, where as a uniformed scientist he performed micro-circuit research. He became a Civil Service employee after completion of active Army duty in 1961.

ROBERT GERHOLD, who was serving as chief of the Modular Assemblies Branch, in Electronic Parts and Materials, holds a B.S. degree in electrical engineering from Cooper Union, N.Y.

Before joining the Army Electronics Laboratories in 1951, he worked as a researcher for Wheelock Signals Inc., as a field engineer for the Board of Transportation of the City of New York, and with the Naval Applied Science Laboratory in Brooklyn.

At the Army Electronics Laboratories, Gerhold has conducted R&D programs on new modular circuit systems for military electronic equipment. From 1958 to 1962, his duties included technical direction of the Army micromodule program which provided much of the initial impetus to the new field of micro-electronics.

He has written and presented over a score of papers on his work which most recently was directed toward development of the micro-circuit module for use with the most advanced devices in semiconductor and thin film integrated circuits.



Dr. James D. Meindl

Robert A. Gerhold

Microelectronics Revolutionizing Equipment Design

(From an Army Electronics Laboratories Fact Sheet)

Although the term, microelectronics, is itself only a few years old, government and industry researchers, engineers, and officials agree that progress has been so rapid that a widening revolution in electronic design is clearly in prospect.

These changes, actual and prospective, are largely the outgrowth of an earlier revolution brought about by the advent of transistors and printed wiring little more than a decade ago.

By replacing vacuum tubes in a multitude of applications, transistors interconnected by printed wiring have resulted in equipment in use today that is up to 10 times smaller than the former counterpart equipment which depended solely on vacuum tubes. In turn, microelectronics is bringing about further practical size and weight reductions ranging from 10- to 50-fold, while providing enhanced electronic capabilities.

Although very small, transistors and each of the associated parts needed for a circuit have had to be individually manufactured, tested, vended, mounted and connected to produce a circuit. In contrast, microelectronics introduces the concept of manufacturing such transistors and associated parts, already interconnected, on a tiny silicon crystal chip, thereby permitting extremely small circuits to be fabricated.

The recent substantial gains in microelectronic technologies have generated considerable optimism in regard to the new types of circuits that can be so constructed. It is expected that the first impact of microelectronics will be in the displacement of the previous discrete parts used in most computer designs.

The Electronics Command's Laboratories emphasize, however, that reductions in size and weight reduction of equipment, while highly important within themselves, are only some of the objectives in the Army's microelectronic research and development.

The principal advantages of the integrated fabrication techniques are greater reliability, a resultant reduction in equipment maintenance and repairs, and lower production costs because of a reduction in the manufacturing operations and labor required to produce equivalent electronic circuits. Additional advantages include better electrical performance and reduced power field use requirements.

ERDL Reports $3.2 Million Saved

Army Cost Reduction Program savings of $3.2 million were reported by the U.S. Army Engineer Research and Development Laboratories, Fort Belvoir, Va., for the first half of Fiscal Year 1965.

The figure exceeded the $3,135,000 goal set for the entire fiscal year. Savings totaled $1.8 million during the first quarter and $1.4 million in the second quarter. Competitive procurement and value engineering practices were cited as the principal methods of achieving the record.

U.S. Army Contracts Total $79 Million

General Dynamics Corp., Pomona, Calif., received three contracts totaling $25,206,375, largest awarded by the U.S. Army recently for research, development, test and evaluation, which totaled $79,231,000.

All three General Dynamics agreements pertained to Redeye, the Army's shoulder-fired guided missile designed for use against low-flying aircraft. A $16,384,822 contract called for production of a classified quantity of Redeyes. A $6,648,776 modification for engineering services was followed by a $2,172,777 contract for further research and development of Redeye in FY 1965.

Heil Co., Milwaukee, Wis., was awarded a $7,669,815 contract for 825 semitrailers. Holston Defense Corp., a subsidiary of Eastman Kodak Co., received a $7,663,284 modification for miscellaneous propellants.

General Motors Corp., Detroit, Mich., received three contracts totaling $7,355,417 for production of diesel engines and motor buses (ambulance conversion).

Bendix Corp., Bendix Radio Division, Baltimore, Md., was issued a $6,644,891 contract for 112 radio sets (AN/GRC/68 and AN/GRC/66) with ancillary items. Honeywell, Inc., Hopkins, Minn., and St. Petersburg, Fla., was awarded two contracts totaling $4,446,533 for an initial procurement of classified electronics equipment under a 4-year arrangement and for bomb dispensers, ammunition and special tooling.

Benson Manufacturing Co., Kansas City, Mo., will produce 1,074 stainless steel tanks for $2,903,655. Itek Corp., Lexington, Mass., received a $2,397,505 agreement for design, fabrication and test of a digital mapping system for production of topographic maps from aerial photographs.

General Electric Co., Ordnance Division, Burlington, Vt., received a $1,885,250 letter contract for tooling and for 7.62 mm. aircraft machine guns with pods. Admiral Corp., Chicago, Ill., was awarded a $1,837,008 contract for radar surveillance sets and ancillary items.

Norris-Thermador, Los Angeles, received a $1,724,732 contract for 105 mm. cartridge cases. Kaiser Jeep Corp., Toledo, Ohio, was issued a $1,698,187 agreement for 984 ¼-ton utility trucks.

Philco Corp., Aeronutronics Division, Newport Beach, Calif., was issued a definization of a letter contract for $1,492,660 for design, development, fabrication and testing on the Chaparral Air Defense System.

TRW Space Technology Laboratories, Inc., Redondo Beach, Calif., received a $1,460,000 contract for classified research and development.

ITT Corp., ITT Kellogg Communications Systems Division, Chicago, Ill., was awarded a $1,350,000 contract for two transportable electronic switchboards.

White Motor Co., Lansing, Mich., received a $1,236,950 contract for production engineering services on the 2½-ton truck. The University of Illinois, Urbana, Ill., was issued a $1,200,000 contract modification for continuation of an experimental and research program in applied and electronic sciences.

U.S. Rubber Co., Mishawaka, Ind., was awarded a $1,060,244 contract for rubber fuel tanks for the UH-1D Iroquois helicopter.

Finn Larsen Named Chairman of ASAP

(Continued from page 1)

nia, Dr. O'Brien is a 1925 graduate (B.S. degree) of Massachusetts Institute of Technology. Dr. Keller is the retired chairman of the board of Chrysler Corp. and Dr. Lauritsen is Professor Emeritus of the Kellogg Radiation Laboratory, California Institute of Technology.

Dr. Larsen has been an ASAP member since September 1963, two months after he resigned as Assistant Secretary of the Army (R&D) to return to Honeywell Inc., Minneapolis, Minn., as vice president for Research. He started as a research physicist with Minneapolis Honeywell in 1948, advancing to his present title in 1959. He was ASA (R&D) for two years.

Terms of 11 of the 23 members of the Army Scientific Advisory Panel expire on Apr. 15 and the realignment of the Panel, including the creation of the Senior Advisory Council, is keyed to appointment of successors.

Army Regulation 15-8, which delineates the functions and responsibilities of the ASAP, provides for a list of consultants appropriate in size to the mission of the Panel, currently about 35. Under a pending revision of the AR, consultants also will be appointed for 2-year terms, as are the 25 members of the ASAP.

Medical Scientist Writes Book

An Army medical scientist at the Walter Reed Army Institute of Research (WRAIR), Washington, D.C., is the author of a new book which explores the various types of infections in the human body and current therapeutic methods.

Common Bacterial Infections (subtitle *Pathophysiology and Clinical Management*) was published recently by W. B. Saunders Co. The author is Col Edwin J. Pulaski, director of Basic Surgical Research, WRAIR.

In his preface, Col Pulaski discusses some of the problems of drug resistant bacteria. In subsequent chapters, he examines infections relating to trauma and burns and such parts of the body as the skin, bones and joints, the central nervous system and the respiratory system.

Scientific Calendar

67th Annual Meeting of the American Ceramic Society, Philadelphia, Pa., May 1-6.

Symposium on Numerical Solution of Partial Differential Equations, sponsored by AFOSR, ONR and University of Maryland, College Park, Md., May 3-7.

18th Annual Industrial Communications Association, Pittsburgh, Pa., May 4-7.

Electronics Components Conference, sponsored by IEEE and EIA, Washington, D.C., May 5-7.

International Symposium on Microwave Theory and Techniques, Clearwater, Fla., May 5-7.

Spring Meeting of the Society for Experimental Stress Analysis, Denver, Colo., May 5-7.

27th National Meeting of the Operations Research Society of America, Boston, Mass., May 6-7.

6th National Symposium on Human Factors in Electronics, Boston, Mass., May 6-8.

Ultrapurification of Solid State Electronics Conference, sponsored by the AF Cambridge Research Laboratories and New York Academy of Sciences, N.Y.C., May 6-8.

Spring Meeting of the Electromechanical Society, San Francisco, Calif., May 9-13.

3rd Organic Crystal Symposium, sponsored by the University of Chicago, ONR and DA, Chicago, Ill., May 10-12.

National Aerospace Electronics Conference, sponsored by IEEE and AIAA, Dayton, Ohio, May 10-12.

Annual Convention of the National Microfilm Association, Cleveland, Ohio, May 11-13.

National Forum on the Control of Water Quality, sponsored by ASTM, Philadelphia, Pa., May 12-13.

8th National Instrument Society of America Power Instrumentation Symposium, N.Y.C., May 12-14.

Symposium on Signal Transmission and Processing, sponsored by IEEE and Columbia University, N.Y.C., May 13-14.

Association of Data Processing Service Organizations Conference, Las Vegas, Colo., May 13-14.

56th National Meeting of the American Institute of Chemical Engineers, San Francisco, Calif., May 16-19.

13th Annual Conference on Mass Spectrometry and Allied Topics, sponsored by ASTM, St. Louis, Mo., May 16-21.

Design Engineering Conference and Show, sponsored by ASME, N.Y.C., May 17-20.

High-Power Microwave Tubes Symposium, sponsored by Electronics Command and Advisory Group on Electron Devices, Fort Monmouth, N.J., May 19-20.

2nd National Convention of the Consulting Engineers Council, St. Louis, Mo., May 19-21.

4th Power Industry Computer Application Conference, sponsored by IEEE, Clearwater, Fla., May 19-21.

Present Status of Information Networks, sponsored by American Documentation Institute, Columbus, Ohio, May 21.

Annual Meeting of the Radiation Research Society, Philadelphia, Pa., May 24-26.

3rd International Federation for Information Processing Congress, N.Y.C., May 24-29.

2nd Aerospace Expandable Structures Conference, sponsored by AF Propulsion Lab and Archer-Daniels Midland Co., Minneapolis, Minn., May 25-27.

11th National Instrument Society of America Analysis Instrumentation Symposium, Montreal, Canada, May 26-28.

Symposium on Heterogeneous Catalysis, 48th Chemical Conference and Exhibition of The Chemical Institute of Canada, Montreal, Canada, May 31-June 2.

DASA Deputy Director to Receive Nuclear Award

Dr. Theodore B. Taylor, Deputy Director (Scientific) of the Defense Atomic Support Agency (DASA), has been named one of the recipients of the Ernest Orlando Lawrence Memorial Award, for his meritorious contributions to the field of atomic energy.

Along with four other scientists, Dr. Taylor will be presented the award on Apr. 29 at the National Academy of Sciences in Washington, D.C. Each recipient will receive a medal, a citation and $5,000.

Dr. Taylor, a member of the American Nuclear Society and the American Physical Society, was cited for "outstanding contributions to the design of nuclear weapons," and also for conceiving the principle of the widely used TRIGA research reactor.

The Lawrence Award has been made by the Atomic Energy Commission to five outstanding young scientists each year since 1960. The recipients are recommended to the Commission by its General Advisory Committee and approved by the President. They must be scientists not more than 45 years of age who have made recent and especially meritorious contributions to the Nation's atomic energy programs.

Dr. Taylor, 39, was born of American parents in Mexico City, Mexico. He received a B.S. degree from the California Institute of Technology in 1945 and did graduate work at the University of California at Berkley from 1946 to 1949. While at Berkley, he served as a physicist in the University of California Radiation Laboratory. In 1954 he received a Ph.D. from Cornell University.

Dr. Taylor was one of the leading theoretical physicists at the Los Alamos Scientific Laboratory from 1949 to 1956. While at Los Alamos, he conceived the design of many nuclear weapons and made important contributions to neutron cross section theory.

As senior research advisor for the General Dynamics Corp's General Atomic Division from 1956 to 1964, he worked on the theoretical principle on which the inherent safety of the TRIGA research reactor depends.

He also conceived some of the basic principles of Project Orion, a study in the use of controlled nuclear explosions to propel very large space vehicles capable of carrying payloads ranging from 10 to more than 1,000 tons. In October, 1964, Dr. Taylor was named scientific deputy to Lt Gen H. C. Donnelly, USAF, Director, DASA.

An agency of the Department of Defense, DASA is staffed by personnel of the Army, Navy, Air Force and Marine Corps. In addition to primary responsibility for DoD underground testing programs, the Agency is responsible for continued readiness to resume atmospheric nuclear testing, should it become necessary. The Agency also provides technical, logistic and training advice on nuclear matters to the Secretary of Defense, Joint Chiefs of Staff and the military services.

The other scientists named for the Lawrence award are Dr. George A. Cowan, Los Alamos Scientific Laboratory, Los Alamos, New Mex.; Floyd L. Culler, Oak Ridge National Laboratory, Oak Ridge, Tenn.; Milton C. Edlund, Babcock & Wilcox Co., Lynchburg, Va.; Dr. Arthur C. Upton, Oak Ridge National Laboratory, Oak Ridge, Tenn.

Dr. Theodore B. Taylor

The award was established in honor of the late Dr. Ernest O. Lawrence, inventor of the cyclotron.

Vorder Bruegge Succeeds Blount as Medical R&D Head

The Army Surgeon General, Lt Gen Leonard D. Heaton, on Mar. 5 elevated Col Colin F. Vorder Bruegge from deputy commander to commander of the U.S. Army Medical Research and Development Command.

Col Vorder Bruegge, also assigned as special assistant for R&D to The Surgeon General, succeeds Brig Gen Robert E. Blount, who has assumed command of William Beaumont General Hospital in El Paso, Tex.

The new Medical R&D commander was nominated for one-star rank last October by President Johnson. Confirmation by the Senate was still pending at press time.

Col Vorder Bruegge has been deputy commander since 1959 with the exception of one year, 1963-64, when he was a student at the Industrial College of the Armed Forces. He also was chief of the Research Division of the Command in 1959 and deputy commander of the U.S. Army Medical Unit at Fort Detrick, Md. from 1956-59.

Col Colin F. Vorder Bruegge

He received his pre-medical training at Memphis State University and his M.D. degree from the College of Medicine, University of Tennessee, in 1939.

During World War II, Col Vorder Bruegge served in England and France. In 1946 he was commanding officer, Seventh Medical Laboratory, Germany, and later chief, Preventive Medicine Division, Surgeon's Office, Hq., in Berlin.

From 1948-50 he was assistant director of the Armed Forces Institute of Pathology (AFIP) and from 1950-55 served as special assistant to the director for organization and planning and technical adviser and Institute representative to the group planning the new AFIP building.

Col Vorder Bruegge holds the Legion of Merit with First Oak Leaf Cluster, the Certificate of Achievement for outstanding service in planning the new AFIP building.

He is a Diplomate of the American Board of Pathology; member of the American Association for the Advancement of Science; Fellow, American Society of Clinical Pathologists; and Fellow, College of American Pathologists.

Army Audit Head Named

Maj Gen Thomas J. Sands was appointed recently as chief of the U.S. Army Audit Agency. He will direct development and execution of plans, policies and programs for the Army's worldwide audit organization.

Dugway CO Keynotes Annual Intermountain JSHS

"Science as a Career" was the subject of a keynote address to about 200 high school students and teachers from five states at the 1965 Third Annual Intermountain Junior Science and Humanities Symposium (JSHS).

Held at the University of Utah in Salt Lake City, Mar. 11-13, the conference was sponsored by Dugway (Utah) Proving Ground (DPG); the Army Research Office at Durham, N.C., and the University of Utah.

DPG Commander Col William W. Stone, Jr., gave the keynote address on the importance of the educator's role in stressing "quality rather than quantity" in order to mainain leadership in science and technology.

In discussing comparative science and technology efforts, he pointed out that the Soviet Union each year is producing three times as many engineers as the United States, and that the Soviet Union has doubled its budget for scientific research during the last four years.

Reviewing the challenges and opportunities for students interested in science and engineering careers, Col Stone pointed out the role of the Federal Government in maintaing leadership in science and technology. In the U.S., more than $16 billion annually is being spent in these fields and the Government spends $12 billion, or 75 percent.

As an integral part of the symposium, which included lectures, presentation of papers by students, tours of industrial plants and panel discussions, six students were chosen to represent the intermountain area at the National JSHS to be held at the U.S. Military Academy, West Point, N.Y., Apr. 28.

The selectees are Diana Jackman who wrote on "Emotional Development—Early and Adult"; Randy Wright, "The Effects of X-ray and Ultraviolet Light on the Growth and Structures of Crystals"; Dean Black, "Polott—Throttle for Solids";

Reed Bonham, "The Father of Television"; Daniel Stone, "A Study of the Piezoelectric Qualities of Zinc Sulphide Crystals" and David Patten, "A Numerical Derivation of 'n'th Root Algorithm from the Square Root of Algorithm."

Students attending the conference participated in a panel on communications and a curbstone clinic, where they were divided into small groups with scientists, engineers and faculty members of the University and DPG for question and answer sessions.

Other highlights of the meeting included an address by Neal Maxwell, University dean of students, who told the conferees that the "scientist must be related to the problems and human predicament of his society. No one can escape the responsibility for participating in the decision making process of society. . . ."

Dr. Robert R. Kadesch, associate professor of physics at the University of Utah, spoke at the closing session and told the students that "the science of the future is in your hands," and that the future lies in "discovering the new by being original even in doing the routine."

U.S., Italy Agree on Joint M-60 Tank Production

An agreement for joint production of the new U.S. medium M–60 tanks in Italy was announced Mar. 13 by the U.S. Department of Defense and the Italian Ministry of Defense. The United States and Italy have cooperated in the field of military production for several years.

Under the agreement, the first tanks (approximately 20 percent of the envisioned total) will be furnished by the United States directly from production to accelerate delivery to the Italian Army.

The remaining tanks will be built by cooperative production at Italian plants under technical arrangements being developed by the U.S. prime contractor, Chrysler Corp., and Italian manufacturers.

M–113 armored personnel carriers are now being produced in Italy in Italian-U.S. cooperative production. Close cooperation also exists between the two countries in the field of research and development, with exchange of technical data on specific projects and production of scientific material of common interest.

The agreement announcement regarding the M–60 tanks said it is particularly welcomed by the U.S., not only because it means considerable contribution to the modernization of equipment already under way in the Italian Armed Forces committed to NATO, but also because it creates a considerable amount of work for U.S. industry.

Of more immediate importance, with the sale of U.S.-produced tanks and components, this coproduction project will make a significant contribution toward improving the U.S. balance of payments situation, Defense Department officials stated.

The M–113 coproduction, cooperative research and development, and now the agreement to coproduce M–60 tanks are landmarks of continuing U.S./Italian military cooperation for the mutual benefit of both countries, Department of Defense authorities said.

BEST Tests Evaluated for Air Army Applications

BEST (Ballastable Earthmoving Sectionalized Tractor) tests recently conducted by the 11th Air Assault Division are being evaluated to determine possible applications in support of an air mobile army. Developed by the U.S. Army Engineer R&D Laboratories at Fort Belvoir, Va., the sections can be transported by the Chinook helicopter (photo at right). In lower photo, front- and rear-powered axel units of a tractor are shown in the foreground. In the background (l. to r.) are combinations utilizing tanker, grader and scraper center.

NSF Awards Grant for Chemical Data

A $463,000 grant directed toward harnessing the flood of new information growing out of chemical research was announced Mar. 8 by the National Science Foundation (NSF).

Working in cooperation with other Federal agencies, NSF made the award to the American Chemical Society/Chemical Abstracts Service (ACS/CAS) for research aimed at mechanized handling of information in a national system.

The grant is part of a broad intragovernmental cooperative effort to develop a unified chemical information program providing high-speed, flexible response to the information needs of Government and industry.

The White House Office of Science and Technology (OST) has coordinated Federal support of research and development associated with the national chemical information program.

The OST is headed by Dr. Donald F. Hornig, Special Assistant to the President for Science and Technology, who functions also as Chairman of the Federal Council for Science and Technology. The Council is an interagency group which has coordinated Federal support in developing the program.

Members of a Council task group have examined Federal interests and needs and have recommended that the ACS/CAS system be a part of the unified national effort. The group also recommended that proved research competence in chemical documentation in other organizations be used to the greatest extent possible.

The grant supports the investigation of methods for recording, identifying, and filing information associated with chemical compounds appearing in published chemical literature. As part of the program, research is related to the development of a "Registry System" which records and catalogs structural descriptions of chemical compounds.

(See *Newsmagazine*, February 1965, p. 6, for Value of Modern Methods in Chemical Information Handling article illustrating chemical molecular structure encoding.)

Future arrangements with the ACS will be developed as a single Government contract handled by the National Science Foundation. Funds will be supplied by the Department of Defense, National Institutes of Health and the Foundation.

An interagency Coordinating Group has been established to direct the technical and administrative aspects of the multi-agency support effort. Steps also have been taken to bring academic and industrial interests to bear on the planned unified program.

The present NSF grant is the initial support effort under the multi-agency arrangement, with plans nearing completion for a coordinated 2-year Government support program.

In addition to the ACS/CAS contract, a portion of the funds for the program will be used for research in other areas, such as the storage and retrieval of graphic information, and linguistic and classification problems.

Following detailed evaluation of progress at the end of the 2-year period, additional steps to be taken will be determined by interested Federal agencies.

Heart Attack Claims OCRD Administrator

One of the "old timers" on the key staff of the Office of the Chief of Research and Development, a man whose 18 years in headquarters R&D activities earned him wide respect and many friends, died of a heart attack Mar. 22.

John Wilson Green, 50, assistant executive for administration, is perhaps best known as the originator of the Army Atomic Energy and Research and Development Officer Specialist Programs.

Initiated in 1959, these programs have stimulated greatly the development of a hard core of specially trained experts in these fields. Currently, 1,323 are enrolled in the R&D and 187 in the AE career programs.

A veteran of 31 years of Federal Government service, he was stationed in World War II with Headquarters, Army Service Forces, in the Pentagon from 1943 to 1945 and was discharged with the rank of major. In the Army Reserves he was promoted to lieutenant colonel, and was prominent in staff supervision of the U.S. Army Reserve R&D Units and the Mobilization Designation programs.

Funeral services were held at the Fort Myer Chapel and interment was in Arlington Cemetery.

Industry, Universities to Join in Materials Research

The Department of Defense Advanced Research Projects Agency recently awarded three contracts for programs of research in the materials field.

The agreements are considered significant in procedure because in each case an industrial laboratory and a university will join forces to advance a field of materials technology of major interest to the Department of Defense.

The Martin Co., Denver Division, will subcontract with the University of Denver and conduct a 3-year program of research on the high-energy rate forming of metals under a contract for approximately $1 million.

Union Carbide Corp. will subcontract with the Case Institute of Technology and the Bell Aerospace Corp. and conduct a 3-year program of research on carbon composite materials. This contract will be for approximately $2 million.

The Monsanto Research Corp. will subcontract with Washington University of St. Louis, Mo., and conduct a 2-year program of research on high-performance composites, under a contract for approximately $2 million.

The science developed at the universities, the industrial laboratories and elsewhere will be systematically and rapidly applied to developing new materials and new processes.

This "coupling" of science to applications will assist in developing the stronger, lighter, more versatile materials important to national defense. the DoD stated.

Natick Labs Developed Foods Tested on Gemini Flight

Eight new food items developed by the U.S. Army Natick (Mass.) Laboratories were tested Mar. 23 on the first manned Gemini orbital space flight.

The foods, representative of 59 items developed to date, were selected to test the various types of foods under actual flight conditions and to give the flight crew experience in their use.

Four dehydrated items—beef pot roast, orange juice, applesauce and grapefruit juice—were reconstituted in flight by injecting water into the food pouches for rehydration. The foods were then squeezed out of the pouches through a feeding tube and into the mouth.

Four bite-size items—bacon and egg bites, toasted bread crumbs, chicken bites, and brownies—were eaten as is. To prevent free floating crumbs in the spacecraft cabin, the bite-size items were coated to avoid fracturing, crumbling and dusting.

The food items developed to date are designed for use on the longer range Gemini flights and also will be used on the Apollo lunar flights.

Procurement of the foods for the 3-orbital Gemini flight was made for NASA through industrial firms and produced with production guides developed by the Natick Laboratories.

AMC Role in Standarization Program Explained

(Continued from page 9)

quarters and major subordinate commands. The ABCA nations are working on some 600 R&D projects.

About 100 ABCA standards have been agreed to and published in the materiel area. An equal number of Standardization of Operations and Logistics (SOLOGS) for nonmateriel standardization in such areas as doctrine, training, organization and logistics have been published.

Another international activity monitored by the Materiel Command's ABCA Section is the Tripartite Technical Cooperation Program (TTCP), which includes all of the military services of the United States, United Kingdom and Canada.

In general, the TTCP reviews objectives and progress of the three countries in the field of military R&D. Objectives include the formulation of proposals to obtain maximum cooperation and optimum employment of resources and the complete and continuous interchange of information between the countries.

The USAMC is currently supporting TTCP activities in guided missiles, electron devices and electronic warfare, nuclear weapons effects, ordnance, infrared, radar techniques, and organic and inorganic materials.

The Air Standardization Coordinating Committee (ASCC) of the Quadripartite countries is another program under the management of the Materiel Command ABCA Section, as part of the developing agency functions.

This program has as its objective the negotiation of agreements between the Air Forces of the participating countries to:

- Ensure that in the conduct of combined air operations, there will be a minimum of operational and technical obstacles to full cooperation.
- Provide for essential cross servicing facilities.
- Furnish logistic support to aircraft of each of the countries and promote economy in the use of natural resources.

USAMC scientists, technicians and engineers are participating in the following working parties: aircraft instruments and aircrew stations; aircraft maintenance, basic aircraft and ground electrical systems; gaseous systems; aviation fuels, lubricants and liquid propellants; aeronautical standard parts; aircraft electronics servicing; conventional aircraft armament; aerial reconnaissance; air navigation and air-to-surface weapons directing equipment; airborne weapon control systems.

The North Atlantic Council has delegated responsibility for the NATO research, development and standardization program, which is managed by the NATO Section, to two permanent units—the Military and the Armaments Committees.

The Military Committee, through its Military Agency for Standardization (MAS), guides the defense establishments of the member nations toward standardization or adoption of existing equipment, organizations, and procedures to improve interoperability of the national forces which are shielding Western Europe.

The USAMC supports Army, Navy and Air Boards of the Military Agency for Standardization in London. The Command operates under the philosophy that U.S. equipment must be capable of being serviced by or of servicing equipment of other nations, also, that equipment of all NATO nations must be interoperable to the maximum degree.

In furtherance of this objective, the USAMC keeps highly qualified experts in regular attendance at NATO meetings of MAS working parties and panels of experts, seeking to find areas in which agreement or compromise is possible and profitable.

The MAS groups supported by the U.S. Army Materiel Command are:

Army Board—Army equipment, camouflage and concealment, combat clothing and personal equipment, interchangeability of demolition accessories, fuels and lubricants, links and chargers for 7.62 mm. ammunition, marking and color code of ammunition and explosives, movements and transport, and handling of military stores.

Naval Board—Interservice fuels and lubricants coordinating committee, and naval fuels and lubricants.

Air Board—Aircraft instruments and aircrew stations; air electrical and aircraft gaseous systems; environmental test methods for aerospace electrical and associated ground equipment; electromagnetic compatibility test methods for aerospace electrical and electronc equipment; air transport and comparative trials of aerial delivery equipment; air armament; aircrft standard prts, equipment and systems; photographic reconnaissance and interpretation; photographic equipment and materials; and aircraft maintennce.

Having determined sufficient area for standardization, MAS publishes a Standardization Agreement (STANAG). USAMC takes the majority of actions to insure that provisions of STANAGs applying to U.S. Army or Army-procured equipment are incorporated in the proper U.S. standards and specifications.

The Armaments Committee believes it is making significant progress in obtaining cooperation between member countries in major projects leading to standardization and production of armaments. Each success in these ventures reduces the problems being faced by the MAS; assures interoperability of forces; increases the capability of the total research, development and production capacity of the NATO countries; and improves the state of readiness and fighting capability of NATO.

The participation of the expert groups and the Ad Hoc mixed working groups is usually technical in nature. The USAMC sends its foremost authorities to meetings designed to develop cooperation between nations.

The Army Materiel Command also generates technical papers, tests equipment, conducts demonstrations and carries out all other U.S. operational matters concerned with equipment designed or planned for use in the NATO arena.

The NATO Advisory Group on Aeronautical Research and Development (AGARD) is a specialized program managed by the NATO Section. The AGARD mission is to act in an advisory capacity to the NATO Standing Group and to bring together leading aeronautical personalities to recommend effective ways to use R&D capabilities for the common benefit of NATO nations.

In its role as the major developing agency, the USAMC also provides for the U.S. Army substantial support of panels on fluid dynamics, flight mechanics, combustion and propulsion, structures, materials, and avionics.

Deputy ASD (PA) Lennartson Retires from Federal Service

Nils A. Lennartson, Deputy Assistant Secretary of Defense for Public Affairs since Jan. 17, 1961, resigned in mid-April to accept appointment as president of the Railway Progress Institute in Chicago.

His Federal Government career of 16 years includes service as special assistant to the Secretary of the Air Force, Deputy Director of Public Relations for the Air Force, Director of Information for the Department of Commerce and assistant to the Secretary of the Treasury. He was nominated in 1964 by the Department of Defense for a Rockefeller Public Service Award.

War Game Experts Attend Symposium at RAC

More than 250 civilian and military experts in war gaming attended the Fourth Symposium on War Gaming of the East Coast War Games Council Mar. 25-26 at the Research Analysis Corp. (RAC), McLean, Va.

Logistic Gaming was the theme of the 2-day meeting. Martin W. Brossman, chief of RAC's Logistic Simulation Division, chaired the symposium, assisted by Robert G. Busacker, also of RAC.

War Gaming, originally developed by the military for the purpose of training officers and evaluating combat situations, has been extended to many new areas, including industrial management, political decision, market analysis and logistic management and operations.

The ECWG symposium also included discussions on logistics of national survival, logistic games, combat games and generalized computer simulation, and gaming models.

While emphasizing logistics, specific papers were presented on methodologies of solving management and operational problems and simulations of decision making during crisis. Applications of games and simulations to research and training also were covered.

James N. Davis, former Deputy Assistant Secretary of Defense for Weapons Acquisition and Industrial Readiness, gave the featured address on "Key Problems for Logistics Gaming" at the opening session.

Other papers included: Irving Gaskill, Formulation and Analysis Division, Mathematics & Computation Laboratory, National Resource Evaluation Center — Gaming Resource Losses and Availabilities; Wallace B. Oliver, Data Development Division, National Resource Evaluation Center —Gaming Logistics of Survival.

Marshall K. Wood, Economic Programming Center, National Planning Association—Gaming the Post-Attack Economy; James C. Pettee, National Resource Evaluation Center, Office of Emergency Planning—The Spectrum of Solutions in Logistics Gaming;

General Carter B. Magruder (USA Ret.)—Logistic Gaming as Applied to Army Problems; Martin W. Brossman, Research Analysis Corp.—A Loistic Gaming & Computer Simulation System;

Walter L. Hughey, Technical Operations, Inc., Logistic Studies Office —A Combat Service Support War Game; Dan B. Wallace, Technical Operations, Inc., Logistic Studies Office —Computer-Assisted Simulation of Supply and Related Systems; David Ameen, U.S. Army Logistics Management Center — Use of Computer Simulation in Logistics Training;

Admiral Henry E. Eccles (USN Ret.)—Logistic Gaming as Applied to Navy Problems; W. M. Faucett and S. D. Williams, General Dynamics Corp.—Two-Sided Limited Warfare Gaming Model;

W. W. Fain, H. W. Karr, Aerospace Sciences Dept., Douglas Aircraft Co. —Tactical Warfare Simulation Program; Rufus C. Ling, Research Analysis Corp.—Logistic Gaming in Tacspiel; Hebron E. Adams, RAC—Logistic Gaming in Theaterspiel;

Lt Gen Kenneth B. Hobson, USAF, vice commander, Air Force Logistics Command—Application of Simulation Techniques to Air Force Logistic Problems;

Ithiel de Sola Pool and Allan R. Kessler, Massachusetts Institute of Technology—CRISISCOM: A Computer Simulation of Perception and Decision Making During a Crisis; Alvin F. Andrus, U.S. Naval Post-graduate School, Department of Operations Analysis—Bringing Computer Simulations into the Classroom;

J. R. Lind, The Rand Corp., System Operations Dept.—FAST-VAL: A Model for Forward Air Strike Evaluation; Gil Bernstein, RAC, and Tom Muller, Systems Development Corp.— The Plan Generator.

Contract Calls for Models for Joint Loran-D Tests

A contract to provide models of a lighter, smaller aircraft and ground vehicle navigation system for joint tests by the Army and Air Force was awarded in March to the Sperry Gyroscope Co.

The tests will be held at the U.S. Army Electronic Proving Ground, Fort Huachuca, Ariz., and at Eglin Air Force Base, Fla. The purpose is to determine whether the new navigation system, known as Loran-D, can provide accurate position-fixing for both aircraft and ground vehicles.

The first phase of the testing will begin in December 1965 at Eglin and the second phase at Fort Huachuca in mid-1966. Several kinds of Air Force aircraft, including F-105 jets, Army prop-driven aircraft and helicopters, and ground vehicles will be equipped with Loran-D receivers.

Because it covers many thousands of square miles, the system will provide coverage to several states from each location. Master and slave transmitters will be located at surveyed points on the ground: their interlocking wave patterns will provide the airborne and ground receivers with time difference information from which a small computer will provide rectangular coordinate position information to permit the operator to pinpoint his position in the pattern; he can then locate himself on or over the ground.

Loran-C, the predecessor is widely used for commercial aircraft and marine navigation. Both services believe Loran-D, may serve as a tactical aid in locating and guiding units in battle—the same uniform system being used by all elements, in the air and on the ground.

USAEPG Engineers Test TV To Pinpoint Artillery Fire

A concept of using television to pinpoint artillery fire is being tested at the U.S. Army Electronic Proving Ground, Fort Huachuca, Ariz.

Dubbed the "flying eye," the TV camera is mounted in a small drone airplane which takes the place of the forward artillery observer. Engineers are trying to determine if artillery fire can be directed and then easily corrected through pictures of the target on a television screen.

An additional advantage of the "flying eye" is that the drone can swoop in low after a hit to assess the damage. The camera concept has been previously tested in piloted aircraft, both fixed-wing and rotary. It weights 65 pounds, has a high resolution (600 lines) image-orthicon tube and, except for the tube, is completely transistorized.

Power for both the camera and the 13-pound transmitter is supplied by an alternator, belt-driven by the drone's engine. It was designed and manufactured by Hallamore Electronics (now Lear-Siegler Corp.) for the Army Electronic Research and Development Activity at Fort Huachuca.

The drone aircraft in which it will be flown is the Army's standard surveillance drone. If the tests are successful, the "flying eye" will be used to develop a combat model artillery-forward-observer system.

ARO Grants Total $6.2 Million

Individual research grants awarded by the Department of the Army and reported by the U.S. Army Research Office (USARO) totaled over $6.2 million for 1964 and represented 242 projects assigned to 161 institutions.

The figures were reported recently by the Research Contracts and Grants Branch, Research Programs Office, USARO.

Research In Review...

(Continued from page 15)

phenomena on underground structures are some of the many areas of research which may be undertaken by the earth scientists at WES.

The Research and Analysis Division of the Geodesy, Intelligence Mapping Research and Development Agency (GIMRADA), Fort Belvoir, Va., is engaged in the various scientific disciplines necessary to develop principles and techniques pertinent to surveying, geodesy, mapping, position determination, targeting, cartographic drafting and map reproduction.

GIMRADA geodesists and photogrammetrists work with physicists, mathematicians and electronics engineers in conducting basic and applied research related to the earth's gravity field, the effect of gravity anomalies on inertial platforms and inertial positioning systems, basic studies in geodesy such as the figure of the earth based on figures equilibrium, photogrammetric flash triangulation systems, and many other problems in the geodetic sciences.

SECOR, a geodetic satellite project which is a product of basic and applied research in the GIMRADA laboratories, in cooperation with the Army Map Service, is one of the developments which threaten to revolutionize global surveying.

The science of geodesy has come a long way since Eratosthenes first measured the circumference of the earth nearly 2,000 years ago, and the first crude calculations of latitude and longitude were made. Research at that time developed the astrolobe gnomon, diopter, sextant, octant and quadrant, and opened the doors to modern geodesy.

Geodesy has become one of the most vital, yet very preplexing, areas of research since the advent of long-range warfare. It is somewhat paradoxical that until the mysteries of the earth's interior can be solved, locating one's self on the surface will continue to be less than precise.

The world's cold regions are geologically very intriguing. Coal beds, coral reefs and remnant magnetism indicate that the poles were either once very warm or have migrated toward the equator during the past few hundred million years. More immediate problems—although the magnetic history of the earth is quite important—are being investigated by more than a dozen geologists and geological engineers at the U.S. Army Cold Regions Research and Engineering Laboratory, Hanover, N.H.

Some of the CRREL investigations in the earth sciences important to the Army in cold regions operations are the stratigraphy of snow, ice, and physics of frozen and unfrozen soils; problems in analysis of airborne imagery of snow and ice-covered surfaces, frozen ground and other land forms; the seismology of ice; the hydrology of cold regions; the petrofabrics and geochemistry of ice; and methods of drilling in ice and permafrost.

At the Institute for Exploratory Research, Fort Monmouth, N.J., geologists and geophysicists are conducting research in geomagnetism, acoustic seismic propagation in ice and the crust of the earth, and electromagnetic propagation in ice with the objective of improving present or devising new techniques of communication and surveillance. Basic laboratory geophysics in terms of macro- and micro-properties of rocks are being performed with respect to electromagnetic and acoustic phenomena.

Mr. Amory (Bud) Waite's work on radar propagation in ice is an example of some of the fine work being done. Through his research efforts, it now appears that ice-bottom profiles at great depths may be obtained without the use of bulky seismic equipment. A continuous traverse may be possible by either surface or air survey. Dr. Kurt Ikrath, of the same laboratory, is obtaining interesting results from a seismic transducer which may prove useful in both fields of communications and surveillance.

Necessity created the development of the growth of synthetic quartz by the Fort Monmouth laboratories and contracting companies. The supply of crystallagraphically perfect piezoelectric quartz from Brazil could not meet the demands imposed by the military during World War II. Research proved that crystals with selected crystallographic orientation and exterior morphology suitable for a given crystal wafer could be fabricated—or grown.

Similar situations were solved in the case of manganese dioxide, used in batteries and obtained almost exclusively from the African Gold Coast, and mica "books" used in radio tubes and obtained primarily from India, although small quantities were mined in the Appalachian pegmatites. In each instance, synthetic replacements had marked advantages over the natural product.

The Army's use of earth scientists is not restricted to the laboratory, office and field programs discussed here, although these organizations do account for a large percentage of those actively engaged in earth science activities.

For example, in the Department of Geodesy at the Army Map Service, 75 geodesists are engaged in field surveys, research and computation of geodetic data on a world-wide basis. Although the field surveys are not classified as research, the data obtained is fundamental to research conducted in physical geodesy by the military services.

In addition, geologists and geophysicists in lesser numbers are engaged in research and development at the Engineering Research and Development Laboratories, Fort Belvoir, Va., the Limited War Laboratory at Aberdeen Proving Ground, Md., and the Intelligence Division, GIMRADA, Fort Belvoir.

Physical geographers, geomorphologists, soils scientists and photogrammetrists also are actively engaged in R&D at the U.S. Army Natick Laboratories, Natick, Mass., and the Land Locomotion Laboratory, Detroit, Mich.

Investigations conducted in Army laboratories are supplemented by university, nonprofit and industrial research on the premise that combined efforts will provide solutions to the Army's problems in the field of Earth Science; also, that the state-of-the-art will be advanced, and that there will be an over-all benefit to the scientific community by encouraging a broad program of research in the Earth Sciences.

Today's Earth Scientists are the epitome of a science which has grown since man was first curious about the planet beneath his feet. It is a science which has developed from the crude theories of the Neptunist to the geophysicists whose sound facts are the basis of modern theories.

Earth Science has evolved from its earliest crude tools for locating ore veins, as described by Agricola, or those employed by the alchemist to separate the metal from the rock, to the ultimate of tools, the radioactive isotope, such as AR^{40}/K^{40} used to determine the age of rock, or C^{14} to set the date a tree was felled during the Ice Age or to measure the rate of recharge and confirm the source of water in an aquifer.

In this way geologists will continue to search for that sign of the beginning—if not on the earth, then on some extraterrestrial body, and they will strive to explain the present and predict the future.

Betts Informs Congress on Army AE Goals

(Continued from page 2)

Our goal is to establish total feasibility of the Energy Depot concept early in Calendar Year 1966. The majority of our present effort is directed toward the production of ammonia in present internal combustion engines with minor modifications.

The investigation of the ammonia production concept is proceeding on the basis that this concept can be integrated into the military system within a very short time if an uncertain military situation should make this course of action desirable.

More significantly, we are investigating potentially more attractive concepts such as electro-chemical cells which might be recharged directly from the electrical energy produced at a nuclear reactor or any other convenient source of electrical power.

These more advanced concepts offer the potential of order of magnitude improvements in the overall Energy Depot efficiencies as compared with the near-term ammonia — internal combustion engine concept. It is this potential which makes continued investigation of the concept desirable. Specific work being conducted under Army contract includes:

- Studies aimed at increasing production of ammonia which includes contracts with Allis-Chalmers, Air Products & Chemical Co., Inc., Aerojet General Nucleonics, Pratt & Whitney, American Cynamid, Allison Division, GMC.
- Studies on the utilization of ammonia in internal combustion engines, consisting of a contract on the utilization of ammonia in gas turbines with the Solar Division of International Harvester, and another contract on the utilization of ammonia in piston engines.
- An operational analysis with a cost effectiveness study being conducted by the Corps of Engineers' Strategic Studies Group, augmented by a contract with the Stanford Research Institute.

The magnitude of the Army's petroleum supply problem is such that the establishment of the Nuclear Powered Energy Depot concept feasibility has received high priority.

Other projects on the Army side of the program which may be of interest to the Committee include the SM–1 Nuclear Power Plant at Fort Belvoir, Va. This has continued to operate as a training vehicle for operating crews of all three military services and for research and development as required. It was one of the original plants installed and, therefore, we have initiated certain modifications to bring this plant up to the current state of technology.

Specifically, we have considerably improved the nuclear instrumentation and are making some health physics modifications. The Army funded work on this plant is anticipated to be completed by May 1965.

The SM-1A Nuclear Power Plant at Fort Greely, Alaska, has continued to supply both electrical power and space heat to the post. As has been previously indicated to the staff of the Committee, we plan to replace the carbon steel pressure vessel of the SM–1A during the spring of Calendar Year 1966, due to the predicted rise in nil ductility transition temperature caused by radiation of the carbon steel vessel.

The contract for the preparation of specifications for the new stainless steel pressure vessel and details of the replacement effort is presently in effect. We anticipate award of the contract for the fabrication of the new pressure vessel and for the actual removal and replacement early in FY 66.

This modification is being made at this time due to the uncertainties in information on the nil ductilty transition temperature phenomena and the urgent need for the SM–1A Nuclear Power Plant during the winter months at Fort Greely. By initiating this modification during the spring of Calendar Year 1966, we will be able to complete the work prior to the 1966-67 winter season.

The Army's portable nuclear power plant previously located at Camp Century, Greenland, was removed last summer due to a decline in the requirements for power at this remote installation. The removal effort, which served to further our information on employment and subsequent removal for reemployment of portable nuclear power plants, was successfully accomplished.

The utilization of the Camp Century site by U.S. Forces was in accordance with an agreement with Denmark. Accordingly, Danish representatives maintained surveillance over the removal operation and at its completion remarked very favorably on the removal effort.

At the present time, the secondary components of the plant are in storage at the New Cumberland Army Depot, while the reactor skid has been transferred to the AEC for use in conducting extensive tests on the nil ductility transition temperature phenomena.

The construction of the 10,000 KWe Floating Nuclear Power Plant, recently designated the "STURGIS," is proceeding in a satisfactory manner. At the present time, construction, under an Army prime contract with the Martin Co., of Baltimore, is over 65 percent complete.

The actual fabrication of the plant, utilizing a modified surplus Liberty ship hull, is being done at Mobile, Ala., by the Martin subcontractor, Alabama Drydock and Shipbuilding Co.

Our present schedule calls for completion of the plant late this fall, at which time it will be towed to the test site at Fort Belvoir, Va. After completion of the six months operational test next year, the plant will be turned over to STRIKE Command for use as a strategic resource in support of future operations.

This completes my general presentation.

Production Testing Begins On M-5 Weapon System

Delivery of the M-5, the first weapon system developed for firing 40 mm. grenades from helicopters, was made last month to Aberdeen (Md.) Proving Ground for initial production testing and crew training.

Aimed through conventional sighting and fire control elements, the M-5 is electrically driven, and can be operated by either the pilot or a gunner. Ammunition is fed through flexible chuting to the launcher from a storage box within the aircraft.

Production items of the 200-pound weapon, capable of firing a 40 mm. high explosive grenade at the rate of more than 200 rounds per minute, will be delivered to Army field units later this year.

The General Electric Co. of Burlington, Vt., is prime contractor.

The Department of the Army Meritorious Civilian Service Award was presented recently to Isidore Berg, the U.S. Army Materiel Command Cost Reduction Program Manager.

Brig Gen E. G. Hardaway, Comptroller and Director of Programs, AMC Headquarters, presented the award and a citation which stated, in part:

"Mr. Berg's professional competence, his effectiveness in resolving the numerous problems that arise with a new program, and his initiative, ingenuity and inspirational leadership were predominantly responsible for the outstanding results achieved in the AMC Cost Reduction Program. AMC was responsible for saving $548 million, more than half of the total Army savings."

A 1950 cum laude graduate of American University, Washington, D.C., Berg is now a candidate for the master's degree from American in the field of international relations. He has won two other Army awards.

Lt Col Bruce S. Ott, chief of the newly created Experimental Surgery Branch of the Armed Forces Institute of Pathology (AFIP), was awarded the Bronze Star for meritorious service as senior veterinary advisor to the Republic of Viet Nam Armed Forces Veterinary Service in 1964.

Brig Gen Joe M. Blumberg, Director of the AFIP, presented the award. The citation accompanying the medal stressed Lt Col Ott's "untiring efforts, professional ability and the energetic application of his extensive knowledge" materially contributing to the U.S. mission in VietNam.

Two top-level officers at the U.S. Army Strategic Communications Command (STRATCOM) were cited for meritorious service during tours in the Pentagon, Washington, D.C.

Col John N. Medinger, commanding officer of STRATCOM's Continental United States (CONUS) operations, received the Joint Service Commendation Medal. Col Kenji Hino, STRATCOM's Director of Engineering, received the First Oak Leaf Cluster to the Army Commendation Medal.

Col Medinger was praised for his "exemplary" performance of duty and "outstanding qualities of leadership" while serving with the Communications - Electronics Directorate of the Joint Staff for a 3-year period ending in August 1964.

Col Hino was cited for his "superior and selfless" performance of duty in a series of key positions with the Command and Control Systems Directorate, Office of the Chief Signal Officer, and with the Office of the Chief of Communications, for a 4-year period ending in July 1964.

Eighteen engineers of the U.S. Army Transportation Research Command, (USATRECOM), Fort Eustis, Va., were awarded checks of $250 each and official Commendation for their "outstanding contribution" in evaluating the Counterinsurgency (COIN) aircraft.

Col Michael J. Strok, USATRECOM commanding officer, said that the awards were made on a Special Act basis and followed official commendations to the Command for this work from the Assistant Secretary of the Army for Research and Development, the Chief of Staff, U.S. Army, and the Commanding General of the U.S. Army Materiel Command.

Maj Gen William Lapsley, CG, U.S. Army Mobility Command, made the presentations during a recent visit.

The evaluation group developed possible Army missions for the COIN concept, modified the aircraft with proposed Army equipment, evaluated the modified aircraft and made comparisons with other Army aircraft requirements. In effect, over 500 aircraft designs were evaluated in a 6-week period.

The methods and evaluation procedures developed by the COIN group reportedly have largely resulted in the procedures being accepted as a means of evaluating low-speed aeronautical development programs.

Col Strok also announced that the Human Factors and Survivability Group at USATRECOM was accorded honors by Maj Gen Lapsley.

A Certificate of Achievement was presented to E. V. Merritt, Human Factors Group Leader, in recognition of the Group's saving over $325,000 while designing, fabricating and assembling prototype and operational aircraft personnel armor systems.

Natick Scientist Wins Exceptional Service Award

Dr. Stephen J. Kennedy, director of the Clothing and Organic Materials Division, U.S. Army Natick (Mass.) Laboratories, recently received the Exceptional Civilian Service Award.

Secretary of the Army Stephen Ailes cited Dr. Kennedy for "fundamental textile research conducted under his direction, which resulted in improved military efficiency, increased savings to the Government, and lasting benefits to the civilian economy."

Brig Gen Woodrow W. Vaughan, commanding general of the Natick Laboratories, presented the medal and accompanying certificate. In 1958 Dr. Kennedy received the Harold DeWitt Smith Memorial Medal from the American Society for Testing Materials.

His service with the Army began in 1942, when as a lieutenant colonel he became chief, Textile Section, R&D Branch, Military Planning Division, Office of The Quartermaster General. In this capacity he initiated the Quartermaster Corps program of R&D in the field of textiles and successfully sought and utilized the cooperation of the textile industry, foremost scientists, and laboratories in the designing and development of improved shelter and clothing for American soldiers. For his wartime accomplishments he was awarded the Legion of Merit.

Dr. Kennedy received his B.A. in chemistry with honors from the University of Illinois (1926), his M.A. from Columbia University (1931), and his Ph.D. in political science (1936). From 1935 to 1941 he was director of market research for Pacific Mills.

Authored or coauthor of several books on textiles, Dr. Kennedy has written numerous articles for trade and scientific publications, and is a member of numerous scientific organizations and associations.

President Extends Tenure Of Surgeon General Heaton

President Johnson has extended the tenure of Lt Gen Leonard D. Heaton, who assumed the office of The Army Surgeon General in June 1959, until Dec. 1, 1966. This is the second such extension.

At the end of General Heaton's statutory 4-year tour in May 1963, the late President Kennedy extended his appointment an additional two years. This was the first such extension of a surgeon general in more than 30 years.

General Heaton served as commanding general of Walter Reed Army Medical Center before his present assignment. He holds the Legion of Merit with two Oak Leaf Clusters along with the Distinguished Service Medal with First Oak Leaf Cluster.

While CG of Walter Reed, General Heaton maintained an active practice in general surgery he has continued during duty as Surgeon General.

Concrete Research Earns Engineer Bid for Presidential Citation

Results of a study on casting of articulated concrete mattress using fly ash and water-reducing admixture have earned Charles A. McVean, a concrete engineer with the U.S. Army Engineer District of Memphis, Tenn., nomination for a Presidential citation.

The Army Corps of Engineers uses the articulated mattress in revetting the banks of concave bends to prevent caving and the resultant changes in the navigation channel on the lower Mississippi River.

In an average year, contractors for the Memphis Engineer District cast about 250,000 squares of mattress at four Corps-owned casting fields at a cost of approximately $3,900,000.

Each square covers 100 square feet, and consists of 20 sections, each 3 feet 10 inches by 14 inches, by 3 inches thick, with longitudinal strands of non-corrosive fabric cast in the concrete. In use, the individual squares are fabricated and placed as a continuous subaqueous mattress extending from the low water line to the channel thalweg.

Mat casting is an expensive phase of revetment construction and operation and is subject to periodic cost assessment. Over the years, reductions have been achieved by close proportioning and reduction of cement to the maximum extent consistent with preserving structural strength.

In an effort to further reduce cost and to improve management, the study conducted by McVean has resulted in increased production and annual cost savings to the Government estimated at more than $50,000.

A native of Missouri, McVean studied engineering at the University of Colorado, and has been with the Memphis Engineer District since 1934. He serves as concrete engineer for the Memphis District and also as assistant chief of the district's Inspection Branch.

Previous studies made at the U.S. Army Engineers Waterways Experiment Station, Vicksburg, Miss., had shown that mixtures containing fly ash or water-reducing admixtures, or both, could be used to cast mats more economically than by using only Portland cement.

In McVean's study, field casting tests were made by the Memphis District to determine (1) whether strength requirements could be met by concrete containing fly ash or water-reducing admixture, or both, when mixed, placed, and cured under normal field conditions; and (2) the effects on breakage and production.

The mats so cast were tested for flexural strength and were analyzed for breakage through all revetment operations from loading out on trucks at the casting field to the final assembly and launching into the river.

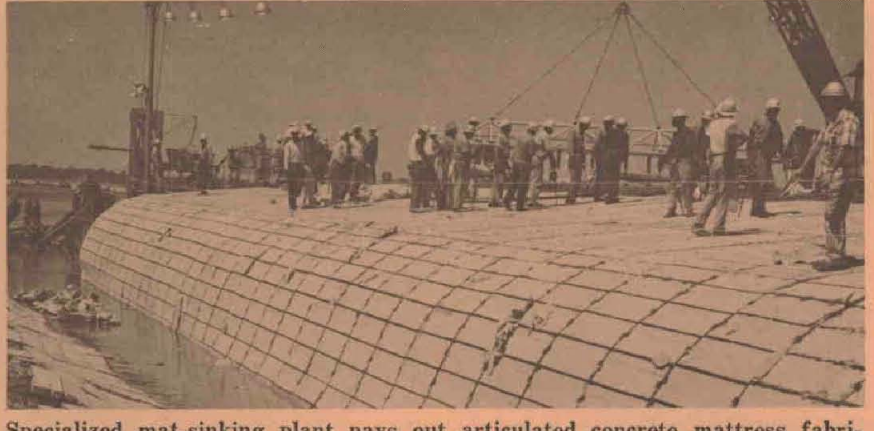
In making the field tests, the Memphis Engineer District let a contract in 1963 for the experimental casting of 41,000 squares of articulated concrete mattress on the Caruthersville, Mo., casting field.

Results of the experiment, reported in Memphis District Technical Report No. 1-64, dated September 1963, revealed that concrete mattress containing fly ash or water-reducing admixture could be satisfactorily cast for revetment construction, with the indicated cost reduction.

By the use of a water-reducing admixture, it was possible to reduce the cement factor from 3.75 bags per cubic yard to 3.4 bags per cubic yard, using an average water-cement ratio of 7.3 gallons per bag, and to obtain approximately the same strength and quality of concrete as in standard mattress. Field tests indicated an increase in production rates, primarily because of the improved workability of the concrete.

As a result of the experimental casting, invitations for bids on casting mattress for the year 1964 provided optional bids for casting mattress with 100 percent Portland cement; with fly ash to replace a maximum of 30 percent Portland cement; or with water-reducing admixture, reducing Portland cement by about 10 percent. The low bids for 1964 mat casting in the Memphis Engineer District were based on the use of a water-reducing admixture.

The estimated annual cost reduction resulting from the use of the water-reducing admixture in concrete used for casting articulated concrete mattress in the Memphis District is $38,000. Based on the tests of the Memphis District, Army Engineers at New Orleans awarded a contract for mattress cast with water-reducing admixture, resulting in a cost reduction of about $25,000 in that district.



Specialized mat-sinking plant pays out articulated concrete mattress fabricated with fly ash and water-reducing admixture in Mississippi River channel stabilization project by U.S. Army Corps of Engineers.

APG Begins Construction On Weapon Systems Lab

Facilities to support Army Materiel Command war gaming and guidance and control programs will be consolidated in a new Weapon Systems Laboratory under construction at Aberdeen Proving Ground, Md.

The first major building project to be started this year at APG, the laboratory is expected to cost about $635,000, bringing the total cost of major construction under way at APG to nearly $4 million.

Estimated for completion by the end of the year, the new lab—as an addition to the research facilities of the U.S. Army Ballistics Research Laboratories—will perform in evaluating the effectiveness and cost of weapons.

Col Charles D. Y. Ostrom, Jr., commanding officer of the Ballistic Research Laboratories, officiated at recent ground breaking ceremonies. Designed by von Storch and Burkavage of Clarks Summit, Pa., the new lab will be built by the Verdel Construction Co. of Baltimore under supervision of the Baltimore District Engineer.

H. J. Washburn will act as the resident engineer. Loyd O. White, representing APG's Engineering Support Services Div., is project engineer.

MIT MAC Relays 'Instant Answers'

Dr. Richard Mills (left), assistant director of MIT project MAC, feeds filter design problem into converted computer console located at Army Ballistic Research Laboratories, Aberdeen Proving Ground, Md.

At right, unmanned computer located at MIT, Cambridge, Mass., receives problem through standard TWX line, computes problem, and relays answer instantaneously back to the Ballistic Research Laboratories at APG.

"Instant answers" were introduced at a recent Army computer conference when a problem was fed into a console at Aberdeen Proving Ground (APG), Md., and transmitted to a computer located at the Massachusetts Institute of Technology—a distance of about 400 miles.

Within a matter of seconds, the instantaneously computed answer was automatically relayed by standard TWX line back to the source at the Ballistics Research Laboratories (BRL) at APG.

The demonstration was conducted by Dr. Richard G. Mills, assistant director of Project MAC, an Advanced Research Project Agency funded program in progress at M.I.T. MAC (Machine Aided Cognition or Multiple Access Computer) is being administered by the Office of Naval Research.

At the present stage of development, about 40 remote stations are in use around the M.I.T.—Cambridge, Mass., area. Like telephone users sharing facilities of a central exchange, the stations are tied into the computer, and each is capable of receiving instant service.

The demonstration was conducted for about 55 attendees at the first session of the 1965 Army Conference on Numerical Analysis and Mathematical Programming, Feb. 15-16, at the Ballistic Research Laboratories, APG.

The conference was the third in a series (originally established by the ARO Working Group on Computers) designed to provide for an exchange of information among Army personnel using computers in scientific and other nonbusiness applications.

Part of the meeting was devoted to a report by Dr. R. Buhler, Princeton University, on the general purpose program packages for statistics in use at the Princeton University.

Other sessions included an Army panel discussion concerning the need and feasibility of developing general purpose program modules for trajectory calculations. Dr. R. Moore, Mathematics Research Center (MRC), U.S. Army, University of Wisconsin, reported on his work on the numerical solution of ordinary differential equations.

The Army Mathematics Steering Committee (AMSC) subcommittee on Numerical Analysis and Computers met at the Laboratories for preliminary discussions of an annual report to the AMSC.

Members of the subcommittee include Dr. J. H. Giese, BRL, chairman; Dr. R. K. Brown, U.S. Army Electronics Laboratories; S. H. Eisman, Frankford (Pa.) Arsenal; R. McGowan, U.S. Army Missile Command; Dr. L. B. Rall, MRC; and Dr. Selig Starr, U.S. Army Research Office.

AMC Initiates Broad Procurement Information Plan

A far-reaching new program to provide industry with market information on the Army's future procurement needs was announced recently by General Frank S. Besson, Jr., commander of the U.S. Army Materiel Command (USAMC).

The program is designed to broaden industry competition for the Army's procurement dollar and thus reduce acquisition costs. A pilot test was started last month at nine Army/Industrial Materiel Information Liaison Offices (AIMILO).

The pilot test will be under the direction of Brig Gen R. C. Conroy, USAMC's deputy commanding general for western operations, Fort Mason, San Francisco, Calif.

General Besson's announcement was made to an industry audience assembled in Los Angeles under the auspices of the Defense Department and the National Security Industrial Association to provide advance information of defense requirements during upcoming years.

Conferees were told that the Army is trying to find out whether or not this type of future marketing information will assist in making management decisions to bid on more kinds of Army materiel.

The program is built around an Advanced Planning Procurement Information (APPI) form which will be prepared on end items to be procured by the expenditure of PEMA (Procurement Equipment and Missiles, Army) funds in the annual budget.

APPI data will include pertinent historical facts about the end item, current fiscal year procurement action, and the Army's planned procurement through the following six years. Included also will be statistics pertaining to quantities, monthly production rates and anticipated methods of procurement.

The APPI will be released to current bidders and sources cleared to receive it by the procuring agency's AIMILO. Concurrently, the APPI will be synopsized for public media in order to advertise its availability to all industries.

Those interested may obtain identical APPI at any one of the nine AIMILOs established for this purpose by presenting proof of security clearances required or, lacking proof, by initiating actions that will enable them to receive APPI in the future.

For test purposes, AIMILOs have been established at the following USAMC organizational elements: Electronics Command, Fort Monmouth, N.J.; Missile Command, Huntsville, Ala.; Weapons Command, Rock Island, Ill.; Munitions Command, Dover, N.J.; Tank Automotive Center, Warren, Mich.; Mobility Equipment Center, St. Louis, Mo.; Aviation Materiel Command, St. Louis, Mo.; Los Angeles Procurement District, Pasadena, Calif.; San Francisco Procurement District, Oakland, Calif.