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TARC Releases Massive Proposed Research Program Document

Comprehensive study, analysis and planning for more effective management of Army basic research activities in the next five years are linked in a newly published 434-page document that bids for recognition as the most important of its kind in Army history.

The proposed "Army Research Program Covering 6.11 Activities for Fiscal Years 1965-1969" was placed in distribution in mid-August to all major Army research and development activities. It represents the culmination of more than six months of rigorous work by The Army Research Council (TARC).

TARC has brought together during that period the top scientific, engineering and management talent available to the Army in daily sessions that more often than not have extended far into the night. The report has been termed a detailed blueprint for a course of constructive future action.

Originally, the classified planning document was a compilation of more than 2,000 pages. In its "sharply scissored" form, the report is a highly concentrated presentation of purpose, policy, philosophy and planning procedures with respect to the programming of basic research activities.

Simultaneously with the issuance of the report, TARC turned full-time

(Continued on page 6)

DoD, NASA Agree on Information Policy

An agreement effected between the Department of Defense and the National Aeronautics and Space Administration in mid-August on research and technology information exchange provides for use of a standardized reporting form for on-going work suited to automatic processing.

Copies of the agreement are being sent to all Federal agencies engaged in research and development programs, inviting them to participate in FY 1965. The agreement is binding upon the Army, Air Force and the Navy as well as upon NASA's Office of Manned Space Flight, Office of Advanced Research and Technology, Office of Space Sciences, and Office of Tracking and Data Acquisition.

Ultimately it is hoped that the plan of operation established by the agreement will be extended to other Federal agencies, notably the Department of Commerce Office of Technical Services

(Continued on page 8)

Vincent Succeeds Aines As USARO S&TI Chief

An Army Research Office key staff position vacant for 2½ months was filled Aug. 14 when Col Dale L. Vincent reported for duty as successor to Col Andrew A. Aines in the Scientific and Technical Information Division.

Until he was reassigned as executive secretary of the Department of Defense Committee on Scientific and Technical Information (COSATI), Col Aines was director of Army Technical Information and chief of the S&TI Division.

For the past year Col Vincent has served as a chemical officer in Korea with the U.S. Army Pacific Command (USARPAC), but he has spent much of his 25-year Army career in research and development or related assignments.

Prior to assignment to Korea, he was chief of the Chemical-Biological-Radiological Weapons Operations

(Continued on page 11)

DoD Decides Assignment Of 22 Analysis Centers

Twenty-two Information Analysis Centers intended to furnish answers to specific technical questions, instead of lists of documents, have been assigned by the Department of Defense to the Army, Navy and Air Force for operation.

DoD Instruction 5100.45, dated

(Continued on page 5)

Distinguished Service Awards

(See story on page 3)

Katherine Mather

Eugene W. Weber

Featured in This Issue...

Army R&D Newsmagazine

Vol. 5, No. 9 September 1964

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Purpose: To improve informal communication among all segments of the Army scientific community and other Government R&D agencies; to further understanding of Army R&D progress, problem areas and program planning; to stimulate more closely integrated and coordinated effort among the widely dispersed and diffused Army R&D activities; to maintain a closer link from top management through all levels to scientists, engineers and technicians at the bench level; to express views of leaders, as pertinent to their responsibilities, and to keep personnel informed on matters germane to their welfare and pride of service.

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USATECOM Claim to Fame: Unique Test Mission

By Maj Gen James W. Sutherland, Jr.

Maj Gen J. W. Sutherland, Jr.

The U.S. Army Test and Evaluation Command, one of the largest organizations in the Army research and development program, is unique in that its sole mission is the testing of materiel. Its primary contribution to the program is the testing and evaluation of items or systems developed by other Army Commands. USATECOM also supports these commands and other Department of Defense development agencies, as required, during the various progressive phases materiel development and production.

Created by the Army reorganization in August 1962, USATECOM in many respects occupies an enviable position in that it has no ties with the past to bias its philosophy and procedural concepts. Headquartered at Aberdeen Proving Ground, Md., the Command includes the major testing agencies of all the former Technical Services as well as the Service Test Boards which formerly belonged to the Continental Army Command. It has been able to draw upon the vast experience of these organizations and to use the best of this experience to establish new policies and procedures which can be applied uniformly to provide more effective and efficient test support to the Army.

Prior to the reorganization of the Army, unnecessary duplication of test facilities and tests and failures to plan and program test time in the development phase, often caused concern. This situation existed, to a degree, because of the multiplicity of testing facilities within the Technical Services and the bias which is inevitable when the developer performs his own tests. This system fostered other undesirable factors such as a lack of adequate planning and coordination between the several test activities, creating a duplication of effort in a significant number of cases. In the Test and Evaluation Command, the Army has created a single efficient and effectively responsive materiel testing organization.

In this article, I would like to cover some of the actions which have been taken or are planned.

ORGANIZATION. Firstly, there was the need to organize a Headquarters which could efficiently direct and supervise the testing and evaluation of essentially the entire spectrum of Army materiel, from shoes to missiles. By the establishment of a directorate-type organization, with each of eight directors responsible for a given commodity area, this first requirement was satisfied. This organization has proved to be sound and no significant changes have been found necessary.

Secondly, a management system had to be evolved for the organization of more than 40 test activities into manageable force. Among the ranges, proving grounds, boards, agencies and offices there existed vast differences in size, organization, management procedures, self-sufficiency and staffing patterns. Combining two or more agencies located in the same general area made it possible to eliminate or reduce staffs, cut overhead, and limit the number of subordinate commands to 17. This action and directed reductions in strength levels were accomplished at the same time.

In the subordinate test activities created by consolidation, further personnel reductions were made possible by the amalgamation of both technical and support functions. At the same time, the efficiency of operations was maintained and in some instances was actually increased.

In the area of cost reduction, one of the most fruitful efforts of USATECOM has been the consolidation of common supporting services and resources. Using the results of combining co-located activities as a guide, a positive review in other installations revealed the possibility of further reductions. The reorganization of Yuma Proving Ground in 1963, a reorganization and consolidation of White Sands Missile Range during the first part of 1964, and consolidations at Aberdeen Proving Ground and Edgewood Arsenal has been effected.

(Continued on page 28)

Top DoD Civil Awards Won By 7, Including Army Lady Geologist, Army Engineer

An Army scientist became the first woman to receive a Department of Defense Distinguished Civilian Service Award when she was among seven employees honored with the award in recent ceremonies in Washington, D.C.

Deputy Secretary of Defense Cyrus R. Vance presented the awards consisting of a medal, citation, lapel pin and rosette.

The award is presented annually to those outstanding employees of the Department of Defense, Army, Navy and Air Force who have made the greatest contribution to efficiency, economy, research and engineering or across-the-board improvements in operation of the Departments.

The Army recipients are Mrs. Katherine Mather, supervisory geologist, U.S. Army Engineer Waterways Experiments Station, Jackson, Miss., and Eugene W. Weber, deputy director for policy, Office of the Chief of Engineers, Department of the Army, Washington, D.C.

Other winners are Dr. Norman W. Rosenberg, chief, Ionospheric Perturbations Branch, Air Force Cambridge Research Laboratories, Cambridge, Mass.; Dr. William A. Zisman, superintendent, Chemistry Division, U.S. Naval Research Laboratory, Washington, D.C.; Robert C. Moot, comptroller, Defense Supply Agency, Washington, D.C.;

Dr. Carl F. Romney, assistant technical director, Air Force Technical Applications Center, Department of the Air Force, Washington, D.C.; and Oliver R. Kirby, National Security Agency, Department of Defense, Fort Meade, Md.

MRS. MATHER's citation reads: ". . . in recognition of her contributions to the application of petrographic knowledge and techniques to research on concrete and concrete materials. Through Mrs. Mather's efforts, standard procedures for petrographic examination have been adopted throughout the Corps of Engineers, with significant benefits in terms of improved quality and economy.

"Mrs. Mather also has made contributions of great value to the Department of Defense in the resolution of problems relating to the engineering properties of soils and rocks and as a consultant on major engineering projects.

"Mrs. Mather has earned the respect of the scientific community of which she is an outstanding member and of the engineering community which she serves, and warrants recognition at the highest level within the Department of Defense."

In October 1962, Mrs. Mather was presented with a Department of the Army Exceptional Civilian Service Award.

MR. WEBER's citation, based on achievements which won him a $5,000 Rockefeller Public Service Award in December 1963, reads in part: ". . . in recognition of the leading role he has played in the development of the water resources of the United States and in the resolution of technical and quasi-judicial problems relating to international boundry waters.

"In his long association with the Civil Works program of the Corps of Engineers since 1931, Mr. Weber has pioneered in many aspects of water resources planning, including economic planning and the coordination of complex inter-agency relationships. Mr. Weber's contributions to this vital field have reflected great credit upon himself and the entire Department of Defense."

CS Commission Sets Series of Management Seminars

The U.S. Civil Service Commission's Office of Career Development has announced a series of four seminars and institutes to improve development of managerial and first-line supervisory employees.

An Institute for Executives in Scientific Programs, limited to scientists, engineers and scientific administrators at the GS-15—18 level, is scheduled Sept. 21-25 at the CSC Building, 1900 E. Street, N.W., Washington, D.C.

The Institute is designed to give scientists an opportunity to explore important concepts and current issues relating to the organization and administration of scientific and related activities of the Federal Government. It aims to provide insight into critical issues facing Federal officials in the determination and implementation of research, development, testing and evaluation policies.

An Executive Leadership Institute, to be held at a yet unannounced site outside the Washington, D.C., area, will meet Sept. 28-Oct. 2. It is limited to 30 executives in GS-16 and above or equivalent military officers.

This Institute seeks to promote an understanding of the basic framework of the Federal Government, provide insight into human motivations and values, and systematize the participants' ideas of the role of bureaucracy in the maintenance of democratic values. Emphasis is on the personal responsibility each career official bears for the success of governmental institutions.

A Seminar on International Operations for executives GS-14—18 and officers with the rank of colonel and above will be held Oct. 12-16 at the CSC Building. Participation will be limited to a maximum of 36 conferees. Half of these, it is expected, will be drawn from R&D facilities.

The Seminar seeks to provide a broad interagency perspective and exposure to diverse relationships within the foreign affairs community, as well as a fuller comprehension of contemporary national policy direction in the foreign affairs field.

Personnel Management: Ideas and Authors, for personnel at grades GS-13 and above, will consist of four sessions spaced about a month apart, from September through December, in which outstanding authors will discuss their books, ideas contained therein and their significance in Federal personnel matters.

Meetings will take place in the CSC Building conference room.

Shillelagh Production Involves Army Receipt of GSA Facility

Plans for mass production of the U.S. Army's Shillelagh guided missile at Lawndale, Calif., are involved in transfer of a 22.7-acre facility from the General Services Administration to the Army within the next few weeks.

The 205,000-square-foot production facility is to be operated for the Army under a contract pending with Aeronutronic Division of Philco Corp., a Ford Motor Co. subsidiary.

The General Sheridan, incorporating the Shillelagh, is the first American ground combat vehicle designed to fire a missile. Both the Shillelagh and conventional ammunition can be fired from the vehicle's 152 mm. gun launcher. A command guidance system is capable of maneuvering the missile in flight to attack moving targets.

Designed for use by armored reconnaissance and airborne assault forces, the Shillelagh provides increased firepower against armor, troops and field fortifications.

HOUSE CLEANING. The late Justice Cardozo of the Supreme Court advised (Schecter v U.S., 1934):

When the task that is set before one is that of cleaning house, it is prudent as well as usual to take counsel of the dwellers.

U. S. Army Concept Team in Viet Nam Evaluates Counterinsurgency Operations

Col Paul L. Bogen, chief of ACTIV, was formerly Chief of Staff, 2nd Armored Division and prior to that commanded its 1st Brigade. He has served as executive officer, Defense Intelligence Agency; chief, Program and Budget Division, Office, Assistant Chief of Staff, Intelligence; CO of the 3rd Battalion, 6th Cavalry; and with U.S. Army, Alaska. He is a graduate of the Army War College and served on the Command and General Staff faculty (1951-54).

A graduate of the University of Nebraska, he received an M.A. degree at the University of Iowa, and did postgraduate work at Northwestern University, Ohio State University and Denver University. Col Bogen was a member of the faculties of the University of Nebraska and Ohio State University during the period between World War II and the Korean War. In World War II, he served as a member of the 6th Armored Division.

ACTIV is the appropriately descriptive acronym for the Army Concept Team in Viet Nam, one of the newest elements of the U.S. Army research and development organization, which is providing valuable on-the-spot combat capability evaluation in that insurgency environment.

Reorganized recently in line with knowledge gained during 16 months experience in Viet Nam operations, ACTIV is a team of about 50 officers and enlisted men established originally in November 1962. Supplementing this staff is a small liaison detachment in Washington, D.C.

Initial guidance directed the Team to conduct a series of tests and evaluations of the Mohawk, Caribou and armed helicopters in view of the rapidly expanding use of these aircraft in counterinsurgency operations.

As it became apparent that operations in Viet Nam provided a unique opportunity for evaluation of a wide range of Army concepts and techniques, the ACTIV effort was broadened in consonance with its assigned mission to:

"Conduct tests for the purpose of evaluating new or improved operational and organizational concepts, doctrine, tactics, techniques and procedures, and to gain information on materiel. Effect continuous improvement in the combat effectiveness of Viet Namese military forces and U.S. Army units in Viet Nam. Recommend improvement in U.S. Army operational and organizational concepts, and materiel."

All research and testing in Viet Nam was placed under joint operational control in April 1964 when the Joint Research and Test Activity (JRATA) was established by a Joint Chiefs of Staff directive. ACTIV, along with the Air Force Test Unit (AFTU) and the Department of Defense Advanced Research Projects Agency Field Unit (ARPA-FU), became a service component.

Brig Gen John K. Boles, Jr., who served as executive to former Army Chief of Research and Development Lt Gen Arthur G. Trudeau (USA, Ret.), is director of JRATA. Prior to his present assignment, he was chief of the Research and Development Division, J-5, Joint Chiefs of Staff in Washington, D.C.

Formation of JRATA has served to increase ACTIV's responsibilities in matters of joint interest. Due to JRATA's relationship to the Viet Namese Combat Development and Test Center through ARPA-FU, the arrangement has helped to provide for closer ACTIV relations with the Viet Namese Army.

ACTIV continues as a Class II Field Activity assigned to the Department of the Army under the jurisdiction of the Assistant Chief of Staff for Force Development, and its program of projects is coordinated with the U.S. Army Combat Developments Command. As an added function, within the limits of its resources, the Team services Army-wide requests for information concerning Army activities in Viet Nam.

Eight of ACTIV's 15 formal evaluations during its first 20 months of operation related to aviation requirements. Examples of exceptions include an evaluation of the Engineer Construction Advisory Detachment in the field of civic action, and evaluation of the mechanized rifle troop (M-113 APC).

Under JRATA-directed or approved peripheral projects, ACTIV conducted two aviation evaluations (target marking heads for the 2.75-inch rocket, LSFFAR, and bullet detection for aircraft) and evaluation of a need for an improved sidearm.

Areas of interest were expanded during that period, however, with the beginning of evaluation projects on the mechanized rifle troop employing the M-113 armored personnel carrier, the armored cavalry reconnaissance troop employing the M-114 vehicle, and the Tri-Lambretta psychological warfare and civic action vehicle.

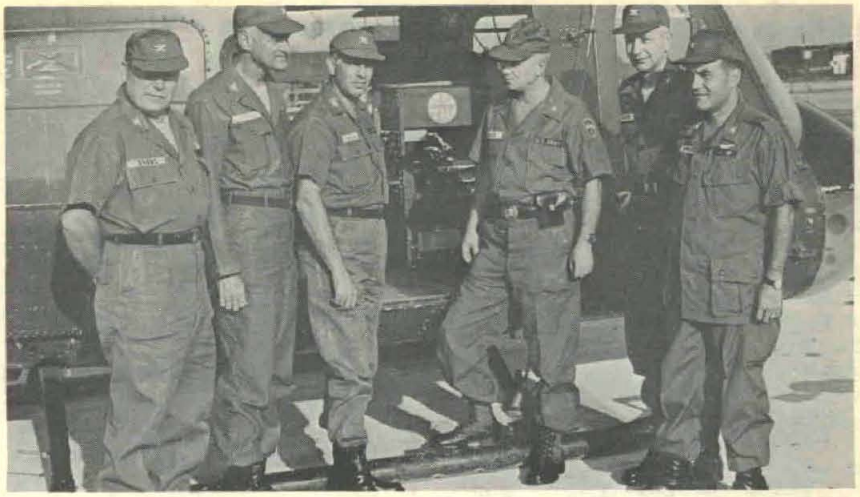
ACTIV evaluations thus contribute to the immediate and short-range war effort, and also provide a basis for long-range changes in Army doctrine and materiel. During the M-113 project, for example, ACTIV proposed the adoption of numerous field expedients and forwarded some 15 equipment improvement recommendations, prior to project conclusion.

An analysis completed in March 1964 of ACTIV's first full year of operations resulted in the recent modifications of its organizational structure and program. Major evaluation projects now are handled by an Army Aviation Division, Army Ground Combat Division, and a Logistics Communications Division.

Scientific support is provided by civilian research advisers furnished by Stanford Research Institute under contract to the U.S. Combat Development Experimentation Center at Fort Ord, Calif.

Experience gained from initial projects of the Team has contributed to development of planning and programing factors for the ACTIV operations. Projects scheduled in FY 1965 or planned for FY 1966 include (partial listing only): Employment of Artillery in Counterinsurgency Operations. Employment of Airmobile Forces in Counterinsurgency Operations. Evaluation of Combined Arms Teams Organization in Counterinsurgency. Balloonborne Radio Communications System.

The unusual opportunity presented in Viet Nam to observe, record and evaluate the application of doctrine and the employment of combat materiel in actual operations is constantly broadening ACTIV's scope of inquiry. As an organization rapidly responsive to U.S. Army requirements in this specialized field of investigation, the Team is winning recognition by both U.S. and Viet Namese leaders as an increasingly valuable asset.



ACTIV MEMBERS standing beside helicopter equipped with communications console developed for use in an heliborne command post, include, left to right, Col John B. Babbs, chief, Logistics Communications Division; Col Donald M. Callahan, chief, Army Ground Combat Division; Col Paul L. Bogen, chief, ACTIV; Brig Gen John K. Boles, Jr., director of JRATA; Col Ralph M. Rogers, deputy, ACTIV; and Col Russell P. Bonasso, chief, Army Aviation Division.

DoD Assigns 22 Tech Information Analysis Centers

(Continued from page 1)

July 28 and announced Aug. 4, directs the centers (IACs) to serve managerial, scientific and engineering personnel in all DoD facilities and in all DoD contractors' organizations.

Established under the authority of the Director of Defense Research and Engineering, Dr. Harold Brown, the centers will be located at research institutions, universities and Government laboratories throughout the Nation. More than 20 additional centers are being studied for future DoD action.

In that their function will be analysis and special information desired by user individuals and organizations, the new centers will differ from existing documentation centers and libraries concerned primarily with the handling of technical documents — that is, making them available to requesters.

As announced by the DoD, recommendations for the establishment of an IAC may be made by any source, within or outside the DoD. The Director of Defense Research and Engineering (DDR&E) will determine what existing centers will continue to operate.

Similarly, DoD components desiring to establish new centers, to make major changes in a center's scope or subject area, or to discontinue their operation, will submit proposals to the DDR&E for approval.

DoD Instruction 5100.45 implements a recommendation made by the President's Science Advisory Committee (PSAC) in a 1963 report which stressed the need for a national system of "specialized information centers." The DoD action represents one of the first Government policy statements in response to the PSAC report proposals.

The IACs will operate within the framework of the DoD Scientific and Technical Information Program. Usually the centers wil be adjuncts to organizations engaged in technical work.

As stated in 5100.45, "It is contemplated that a substantial part of the information analysis work of the centers will be performed by personnel of the host organization in extension of and in conjunction with their regular scientific work." The Instruction policy is further delineated as:

"The growth of published and unpublished scientific and technical information that must be assimilated by technically trained managers, scientists and engineers has resulted in ever-expanding requirements for organized screening, filtering and reduction of such information to insure that those who need it are provided with the best, the most pertinent, and the most succinct information.

"The Department of Defense, after considering the advantages and disadvantages of central review of pertinent information, endorses further development of the information analysis concept, with special emphasis on the evaluation aspects of the concept. . . ."

The Director of Defense Research and Engineering has assigned sole responsibility for operation for Research Analysis Centers to DoD agencies, as follows:

AIR FORCE — Binary Constitution Information Service, Chicago, Ill.; Ceramics and Graphite Technical Evaluation Section, Wright-Patterson Air Force Base, Ohio; Defense Metals Information Center, Columbus, Ohio; Electrical and Electronic Properties of Materials, Culver City, Calif.; Mechanical Properties of Materials, Suttons Bay, Mich.; Radiation Effects Information Center, Columbus, Ohio; and Thermophysical Properties Research Center, Lafayette, Ind.

DEPARTMENT OF THE ARMY — Human Engineering Information and Analysis Service, Medford, Mass.; Military Entomology Information Service, Washington, D. C.; Nondestructive Testing Information Service, Watertown, Mass.; Plastics Technical Evaluation Center, Dover, N. J.; and Counterinsurgency Information Analysis Center, Washington, D. C.

ADVANCED RESEARCH PROJECTS AGENCY — Ballistic Missile Radiation Analysis Center, Ann Arbor, Mich.; Battelle-Defender Information Center, Columbus, Ohio; Remote Area Conflict Information Center, Columbus, Ohio; and VELA Seismic Information and Analysis Center, Ann Arbor, Mich.

DEFENSE ATOMIC SUPPORT AGENCY — DASA Data Center, Santa Barbara, Calif.

TARC Releases 5-Year Research Program Document

(Continued from page 1)

attention, after a couple of weeks of relaxation of effort, to what is recognized as an even more formidable task—a similar in-depth study of exploratory research as defined under scope of the Army's 6.21 program.

TARC is composed of nine of the Army's most distinguished senior scientists, selected to be representative of the four major areas of effort in the Army basic research program and also to be representative equally of management and Army in-house laboratories in each of the areas.

Dr. Ralph G. H. Siu, scientific director of the Research Division, U.S. Army Materiel Command, is chairman of TARC and its coordinator is Director of Army Research Brig Gen Walter E. Lotz, Jr.

TARC members are: *Physical and Mathematical Sciences*, Dr. J. V. R. Kaufman, chief scientist, Munitions Command, and Dr. C. W. Lampson, technical director, Ballistics Research Laboratories, Materiel Command. *Engineering Sciences*, Dr. Gilford Quarles, chief scientific advisor, Office of the Chief of Engineers, and Dr. S. B. Levin, deputy director, Institute for Exploratory Research, Army Electronics R&D Laboratories. *Environmental Sciences*, Dr. Leonard S. Wilson, chief, Environmental Sciences Division, U.S. Army Research Office, and Dr. Donald M. Swingle, senior scientist, Meteorological Division, Army Electronics R&D Laboratories. *Life Sciences*, Col Tyron Huber, chief, Life Sciences Division, U.S. Army Research Office, and Col William D. Tiggert, director, Walter Reed Army Institute of Research.

Assistant Secretary of the Army (R&D) Willis M. Hawkins established the Council after consulting with Lt Gen William W. Dick, Jr., Chief of R&D, General Frank S. Besson, CG of the U.S. Army Materiel Command, Lt Gen Leonard D. Heaton, The Surgeon General, and Lt Gen W. K. Wilson, the Chief of Engineers.

The stated purpose of the TARC program document is to provide: "Raison d'etre and managerial philosophy of Army research; criteria for allocation of resources; a method of evaluating research performance; clarity and continuity of research objectives; a balanced portfolio of scientific investigations."

Basic premises of the Army Research Program, as highlighted in the summary of the document, are related to Army roles, missions and combat objectives. These are delineated in excerpts from Title 10 of U.S. Code 3062, Department of Defense Directive 5100.1, the Basic Army Strategic Estimate (BASE), the Army Strategic Plan (ASP), the Army Force Development Plan (AFDP), and the Combat Developments Objective (CDOG).

The summary states further that:

- The Army's research activity must be of such a high order of excellence and challenge as to attract sufficient numbers of outstanding investigators to solve its urgent problems.
- The Army must be in a position to recognize the existence and/or application of scientific advances to gain competitive lead time over potential enemies . . . of translating scientific advances into operational reality without delay.
- It must influence the timing of scientific advances to match the needs of the Army through judicious allotment of resources. It must be able to assess enemy potentialities through first-hand knowledge of the important scientific issues involved.
- It must maintain a capability to assist in the fulfillment of the modern military role of visible deterrence against potential aggressors.

While the Army policy will be to conduct and support a broad and continuing research program to provide fundamental knowledge, the document states, with emphasis related to Army needs, "mission relevance will not be interpreted so narrowly as to preclude pioneering ventures into high-risk and controversial areas. The more basic in nature the research, the wider the range of potential application of its findings and, consequently, the more "Army-wide" is the research. . . ."

Explicitly stated is that "management will emphasize the emergence and application of new, useful and bold ideas, rather than administrative smoothness of operations. The focus of attention will be the acquisition, retention and development of capable people. The working environment will be made conducive to their maximum output. . . . Quality rather than quantity will be emphasized in management of Army Research. . . ."

In the planning of Army programs, close relations will be maintained with other Federal agencies and the scientific community. Army planning and management of research will consider boundary limitation, and the document recognizes that "overall resources available for research will probably not exceed those currently programmed in the Army Force Development Plan. . . ."

Reflected in Army planning for research will be the Department of Defense categorization of research into scientific disciplines, and the DoD concept of "core" programs. Criteria for the distribution of resources are to be followed judiciously, and no rigid quantitative formula will be used.

Importance of respective areas of scientific research can be generally estimated and related to Army functions, including the state-of-the-art involved, TARC contends. Weighing factors include the primacy of Army concern, investment of non-Army agencies, maintenance of essential in-house competence, contribution to scientific readiness of the Nation, competence of scientists involved, and activities by potential enemies.

Fourteen subelements in the four major areas of Army research effort promulgated for the Army basic research program include biological and medical sciences, general physics, terrestrial sciences, behavioral and social sciences, nuclear physics, atmospheric sciences, chemistry, mathematics, oceanography, astronomy-astrophysics, energy conversion, electronics, materials, and mechanics.

In each of the four major areas the subject range of interests in the subelements is delineated as, for example:

PHYSICAL SCIENCES. *Physics:* Solid-state, surface and neutron scattering of metastable substances, e.g., biochemicals, explosives, propellants, and pyrotechnics; many-body problem, lattice energy, and fundamental atomic and molecular behavior; thin films, catalysis; and photoconductivity.

- *Chemistry:* Radiation chemistry and free radical behavior, conformation transmission in chemical substances, and preparation and analysis of ultra-pure substances.
- *Mathematics:* Properties of oscillations; qualitative behavior and stability of higher order systems; parameter dependence on the behavior of solutions; mathematics of biological systems; theory of plates, shells, and cubes; mathematics of dynamics of vehicles, projectiles, missiles and satellites; mathematics of physical processes involving ordinary and partial differential equations; curve fittings and error analysis; and solution of large systems of linear equations.

ENGINEERING SCIENCES. *Electronics:* Inertialess scanning antennas and associated adaptive control networks for multi-path and polarization selectivity and following; image intensification for night vision; pattern recognition theory and techniques; Lasers, especially of high energy; propagation channel model and analytical simulation; phase and

amplitude perturbations of VLF signals over long propagation paths; error correction codes and digital information compressions codes; high resolution antennas for radar; multiple thin films for integrated microcircuitry; fundamental properties of plasmas; and beam waveguides.

• *Materials:* Brittle fracture in ceramic bodies; fracture initiation and propagation in solids; elastic wave and shock wave propagation in solids under conditions of ultra-high loading rates; Laser crystals; superconducting compounds, alloys and solid solutions; reinforced materials and composites, theoretical models of static and dynamic loadbearing characteristics; formation of thin crystalline films; epitaxial growth; magnetic compounds; ultra-high pressure and temperature effects; and fibrous non-glassy ceramics.

• *Energy Conversion:* Use of hydrocarbon fuels in fuel cells; low-temperature fuel cells; high-energy batteries with increased capacity; thermo-photo-voltaic energy conversion; and magnetohydronamic phenomena and techniques.

• *Mechanics:* Transonic aerodynamics and mechanics of structure and solids; low-speed wind-tunnel studies, reliability analysis and decision theory on safe life-span concept versus arbitrary fixed safety-factor approach to design, scaling laws for behavior of structures under dynamic and static loads, and shock wave phenomena in solids and structures.

ENVIRONMENTAL SCIENCES. *Terrestrial Sciences:* Map representation of cultural and physical earth features by means other than topographic maps for military planning and operations, local gravity anomalies, interrelationship between land form, vegetation, and climatic patterns, and transmission of sound through natural media.

• *Atmospheric Sciences:* Mesometeorology with emphasis on circulations and structures, and atmospheric modification with emphasis on identification and evaluation of new approaches, ionospheric physics with emphasis on new types of upper atmosphere probes, and adaptive control networks in electromagnetic probing of selected regions of the ionosphere.

• *Astronomy and Astrophysics:* Radio and radar astronomy.

LIFE SCIENCES. *Biological and Medical Sciences:* Rapprochemont, bionics, microbial drug resistance, diarrhea, dysentery and other gastrointestinal diseases, chemical protective mechanisms, molecular order and protein synthesis, brain function correlation atlases, and normal physiological parameters of laboratory animals and their extrapolation to man.

• *Behavioral and Social Sciences:* Motivation and group behavior, human memory and performance.

The program document recommends either increases or decreases in each of the 14 subelements, and it presents a variety of charts reflecting the overall programmed Army resources of comparative interest to research, development, test and evaluation.

Under the heading of "Army Philosophy of Research Management," it gives a basis for separation of basic from exploratory research. The distinction between these categories, since they necessarily overlap frequently, and since Army research preferably (and for the most part) is channeled toward meeting military requirements, has been continually subject to controversy and confusion. It is stated that:

"What is of vital concern for an aggressive research and development organization is maintaining a research salient reaching as far to the left in the spectrum as possible and continually probing in that direction (6.11 program, basic research), yet insuring a substantive contiguity with the more directly mission-related activities pointed in the opposite direction (6.21 program, exploratory research). . . ."

In discussing military mission relevance to the concept of research programing, TARC's stated position is:

". . . However, the criterion of relevance to Army needs should not be too stringently interpreted. In actual practice, a stated military hardware requirement in the form of a Qualitative Material Requirement (QMR) has frequently been made a requirement for the approval of a research project. Regulations do *not* specifically require this and should not be so interpreted.

"A prime function of Army 6.11 research is to maintain the Army in contact with the emerging significant ideas of man, so that they can be evaluated as to their potential contributions to the Army. To insist that Army scientists know the contributions of research *before* undertaking it negates one of the very purposes of Army research. A degree of reasonableness and understanding is called for in the interpretation of 'mission relevance.'"

Emphasis on quality rather than on quantity in management of research is explained by the statement that:

"Activities conducted in the 6.11 category can fulfill the Army's expectations only if carried out by researchers of highest quality under conditions in which imagination, competence, and dedication are given appropriate expression. The philosophy of the Army will be reflected in a highly selective distribution of limited resources and in its readiness to depart from conventional procedures, if necessary, to insure that this demand for excellence is fulfilled."

Complexities inherent in the conflicts and competition among the military services in research programing, in view of the natural growth impulse and the philosophical disparities stemming from the belief that research should be done where the skills and professional interest occur, rather than by assignment of specific missions, prompt the comment:

"Army research will be conducted in close collaboration and coordination with the other military services and non-military Federal agencies . . . It is admittedly difficult to hew a fine line between these conflicting forces. It is to be hoped that continued encouragement and moral persuasion will minimize the deleterious effects of these conflicts. . . ."

The committment in the document to maintain close relations with the scientific community states:

"Army philosophy provides for harmonious and fruitful relationship with the scientific community as exemplified by participation in the activities of scientific societies, enthusiastic offers for collaboration with leading research institutes, and optimal balance between in-house and extra-mural research.

"An expressed Army philosophy exists regarding the desirability of close association and cooperation between the Army research scientists and the scientific community. Army policy also encourages participation by Army personnel in professional societies and close liaison between them and their colleagues both within and without the Federal Government.

"The strong link between the in-house research personnel and the American scientific community is an essential ingredient of 'keeping up to date' among American scientists."

Similarly, the document stresses full cooperation in research with friendly nations, as is the current practice with respect to the United Kingdom, Canada, Australia and NATO countries, terming it "of utmost importance."

The foreword to the program document expresses appreciation of The Army Research Council to the many leaders whose assistance and support made the study possible, and particularly to the major agencies concerned, saying in part:

"Indeed, much of the work already had been completed by them and this document may justifiably be regarded as a combined product of their effort and that of the Council."

DoD, NASA Agree on Information Policy

(Continued from page 1)

and the National Science Foundation. The purpose is stated as:

- Research personnel will have improved knowledge of work underway in their fields. [Machine processing will keep it current and readily usable.]
- Management will have improved knowledge of on-going work.
- Each agency will be aided in its internal planning, programming and budgeting.
- More meaningful inter-agency decisions can be made regarding program goals and balance.

The new basis of common information exchange will be a standard reporting form titled "Research and Technology Resume," NASA Form 1122 and DoD Form 1498.

Conceived as the climax of several months of intensive studies, discussion and compromise of differing viewpoints, and focused exclusively on the reporting of work under way within approved programs, the Research and Technology Resume is divided into two parts.

The upper section, blocks 1 through 26, contains information of mutual interest to both NASA and the DoD. It will be completed against common standards for unclassified reports and shared without reservation. Classified reports are subject to the customary security requirements.

The lower section (block numbers to be defined by each agency, starting with No. 27), contains information for internal use of the originating agency. Certain data in this agency-unique section, the agreement states, may be exchanged under special circumstances.

The essence of the agreement is the 26 common information elements, the common set of definitions and codes, and the common digital machine language representation of the 26 information elements. The form itself is merely a common agreed-upon arrangement of the 26 elements, and is therefore an output form of the machine language system. No restriction is imposed on either agency regarding the forms to be used for the collection of input data.

Other stipulations require that the resume will be completed by both NASA and the DoD at the lowest practicable reporting element, defined as the "work unit," which term cancels and supersedes the terms subtask in DoD and task in NASA, and that the first echelon above work unit will be "task area."

The definition of a work unit is that it is the natural unit into which research and applied research projects are normally divided for purposes of local administration. It may range from a fraction of a professional man-year to several professional man-years. A task area is defined as the scientific or technical bounds within which the work unit may be created.

Instructions on the technique of preparing the resume and the conversion of resume language into automatic data processing machine (ADP) form are given in documents supporting the resume. Each agency will prepare the resume as a "hard copy" and a machine language equivalent of the resume.

Semi-annually, for the coming year, the agencies will exchange both work unit resumes (2 copies each) and their machine language equivalents (1 copy each) in mutually agreed upon packages. A program for the exchange of data at the next level above the work unit, that is, at the task area level, may be established at a later time.

The agreement further provides that resumes will be Government standard 8 x 10½" size paper, 3-hole prepunched on left margin, and that the quality of resumes exchanged will be equivalent to original machine printed or typed manuscript to satisfy reproduction requirements. The standard exchange of machine language will be in the form of magnetic tape, except that, as mutually agreed, 80-column punch cards or paper tape may be used.

All unclassified resume information (blocks 1 through 26) will be releasable, as a standard operating procedure, without prior approval of the originating agency subject to stated release limitations.

Coordinated implementation of the agreement is the responsibility of the Supporting Space Research and Technology Panel (SSRT) of the Aeronautics and Astronautics Coordinating Board (AACB).

Implementation objectives call for the standard method of reporting research and technology data to be put into effect within 60 days of the date of the agreement, and

- To achieve, within the next year, the maximum practicable information exchange of on-going work, utilizing existing data processing technology.
- To achieve, within the next year, in selected areas, a joint system of inter-agency review of work units.

SCIENTIFIC CALENDAR

National Symposium on Space Electronics and Telemetry, sponsored by the Institute of Radio Engineers, Philadelphia, Pa., Oct. 1–31.

ANS/ASTM Symposium on Effects of Radiation on Electronic Components, Systems and Materials, sponsored by the American Society for Testing Materials, Syracuse, N.Y., Oct. 5–7.

Aeronautic and Space Engineering and Manufacturing Meeting, sponsored by the Society of Automotive Engineers, Los Angeles, Calif., Oct. 5–9.

IEEE/PTC International Space Electronics Symposium, sponsored by IEEE, Las Vegas, Nev., Oct. 6–8.

1st Annual Conference on Industrial and Commercial Power Systems, sponsored by IEEE, Philadelphia, Pa., Oct. 6-8.

Symposium on Hazard and Radio Phenomena, sponsored by the IEEE, Bucharest, Rumania, Oct. 6–13.

Joint National Meeting of the Institute of Management Sciences and Operation Research Society of America, sponsored by the Institute of Management Sciences, Minneapolis, Minn., Oct. 7–9.

Symposium of the Association of Data Processing Service Organizations, N.Y.C., Oct. 12–13.

17th Annual International Systems Meeting, Philadelphia, Pa., Oct. 12–14.

Entry Technology Conference, sponsored by the American Institute of Aeronautics and Astronautics, Williamsburg, Va., Oct. 12–14.

19th Annual Instrument Society of America Instrument-Automation Conference and Exhibit, N.Y.C., Oct. 12–15.

Symposium on Dosimetry in High Level Exposure, sponsored by the International Atomic Energy Agency, Vienna, Austria, Oct. 12–16.

8th Annual Organic Chemistry Conference, sponsored by NAS-NRC and the Advisory Board on Military Personnel Supplies of the Division of Engineering and Industrial Research, Natick, Mass., Oct. 13–14.

Annual Air Force Science and Engineering Symposium, sponsored by USAF, Brooks AFB, Tex., Oct. 13–15.

Annual Meeting of the Electron Microscopy Society of America, Detroit, Mich., Oct. 13–17.

1964 Sonics and Ultrasonics Symposium, sponsored by IEEE, Santa Monica, Calif., Oct. 14–16.

Systems Science Conference, sponsored by IEEE, Philadelphia, Pa., Oct. 15–16.

2-Particle Correlations in Nuclear Reactions Conference, sponsored by the Oak Ridge National Laboratory, Gatlinburg, Tenn., Oct. 15–17.

AEC Contractors Nuclear Materials Management Meeting, sponsored by the Oak Ridge National Laboratory, Gatlinburg, Tenn., Oct. 19–20.

Working Conference on Linear Free Energy Correlations, sponsored by ARO-D and Duke University, Durham, N.C., Oct. 19–21.

1964 National Electronics Conference, sponsored by the Illinois Institute of Technology, Chicago, Ill., Oct. 19–21.

Mechanisms Conference, sponsored by ASME, Lafayette, Ind., Oct. 19–21.

Metals/Materials Exposition and Congress, sponsored by American Society for Metals, Philadelphia, Pa., Oct. 19–23.

Symposium on Radiochemical Methods of Analysis, sponsored by the International Atomic Energy Agency, Salzburg, Austria, Oct. 19–23.

Textile Engineering Conference, sponsored by MIT, Cambridge, Mass., Oct. 20–21.

East Coast Conference on Aerospace and Navigational Electronics, sponsored by IEEE, Baltimore, Md., Oct. 21–23.

17th Annual Gaseous Electronics Conference, sponsored by ARO-D, U.S. Army Electronics R&D Laboratory and the American Physical Society, Atlantic City, N.J., Oct. 21–24.

Data Management—Now and Tomorrow, sponsored by the Data Processing Management Assn., Louisville, Ky., Oct. 22–23.

AIAA/CASI Joint Meeting, sponsored by AIAA, Ottawa, Canada, Oct. 26–27.

11th Nuclear Sceince Symposium on Instrumentation in Space and Laboratory, sponsored by IEEE, Philadelphia, Pa., Oct. 28–30.

Electron Devices Meeting, sponsored by IEEE, Washington, D.C., Oct. 29–30.

• To encourage other agencies to participate in this program at the earliest possible time.

No changes are to be made in the "common section" (blocks 1 through 26) of the resume before June 30, 1965. At that time changes will be considered to reflect the experience of NASA, DoD and any other participating agencies. As of July 1, 1965, reports of all on-going work units will be available in resume and magnetic tape format.

Exchanges of data are scheduled between NASA and the DoD twice within the Fiscal Year, the first being on Feb. 1 and the second on Aug. 1, 1965. Composite documents based upon both DoD and NASA work unit reports in selected areas, comparable to the NASA "Research and Technology Program Digest," will be prepared for both DoD and NASA. All exchanges will be under the auspices of the Secretariat SSRT Panel.

An Ad Hoc Working Group on Technical Disciplines will be established under the SSRT Panel within 30 days to consider and recommend areas of research and technology interest most susceptible to continuing inter-agency comparison and decision-making regarding program goals and balance.

Typical of such areas are life sciences, materials, control-guidance, and navigation. The group will submit its recommendations by Oct. 1 and the Panel will accomplish final review and implementation on or before Nov. 1.

An Ad Hoc Working Group on Data Review also will be established under the SSRT Panel within 30 days to consider and recommend standardized processes, procedures and techniques for program review and decision-making in the various disciplinary areas. Recommendations will be made by Oct. 1 and the review and implementation by the Panel will occur on or before Nov. 1.

The agreement requires that on or before July 1, 1965, the DoD and NASA will consider modifications to adjust to the needs of other agencies, to guidance from the Office of Science and Technology of the Office of the President, and coordination by the Bureau of the Budget.

A concluding special provision is that information which will be exchanged in the program will be available for comparative analysis or dissemination within any organizational element in either the DoD or NASA.

It is also agreed that any comparative conclusions, tabulations, or other findings derived from the usage of this joint information, and intended for release outside either NASA or DoD, will be submitted to the agency desiring such release to the second party for review and concurrence.

DoD Launches Satellite Communications Program

Secretary of Defense Robert S. McNamara has directed the U.S. Air Force to proceed immediately with a program to orbit 24 satellites for an interim independent Defense Satellite Communications System.

This system will provide reliable, worldwide circuits, highly resistant to jamming and physical attack, for carrying essential military communications in times of crisis.

The satellites will be used with surface equipment installed by the U.S. Army. Three Titan III-C booster flights will be used, each to put eight satellites into near-equatorial orbits high above the earth.

An exact schedule for the launchings is now being developed by the Military Departments and the Defense Communications Agency. The first launching is expected in 1966.

The combination of the number of planned satellites, their orbital altitude and plane, their radiated power and their lifetime promises to provide a most useful initial satellite communications system. This system will be used to establish extremely reliable duplex high-quality voice circuits between several important military locations around the globe.

It will provide for the rapid initiation of additional circuits between the United States and almost any other location on the earth, using small, transportable terminals which have already been developed. A thorough testing of the system under operational conditions will be possible.

The decision to proceed with an independent military system followed the recent decision that a so-called "shared" Commercial-Military System would not be developed.

A "shared" system design, under consistent and detailed study by the Department of Defense and the Communications Satellite Corporation during recent months, was determined to be technically and operationally sound.

However, it was found that the necessary procedural arrangements for the development and operation of a "shared system" could not be made at this time as part of the international agreements still in negotiation. Under these circumstances, it was decided to proceed with the interim Defense Satellite Communications System.

By Ralph G. H. Siu

NO SNAKES. Too many projects have gone sour, not so much because the laboratory's work was incompetent, but because the Headquarters' question was incomplete. The situation recalls the story of the little boy fishing along the banks of a beautiful lake in the South. Several tourists saw the inviting water, as their car approached it.

The driver stopped the car and asked the youngster, "Son, are there any snakes in this lake?"

"No suh, no snakes in the lake," replied the boy.

Whereupon the men peeled off their clothes and enjoyed an hour and a half of fine swimming. When they came out, one of the men asked the boy, "How come there are no snakes in this lake?"

Said the boy with a half-grin, "Because alligators done et them up."

IT'S POLICY. Sticking to the traditional way of doing things just because "it's policy" and can't be changed seems to be the refuge of many a conscientious soul. Yet, it reminds me of Plutarch's story of Hiero (Moralia: How to profit by one's enemies—95 AD).

Hiero was reviled by one of his enemies for his bad breath. When he went home, he said to his wife, "Why haven't you told me of this?" But the wife, being virtuous and innocent said, "I supposed that all men smelt so."

ROSE SOUP. It takes a special combination of talent, it seems, to be capable of making astute esoteric scientific observations and yet have the final smidgen of plain horse sense to take the practical next step. This led H. L. Mencken to comment acidly about certain characters, when he defined the idealist as "one who, on noticing that a rose smells better than a cabbage, concludes that it will also make better soup."

THE FLY'S APPROACH TO R&D. Criticizing Edmond de Goncourt in 1891, Robert de Bonnieres wrote a description which may not be too wide of the mark for some of today's self-served "generalists."

He takes the sort of literary trepidation he has been indulging these past fifty years for the free flight of ideas. He has the eyes of a fly, eyes with facets, and like a fly, he alights on everything but penetrates nothing.

OCRD Personnel Movements Continue at Heavy Summer Rate

Personnel changes recently in staff assignments within the Office of the Chief of Research and Development have been continuing at the normal heavy rate during the summer when most moves of families are made.

Col Francis J. Pallister, new director of Special Weapons, OCRD, received a B.S. degree in journalism from the University of Oregon in 1934. Since then he has studied at the Army War College, Air Command and Staff College, Army Air Defense School and has taken various courses with the North American Air Defense Command.

His military experience includes service with the Army Field Forces, G3 Section, where he was responsible for monitoring the development of initial doctrine and literature for the employment of tactical atomic weapons and Nike Sam, 1950-53.

He has also served as director, Orientation and Employment Division, Field Command, Armed Forces Special Weapons Project, 1956-59 and executive officer, 45th Artillery Brigade, 1960-62, where he had primary responsibility for completing and placing in operational status the Missile Master and Norad Control Center.

COL OLIVER H. STEED, chief of the Biological Sciences Branch, Life Sciences Division, U.S. Army Research Office, was reassigned in August to Brooke Army Medical Center, Fort Sam Houston, Tex.

Previous to joining the USARO staff two years ago, Col Steed served as chief, Army Medical Services Career Planning, Office of The Surgeon General and from 1958-61 as commander, U.S. Army Europe Medical Service School and commander, 8th Evacuation Hospital, Germany.

From 1955-58, Col Steed was assigned to the Office of the Chief of Research and Development, Washington, D.C., following three years as an instructor at the Medical Field Service School, Fort Sam Houston, Tex.

ABRAHAM S. POLLACK has taken a GS-14 post as general engineer (reliability) with the Activities Branch of the Policy Division.

Born in New York City, Pollack graduated from the City College of New York in 1947 with a B.S. in electrical engineering. Since then he has pursued graduate studies in electrical engineering, mathematics and reliability at the University of Maryland, Polytechnic Institute of Brooklyn and Radio Materiel School.

LT COL KIRBY LAMAR is a new staff officer in Combat Surveillance, Electronics Warfare and Avionics, Communications-Electronics Division.

A U.S. Military Academy graduate in 1949, he earned an M.S.E. in electrical engineering from the University of Michigan in 1955. His military schooling has included the British Staff College (1961), Command and General Staff College (1960), Fort Monmouth's Signal School (1959), Fort Benning's Guerrilla Warfare and Airborne Schools (1950-51) and Monmouth's Basic Signal Officers Course.

His most recent assignment was as staff officer with the Signals Division of the Combined Military Planning Staff, Central Treaty Organization, Ankara, Turkey, 1962-64. He has been assistant chief of the Technical Staff, U.S. Army Signal R&D Laboratories at Fort Monmouth, N.J. (1959-60) and chief, Drone Division, Combat Surveillance Department, U.S. Army Electronics Proving Ground, Fort Huachuca, Ariz. (1955-59).

LT COL HAROLD C. KINNE, Jr., has been designated deputy chief of the Chemical-Biological Office. After earning an Sc.B. degree in chemistry from Brown University (1949) and an M.S. in physics from Navy Postgraduate School, he earned an M.B.A. from George Washington in 1963 while concurrently attending Air Force Command and Staff College.

During World War II he served in the European Theater with the 90th Infantry Division, 1943-46. From 1959-62 he served as an instructor in CBR defense with the 7th Army Training Center in Germany, where he headed the 1st Davy Crockett instruction team.

LT COL JESSE A. FIELDS has been assigned to the Space Office. Graduated from the U.S. Military Academy in 1946, he has completed Command and General Staff College; the Basic and Advanced Artillery courses; Staff Officer's Guided Missile Course; and Hawk Officer's Qualification Course.

LT COL EDWIN A. RUDD has been designated for service with the Nike X Branch, Army Ballistic Missiles Office. He received an M.S. degree in engineering from Purdue University in 1957 and has completed schooling at the Command and General Staff College.

Col Rudd recently returned to the United States after two years on Kwajalein, Marshall Islands, where he was chief of the Nike X Operations Division, Pacific Field Office. Prior to that he was with the R&D Division at Redstone (Ala.) Arsenal and with Development and Proof Services at Aberdeen Proving Ground, Md.

Col F. J. Pallister

LT COL OSCAR C. VIGEN, fresh from two years as comptroller, Tenth Army Corps, Fort Lawton, Wash., is newly assigned to the Programs Branch, Program and Budget Division.

Col Vigen's military schooling lists attendance at the Officer Candidate Infantry School; Armored School advanced course; Command and General Staff College regular course; and Army Management School.

His decorations include the Bronze Star Medal with two Oak Leaf Clusters, the Purple Heart with one Oak Leaf Cluster and an Army Commendation Medal.

LT COL THOMAS R. OSTROM was assigned to the Medical and Biological Branch, Life Sciences Division after serving as consultant and then Project Officer in the Greenland Waste Disposal Study since 1960.

Born in San Francisco, Calif., Col Ostrom received a B.S. degree in civil engineering from the University of California in 1944. He earned a master's degree in sanitary engineering from Harvard University (1948) and Ph. D. degree from Harvard University (1955).

He has had articles published in *Military Medicine* (1961), *The California Engineer* (1941), *USAREUR Medical Bulletin* (1964), *Journal of the Water Pollution Control Federation* (1962), and the *WRAIR Management of Mass Casualty Series* (1961).

LT COL HAROLD G. De ARMENT has been assigned to the Tactical Missile Branch, Missile Division. He recently completed a course at the Army War College after attending the Air Command and Staff School at Air University, Maxwell AFB, Ala.

As a civilian, he received an M.S. degree in electrical engineering from the University of Pennsylvania (1950) and has been registered as a professional engineer in New Mexico.

Col De Arment has had duty tours in Germany (1961-63) as commanding officer of the 7th Howitzer Battalion, 8th Infantry Division, and in Korea as assistant to the Chief of Staff, 1st Cavalry Division. His decorations include the Bronze Star Medal, Army Commendation Medal with Oak Leaf Cluster and Air Medal with Oak Leaf Cluster.

LT COL HAROLD W. HORNE, who was born in Honolulu and attended the University of Hawaii for two years as an undergraduate, has been assigned to the Missile Division.

Col Horne was recently CO of the 2nd Battalion, 21st Artillery (Little John) 1963-64. He has been Missile and Nuclear Action Officer, USARPAC, 1961-63; chief, Technical Inspections, 8th Army IG Section, 1960-61; and chief, Research and Review Branch, HJ/Lax Division USAAMS, 1956-59.

LT COL ERWIN R. BRIGHAM recently began duty in the Standardization Branch, International Division.

Graduated from the University of Illinois in 1950 with a B.S. degree in social science, he earned an M.A. degree in foreign affairs from the University of Virginia in 1957. His military schooling lists the Career Course at Army Armor School (1951) and Pakistan Command and General Staff College (1953-54).

CAPT DONALD R. CAMPBELL has been assigned to the Operations Research Branch, Human Factors and Operations Research Division. Born in Temple, Tex., he received a B.A. degree in mathematics from St. Mary's University of Texas (1954) and an M.B.A. in Operations Research from Tulane University.

Between 1961-62 he served with the Intelligence Research Office, 502nd MI Battalion. Other service includes battery commander at Fort Sill, Okla. (1960); Intelligence Research Office, 3rd Operations Group, 4th USA Advisory Group (1957-60) and Battery Commander, Battery A, 2nd Field Artillery Battalion (1956-57).

MAJ THOMAS N. ELLIS takes over as chief of the Industrial Liaison Branch in the Technical and Industrial Liaison Office. Born in San Antonio, Tex., Maj Ellis is a 1952 graduate of the U.S. Military Academy and has attended the Command and General Staff College and taken the Artillery Advanced Course.

His most recent duty tour was as Assistant Chief of Staff, Operations, with the Special Weapons Office, Headquarters, U.S. Army Southern European Task Force (1960-63).

MAJ EDWIN S. TOWNSBY, assigned to the Combat Materiel Division, received an M.P.A. degree in political economy and government from Harvard University in 1953 and then went to the University of Illinois for an M.S. and Ph. D.

He has attended the Ground General School (1949), Basic Engineer Officers Course (1950), Airborne School (1952), Advanced Engineer Officers Course (1954-55), Ranger School (1959) and Command and General Staff College (1963-64).

MAJ MORRIS J. KELLER recently returned from Ethiopia where he was an Operations and Training Officer with the U.S. Army element, Military Assistance Advisory Group (1962-64). He is assigned to High Altitude Missiles, Air Defense Div.

In 1950 he graduated from the University of New Hampshire with a B.A. in economics. He has completed the Artillery Basic and Advanced Courses and Command and General Staff College as well as the Officer Guided Missile Course.

Vincent Succeeds Aines as S&TI Chief

(Continued from page 1)

Office, U.S. Army Munitions Command, Army Materiel Command, at Dover, N.J.

During World War II he served as a battalion executive and commander of 91st Chemical (4.2") Mortar Bn in Europe and the Continental United States (1944-46). Reassigned in 1946 to the Army Chemical Center, Md., he served until October 1949 as a product design and development officer.

Four years of duty as a U.S. Army standardization officer with Canadian Army Headquarters and the Canadian Defense Research Board preceded his assignment in 1953 to the Development Branch, Research and Development Division, Office of the Assistant Chief of Staff, G-4. He then served two years as staff officer and as chief, General Materiel Branch in the Development Division, Office of the Chief of Research and Development, until June 1956.

In August 1958, he became director for Industrial Mobilization Planning, Army Chemical Center, Md., and then comptroller and assistant to the commanding general at the Center until August 1961.

Graduated from the University of Wyoming in 1948 with a bachelor's degree in general engineering, he received a master's degree in business administration from Stanford University in 1958. His military schooling includes the Army Chemical School, Infantry School, Naval Intelligence School (Russian Language), Command and General Staff College, and the Armed Forces Industrial College.

Col D. L. Vincent

APG Starts Construction On New Radiation Facility

U.S. Army capabilities for research with radioisotopes will be increased at Aberdeen Proving Ground, Md., by a new radiation applications building scheduled for completion in February 1966.

Estimated to cost $900,000, the facility is being constructed for the Ballistic Research Laboratories (BRL). It will provide storage for radioactive materials and a laboratory where existing and future weapons systems can be subjected to exposure to ionizing radiation sources.

BRL commander, Col Charles D. Y. Ostrom, Jr., stated during recent ground-breaking ceremonies that the radioisotope laboratory "will expand our research capabilities in both the physics and chemistry of propellant behavior, in the physical behavior of projectiles and armor at impact conditions, and in other ways that cannot be foreseen today. The latter often turn out to be the most important."

Present for the ceremonies were Lt Col Grant R. Brickell, BRL executive officer; Dr. Frank E. Grubbs, acting technical director, BRL; Dr. Joseph H. Frazer, chief, Interior Ballistics Laboratory, BRI; Dr. Edward E. Minor, chief, Terminal Ballistics Laboratory, BRL; Carman Cialella, supervisor, Nuclear Radiation Section, Terminal Ballistics Laboratory; and Norton H. Newberry, District Engineer Office.

Former Top Secret Material Fills Many Army, Industry Needs

By Harold F. Davidson

Research in Review...

Harold F. Davidson

Harold F. Davidson joined the Advanced Technology Branch, Army Research Office, in June 1963. His present assignment includes identifying applications in research results and the analysis and evaluation of possible solutions to Army problems in terms of available engineering and technology.

Graduated with a B.S. degree from the College of the City of New York (1940), he did extensive graduate work in research in chemistry at the Brooklyn Polytechnic Institute, and received an M.S. degree from George Washington University. Recipient of a Secretary of the Navy commendation for outstanding performance in international standardization as a member of various ABC and NATO technical standardization panels, he is a member of the American Society for Testing and Materials, and Society of Automotive Engineers.

One of the fascinating stories of research and development achievements in the past quarter century concerns an extraordinary family of chemicals—the fluorocarbon polymers—and the scientific and engineering feats that made them available to man at a critical moment in his affairs.

It is a stimulating story of basic research—the unrequited search for knowledge for the sake of knowledge with no application necessarily in view. As one scientist put it, "Nature is inexhaustible." One has but to look to find.

The story begins with a molecule, a minute particle containing tens of thousands of atoms of fluorine and carbon tightly bonded together. One of the partners, fluorine, is among the most volatile of all chemical elements; alone, it will burn water or concrete. Yet, united with carbon, it yields an organic material as inert as any known solid.

Discovery of fluorocarbon polymers was made, paradoxically, by scientists researching refrigeration gases. Working at Du Pont's Jackson Laboratory in New Jersey one morning in April 1938, they found a gas cylinder, supposedly empty, that weighed about as much as when it was almost full. Inside they found a white, waxy solid that, in testing, would yield to no conventional solvent and was unaffected by extreme temperatures.

From the white, waxy solid at Jackson Laboratory came, first, fluorocarbon resins, trademarked "Teflon," that gave a new dimension to the world of plastics. Films, fibers, finishes, elastomers, and other materials followed, including a melt-processable Teflon, all of considerable interest to the Army because of the very unusual properties of the material.

Chemists studying the long fluorocarbon molecule since its discovery have deduced that a tightly bonded impenetrable shield of fluorine atoms surrounds and guards the interior chain of carbon atoms. This structure gives the fluorocarbon polymers their uniqueness and explains why they resist attack by the most corrosive chemicals, retain their strength at extreme temperatures, excel as electrical insulation, and are so slippery practically nothing sticks to them.

Fluorine is one of the wildest elements in the periodic table. A greenish-yellow gas, it will burn almost any substance. Yet, its violence—born of the need to unite with another substance—is transformed in union into a stubborn resistance to change. Its marriage to the placid carbon atom results in a solid material whose stability and inertness are unsurpassed among organics.

Tht long fluorocarbon molecule is made up of tens of thousands of basic carbon-fluorine units, expressed like this in organic chemistry:

$$\begin{array}{cc} F & F \\ | & | \\ (-C & -C)_n \\ | & | \\ F & F \end{array}$$

The closed-linked fluorine and carbon atoms form unusually strong, nonpolar bonds.

Called polymers and composed of countless long-chain molecules, they are impervious to such chemicals as strong acids because the carbon-carbon and fluorine carbon bonds resist being broken apart to form new partnerships with the atomic constitutents of nearby chemicals. These bonds are so strong that temperatures upwards of 750° F. are required to rupture them. The fluorine sheath prevents other elements having an affinity for carbon from attacking the carbon chain.

Some fluorocarbon polymers are rated for continuous service at 500° F. Above their melting or transition point of 621° F., they do not liquefy like other thermoplastic materials. Instead, they change from crystalline materials to translucent (amorphous) gels which still retain some mechanical strength.

When long-chain molecules like the hydrocarbon polyethylene are heated, the thermal energy causes extreme agitation of the molecules and their atoms. As the temperature increases, the molecular motion increases. Eventually, the intermolecular bonds are overcome and the polymer flows like a liquid.

In the fluorocarbons, the outer layer of fluorine stiffens the molecule. Thus the absorption of much greater amounts of thermal energy is required to reach the melting point. Even above the melting point the material does not become liquid because of the "enormous" size of the molecule.

As an electrical insulator, fluorocarbon polymers have three important traits. They exhibit the lowest dielectric constant and the lowest dissipation factor of all solid materials, and they retain these characteristics over a temperature range of from minus 450° F.—only nine degrees above absolute zero—to about 600° F., and over a frequency range of 10^1 to 10^{10} cycles per second. These traits derive, again, from the structure of the molecule.

Since the fluorine atoms are uniformly distributed over the lengths of the molecular chain, there is little or no tendency for a separation of charges into positive and negative poles. Thus, the material absorbs little electrical energy when exposed to an alternating electrical field (dissipation factor) and has a low capacity for storing electrostatic energy (dielectric constant).

Fluorocarbons polymers exhibit an extremely low coefficient of friction.

Practically nothing will adhere to them. When clean dissimilar materials, other than fluorocarbons, are pressed together, strong intermolecular bonds form. If sliding takes place, the new bonds may hold fast, with the molecular structure of one material breaking up. Shearing then occurs within the bulk of one material rather than at the surface.

When a fluorocarbon, with its tightly bonded molecular structure, is pressed against another material, the attraction that its molecules exhibit toward dissimilar molecules is scant, and shearing takes place at the surface. Result: low coefficient of friction. By the same token, dissimilar materials do not adhere well to surface of fluorocarbons. The intermolecular forces of attraction are too small.

These chemical, electrical, thermal, and surface properties led the fluorocarbon resins to be used as engineering materials, a field into which early plastics did not fit. At the same time, they presented problems in manufacturing and application which had to be solved before the resin could be valued in the market place.

In the early days of atomic energy, engineers on the Top Secret Manhattan Project faced the difficult problem of separating the volatile uranium isotope 235 from the more plentiful but inert uranium 238. Their solution called for equipment which would contain, without leaks, a highly corrosive fluorine compound that attacked all known gaskets and seals.

Teflon solved that problem, and the small quantities made were immediately preempted. Security-conscious officials referred to Teflon only by code—K 416—and anxiously guarded its production. The Teflon not required by the Manhattan Project went to other military uses. In explosives plants, where nitric acid destroyed gaskets of other materials; in radar equipment, proximity fuses for artillery rounds, and in airplane engines Teflon performed notably.

From a price of $18 a pound for the extremely limited supply in 1944 the price has fallen as production difficulties were overcome to about $3.25 in 1964.

Unlike cellophane or nylon, Teflon did not become widely known until long after its discovery. Its uses in such things as electrical, chemical, and varied industrial equipment were largely hidden from public view. Not until 1961, when nonstick frying pans lined with fluorocarbon resin were introduced in United States stores, did Teflon gain public identification.

Today, Teflon has a growing list of uses, obscure and obvious, hidden and visible, small and large. With Teflon, for instance, candy companies have eliminated sticking on their equipment and housewives have a range of easy-to-clean kitchenware.

Fluorocarbons insulate wire in jet fighters, equip spacecraft and are vital to atomic submarines and their Polaris missiles. They are even used on the outside of periscopes in submarines as dry lubricants, replacing the grease of days gone by.

The material is also used as replacement for human arteries, bearings that may outmode grease in an automobile and on shells developed for antiaircraft use by the Navy.

The Vanguard I Satellite launched over five years ago used antenna insulators of Teflon. Wire insulated with Teflon was also used in the recent Mariner Venus probe.

Direct military uses are many. A protective suit made of Teflon fiber and film surfaced with 24-kt. gold provides protection from flash temperatures up to 3000° F. for men handling exotic fuels. Army aircraft operating in Greenland are equipped with skis coated with sheets of Teflon for landing gear.

An astounding number of military specifications — approximately 34 — have been written about Teflon products covering a wide gamut, including fabricated shapes such as rods and tubes, electrical insulation, hose, film, tape, laminates, seals, coatings and surface treatment, capacitors, connectors, rings, terminals, and wire and cable. There are also at least an equal number of specifications by nongovernment groups such as The American Society for Testing and Materials, the Society of Automotive Engineers and the Society of the Plastics Industry.

Sprayed on metal and other surfaces, Teflon has unique lubricative properties and provides just about the lowest coefficient of friction of any material known. The latter quality has long fascinated both the theoretical scientist and the equipment designer. The promise of simplified design, improved mechanical efficiency and minimized lubrication difficulties has encouraged many research and development programs in military laboratories—particularly at the Naval Research Laboratory and the Pitman-Dunn Laboratories of Frankford Arsenal—leading to many practical nonlubricated and minimally lubricated mechanisms in military equipment.

Recent work under military contract at the General Plastics Corp., Bloomfield, N. J., has developed a method for electro-depositing Teflon coatings much like chrome is deposited on steel. While not producing films quite as good as the spray type, the process provides a coating much faster and cheaper than conventional spraying. It has a major advantage of being able to coat the interior of pipes and other circular shapes as well as irregular forms which would not be done by spraying. This advance will enable many new uses and solve many problems which posed difficulties previously.

Considerable research is continuing in fluorine chemistry of all kinds, particularly with a view toward producing more, and possibly, cheaper materials offering even better properties than the very versatile Teflon.

Discovery of these materials will have a profound effect on the Army, enhancing its ability to operate in all climates and in all parts of the world. Improved logistics, for instance, will result from electrical equipment smaller in size than today's, but performing the same function. Teflon has been, in its own way, a major contributor to the Army's mission. Continued basic and applied research in fluorine chemistry will undoubtedly enhance Army capabilities today believed most difficult of attainment.

Army Reserve R&D Unit Member Elected ASTM Committee Secretary

Maj Glenn L. Cook, a member of the 5010th U.S. Army R&D Unit, was recently elected secretary of the American Society for Testing and Materials E-14 Committee on mass spectrometry at their 12th annual meeting in Montreal, Canada.

The committee, whose purpose is to promote the art and science of mass spectrometry, has achieved worldwide recognition as the outstanding group in its field. Maj Cook, a research chemist at the Bureau of Mines, has previously served in several subordinate offices in the committee, including the executive board and the chairmanship of a subcommittee studying the mass spectrometry of high-molecular-weight organic compounds.

Glenn L. Cook

Canal Zone Zodiacal Light Study Weighed

Final evaluations are being made of a pilot project on zodiacal light measurements conducted in the Canal Zone (C.Z.), June 8-19, by a contract team from the University of Minnesota.

Supported by the U.S. Army Tropic Test Center, Fort Clayton, C.Z., and sponsored by the Office of Naval Research, the team of scientists included Dr. E. P. Ney, F. B. Gillett, W. F. Huch and R. W. Maas.

The zodiacal light is a phenomenon discernible several hours before sunrise and several hours after sunset. Appearing as a cone of diffuse light, it is most visible where the ecliptic is vertical. Consequently, it is studied most easily where latitudes are between $\pm$ 20°, i.e., in the tropics.

Zodiacal light is originated by means of the scattering of sunlight by dust and electrons in the Solar System. The interplanetary electrons are of astrophysical interest because they produce such phenomena as magnetic storms and auroras.

The recent experiments involved balloons carrying telescopes and flying at 100,000 feet. Each flight had two telescopes, one working at visible wavelengths (approximately 4,500 angstroms), the other at infrared wavelengths (9,000 angstroms).

Researchers anticipated that the infrared telescope, with a mirror of 12-inch aperature, would emit a different relative response to the light scattered by the zodiacal dust than the visible telescopes because the dust is believed to be about one micron in diameter. This size is about the wavelength of the infrared light, but much larger than the visible wavelength. The purpose was to study the dust to electron ratio by comparing results obtained with the two telescopes.

Because the zodiacal light is polarized, both telescopes had rotating polaroids, to permit determination of its polarization as well as its intensity.

The balloons were launched at night to observe the morning zodiacal light. While each balloon was at ceiling altitude, the telescopes were slowly rotated in azimuth. The light intensity to which they were exposed was measured by photo multipliers and telemetered at 1,680 megacycles to the ground station.

As the telescopes revolved, the field of view could be determined by the stars that passed in and out and by the passage of the Milky Way and zodiacal light through the field. As expected, the brightness of the zodiacal light, compared to the Milky Way, was very different at the two wavelengths.

Upon completion, the final evaluation of the study will be available from Dr. E. P. May, University of Minnesota.

Army Engineer Wins SA Grant to Study Vibration

An outstanding young Army engineer hopes to advance U.S. Army helicopter design during a year of study in England under a Secretary of the Army Research and Study Fellowship at the University of Southampton's Institute of Sound and Vibration Research.

Frank W. Taylor, a 29-year-old, GS-14 aerospace engineer at U.S. Army Materiel Command (AMC) Headquarters, Washington, D.C., will leave in October to study ways to reduce helicopter noise and vibration without reducing payload and other capabilities. Currently he is chief of the Research and Development Branch, Technical Management Div.

Normally, to receive a Secretary of the Army Research and Study Fellowship, an applicant must be at least 35 years of age and have a minimum of five years' consecutive service with the Department of the Army. Importance of Taylor's project resulted in waiver of the requirements.

General Frank S. Besson, AMC commanding general, stated in indorsing the SA Fellowship application: "Mr. Taylor's proposed study would provide opportunity for his development in the field of helicopter noise and vibration and would materially contribute toward the progress and achievement of the Chinook project. This research and study project is considered to be of benefit to the U.S. Army Materiel Command and the Department of the Army in the development of helicopters."

Lt Gen William W. Dick, Jr., Chief of Research and Development, also recommended approval.

Taylor spent 1956-57 with the Vertol Division of Boeing Aircraft Co. following graduation from Union College (Schenectady, N.Y.) with a B.S. degree in mechanical engineering. He began his Federal service career as a GS-7 flight test engineer in the VTOL/STOL Branch with the Naval Air Test Station, Patuxent River, Md., where he served for six years and authored nine engineering reports on helicopter tests and studies. He is a graduate of the U.S. Naval Test Pilot School.

Frank W. Taylor

Aviation Pathologists to Hold 5th Scientific Meet, Oct. 12-14

Under auspices of the Armed Forces Institute of Pathology, the Joint Committee on Aviation Pathology will convene in Washington, D.C., Oct. 12-14, for its Fifth Scientific Session.

Walter Reed Army Medical Center will be the scene of guest speaker and technical paper presentations by scientists from the United States, United Kingdom and Canada.

Planned sessions cover a wide range of subjects, including legal aspects of aircraft accidents, pathological problems associated with mass casualties, preventive medicine and aviation, aircraft accidents at sea, investigation of aircraft accidents under difficult geographic conditions, recent work in anoxia and decompression, and toxicology.

The Joint Committee on Aviation Pathology was established by the U.S. Department of Defense in 1955 as a central coordinating committee concerned with all matters relating to the role of pathology as applied to aviation and flight safety. Operating under the AFIP, the Committee serves as a focal point for the dissemination of information.

Membership of the Committee consists of two representatives each from the three United States military services, the Royal Air Force, the Royal Navy, the Royal Canadian Air Force and the AFIP.

Application for registration for the Scientific Session should be made to: The Secretary, Joint Committee on Aviation Pathology, Armed Forces Institute of Pathology, Washington, D.C. 20305. Early application is recommended as the number which can be accepted is limited.

USAECOM Realignment Serving Balanced Planning, Operations

One of the major concepts embodied in the restructuring of the U.S. Army Electronics Command—better balance between planning and operations—is being accomplished, results of the past four months indicate.

Maj Gen Frank W. Moorman, USAECOM commander, stated when the restructuring plan was effected May 1 that "a better balance between planning and programing and the direction of operations was among principal objectives."

Responsibility for working toward these objectives was assigned to Brig Gen Paul A. Feyereisen, who had served as deputy commander of the USAECOM since December 1963, and Brig Gen Wesley C. Franklin, former commander of the Army Electronics Materiel Agency.

General Feyereisen was named Deputy CG for Plans and Programs and General Franklin took over as Deputy CG for Operations. Their duties, concerned with both headquarters and operating activities, encompass the whole life-cycle of electronic equipment—research, development, production engineering and procurement, and materiel readiness.

Activities and functions assigned to General Franklin as commander of the Electronics Materiel Agency in Philadelphia were absorbed in USAECOM's new Procurement and Production and Materiel Readiness Directorates.

When broad-scale reorganization of the Army was announced in 1962, it came as no surprise to General Feyereisen. He was one of three officers now assigned to the Army Materiel Command who served on the Hoelscher Committee study which led to the reorganization.

Both generals are in the select group who achieved that rank without graduating from the United States Military Academy. General Feyereisen entered the Army in World War II, in which he served in the China-India-Burma Theater, by way of an ROTC commission at the University of Minnesota. Postwar overseas service includes tours in Japan and Europe.

In 1952 he received a B.S. degree in economics and social studies from Sophia University in Tokyo, Japan, and was graduated with distinction (M.A. degree in business administration) from Harvard University in 1954. He is also a graduate of the Command and General Staff College, the National War College, and various other service schools. He holds the Legion of Merit with Oak Leaf Cluster and the Army Commendation Medal.

Brig Gen P. A. Feyereisen

Brig Gen W. C. Franklin

GENERAL FRANKLIN attended the University of Alabama and was graduated from Cornell University in 1938. He is also a graduate of the Army Command and General Staff College and of the National War College.

During World War II he served in the Pacific, taking part in the invasion of Iwo Jima and the Marianas Islands, and after the cessation of hostilities was assigned to Germany. In 1961-62 he was a Signal Officer of the I Corps in Korea. His decorations include the Bronze Star with V clasp, the Commendation Ribbon with Metal Pendant, and the Secretary of the Navy's Distinguished Unit Citation.

Copyright Office Considers Computer Program Policy

Computer programs may be registered for copyright under present law, the U.S. Copyright Office has decided after much consideration, but the courts may hold such copyrights invalid and refuse enforcement.

The Copyright Office defined a computer program as "either a set of operating instructions for a computer or a compilation of reference information to be drawn upon by the computer in solving problems. In most cases, the preparation of both of these types of programs involves substantial elements of gathering, choosing, rejecting, editing and arranging material."

The registrability of computer programs involves two basic questions: Whether a program, as such, is the "writing of an author" and thus copyrightable; and whether a reproduction of the program in a form actually used to operate or be "read" by a machine is a "copy" that can be accepted for copyright registration.

Both of these are doubtful questions, the Copyright Office contends. In accordance with its policy of resolving doubtful issues in favor of registration wherever possible, the Office will consider registration for a computer program as a "book" in Class A if:

- The elements of assembling, selecting, arranging, editing and literary expression that went into the compilation of the program are sufficient to constitute original authorship.
- The program has been published, with the required copyright notice; that is, copies or reproductions of the program in a form perceptible or capable of being made perceptible to the human eye bearing the notice have been distributed or made available to the public.
- The copies deposited for registration consist of or include reproductions in a language intelligible to human beings. If the only publication was in a form that cannot be perceived visually or read, something more (a print-out of the entire program) would also have to be deposited.

The detailed practices of the Copyright Office in this area will have to be evolved over a period of time, on the basis of experience.

Only half a dozen computer programs have been registered to date and most companies seem to feel that it is not in their interest to take the action necessary to obtain copyright protection.

A Copyright Office official predicted that eventually most companies would publish and copyright their computer programs. Video tapes are also being accepted for registration.

2nd Increments Pace Contracts for $114.6 Million

Second increments of 3-year agreements were prominent in recent U.S. Army contracts for research, development and production totaling $114,611,000.

Topping the list was a $47,669,767 second increment for 8,000 2½-ton trucks to Kaiser-Jeep Corp., Toledo, Ohio. The first increment of $61,359,935 for 9,853 trucks was announced June 12.

Ford Motor Co., Tractor Division, Highland Park, Mich., received a $25,423,983 second increment for 10,000 ¼-ton utility trucks. The first increment of $25,740,861, also for 10,000 trucks, was announced Feb. 10.

A second increment to Continental Motors Corp., Muskegon, Mich., for 8,000 multifuel engines totaled $14,939,440. A $20,830,803 increment was issued June 12.

Sperry Rand Corp., Salt Lake City, Utah, received a $5,352,974 modification to a contract for modification kits for the Sergeant missile.

Cardinal Contracting Co., Inc., Dallas, Tex., for $3,917,606, will build a classified study and mission staging facility and other structures at Fort Bragg, N.C.

Radio Corp. of America, RCA Service Co. Division, Camden, N.J., will design, furnish and install a Solar Simulator System for $3,298,562.

International Fermont, a division of Dynamics Corp. of America, Suffern, N.Y., was awarded a $3,090,700 second increment calling for 3,100 gasoline-driven engines.

Canadian Commercial Corp., Ottawa, Canada, received a $2,600,000 letter contract for lightweight airborne Doppler navigation systems for Mohawk aircraft.

General Atronics Corp., Philadelphia, Pa., received a $2,220,000 award for service test models of the Terminal Digital Data, AN/GSC–10 (Kathryn Technical Data Package) and auxiliary items.

Sperry Rand Corp., Univac Division, Washington, D.C., was awarded $2,000,000 contract for the purchase of previously rented classified electronic equipment.

Philco Corp., Blue Bell, Pa., will provide service and materials to modify an existing communications system for $1,998,000. Hupp Corp., Hercules Engine Division, Canton, Ohio, will produce 3,100 gasoline-driven, 2-cylinder, 20-h.p. engines under a $1,788,855 allotment. An increment of $2,205,927 was announced June 19.

TRECOM Contracts $607,000 for Flexi-Wing Gliders

Two contracts totaling $607,000 were issued recently by the U.S. Army Transportation Research Command for two new members of the flexible-wing family of cargo delivery vehicles under development.

The design, fabrication and testing contracts for $325,000 and $282,000 were issued for the Defense Department's Advanced Research Projects Agency (ARPA) to the Ryan Aeronautical Co., San Diego, Calif. They call for a Towed Universal Glider (TUG) and a Light Utility Glider (LUG).

Light Utility Glider (LUG)

Towed Universal Glider (TUG)

TUG will be designed to deliver 4,000 pounds of liquid petroleum or high-priority dry cargo, including ammunition, food, machinery and other essential items, into remote areas. A testing program will be conducted at the Army's Yuma (Ariz.) Test Facility when prototype vehicles are completed.

In limited-war applications, where conventional landing strips are difficult to maintain, TUG would enable helicopter squadrons to move into forward bases and establish fuel dumps and concentrations of other supplies required by ground troops.

LUG will be a further step in the development of the flexible-wing method of unmanned delivery of high-priority cargoes. The glider is towed by an aircraft to the vicinity of the drop zone, then can be cut off in mid-flight and radio controlled to a pre-selected landing location by "homing" on personnel on the ground. If necessary or desirable, the aircraft can land with the glider still in tow.

The air cargo glider concept multiplies the overall lifting capability of helicopters. Models have been tested successfully by Ryan for the Army and ARPA with various types of cargoes, including Jeeps and other light-weight wheeled carriers usually delivered inside transport planes. In tests with an OH–23G helicopter, the normal payload was multiplied almost four times.

XV-5A Hovers Successfully In Edwards Base Flight Test

The U.S. Army experimental XV–5A, lift-fan jet V/STOL aircraft, was successful recently in its first demonstration of hover flight at Edwards Air Force Base, Calif.

Lifted vertically on the jet thrust of two J85 engines channeled into two wing fans and a nose fan, the plane hovered motionless and then descended slowly for a landing. It was another step toward performing the full flight cycle from vertical takeoff through transition to conventional horizontal flight and vertical landing.

Under development by the U.S. Army Materiel Command's Transportation Research Command at Fort Eustis, Va., the XV–5A previously performed successfully in conventional takeoffs and landings.

By drawing atmospheric air through the wings, the fans augment the engine thrust by nearly 300 percent for vertical takeoff, hovering and landing. This advantage will make possible important savings in fuel consumption, flight test officials said, adn is expected to provide greater range and payload.

The XV–5A is being flight tested by Ryan Aeronautical Co., San Diego, Calif., which designed and built the aircraft under contract from General Electric. The latter is the developer of the lift-fan propulsion system and prime contractor for the XV–5A system.

OTS Translation Program Yields Soviet Technical Information

About 30,000 pages of scientific literature from books and articles originally published in Russian (22,000), Polish (3,800), and Serbo-Croatian (4,000) were translated into English during FY 1964 through the U.S. Department of Commerce (Office of Technical Services) and the National Science Foundation.

Since the program began in 1959, work has been initiated on about 204,000 pages. Translations completed by the end of FY 1964 consisted of 400 books, monographs, journal issues and reference works and nearly 600 selected articles, totaling about 118,000 pages.

The Russian language scientific literature, by far the largest, is translated in Israel. The Polish and Serbo-Croatian papers are translated in Poland and Yugoslavia by bilingual natives.

The translation program grew out of the Agricultural Trade Development and Assistance Act of 1954 (Public Law 480), as amended, which authorized the President of the United States to enter into agreements with friendly nations for the sale abroad of American surplus agricultural commodities for foreign currencies.

As a result of these sales, considerable sums in local currencies, usually referred to as P.L. 480 funds, have accrued to the credit of the United States in a number of foreign countries.

Under the terms of the sales agreements, or as required by the laws and regulations of the purchasing countries, the use of P.L. 480 funds is restricted to their loan or grant to the purchasing country for economic development or for the payment of certain U.S. Government expenditures within the country.

As a result of an amendment enacted on June 30, 1958, a new subsection (k) was added to Section 104, Title I, of P.L. 480, which made it possible for Government agencies to use these funds "to collect, collate, translate, abstract and disseminate scientific and technological information and to conduct and support scientific activities overseas" when such funds were appropriated by Congress.

In July 1958, the Bureau of the Budget requested the National Science Foundation (NSF) to assume responsibility for testifying before the Senate Appropriations Committee on behalf of all interested Government agencies in order to secure an appropriation of P.L. 480 funds for translation overseas of foreign scientific literature.

Following this testimony, Congress appropriated $1,200,000 for the purchase of these currencies from the Treasury Department. In January 1959, an amendment to Executive Order 10560 assigned to the Foundation the responsibility for coordinating the budgetary requests of Federal agencies interested in acquiring foreign translations, and conducting the acquisitions program on their behalf.

Investigation revealed that funds and capabilities existed for translation programs in Israel, Poland and Yugoslavia. The NSF initiated negotiations with the governments of these countries and, in the spring of 1959, a contract was effected with Israel for translation from Russian. In late 1959 and early 1960 contracts were completed with Poland and Yugoslavia for publication in English of the results of research of the scientists of those countries.

Material is selected by the participating agencies on a pro-rata basis. Recommendations of academic institutions and professional societies and from scientists of contracting countries are forwarded to the appropriate agency for consideration for inclusion in its list of selections.

In its early stages the P.L. 480 program was administered by the National Science Foundation. As it gained impetus, however, the volume of operational detail became inconsonant with the Foundation's mission of leadership and policy formulation in the field of science.

Accordingly, in January 1961, the administration of the translation program was transferred to the Office of Technical Services (OTS), Department of Commerce, and an NSF grant was provided for this purpose.

The OTS was already equipped to announce and publicize translations completed and in process, and the Department of Commerce distribution facilities had been utilized from the beginning of the program. The NSF retained responsibility for planning and policy, submission of budgets and negotiations of contracts with foreign governments.

The categories of scientific information selected for translation under this program are those appropriate to the mission of the participating agencies:

Department of Agriculture—Animal science, plant science, forestry, soil science, production and marketing economics;

Atomic Energy Commission—Chemistry, nuclear physics, solid-state physics;

Department of Health, Education and Welfare—Medicine, surgery, neurology, nutrition, public health;

Department of Commerce—Mathematics, engineering, metallurgy, meterology, patents;

Department of Interior—Mining and minerals, reclamation, commercial fisheries and wildlife, geology and geography;

National Aeronautics and Space Administration—Geophysics, astrophysics, cosmochemistry, space vehicles;

Smithsonian Institution—Botany, geology, zoology, anthropology.

Bibliographies of current and past reports as well as the translated reports themselves are available from the Office of Technical Services, U.S. Department of Commerce, Washington, D.C. 20230.

Chemical R&D Labs Leader Chosen for ICAF Course

The U.S. Army Edgewood Arsenal Chemical Research and Development Laboratories' Developmental Support director will attend the 1964-65 course at the Industrial College of the Armed Forces at Fort Lesley J. McNair, Washington, D.C.

Dr. B. L. Harris was selected to take the 10-month course by a panel of top career civilians following interviews of candidates from throughout the U.S. Armed Forces.

The Industrial College prepares high-level careerists for management assignments or important staff command positions.

Dr. Harris, a native of Savannah, Ga., is a graduate of the Johns Hopkins University in Baltimore, Md., with a major in gas engineering, class of 1938. In 1941, he earned his Ph. D. in chemical engineering, and served as assistant professor of that subject at the university for eight years. He also was a consultant to numerous industrial companies.

In 1952 he joined Edgewood Arsenal in the Research and Engineering Command and was promoted to his present position with the Chemical Research and Development Laboratories in September 1962.

Among his professional affiliations are Sigma Xi, Scientific Research Society of America, Armed Forces Chemical Association, Reserve Officers Association, the American Ordnance Association, Alpha Phi Omega and the American Association for the Advancement of Science.

Army Cuts Costs By $837 Million

The U.S. Army estimates it will save approximately $837 million in Fiscal Year 1964 as its part in the Department of Defense Cost Reduction Program.

This contrasts with a FY 64 goal of $818 million and FY 63 cost reduction of $678 million. By the end of the third quarter of FY 64, savings totaled $655.4 million, about 80 percent of the goal.

Final official figures were not expected until near the end of August, almost two weeks after this publication went to press.

Deputy Chief of Staff for Logistics, Lt Gen Lawrence J. Lincoln, is manager of the U.S. Army Cost Reduction Program. Handling details of the program in his office is the U.S. Army Cost Reduction Group.

The FY 63 savings of $678 million represented 150 percent of the Army's assigned goal of $459 million. Cost Reduction Group officials explained that such a percentage gain over the goal will not again be possible because they are able to estimate savings more realistically and establish more accurate goals.

Twenty-four different areas of effort are involved in the Army Cost Reduction Program. The Office of the Chief of Research and Development (OCRD) monitors two areas—value engineering to eliminate "goldplating," and technical data and reports.

The latter area objective was established at $2 million but value engineering, by far the largest under OCRD monitorship, has a FY 64 goal of $32 million. By the end of the third quarter, 88 percent ($28.1 million) had been achieved and estimates made as this magazine went to press, indicated FY 64 savings of more than $60 million, with the possibility of an even higher figure.

Instrumental in topping the $32 million goal was Col Frank L. Havel, project manager for general purpose vehicles, U.S. Army Materiel Command, Warren, Mich. He was among the 19 DoD personnel presented Certificates of Merit by President Johnson July 21 for significantly contributing to the cost reduction program. (See August 1964 issue of this publication, page 36.)

Col Havel was recognized for savings to the Government of $21.4 million through cost design and procurement policies on 2½-ton trucks and multifuel engines. About $9 million of this saving will be considered as value engineering creditable to the OCRD-monitored program total. A $50 million goal has been set for value engineering in FY 1965.

Another area monitored by OCRD, Technical Data and Reports, at press time claimed savings of $1,916,000 or 95.8 percent of the FY 64 goal of $2 million.

The Army program was formally established by Army Regulation 11–20, dated April 19, 1963, which implemented DoD Directive 5010.6, Feb. 1, 1963, "Department of Defense Cost Reduction Program."

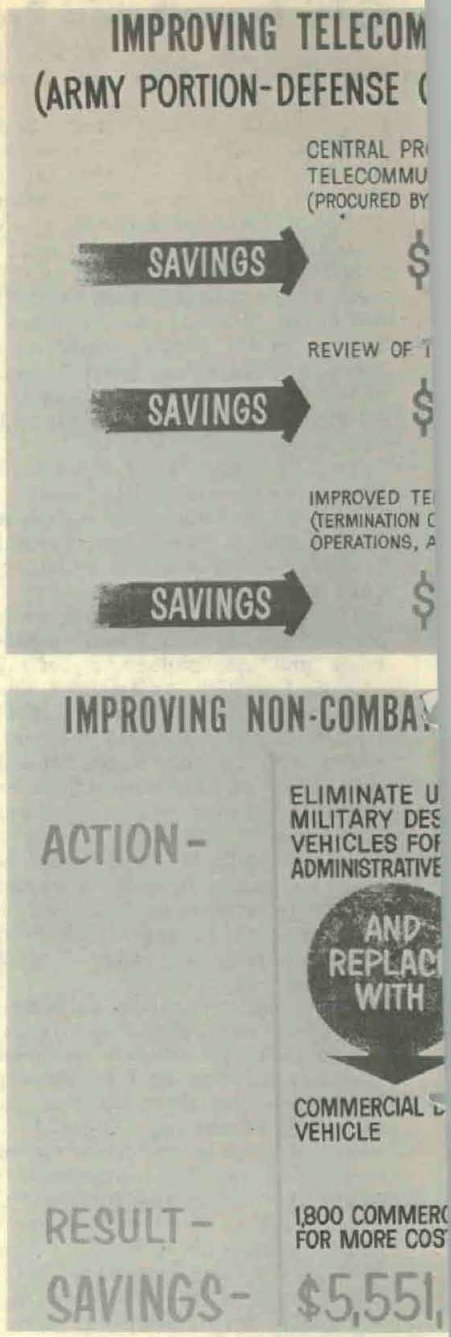
The DoD program was instituted by Secretary of Defense Robert S. McNamara in the fall of 1962 to "improve procurement and logistics management; reduce the costs of operating the Defense establishment, without impairing operating effectiveness; and provide a continuing measure of progress in terms of both of these objectives."

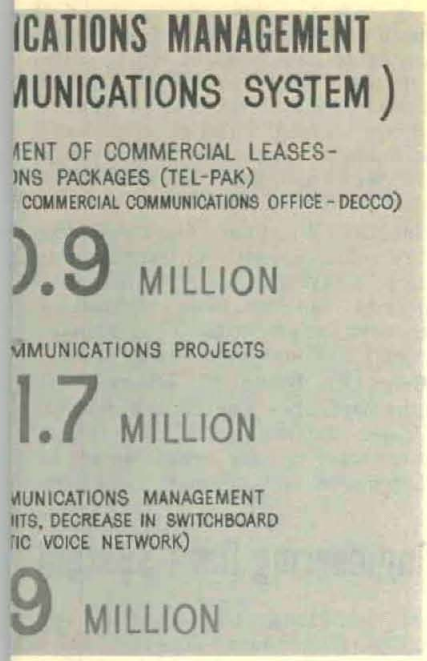
The DoD Program was subsequently expanded to encompass all functional areas. The Army effort is a matter of highest priority, calling for full and continuing support at all echelons, in accordance with AR 11–20. It includes: All functional activities of the Army worldwide; Headquarters, Department of the Army staff, and all echelons of each major command; all Army military and civilian personnel, including members and employees of the Army Reserve and Army National Guard.

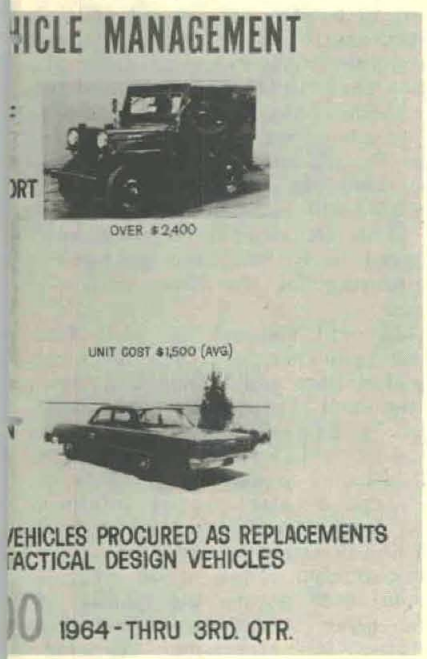
The first Army Cost Reduction Program Manager was Deputy Chief of Staff for Logistics, Lt Gen Robert W. Colglazier, Jr., predecessor to Lt Gen Lincoln.

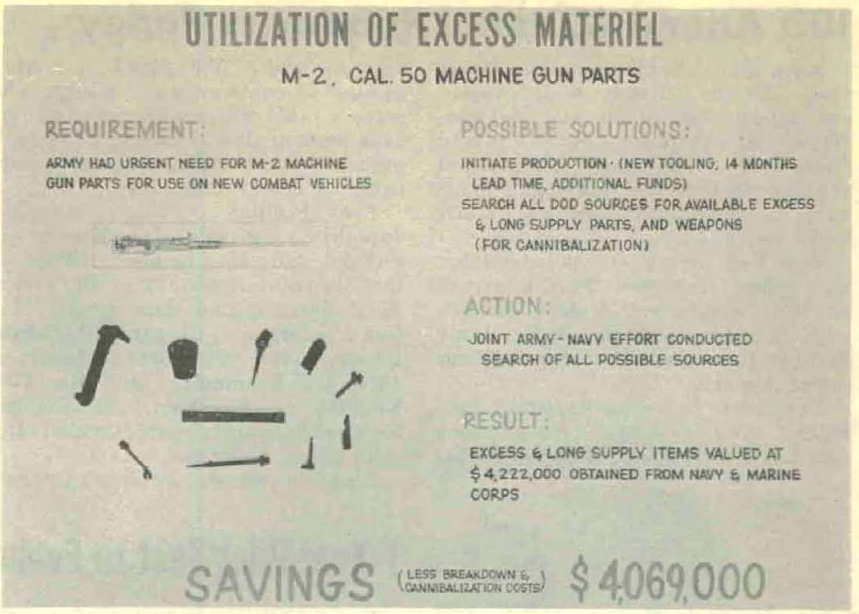
Listed below are 10 examples of significant cost reduction items accomplished during FY 1964:

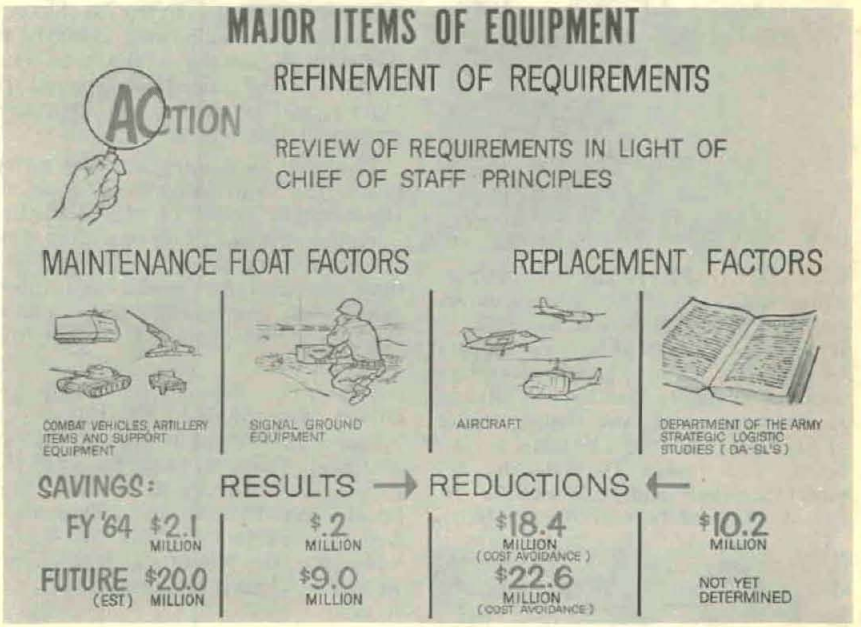
- The reduction of maintenance float factors to a realistic figure and the elimination of "float" from CONUS General Support Units saved $4.1 million and is expected to save another $29 million in the future.
- The reduction made in the Army Supply Pipeline during the past fiscal year saved over $8 million.
- The utilization by the Army of M2 machinegun parts excess to the Marine Corps reduced procurement requirements by $4,069,000.
- The use of propellants recovered from excess 120 mm., 240 mm., and 8-inch ammunition in meeting requirements for the new 175 mm. ammunition saved $5,132,000.
- A simple revision in specifications for laces used in jungle shoes saved $27,684 in FY 64 and is expected to save another $60,000 in FY 65.
- Eliminating "goldplating" by substituting an LDS–465 multifuel engine for a modified commercial design diesel engine in the 5-ton truck resulted in savings of $1,779,869.
- The shift to price competition in awarding contracts has resulted in large savings. As an example, this method of procurement saved over $10 million in purchasing AN/VRC 12 series radios.
- The consolidation, reduction or closure of bases and installations based on decisions made since 1961, involving 635 locations, will result in savings of $135.7 million.











• The replacement of military design vehicles with commercial vehicles for administrative support saved $5,551,000 in procurement costs during the first three quarters of FY 1964.

• The reduction in the use of contract technicians by developing an "in-house" capability has saved over $4 million in FY 64 and is expected to save an additional $8 million in FY 1965.

The U.S. Army has raised its cost reduction sights by nearly $100 million for FY 1965 by setting a goal of $917 million. All military and civilian personnel will be instructed to view current operations and spending with a jaundiced eye and keep alert to ideas which will save the Government money.

Department of the Army Circular 11–2, "Cost Cutting Ideas," offers some overall guidelines and numerous specific examples of ideas which have worked. The general suggestions to management personnel in the circular are as follows:

Initiate the cross-fertilization of sound cost-reduction ideas.

Provide samples of workable approaches to the solution of common management and operation problems.

Demonstrate the payoff attainable through the application of aggressive and intensive attention to specific problems.

Stimulate creative thinking in the evaluation of missions, organizational structures, policies, methods, procedures and performance to identify areas of possible improvement and savings.

The circular also cautions that actions and resulting savings should be documented and auditable under the criteria set forth in AR 11–20 as a prerequisite to incorporation in Cost Reduction Reports.

The document also encourages direct communication between activities with regard to cost reduction ideas and examples, including those listed in the circular.

100 Attend Materiel Readiness Parley

More than 100 maintenance officers from United States and oversea commands attended an Aug. 4-6 conference at Aberdeen (Md.) Proving Ground to analyze problems and recommend how the Army can make sure its equipment will be ready when needed.

The U.S. Army Ordnance Center and School sponsored the Conference on Maintenance and Materiel Readiness jointly with the U.S. Army Combat Developments Command Ordnance Agency.

Daniel M. Luevano, Assistant Secretary of the Army (Installations and Logistics), attended the final session at which five panel discussion groups presented their findings. The reports dealt with maintenance policy, organization and doctrine, personnel, maintenance material resources and equipment maintainability.

The leading speakers included Joseph C. Zengerle, Jr., director of Supply and Maintenance, Office of the Assistant Secretary of the Army (Installations and Logistics); Maj Gen Ferdinand J. Chesarek, Assistant Deputy Chief of Staff for Logistics (Materiel Readiness); and Maj Gen Kenneth G. Wickham, CG, Combat Service Support Group, Combat Developments Command.

Zengerle traced the Army's interest in maintenance and pointed out there is an acute awareness of the requirement for "instant readiness" as a national policy. General Chesarek said the term "materiel readiness" was unknown in the Army dictionary three years ago, but "today it is the hottest topic in town."

General Wickham discussed the Army's new doctrine of "functionalization," saying that "Maintenance functions can be more centralized than ever before with the organization of functional maintenance units."

Brig Gen David W. Hiester, CG of the Ordnance Center and School, indicated the conference proceedings are expected to have broad impact in maintenance and materiel readiness.

KEYNOTE SPEAKERS at Maintenance and Materiel Readiness Conference (l. to r.), Maj Gen Kenneth G. Wickham, CG, Combat Service Support Group, U.S. Army Combat Developments Command; Maj Gen Ferdinand J. Chesarek, Assistant Deputy Chief of Staff for Logistics (Materiel Readiness); and Joseph C. Zengerle, Jr., director, Supply and Maintenance, Office, Ass't. Secretary of Army (I&L).

Assistant Secretary of the Army (I&L) Daniel M. Luevano chats with Brig Gen David W. Hiester, CG of the USA Ordnance Center and School, during break in materiel readiness conference at Aberdeen Proving Ground, Md.

1-Year Pilot Test to Evaluate Engineering Data System

Practicability and value of a DoD Engineering Data Retrieval System Plan (EDRS), submitted recently to Assistant Secretary of Defense (Installations and Logistics) Thomas D. Morris, will be determined in a one-year pilot test started Sept. 1.

Prepared by a joint working group under the chairmanship of John E. Hinesbaugh, Office of the Assistant Director, Plans, Programs and Systems, Defense Supply Agency, the plan provides for mechanized interchange of engineering data among DoD activities and Defense contractors.

Others in the project group included Howard R. Ball, Bureau of Ships, and R. Preston Biglow, Bureau of Naval Weapons, Department of the Navy; Maj Harvey I. Mellion, Materiel Automation and Evaluation Group, Department of the Air Force; and John O. Weyforth, U.S. Army Research Office, Department of the Army.

Announcement of the pilot test was made in a memorandum directed to the Assistant Secretaries of the Army, Navy and Air Force for Research and Development and Installations and Logistics and to the Director of the Defense Supply Agency (DSA). It was signed by Dr. Eugene G. Fubini, Assistant Secretary of Defense, and Deputy Director of Defense Research and Engineering and by Mr. Morris.

The pilot test will encompass assembly by the DSA Electronics Supply Center of a mechanized engineering data file to consist of item data packages covering suitable items for interchange, including item identification data sheets, specifications, drawings, standards, test reports and other pertinent data.

The DoD file will be positioned at about 25 selected Government and industry activities engaged in research, development, testing and evaluation and production engineering. The Army Data Retrieval Engineering System (ADRES) mechanized data file, developed by the Army Missile Command at Redstone (Ala.) Arsenal, will be positioned at about 25 additional selected activities now engaged in RDT&E and production engineering for the Navy and Air Force.

DSA will manage the pilot test under guidance of the Technical Logistics Data and Information Committee and furnish to the ASD (I&L) a detailed plan for conducting the pilot test. During the test DSA will attempt to determine extent of use, type of user, results obtained, cost savings achieved, and overall test and investment costs.

In addition, DSA is to provide standards to assure the quality of data being interchanged and the facilities for processing, reproduction and distribution of the data to be included in the test.

Upon termination of the pilot test, DSA is to determine the usefulness of the plan, possible cost savings and estimates of personnel, cost and facilities required to implement a Defense-wide Engineering Data Retrieval System.

Military Departments will assist DSA by their assemblage and processing of engineering data for incorporation into the test, and by the monitoring of data file utilization at the selected activities and the recording and analysis of test results.

U.S. Army Scientists Continuing Polar Research in Greenland

U.S. Army scientists are carrying on a program of polar research projects in Greenland that began in 1952 and has continued with the harmonious cooperation of the Danish Government since that time.

Because three-fourths of the island lies north of the Arctic Circle, the research activities are usually conducted during the summer and fall when weather conditions are more favorable. Projects must have consent of the Danish Commission for Scientific Exploration of Greenland.

Each year, prior to commencement of operations in June, a representative of U.S. Army polar research briefs the Danish Commission on the Army's proposed scientific program in Greenland. In 1962 the Commission was briefed by the late Dr. Carl Eklund, in 1963 by Dr. Leonard S. Wilson, the chief, and this year by Donald C. Hilton, all of the U.S. Army Research Office's Environmental Sciences Division.

A number of the projects must necessarily extend over several years as, for example, the studies and tests in polar construction techniques, including foundation problems. Subsurface test structures, such as the snow tunnels at Camp Century and the ice and permafrost tunnels at Camp Tuto, must be measured periodically to study deformation and closure of these tunnels due to ice flow movements caused by pressure.

The deformation is caused by consolidation of snow under the footings of the tunnel roof arches and plastic flow of the snow when subjected to continuous loading. This results in subsidence of the roof arches and inward bulging of the snow walls.

The many facets of the Army arctic research program being carried out this year may be grouped into four areas: engineering or construction-related projects; general scientific studies such as glaciology, geology and meteorology; other scientific studies such as communications, geomagnetism and atmospheric physics; and surface transport, medical-human factors research and photo interpretation.

Using a thermal type of coring device, which achieved a depth of nearly 1,000 feet last summer, Army scientists are investigating changes which take place in the icecap interior and studying entrapped particulates within the ice itself.

Mr. Hilton explained in detail to members of the Danish Commission what the U.S. Army hopes to learn from study of the ice cores:

- From stratigraphy — whether any particular year was climatically mild or rigorous and the depth to which each year's precipitation sinks after falling on the surface, (an accumulation of thousands of years in the case of the deep layers).
- From a study of the entrapped particulates—the years when severe volcanic disturbances occurred and the years of severe drought.
- From an analysis of air trapped within the ice—the chemical composition of the atmosphere of past ages.
- From extra-terrestrial particles —those years having an occurrence of unusual meteoric activity.

Also of interest to Army polar scientists are soil studies such as frost action involved in the formation of the polygonal ground pattern common in permafrost regions and the sorting phenomena in areas of deep frost penetration which results in the segregation of coarse material from fine.

The Army has been developing ice-sounding techniques expected to yield a rapid means for obtaining the topography of the underlying bed rock.

Electromagnetic waves of particular frequencies readily penetrate the ice and it is hoped that a method can be perfected which will be more suitable than the slow, laborious seismic method used in the past.

The meteorological program also is being continued in the Camp Tuto and Camp Century area. There Army meteorologists have been amassing data concerning the boundary layer (the lower 100 feet of the atmosphere) for the past 3½ years. Until this year, two additional locations were used.

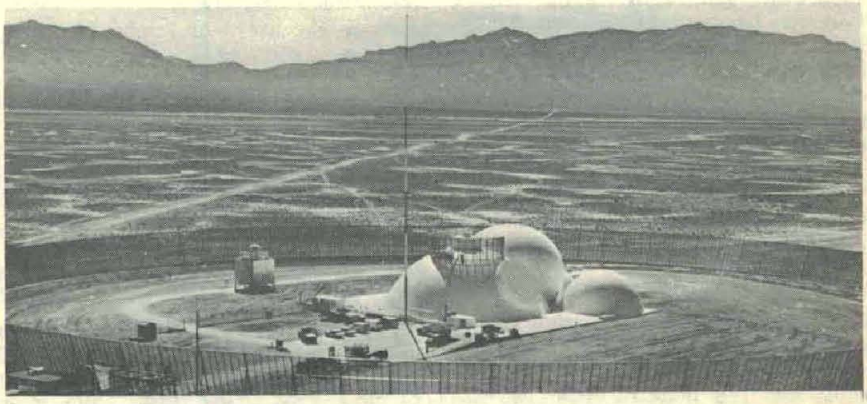
Army meteorologists maintain that the data should be continuous for at least five years to be of maximum usefulness. Related to the meteorological program is an investigation of light transmission over snow surfaces, intended to reveal a clearer insight into the radiation processes taking place immediately above the snow surface.

Other projects include such communications methods as electromagnetic wave propagation through the atmosphere and acoustical transmission through the ice.

Last summer, Army scientists in Greenland conducted experiments with long (up to five miles in length) radio antennas laid directly on snow 1,700 to 2,000 meters thick. Because of the low electrical conductivity of snow and ice, they were, in effect, suspended 1,700 to 2,000 meters above the ground surface. Experiments were described as highly successful and are continuing this year.

This summer an antenna is to be inserted 300 meters deep into the ice to conduct experiments with through-ice radio wave propagation.

Other current investigations involve problems of surface transportation, explosive-induced shock waves in ice and snow, and the imaging of surface features by airborne sensors. During all operations, personnel are observed by Army doctors for any physiological or psychological effects due to arctic environment.



TEST VERSION of Multi-function Array Radar (MAR), under development at White Sands Missile Range (WSMR), N. Mex., is expected to provide for defense against long-range ballistic missiles. Large dome contains MAR receiver equipment and smaller domes house the transmitters. A 2-story building beneath domes, containing two acres of floor space, houses the radar's electronic equipment. The radar is surrounded by a clutter-fence designed to cut down interference from radar beams reflected by the ground.

Army's Medical Unit Self-Contained Transportable (MUST) undergoes exposure to 80 m.p.h. winds generated by U.S. Air Force airplane in foreground during first environmental tests at Eglin Air Force Base, Fla., Climatic Laboratory.

MUST Passes Eglin AFB Environmental Tests

The Army's Medical Unit Self-Contained Transportable (MUST) has successfully passed its first environmental tests at the Climatic Laboratory of the Air Proving Ground Center, Air Force Systems Command, Eglin Air Force Base, Fla.

Hailed by military medical leaders as a highly significant advance in field treatment capabilities, the MUST was exposed for about a month to temperature extremes of —65° F. and +140° F., high-humidity conditions, winds up to 80 m.p.h., and 4 inches of rain per hour. (See May 1964 issue of *Newsmagazine*, p. 14, for initial feature article on MUST.)

Each of the MUST's various elements, including the air-inflated shelter, expendable shelter and utility pack, were under close examination by personnel of Airesearch Manufacturing Co., the principal contractor, and the Army Medical Service.

The principal advantages of the MUST are that it will provide a worldwide medical capability under any environmental condition, improve medical treatment capability in remote areas, allow maximum use of physicians' and nurses' skills in the field, and increase mobility of combat support units. Various quantities of its basic units can be combined to form any size hospital.

When not performing their basic function, the shelter containers of the MUST fold into a shipping container which can carry all equipment in addition to the basic load of supplies required to perform the primary medical function.

The surgery container features modern facilities for performing the most complex and delicate operations. It can fold into a small package that holds all equipment and can be carried by a standard 2½-ton truck, trailer, military cargo aircraft, helicopter, ship or rail.

The hospital ward container holds an inflatable ward shelter capable of providing intensive medical treatment for 20 combat casualties together with all basic hospital ward equipment.

It is anticipated that the MUST will be in the hands of selected Army Medical Service field units for service testing this fall.

The U.S. Air Force's Climatic Laboratory is a facility operated by the 3208th Test Group, Air Proving Ground Center, and is available for use by all Department of Defense agencies. Its complex consists of 12 chambers. The largest, where the MUST was tested, is an insulated hangar 250 feet wide, 200 feet deep, with a maximum height of 70 feet sloping to 35 feet at the sides.

ASTM to Hold Symposium on Surgical Implant Materials

Committee F-4 of the American Society for Testing and Materials (ASTM) will sponsor a symposium on surgical implant materials, in Indianapolis, Ind., Nov. 5-6.

Dr. Fred Leonard, scientific director of the U.S. Army Prosthetics Research Laboratory, Walter Reed Army Medical Center, Washington, D.C., will chair the symposium. Sessions will deal with: Principles of Polymer Implant Applications, Polymer Properties and Design, and Compatability. Advances in this field are critical to many operations for repair or replacement of damaged human organs.

Questions the symposium will attempt to answer include: What are the parameters involved in preparing tissue receptive materials? What is the relationship (if any) between molecular structure and tissue receptivity? What is the effect of physical form? What biological endpoints does one utilize to determine the receptivity of a material? Can we define more precisely the biomechanical environment in which the materials are to be used?

A wide range of mechanical properties available in polymeric materials make them attractive candidates for such uses. Although a material may possess the desired physical characteristics, there is no assurance that it will be successfully utilized in the body. Tissue acceptance is of prime importance and will receive the Committee's full attention.

This ASTM committee was organized in 1962 and is composed of outstanding orthopedic surgeons, metallurgists and research associates. Subcommittees actively work on standards in the areas of mechanical and physical properties, compatability, performance, implant applications and specifications on materials used for surgical implants.

Col Prosser Named Rock Island Arsenal Deputy CO

Col C. M. Prosser

The position of deputy commander, U.S. Army Weapons Command at Rock Island (Ill.) Arsenal, vacant since Mar. 1, was filled Aug. 17 when Col Charles M. Prosser reported for duty.

A graduate of the United States Military Academy in 1936, he is on the recently published list of colonels selected for promotion to brigadier general. Until reassigned he was international weapons and logistics officer in the Office of the Assistant Secretary of Defense (Installations and Logistics).

Brig Gen Roland B. Anderson, who had served as deputy commander under Maj Gen Nelson M. Lynde, Jr., became his successor when he retired from the Army on Mar. 1.

Army Scientist to Serve on 2 NAS-NRC Committees

An Army medical research specialist in hearing and vision has been appointed to committees of the National Academy of Sciences-National Research Council.

Lt Col William Hausman, MC, chief of the Behavioral Sciences Research Branch of the U.S. Army Medical R&D Command, Office of The Surgeon General, was recently designated Army representative on the Executive Council for the Committee on Hearing, Bioacoustics and Biomechanics (CHABA), and on the Executive Council for the Armed Forces-National Research Council Committee on Vision.

Alternate for both these positions is Dr. Glenn R. Hawkes, chief of the Neuropsychiatry Section of the Behavioral Sciences Research Branch.

These committees comprise representatives of the Navy and Air Force in addition to Army personnel and scientists from the National Aeronautics and Space Administration and from the Federal Aviation Agency.

Outstanding civilian scientists on these committees are appointed by the National Research Council. The committees avail themselves for consultation on problems peculiar to identification of targets, night vision, hearing protective devices, and other similar questions.

Army agencies or contractors desiring services from or representation on the committees should forward their requests through the Army representative.

Nike-X Project Manager Names Procurement Chief as New Deputy

Col I. O. Drewry, the Nike X project manager, has announced that Col Robert H. Bull, who has headed the Birmingham Procurement District for the past 13 months, is his new deputy.

A graduate of the Industrial College of the Armed Forces, Col Bull is a veteran of 25 years Army service. He will be involved in contracting for developmental services on the system as well as future planning in the procurement area. Nike X is the Army's single largest missile development program.

Col Bull holds a B.S. degree in education from Kansas State University and a master's in business administration from the University of Alabama. He is a graduate of the Army Command and General Staff College, the United Kingdom School of Land/Air Warfare, the Army Infantry School Advanced Course, and the Airborne School.

Viet Nam Tours Extended

Army Special Forces personnel on duty in Viet Nam will go on a 12-month tour, starting in October. The change will come about as Special Forces detachments from the continental United States phase into Viet Nam on permanent change of station orders instead of the 6-month temporary duty tour now in effect.

Special Forces units already in Viet Nam will not be affected by the new ruling, but detachments replacing them from the continental United States will come under the new tour.

ERDL, Industry Apply Hydraulic Systems Standards

Standardization of hydraulic systems on construction equipment initiated by the U.S. Army Engineer Research and Development Laboratories, Fort Belvoir, Va., is expected to enhance combat readiness and result in significant cost reduction.

Resulting from a cooperative effort with industry, the standards currently specify system hydraulic pressure, system oil, maximum system pressure drop, system filtration, component performance and endurance, component mounting pad and hydraulic port configuration, fitting and hose types and, in some cases, system circuit.

Future plans call for a Qualified Products List program for hydraulic system components, to establish a minimum standard of performance and endurance.

Standardization, aimed at better interchangeability, maintainability, reliability and quality, was initiated following an Army decision to require hydraulically controlled attachments, where practicable, in new construction equipment purchases.

Judging from the fact that the hydraulic system comprises 15 to 50 percent of the cost of 60 major items developed by the Mobility Command's Engineer Research and Development Laboratories alone, standardization of hydraulic systems Army-wide is expected to result in better, yet less expensive, equipment.

APG Specialist Patents Paint Remover for Metals

An Aberdeen (Md.) Proving Ground soldier who claims to be the great-great-great grandson of Davy Crockett is busy earning another kind of recognition at the Coating and Chemical Laboratory.

Sp/4 Joseph T. Crockett is an articulate, soft-spoken Alabaman who has perfected and patented a type of paint remover for metals. Graduated from Auburn University (B.S. degree in chemical engineering), the 25-year-old soldier was employed by Dupont de Nemours and Co. in Waynesboro, Va., until he entered the Army.

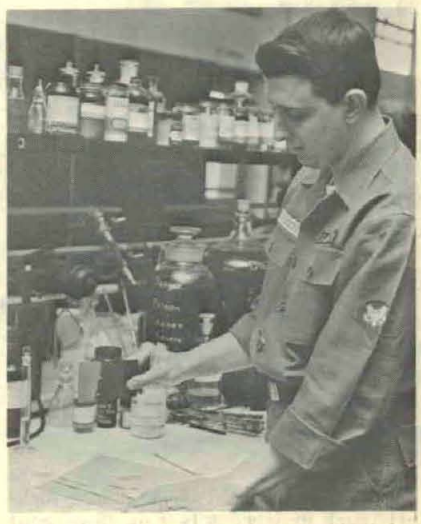
Specialist Crockett holds a patent on his paint remover and shares a patent on another coating and chemical product with Dr. Myer Rosenfeld, his supervisor. The remover takes paint off any metal surface rapidly, thoroughly and without damaging the metal.

In tests at Fort McClellan, Ala., to meet Federal requirements, the paint remover impressed the experts to the extent that it was put to use instead of a commercial remover at a credited saving of a dollar a gallon.

"I'm doing exactly what I did as a civilian chemical engineer," he explained. "Under the tutelage of Dr. Rosenfeld, I find I'm still in an academic atmosphere in which I learn even more as I go along."

Regarding his claimed relationship with Davy Crockett, Joe gives out with some tongue-in-cheek comments on his famous forebear.

"Old Davy was pretty much of a rogue," he said, "a skinny little man with strong convictions and a born wanderer and frontiersman. It is fairly well established that Davy headed to the Alamo to escape the limitations imposed on him by being the father of a growing family."



Sp/4 J. T. Crockett

Services, FAA May Combine Aeromedical Research

U.S. Army, Air Force, Navy and Federal Aviation Agency (FAA) representatives concerned with aeromedical research recently flew from Washington, D.C., to Fort Rucker, Ala., for a briefing on U.S. Army Aeromedical Research Unit activities.

The visit, an Army official said, may well be the first step in a cooperative effort in aviation medicine for the four Government agencies. The U.S. Army Research Office representative was Dr. Edward J. Baldes, Life Sciences Division.

The visitors were taken on demonstration flights, including the nap-of-the-earth flying technique (paralleling the ground's contours and obstacles) and were briefed on the full range of the Unit's research and testing activities in three general categories: hazardous environments, performance standards and efficiency measurement, aeromedical field operations.

Hazardous conditions within the cockpit of a helicopter being investigated, with the aim of alleviation, are noise, light reflection, air contaminants and toxic substances, forces of acceleration, ascending and descending (both in the plane and by parachute), temperature extremes, and ventilation.

Army aeromedical investigators pointed out that various hazards are posed during the firing of some of the new weapons systems designated as helicopter armament.

Light radiation and vibration and their effect on the vision of aviators and crew members, including the visible spectrum, X-ray and far infrared, also are being studied.

Too great or too little illumination produces a hazardous environment. Therefore illumination surveys are performed upon request by members of the Army Aeromedical Research Unit. Recommendations for improvement based upon accepted levels are made for both crew and passenger personnel, including air evacuation and aeromedical care requirements.

External environmental exposures from solar or nuclear sources, or reflected, are evaluated from an operational standpoint by considering spectral composition, intensity levels, duration and distribution.

Other physiological reactions of personnel during flight, fatigue and problems in connection with evacuation of casualties also are being studied and evaluated.

Engineer Labs Set Standard For Army Forklift Trucks

Improvements have been announced in the 6,000- and 10,000-pound models of rough terrain forklift trucks by the U.S. Army Engineer Research and Development Laboratories, Fort Belvoir, Va.

Better mobility, performance, reliability and maintainability will be provided in the units purchased by the Army in the future, on the basis of procurement "packages" recently completed by the Laboratories' Engineering Department.

Specifications, drawings and standards in the package eliminate previous restrictive features. They also establish adequate test procedures and quality provisions to insure that the equipment will meet user requirements. Diesel engines are required in lieu of the gasoline engines previously specified.

The forklift trucks are designed to operate in both salt and fresh water to a depth, including wave action, of five feet, to negotiate various types of terrain including slopes of up to 45 percent, and to travel at speeds of not less than 26 m.p.h. empty and 20 m.p.h. loaded.

ROUGH TERRAIN, 10,000-pound forklift truck undergoes test on 45-percent longitudinal slope at Fort Belvoir.

AMC Report Delineates Role in Cutting Defense Costs

The U.S. Army Materiel Command (AMC) basic challenge—"to do more with less"—keynotes its second anniversary status report to 192 million American shareholders.

The report shows the Command helped cut national defense costs through consolidating facilities, reducing personnel strength and saving dollars.

The U.S. Army Test and Evaluation Command, with headquarters at Aberdeen Proving Ground, played a large part in the savings as one of AMC's seven subordinate commands.

AMC Commanding General Frank S. Besson, Jr., commented: "In this era of rapid change—when weapons and equipment may become obsolete before they wear out, or are even produced . . . the challenge is enormous.

"That the nature of this challenge is recognized, and that it is being met successfully by the unified team which serves under the AMC shield, is of ever-increasing importance to our national defense effort."

AMC reduced its original 278 facilities to 214 in the 24 months since taking them over from the Army's Technical Services Aug. 1, 1962. The Command discontinued 41 installations and integrated 58 with other AMC activities.

Lowering military and civilian personnel numbers 7.5 percent has brought strength down to 172,000 from a peak of 186,000 two years ago.

Experts say AMC will save millions of dollars more than a $417 million cost reduction goal which the Department of the Army established for the Command during Fiscal Year 1964.

The Command achieved these and other savings while spending $8 billion last year for weapons, vehicles, communications equipment and necessary items for the Army and allied forces.

USARO Scientist Selected Among 47 for UCLA Course

Dr. Robert B. Watson, Physical Sciences Division, U.S. Army Research Office, was one of 47 scientists selected from across the Nation to attend a recent intensive 2-week course on "Modern Solid State Physics and Its Applications" at the University of California at Los Angeles.

Members of the UCLA Physical Sciences and Engineering faculties presented 18 lectures detailing important recent developments in solid-state physics. Discussion periods followed each lecture.

Among the areas considered were Masers and Lasers, thermal properties of solids, properties of metals, applications of optical spectroscopy and ultrasonics, and theories of superconductivity.

Dr. Watson, chief of the Physics and Engineering Branch, is known as one of the Army's leading authorities on Lasers and Masers.

Design of Experiments Conference Slated

The Tenth Conference on the Design of Experiments in Army Research, Development and Testing is scheduled Nov. 4-6 in Washington, D.C.

Sponsor of the conference for the Chief of Research and Development is the Army Mathematics Steering Committee, and the U.S. Army Research Office, Arlington, Va., will act as host. Dr. Frank E. Grubbs, associate technical director, Ballistics Research Laboratory, Aberdeen Proving Ground, Md., will be the presiding chairman.

The conference will be dedicated to the late Professor S. S. Wilks, Princeton University, who initiated the series of annual meetings and served as chairman until his recent death.

Guest speakers will include the British statistician, Dr. M. G. Kendall, Maj Gen (USA, Ret.) Leslie E. Simon and Dr. W. J. Youden, of the National Bureau of Standards. Chairman of the panel discussion on regression analysis is Professor Gerald E. Lieberman, Stanford University.

Additional speakers and panelists will be: Professors Oscar Kempthorne, Iowa State University, J. C. Kiefer, Cornell University, G. E. P. Box University of Wisconsin, Ingram Olkin, Stanford University, and John W. Tukey, Princeton University.

The agenda includes technical and clinical sessions. Technical sessions will afford Army scientists opportunities to share their successes in carrying out various types of experiments with persons in other installations.

Experiments which are in the predesign stage and unsolved problems are the types of papers slated for the clinical sessions. The author of a clinical paper needs only to define clearly a troublesome design problem and then let the panel members discuss the paper.

Further information may be obtained from Mr. Fred Frishman, chief, Mathematics Branch, Physical Sciences Division, U.S. Army Research Office, Arlington, Va. 22204.

2 New Members Named To Laser Advisory Group

Arthur B. Hook, who heads the Laser Research Section, Warfare Vision Branch, U.S. Army Engineer R&D Laboratories at Fort Belvoir, Va., and William A. Davis of the Army Missile Command, have been named as members of the newly established LASER Advisory Group (LAG).

Davis is chief of the Special Programs Office of the Future Missile Systems Division of the Directorate of Research and Development. Thomas Hunnicutt of his staff has been named alternate.

Established by the U.S. Army Materiel Command (AMC) to coordinate all phases of Army research and development in Laser technology, the LAG consists of representatives from the Command's major subordinate commands and laboratories. The LAG will advise, provide technical guidance, and assist AMC's Research and Development Directorate.

Other responsibilities include maintaining a current and continuing review of Laser scientific and technological developments, reviewing and evaluating all AMC Laser-related research and development efforts, and providing a coordinated Army input to the Department of Defense Special Group on Optical Masers.

The LAG will be headed by a chairman from the Physics and Electronics Branch, Research Division, Research and Development Directorate of AMC.

Natick Team Demonstrates Military Combat Rations

A briefing and demonstration of proposed U.S. military combat rations was presented by a team from the U.S. Army Natick (Mass.) Laboratories at the 109th tri-annual meeting of the Permanent Joint Board on Defense, Canada-United States.

The Board met at the U.S. Army Air Defense Center, Fort Bliss, Tex., to review recent developments in U.S. Army subsistence and weapons. Members prepared their own dinners based on the Long-Range Patrol Subsistence Food Packet and other selected dehydrated foods. Dinner entrees included chicken stew, beef and rice, chicken and rice, spaghetti with meat sauce, meat balls with beans, beef hash and chili con carne.

Cochairmen of the Board are the Honorable L. Dana Wilgress (Canada) and Ambassador H. Freeman Matthews (U.S.). The Board meets to consider problems relating to the defense of the northern half of the Western Hemisphere.

Cohosts of the meeting were Maj Gen J. D. Alger, assistant deputy chief of staff for Special Operations, and Maj Gen T. Slayton, commanding general, Headquarters, U.S. Army Air Defense Center, Fort Bliss.

The Natick Laboratories team was composed of Mrs. Frances Hemphill Lee, 2/Lt Clayton S. Huber and Sp/7 Eugene P. Schertz.

Picatinny Arsenal Managers Briefed by Explosives Ordnance Team

Top-level management at Picatinny Arsenal and U.S. Army Munitions Command Headquarters at Dover, N.J., was briefed recently on the mission of Explosives Ordnance Disposal Units.

The demonstration by members of the 66th Ordnance Detachment in Bellmore, L.I., was designed to gain support and understanding of some problems faced by explosive ordnance disposal personnel.

The function of Picatinny's Explosives Ordnance Disposal Office is to develop techniques for rendering harmless all missiles, rockets, bombs, or any munition that has become a "dud" or has been extensively damaged—to "outguess" the munition design.

Members of the demonstration team from New York are equipped to handle anything from a .22 caliber bullet up to and including nuclear weapons. The detachment has handled about 60 incidents in the past six months, and works closely with the New York City Police Bomb Squad.

Each of the 100 detachments strategically located throughout the world undergoes annual training at Aberdeen Proving Ground and Edgewood Arsenal, both in Maryland.

Lt Col Harry H. Olson, director of Picatinny's Ammunition Engineering Directorate, observes as two members of visiting New York Explosive Ordnance Disposal team demonstrate method of rendering a bomb fuze safe.

Missile Command Conducts Classified Briefing

The U.S. Army Missile Command briefed about 300 aerospace industry executives on classified aspects of the U.S. Army Missile development objectives for the 1970's, Aug. 10-12, at Redstone Arsenal, Ala.

A different group of 100 of the industrial representatives, along with officials of the Defense Department and other Army agencies, heard the briefing on each of the three days. Details of the structure of the Missile Command's research and development organization were also explained.

Missile Command personnel conducted question-and-answer-periods and panel discussions to clarify programs and long-range goals.

The sessions were the first sponsored by an Army agency since the Defense Department authorized the classified industry briefing program. Original plans called for the briefings in Washington, with presentations by all three military services, but facilities proved inadequate to handle all those who applied.

Army Mobility Forms Subject Of New Troop Info Pamphlet

Department of the Army Pamphlet 360–202 in the Troop Topics series, titled "Mobility," is now serving to inform all U.S. Army troop units throughout the world about modern Army vehicles and transportation needs.

Used as the basis of a lecture and discussion session in the troop information program, the pamphlet discusses the concept of mobility in relation to Army tactics and the importance of mobility in warfare.

Illustrations exemplify present Army mobility on the ground and in the air. Featured are such modern vehicles as the LARC aluminum amphibious cargo carrier, the full-tracked armored M-113 personnel carrier, Army helicopters (CH–47 Chinook, UH–1 Iroquois, CH–37 Mojave and others) and the Armored Vehicle Launched Bridge.

Purpose of the pamphlet is to acquaint U.S. troops with the full range of Army support vehicles and aircraft and their capabilities.

Research Register to List Nation's Industrial Labs

Bowker Associates, Inc., of Washington, D.C., will publish the 12th Edition of *Industrial Research Laboratories of the United States* under an agreement with the National Academy of Sciences-National Research Council, which last published an edition in 1960.

In addition, Bowker Associates will establish and maintain an "Industrial Research Register" in which the data appearing in the published volume will be supplemented with more current information and indexed in depth for retrieval.

Custom searches will be carried out for subscribers and others on a service bureau basis in order to identify R&D organizations with specific combinations of characteristics and capabilities.

New Publication Indexes Scientific Advancements

An illustrated booklet published by The Martin Co., "Contributions to Science and Technology," contains an extensive bibliography of the unclassified scientific papers, technical articles and books in which its specialists reported new techniques and innovations during 1963.

The booklet also summarizes inventions which earned Martin 22 patent awards last year. Bibliographical entries number 381. That figure includes 186 papers that appeared in international journals; 64 articles published in technical or trade magazines; 111 papers appearing in the official proceedings of scientific and technical meetings held in the U.S. and abroad and 20 books, book chapters and special publications.

For additional information or a copy of Martin's "Contributions to Science and Technology," write to Public Relations Director Roy Calvin, Department C-64, The Martin Co., Friendship International Airport, Md.

Missile Command Names Col Mohlere New Chief of Staff

A veteran of 28 years of Army service, Col Edward D. Mohlere is the new chief of staff, U.S. Army Missile Command, Redstone (Ala.) Arsenal. Col Mohlere came from Viet Nam, where he served as chief of the Logistics Division, Military Assistance Advisory Group and under the reorganization as Director of Logistics. He succeeds Col Jesse L. Fishback, who left in August to attend the Industrial College of the Armed Forces.

A graduate of the U.S. Military Academy, Col Mohlere holds an M.S. degree in meteorological engineering from the Massachusetts Institute of Technology and an M.A. degree in international affairs from George Washington University.

Prior military assignments carried him from his first post at Fort Ringgold, Tex., to Ludwigsburg, Germany. They included the Puerto Rican Department; Office, Chief of Ordnance in Washington; U.S. Military Academy; commanding officer, 47th Ordnance Group, Germany; CO of the Detroit Ordnance District and the faculty of the U.S. Army War College.

Col Edward D. Mohlere, left, new Chief of Staff at the Army Missile Command, is shown with Col Jesse L. Fishback, acting chief until his recent departure to attend the Industrial College of the Armed Forces.

SIAM Schedules Series Of Mathematics Lectures

The Society for Industrial and Applied Mathematics (SIAM) has announced a program of traveling lectureships on topics in applied mathematics during the 1964-65 academic year.

The lectures, usually given in universities and colleges throughout the country, are partially supported by the National Science Foundation. Industrial firms and other interested groups often have a lecturer come at their expense. About 30 noted lecturers from universities, corporations and other organizations will be available this season in all parts of the Nation.

The U.S. Army Mathematics Steering Committee thinks some of the lectures may be of interest to Army installations. Further information is available from A. S. Galbraith, director, Mathematics Division, U.S. Army Research Office—Durham, Box CM, Duke Station, Durham, N.C.

Army Studies Ultrasound Image Phenomena

A study directed toward an understanding of the phenomena associated with ultrasound image converters and their application to nondestructive testing and special projects is being conducted by the Army.

The program at Frankford Arsenal in Philadelphia, Pa., is under the direction of Eugene Roffman, chief of the Engineering Laboratories Branch. Work at the Army Materials Research Agency (AMRA), Watertown (Mass.) Arsenal, is supervised by Otto F. Gericke, chief of the Methods Development Section.

Authorized in FY 1964, the program resulted from an early interest shown by Panel P–4 of the Tripartite Cooperation Program (TTCP) and further interest by various agencies of the Department of Defense.

Panel P–4 became interested in ultrasound imaging converters and their potential use for nondestructive testing of materials during a visit to the Atomic Energy Research Establishment (AERE), Harwell, United Kingdom, in April 1962.

J. F. Sayers of the AERE at that time described an ultrasonic microscope which utilized through transmission and a quartz plate transducer for ultrasonic to electronic conversion in the vidicon tube.

A visit was later made by Panel P–4 to the University College Medical School, London, U.K., where Dr. Smyth, a leading scientist in ultrasound imaging, described his progress to date and demonstrated equipment that utilized a vacuum-sealed imaging tube.

Earlier in 1963, the U.S. Army Research Office conducted an experiment in methodology for problem solving, in which Lt Col Louis G. Klinker, chairman of Panel P–4, was named chairman for sessions concerned with "Ultrasound Image Converters and Cinesonography."

Results of the experiment led to the establishment of a plan for research, which was ultimately used as a guideline for obtaining the program authority necessary to proceed with the studies.

A basic ultrasound imaging system is comprised of a high-frequency generator coupled to the piezoelectric crystal to produce oscillations.

Two crystals cut to the same frequency are arranged on opposite sides of the material to be examined. Ultrasound waves passed through the material are converted into an equivalent charge pattern.

The electrical charge pattern is then scanned either mechanically or by using conventional vidicon scanning techniques and displayed on a chart or on the face of a cathode ray tube.

In addition to the research directed toward understanding of basic phenomena, the studies will encompass ultrasound image applications in materials research. Research activities will be directed toward investigation of ultrasound properties and related study programs for the full utilization of sound imaging techniques to assure quality and reliability of Army material.

Priority will be given to the study of the properties of those materials of immediate interest which are difficult or impossible to test nondestructively with present methods. For example, ultrasound imaging techniques will be used to study weld integrity, physical parameters of sintered materials, the presence of non-banded areas in bonded materials (including warheads), solid propellants for flaws, encapsulated materials and underwater structures for soundness or presence of corrosion.

Dynamic observation of gross fatigued regions also will be studied. The technique will be applied in general to those materials where there is a need for a more effective, quicker, better nondestructive test than is presently available and could result in a reduction in equipment operation skills.

Army Engineers' Experiment Plugs Gaps in Dikes With Old Autos

U.S. Army engineers are taking old automobile bodies and experimenting with them in dike construction on the Mississippi River near the Vicksburg (Miss.) Engineer District.

The cars are fastened together end-to-end and resemble huge chains as they slide off the launching barge parallel to the upstream side of the standard wood pile dike. Specifications in the advertisements for these old cars call for the bodies to be essentially complete with hood and trunk covers but no wheels.

The wooden pile dikes are built to retard the current flow and cause sand and sediment to build up to block secondary channels or to deflect the river and improve the channel alignment. The dike structures are somewhat like open lattice work and the rate of accumulation of sand is sometimes much slower than the engineers desire.

The old auto bodies will help fill some of the voids and are expected to cause the sand and silt to accumulate at a much more rapid rate.

In this experiment, the engineers are using several techniques of placing and positioning the auto bodies. The results will be carefully measured and analyzed. If the results prove successful, considerable money will be saved over previous methods.

Army Chief of Staff, AMC CG Visit Aberdeen Proving Ground

Army Chief of Staff General Harold K. Johnson visited Aberdeen Proving Ground, Md., Aug. 13, where he addressed the faculty and students of the Army Ordnance Center and School and viewed Army Test and Evaluation Command facilities.

General Frank S. Besson, Jr., Army Materiel Command CG, and Maj Gen James W. Sutherland, Jr., Test and Evaluation Command CG, were present in conjunction with the Chief of Staff's visit.

Briefings were conducted for General Johnson by commanders of the Army Ballistic Research Laboratories, Human Engineering Laboratories, Coating and Chemical Laboratory, Combat Developments Command Ordnance Agency and the director of the Joint Military Packaging Training Center.

U.S., U.K. to Evaluate Beryllium

The United Kingdom and the United States have decided to undertake jointly a 2-year research program on use of beryllium in aircraft engines.

The work will range from improvement of beryllium through metallurgy to the evaluation of the material in aircraft engines and will be undertaken in both countries. Cost of the program will be shared equally.

USATECOM Claim to Fame: Unique Test Mission

(Continued from page 2)

The effort to bring about savings in supporting services has not been limited to individual installations. The Commanding General, U.S. Army Electronic Proving Ground at Fort Huachuca, Ariz., recently hosted a conference to determine what actions could be taken to effect savings through the elimination of duplication and through cross-utilization of resources and improved testing. Representatives of Yuma Proving Ground and Dugway Proving Ground joined with USAEPG participants to achieve significant results in provisions for increased mutual support. Additional conferences are planned to pursue further the objectives.

Any cost-reduction program is only as good as the follow-up plan and USATECOM is continuing a positive program to effect savings wherever possible. We provide guidance to subordinate commands concerning procedures for achieving objectives. On-site reviews have been conducted to pin-point unnecessary duplication, and specific consolidation actions have been directed where feasible.

These actions characterize the long-range organizational plans of the Command. Activities and installations are appraised continually from the viewpoint of organizational effectiveness. The objective is a uniform command-wide organizational structure flexible enough for responsive mission accomplishment today, and which could provide a sound foundation for quick expansion or contraction as technology and workload changes might indicate tomorrow. Diversification of capability is one of the premises upon which mission assignment and organization changes are based.

TEST MANAGEMENT. Assigning to our command the responsibility for several thousand tests annually required a single, responsive test management system in place of the several different systems which existed prior to the reorganization. To meet this requirement, USATECOM designed the Test, Evaluation, Analysis and Management System (TEAMS). Based on utilization of Automated Data Processing System equipment, TEAMS provides a rapid and efficient means of disseminating and receiving data for use in test planning and management. Actually, TEAMS serves many purposes:

- It provides a continuous inventory of all the USATECOM test load and its distribution.
- It serves as a means for assigning coordinating instructions to multiple-test agencies with maximum effectiveness through the use of a standard vocabulary.
- It serves as a status report for testing in process.
- It provides data in a suitable form for analysis of trends in elements of test management, procedures and materiel.
- It provides an up-to-date working file based on a 24-hour up-dating cycle.

TEAMS is a combination of exception reporting and critical event reporting on an "as occurs" basis. As additional equipment for the Automated Data Processing System becomes available, responsiveness and the value of TEAMS will be enhanced.

PLANNING. It became apparent upon the activation of USATECOM that priority attention had to be devoted to improved test planning. Specifically, planning had to be done early in the development cycle, document formats had to be standardized and communications had to be improved.

Just prior to the reorganization of the Army, a study revealed that the Army materiel testing program suffered from a lack of adequate planning. Items were actually being delivered to test activities with little or no prior notification, and the study recommended that a coordinated test program be intiated as soon as an item was approved for development.

This plan would provide for the necessary funding, prototypes for testing, special facilities and other resources. It would include a testing schedule compatible with the total development schedule of a particular item and in harmony with the overall testing program of the Command.

USATECOM has implemented a coordinated test program and it is now being prepared for all items under development. Already the use of such a program has brought about significant improvement in planning, particularly in the areas of funding, scheduling, provision of prototypes and elimination of unnecessary duplication of tests.

Another problem which required early attention was the provision of adequate test procedure manuals. The Technical Services and Service Test Boards had guides of varying degrees of quality and completeness. In some instances, however, no test manual existed. While it is true that each test plan must be designed to fit a specific item or system under test, a general test procedure guide is useful to both the developer and the tester for overall planning.

The Command has initiated a program to provide test procedure pamphlets covering all commodity areas for both engineering and service-type tests. Pamphlets will be assembled in 10 volumes, will be made available to all agencies having a responsibility in the Army development and test program, and will be prepared by in-house personnel as well as by contract with civilian concerns.

One of the important actions taken to improve uniformity of operations has been provision of standard test plans and reports. This has resulted in more complete compliance with regulations concerning data to be included in reports. It also has produced documents which can be more easily studied and understood.

One of the most difficult obstacles encountered during the organization of the Command was effective communication between subordinate elements of the Command. This applied to both definitions and nomenclature. Each of the former Technical Services had a language of its own, as did the Continental Army Command, and these languages were quite often at variance with each other. Tests were being conducted under more than 75 different names and various interpretations were applied to the definitions of tests described in regulations.

USATECOM has reduced the number of test titles to 19 and has standardized the definitions applying to test programs. We insist on a strict interpretation of all these definitions and we now, within the Command, speak the same language. These actions have greatly improved our ability to communicate, not only among ourselves, but with the developers of Army equipment and other customers.

RESOURCES. The availability of modern instrumentation for testing materiel is an absolute essential. To obtain maximum use of available equipment and to avoid unnecessary duplication, USATECOM has initiated a comprehensive program of long-range instrumentation planning which makes use of two basic tools—Inventory of Data Acquisition and the Instrumentation Master Plan.

The inventories prepared for automatic data processing permit rapid surveys of the physical instrumentation available within USATECOM at any point in time. This permits maximum utilization of existing re-

sources. The inventory system will be extended to include all Commands of the U.S. Army Materiel Command.

Instrumentation Master Plans are detailed 5-year programs which establish and maintain an effective materiel performance evaluation capability. They contain material pertinent to all instrumentation, equipment and construction necessary to operate, maintain, replace and modernize testing capability.

The basis for Instrumentation Master Plans is the systematic review and analysis of all plans and capabilities, using a single set of evaluation criteria and a single estimate of future requirements for all installations.

Several significant results are produced by effective instrumentation master planning, including but certainly not limited to: More effective response to the testing and evaluation needs of the commodity commands and other users of Army testing facilities; expedited testing; increased testing efficiency and more accurate test data; budgetary support; avoidance of unnecessary duplication of instrumentation.

IN SUMMARY. The judgment of those who conceived the establishment of the Test and Evaluation Command appears to have been confirmed in the relatively short time since its activation by significant improvements of the Army materiel testing program. Overall management has been improved; coordination of testing and related activities is now more effective; planning for testing is being accomplished in advance of the receipt of test materiel, thus assuring the availability of testing resources, funds and a better designed test plan.

Moreover, an all-important reduction in test time has been achieved through improvement in test planning which has brought about better coordination, elimination of redundant and unnecessary duplication of tests and the greater utilization of test data from all sources.

Test and Evaluation Command personnel are dedicated to the mission of providing responsive support to the developers and designers of Army materiel. The objective is ultimate assurance to the Army that its troops are being provided with materiel that will do what it is supposed to do whenever and wherever it is required to do it.

Dr. Hall Named Chief Scientist For ARPA's Project AGILE

Dr. Harold H. Hall has been appointed to the newly created position of chief scientist of the Office of the Director for Remote Area Conflict, (Project AGILE), Advanced Research Projects Agency.

Assigned responsibility for the conduct of the more basic and longrange research efforts, Dr. Hall will administer contract work dealing with programs on weapons, surveillance, communications and mobility research as well as the effects of environment in remote areas on these research activities.

Prior to his appointment to ARPA he was assistant director of Reentry and Space Systems Programs in the Aeronutronics Division of the Philco Corp. He received his Ph. D. degree in physics from the University of Wisconsin in 1953.

Watervliet Tests Reinforced Plastic Gun Barrel

Combinations of plastic and fiberglass materials in the manufacture of gun tubes are being investigated at Watervliet (N.Y.) Arsenal as part of the continuing effort to produce lighter, more mobile weapons for the modern Army.

A lightweight glassfiber-reinforced plastic gun barrel for recoilless rifles was tested recently at the Arsenal. Initial efforts by the Industrial Engineering Laboratory have produced a 90 mm. tube that is considerably lighter than a steel tube.

Life expectancy of the fiberglass tube is less than that of its metal counterpart, but may prove quite acceptable for use in limited life or "throwaway" weapons, officials said.

Basic physical characteristics of the plastic materials are being investigated in the hope of increasing tube life expectancy. Using metal lines or metallic plating in the gun bore is another area of research.

Officials say results of limited tests on fiberglass tubes designed at Watervliet and fabricated at Picatinny Arsenal, Dover, N.J., have justified additional research and development. Production cost of fiberglass tubes eventually can be reduced substantially below that of the steel tubes presently in use, they believe.

The fiberglass tube was designed in the Arsenal's Product Engineering Branch by Gary H. Lucier, a mechanical engineer in the artillery subunit.

The Arsenal also produced the special tooling required as attachments for the lathe-like fiberglass winding machine at Picatinny on which the tube was actually fabricated. A mandrel with inverted rifling and other precision tooling was made in the Arsenal Tools Section by Joseph Nicpon and Alexander Petrone, under the direction of toolroom supervisor Edward Furdyna.

The tube was formed from a fiberglass used by Picatinny in the manufacture of rocket casings and nose cones. Strands of this material were drawn from a reel, coated with a bonding resin, and then wound onto the mandrel which, as it revolved, shaped the fiberglass into the tube.

The tube then was baked for three hours at a 300° F., resulting in the finished product. When substituted for the conventional steel unit, the new tube reduces the overall weight of the 90 mm. recoilless weapon from 35 to 20 pounds.

In addition to the primary advantage of light weight, the fiberglass tube is expected to provide considerable savings of time and money by elimination of the customary turning, rifling and other manufacturing steps required in machining steel forgings.

Gary Lucier holds lightweight glass fiber tube for 90 mm. recoilless rifle above a conventional steel-barreled version. At left is John G. Schatz, who heads the Infantry Design Unit; at right, Ralph M. Avakian, chief of the Production Engineering Section, Watervliet Arsenal, N.Y.

Army's Springfield Armory Researches Weaponry Performance of Springs

By James F. O'Neil

The success or failure of many military weapons, including automatic small arms, depends on the performance of a system of springs under dynamic operating conditions.

Small-caliber weapon systems contain numerous interdependent mass-spring systems. The failure of any one of these systems can make the entire weapon system ineffective. The critical action of the various spring types and mechanisms thus becomes a vital part of weaponry research, development and engineering.

A number of years ago, Springfield (Mass.) Armory recognized that the large amount of design, development and testing information generated by the many competent commercial spring industries was, in large measure, unusable for the critical spring problems peculiar to small-caliber weapons.

With this deficiency in mind, the Armory undertook to establish one of the most highly specialized spring research laboratories available for studying the effects of both static and dynamic loading on springs of various types utilized in automatic weapons. The laboratory at Springfield today represents the culmination of 10 years effort.

The Armory's Research Spring Laboratory is used exclusively to evaluate life and fatigue characteristics of various spring designs prior to construction of prototype weapons. The establishment of this laboratory has eliminated the need for many expensive firing tests and has contributed materially to cost reduction through laboratory simulation.

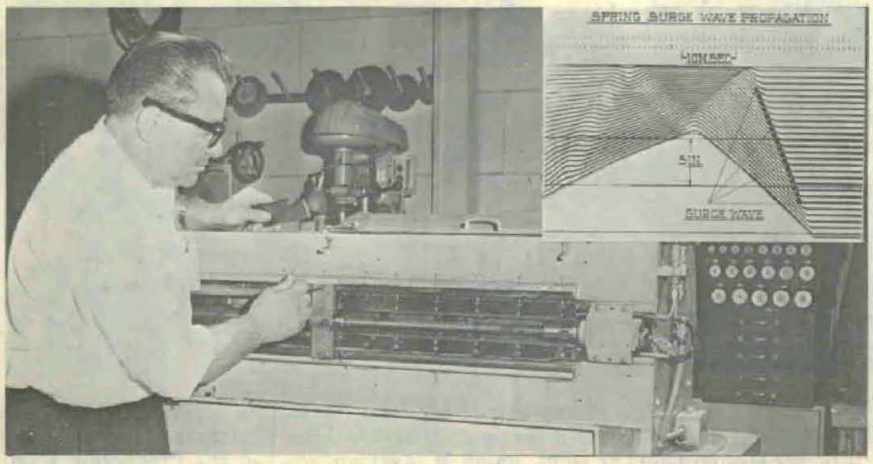
Armory personnel are involved with all types of spring applications, e.g., round, rolled and square wire; torsion, flat and spiral springs; Belleville, stranded, rubber, liquid and pneumatic mechanisms.

Two of the more outstanding contributions in the field of spring design research, which are more or less peculiar to the automatic weapons field, concern ring springs and stranded wire springs. Research and Engineering Division personnel at the Armory use ring springs in many applications such as recoil adapters, buffers and mounting systems in which high-energy absorption and dissipation are required for proper functioning.

Initially, the Armory was limited to a single source of supply for ring springs and little or no manufacturing or performance data were available. Personnel at Springfield developed all the necessary specifications and standards and performed the necessary research to determine optimum fabrication methods so that the Armory and private industry could manufacture and enter into competitive bidding on this item.

The case of stranded wire springs was quite different from that of ring springs. In this particular instance, private spring companies (with one exception) were not interested in the potential of this item. Therefore, the great majority of development work and know-how concerning this important spring mechanism now resides principally at Eaton Manufacturing Co. of Detroit and in the Support Research Branch at Springfield Armory.

Numbered among the Laboratory's many specialized pieces of equipment is a unique device, the Springfield Armory Spring Fatigue Tester. Development of this machine came about because of the acute need for a reliable simulator in the field of small-caliber weapon systems.



Springfield Armory Spring Fatigue Tester

Two reasons accounted for this pressing need. First, conventional gymnasticating tests on driving and operating springs do not provide a true indication of actual spring life, because of the critical nature of the operation of this type of spring functioning in limited space and experiencing high-impact-type loadings.

Secondly, testing of springs under actual operating conditions in the weapon is extremely time-consuming and costly because of the expenditure of ammunition and gun wear. The required acceptance schedule for many spring assemblies makes it impossible to conduct proper evaluation of these components under actual test firing conditions with prototype weapons.

The Armory first undertook to establish preliminary specifications for the design of a fatigue testing machine. The goal was to duplicate the spring action in the gun and thus allow for the testing of springs independent of the weapon. Various data were collected on driving springs and spring guide conditions for a group of selected, characteristic small-caliber weapon systems.

The purpose was to insure that the ultimate tester would cover the full range of present and anticipated future weapon applications. Analytical studies made by the scientists of the Support Research Branch of Research and Engineering Division on the surge-wave theory of springs aided in this determination of specifications for the spring tester.

To evaluate fully the many critical points involved in the design of a suitable tester, a number of types of mechanisms were investigated. Careful evaluation of all advantages and disadvantages of these various devices finally resulted in the selection of the ultimate machine using a spring follower controlled by a driving cam on a rotating drum.

The driving cam duplicates the time-displacement record of the weapon under study. Although this machine was originally developed for duplicating the motion of driving springs for small arms weapons, it is sufficiently flexible for adaption to most long-stroke compression springs. This device contributes three important usages previously not available to spring testing facilities.

First, it provides a realistic inspection device by which springs may

be economically and accurately fatigue-tested on a sampling basis for acceptance. Previous gymnasticating tests required numerous cycles at lower force levels and, nevertheless, yielded unrealistic life data compared with spring data obtained under actual operating conditions. This spring fatigue testing machine allows for simulation of dynamic forces exerted upon the spring and thus provides meaningful inspection criteria.

Secondly, this machine provides a tool for experimental testing of various critical spring designs to determine optimum characteristics for a given application. In many applications, the cost and time involved in actual field testing prohibit the desired—and often required—testing of various spring assemblies.

Finally, it provides an easy means for obtaining dynamic spring relationships. This allows for rapid empirical confirmation or comparison of results of theoretical analyses of spring actions under dynamic loading.

Today the Armory's Research Spring Laboratory is well qualified both in personnel and equipment to investigate all types of dynamic spring system problems. In addition to the equipment already mentioned, the Spring Laboratory has two other highly unique devices. One is a Mauser pneumatic impact tester (brought over from Germany after World War II) for testing short-stroke, high-impact buffer mechanisms. The Laboratory also boasts of a unique coiling machine capable of efficiently fabricating standard wire springs. Commercially available conventional spring coilers are not capable of handling standard material.

Studies conducted by Laboratory personnel include recoil mechanism and gun mount analyses, theoretical surge-wave studies, design and stress analyses of nested spring systems, development of analytical design methods for Belleville washer springs, application of analog computer facilities to solve dynamic spring system problems by means of electric model simulation, design and application of liquid, pneumatic and hydraulic spring types, and many others.

The overall objective of most of these investigations is the derivation of formulae which consider realistic dynamic loading conditions and thus eliminate assumptions, "safety" factors and overdesign. As a result of these studies and unique laboratory facilities, the life, function, reliability and performance of spring systems has been materially increased. This has resulted in the production of improved weapon systems with substantial savings in lead time, material and cost.

James F. O'Neil serves as chief of the Mechanics Research Laboratory, Support Research Branch, Research and Engineering Division at the Springfield Armory. He received his B.A. degree in mathematics from American International College and M.A. degree in mathematics from Boston University in 1949. Since 1949, he has been engaged at the Armory in the various fields of ordnance mathematics and engineering. Prior to his present appointment, he served as chief of the Mathematics Section.

O'Neil's work at the Armory has included extensive studies in weapon kinematics, recoil system analysis, theoretical surge wave studies, and the design and analysis of experiments. His surge wave studies have been instrumental in the rapidly extending use by the Army of stranded wire springs which have proved valuable in many cases involving high velocity and impact type loading.

He is an active member of the Arsenal Mathematicians Symposium, Design of Experiments in Army R&D Testing, Statistical Engineering Symposium, and the Ordnance Conference on Operations Research and serves as a member of the Numerically Controlled Machine Tools and Automatic Data Processing Systems Committees. He is a member of the Spring Committee of SAE, a member of ASTME, Eastern Simulation Council, and is a registered professional engineer in Massachusetts.

Armory Reduces Hazard by Scrap Link Bullet Trap

The fire hazard of bullets ricocheting into wooded areas around Springfield (Mass.) Armory's outdoor firing range in development of helicopter armament systems has spurred Armory problem-solvers to devise bullet traps lined with scrap links.

The problem arose with the M60C machinegun ammunition being tested for the helicopter armament kits, consisting of linked sequences of four ball and one tracer cartridges.

Since the area of impact is greatly expanded by the elevating, depressing and horizontal traversing capabilities of the armament kits, the use of the indoor firing ranges was out of the question.

Safety regulations prohibit use of tracer cartridges and it became necessary to devise some means of firing the armament kits at the outdoor range without setting the woods on fire.

The Armory problem-solvers began by designing a boxlike wooden enclosure and filling it with easily obtainable scrap metal links. Gunfire was directed at the face of the barrier and the flight of all projectiles terminated within the confines of the box of links.

This inventive approach solved one problem but another concerned elevated firing. The Armory's outdoor range is located near an aerial approach path to an Air Force Base. When tests called for weapons to be fired with muzzles elevated, a great deal of time was lost in prearranging firing schedules and waiting for favorable weather conditions.

Technicians had to assume positions at various vantage points for constant observation and continual radio contact to warn of any aircraft approaching the area of elevated fire.

The efficiency and scope of the scrap link bullet-catcher idea was expanded by securing a 55-gallon drum filled with links to a platform on a frame positioned over the gun mount. The gunfire was directed up through the baffleboard into the drum.

With this system elevated firing could be accomplished with a minimum of effort, a maximum of efficiency and in a fraction of the time required for the previous set-up.

Favorable results attained in the use of the Armory-designed scrap link bullet catcher at the outdoor range led to installation of a similar but much larger version at the Armory's Test Branch indoor range. This version will offer many advantages, officials said.

Springfield Armory Shatters 170-Year-Old Labor Precedent

Springfield (Mass.) Armory management and labor leaders recently signed a union contract—the first in the 170-year-old history of the Nation's first arsenal.

Col William J. Durrenberger, commanding officer of the U.S. Army Weapons Command installation, and George A. Brochu, civilian personnel director, signed for management. Kenneth T. Lyons, president of the National Association of Government Employees (NAGE), Joseph E. Boire, president of Local R-1, NAGE, Mildred Dunbar, vice president, and Alton E. Sanderson, judge advocate of the unit, signed for the union.

Kudos

Col Robert T. Larson, retiring CO of the U.S. Army Tropic Test Center, Fort Clayton, Canal Zone, received the Army Commendation Medal. Maj Gen James D. Alger, Commander, U.S. Army Forces, Southern Command, made the presentation.

The award recognized Col Larson's capable administration and technical direction of the Center's activities from Aug. 11, 1962 to July 31, 1964. He will make his home in Los Angeles, Calif., where he will be associated with the Rand Corp.

The U.S. Army Satellite Communications Agency's new Programs Office director, Lt Col Robert H. Scales, was recently presented the Army Commendation Medal, First Oak Leaf Cluster. The award was made by Brig Gen J. Wilson Johnston, SATCOM's CG.

The citation credited him with especially meritorious service as a logistics staff officer and chief of the Maintenance Operations Division, Army Maintenance Board, Fort Knox, Ky., between Jan. 26, 1961 and Mar. 31, 1964, when he was responsible for review and analysis of the Army Maintenance System and for the development of new or revised procedures.

Samuel P. Brown, SATCOM technical director, was presented with a certificate and cash award for Outstanding and Sustained Superior Performance. The award covered the period from April 1962 to March 1963 when Brown was director of engineering. He was cited for his "technical direction of the program for the development and fabrication of the ground terminals for a satellite communications system" as a part of the complex DoD satellite communications program. In addition, Brown was lauded for his technical direction of the design and development of ground stations for support of the NASA satellite.

Col Robert M. Hardaway, III, director of the Division of Clinical Surgery at Walter Reed Army Institute of Research, received the Army Commendation Medal and Lt Col Charles E. Coner, retiring Assistant Health Physics Officer, was awarded the First Oak Leaf Cluster to the Commendation Medal in a recent ceremony at Walter Reed Army Medical Center, Washington, D.C.

Col Hardaway's decoration, which was pinned on by Maj Gen A. L. Tynes, the Center's CG, was accompanied by a citation which read in part: "His investigations of the mechanisms of shock have led to the elucidation of a new and integrated theory of the operation of those methods." The colonel is author of more than 70 published professional papers and has been at WRAIR since June 1960. Graduated from the University of Denver in 1936 with a B.A. degree, he received his M.D. from Washington University of St. Louis (Mo.) in 1939.

Col Coner's citation, covering the period from July 1961 to July 1964, praised his efforts in minimizing the hazards associated with the use of sources of ionizing radiation from X-rays, radium, research reactors and radioisotopes used by the Health Physics staff.

Graduated from Boston College with a B.S. in physics in 1949, the native Bostonian returned to uniform after his three years on inactive reserve while at school and joined the Army Environmental Health Laboratory at Edgewood, Md.

In 1957 he was assigned to the Nuclear Medicine Research Group in Europe in the same capacity. He returned to Edgewood in 1960 before going to Walter Reed in 1961.

For participating as cargo master in more than 25 operational missions in combat zones or over hostile territory in support of Viet Namese operations against antigovernment forces, Capt John N. Shuman, Air Delivery Officer of AMC's Natick Laboratories, recently received the Air Medal award.

A suggestion award of $570 was presented July 28 to Hilary J. Witmer, a digital computer programer with the Army Aviation Materiel Command (AVCOM), St. Louis, Mo. The award was for development of

Dr. MacLeod Receives DoD Public Service Medal

The Department of Defense Distinguished Public Service Medal was presented recently to Dr. Colin M. MacLeod in recognition of 14 years of service, eight as president, with the Armed Forces Epidemiological Board (AFEB).

Currently Dr. MacLeod is deputy director, Office of Science and Technology in the Executive Office of the President of the United States.

Signed by Secretary of Defense Robert S. McNamara the citation paid high tribute to Dr. MacLeod's contributions to the work of the AFEB from 1949 to 1963. It stated that the highest caliber of persons was attracted to the AFEB Commissions because he convinced them that they had a public service responsibility despite pressure of other duties.

Lt Gen Leonard D. Heaton, U.S. Army Surgeon General, pins Distinguished Public Service Medal on Dr. Colin M. MacLeod, deputy director, Office of Science and Technology, Executive Office of the President of the U.S.

Born and educated in Canada, Dr. MacLeod received a Ph.D. degree from McGill University School of Medicine when only 23 years of age. He interned at Montreal General Hospital, came to the United States as a resident in Medical Research, and remained to become a citizen.

Listed in *American Men of Science* as an educator, he has held titles as professor of microbiology at New York University College of Medicine, professor of Research Medicine at the University of Pennsylvania, professor of medicine at New York University School of Medicine, and as member of the President's Scientific Advisory Commission.

Attendees at the awards ceremony included Dr. Donald Hornig, Presidential Science Adviser and Director of the Office of Science and Technology; Dr. Gustave Dammin, president of the Armed Forces Epidemiological Board and professor of pathology at Harvard Medical School; Rear Adm William N. New, representing Dr. Shirley Fisk, Assistant Secretary of Defense, Manpower (Health and Medical); Rear Adm Edward C. Kenney, Surgeon General of the U.S. Navy; and Brig Gen John M. Talbot, representing Maj Gen Richard Bohannon, Surgeon General of the Air Force.

a streamlined system for processing the thousands of inquiries received weekly on the AVCOM electronic computer and will result in an annual saving of $12,717 in computer rentals, personnel and material.

Col J. H. Kerkering, CO of the U.S. Army Engineer Research and Development Laboratories (ERDL) at Fort Belvoir, Va., announced promotions and awards for six employees. James E. Griffin, formerly assistant chief of the Electrical Power Branch, was promoted to assistant chief of the Engineering Department.

Griffin, a 1949 graduate of the University of Virginia, where he received a B.S. degree in electrical engineering, is a Navy World War II veteran and has been with the Laboratories since 1950. Besides his certificate of promotion, he was presented with a DA certificate for Outstanding performance of his duties while assistant chief with the Electrical Power Branch.

Outstanding Performance Ratings (OPRs) and Quality Salary Increases (QSIs) were presented to the following ERDL employees:

Turner G. Timberlake, chief of the Engineering Department and Norman W. Braun, Military Engineering Branch, OPR; John L. McDonald and Darald C. Frink, Air Conditioning and Heating Branch, OPR and QSI; and Mrs. Mildred O. Sportsman, QSI.

V/STOL Project Office Chief Earns MCS Award

Important contributions to the U.S. Army's aviation research programs have earned the Meritorious Civilian Service Award for the man in charge of the office which conducts and monitors V/STOL projects.

Paul J. Carpenter, chief of the Applied Aeronautical Engineering Group at the U.S. Army Mobility Command's Transportation Research Command (TRECOM), Fort Eustis, Va., was recognized at a recent ceremony.

The citation accompanying the award, presented by Col N. A. Gage, Jr., TRECOM commanding officer, was signed by General Frank S. Besson, CG, U.S. Army Materiel Command. Maj Gen Alden K. Sibley, CG, U.S. Army Mobility Command, conveyed his personal appreciation and congratulations.

The TRECOM V/STOL research programs include such projects as the XV-4A and SV-5A VTOL surveillance-type aircraft, the three Tri-Service research VTOL transport aircraft; helicopters and rotary-wing aircraft such as the XH-51A rigid rotor, the XV-8A Hot Cycle, Tip Turbojet and other high-performance helicopters/rotorcraft.

In 1958 he joined the TRECOM staff after 12 years with the National Aeronautics and Space Administration, and has a long list of publications and technical reports to his credit. He has presented technical papers to the Institute of Aerospace Sciences, the American Helicopter Society and other aircraft organizations, and has given numerous presentations to top-level military and civilian audiences, including the President's Scientific Advisory Panel.

Col N. A. Gage, Jr., CO of USATRECOM, congratulates Paul J. Carpenter after presenting him with Army Meritorious Civilian Service Award.

Brig Gen Simpson Snaps July Promotion Streak

Pinning of the star emblematic of his rank on Brig Gen Thomas E. Simpson, CG, U.S. Army Mobility Equipment Center, St. Louis, Mo., in a ceremony Aug. 1, broke a 28-year chain of circumstances.

Every other regular promotion for the new general, from second lieutenant to colonel, had been during the month of July and he missed continuing the magic streak by 24 hours.

A combat veteran and logistician, General Simpson has served in the Pacific and in Europe in both troop and staff posts. During World War II, The Presidential Citation was awarded to his combat engineer battalion during the Philippine Luzon Campaign, and has earned the Legion of Merit, the Bronze Star with Oak Leaf Cluster, the Army Commendation Medal and Order of Military Merit Ulchi with Silver Star.

General Simpson served as a logistics planner with the NATO military headquarters and as a district engineer at Vicksburg, Miss. He holds a B.S. degree in chemical engineering from the University of Alabama, an M.S. degree in civil engineering from Cornell University, and has attended the Command and General Staff School and the Army War College.

Pinning brigadier general stars on Army Mobility Equipment Center CG, Thomas B. Simpson, are Brig Gen Howard F. Schiltz, CG, Army Aviation Materiel Command, and Mrs. Simpson.

Hawk Intercepts Roadrunner In WSMR Air Defense Test

The Army's newest target missile, the Roadrunner, was intercepted by the Hawk air defense missile July 31 in development tests at White Sands (N. Mex.) Missile Range.

The U.S. Army Missile Command called the test a noteworthy success for both the target missile and the Hawk missile system. The Roadrunner is the Army's subsonic-supersonic addition to its series of target missiles used for training of missile crews and development of air defense missile capabilities. A multi-function target, it can simulate the flight pattern and speeds of a wide variety of high performance aircraft as well as missiles.

In one role it can fly as slow as 700 m.p.h. and only 300 feet off the ground. At this speed and altitude it simulates ground-hugging aircraft and missiles. In missions calling for high altitudes and supersonic speeds, it is designed to attain Mach 2 speeds of about 1,300 m.p.h. at an altitude of 60,000 feet.

The Roadrunner flew at a supersonic speed "on the deck" in the WSMR test. The Army said no other target missile had ever flown so low and fast in a controlled mission.

Tri-Service Project BEARS Helps Curb Fuel Contamination

By LeRoy L. Stark and Robert N. Brown

In 1960 and 1961, repeated aircraft incidents of fuel gauge failure, fuel control malfunction, integral wing tank corrosion and actual jet flame-outs came to the attention of the Air Force. Similar reports were received from Army and Navy installations, from the Australian Ministry of Defense and from commercial airlines operating in tropical and semi-tropical environments.

Prior to that time, experience with contaminants in aircraft fuels had been confined to water and fine solids. Rigorous fuel cleanliness standards were evolved and delineated Mil–F–8508 (later superseded by Mil–F–8901) and filter/separators capable of meeting these standards were developed and installed in military fueling systems on a worldwide basis.

When the new incidents occurred, inspection of fuel storage tanks in suspect areas revealed the presence of gross layers of microbial slimes. These were most often located at the fuel-water interface in tanks containing a substantial water bottom.

During fueling operations, some of the microbial material from the storage tank was being pumped through the fueling system into aircraft where, in some cases, it fouled fuel gauges and controls. In other instances, live microorganisms became attached to the inner walls of the aircraft wing tanks. The resulting reproductive process formed by-products which destroyed the effectiveness of the tank coating and corroded holes through the walls of the tank.

Following a Government-Industry Symposium, conducted at the Pentagon by the Office of the Director of Defense Research and Engineering in September, 1961, a comprehensive investigation was undertaken by the military services, on a cooperative basis, to:

- Create conditions in an actual fueling system which would be conducive to active microbial growth, and make studies to determine the parameters of the problem.

LeRoy L. Stark is chief of the Fuels Decontamination Section, Petroleum Equipment Branch, Mechanical Department, U.S. Army Mobility Command, Engineer Research and Development Laboratories, Fort Belvoir, Va.

A native of Wisconsin and a veteran of World War II, he attended the Wisconsin School of Mines, Platteville, Wisc., and the University of Pittsburgh, where he obtained a B.S. degree in 1937. He has been associated with the Laboratories, first in a military capacity and then as a civilian, since 1946, and has authored several papers dealing with fuels decontamination.

- Develop procedures for sterilizing contaminated systems.
- Develop good-housekeeping techniques for preventing further microbial contamination incidents.

The Air Force was most vitally concerned with immediate elimination of microbial contamination. Consequently, its laboratory at Wright-Patterson Air Force Base (WPAFB) was directed to evolve a remedial research program.

Since the U.S. Army Engineer Research and Development Laboratories at Fort Belvoir were recognized for successes in the field of fuels decontamination, in November, 1961, the Systems Engineering Group of WPAFB requested technical assistance in planning, organizing and conducting a joint USAF-Army microbial contamination investigative program. The Navy also volunteered to furnish the services of a fuels consultant.

A project advisory group was established, comprised of representatives from each of the three services, and Project BEARS (Bacteriological Effects, Aircraft Refueling Systems) was initiated to:

- Determine growth rates of microbial contamination in fuel storage and handling systems, under conditions most suitable for growth.
- Determine the effects of microbial contaminants on the water and solids removal capabilities of currently available filter/separators.
- Evaluate filter/separators designed for removal of solids and water, in order to determine their capability for removing microbial contaminations.
- Determine the clogging effects of microbial contaminants on filter/coalescer elements.
- Determine physical effects of microbial contaminants on filter/separator vessels, controls and related equipment.
- Investigate effects of contact with microbial contaminants on the critical characteristics of JP–4 and 115/145 aviation gas.
- Evaluate the effects of various concentrations of anti-icing, corrosion preventive, and biocidal additives on the growth rates of microorganisms in storage tank water bottoms and the stored fuel.

Kindley Air Force Base, Bermuda, met test site requirements because it was located in an area having an abnormally salty and humid atmosphere, was between 35° North and 35° South latitude, and had full-scale fueling facilities available for at least 12 months. Housing for the necessary chemistry and microbiological laboratory also was available.

In April 1962, a specially prepared inoculum was injected into JP–4 and Avgas in 50,000-gallon underground storage tanks and in 55-gallon drums above ground. Both tanks and drums contained water bottoms to provide conditions favorable for microbial growth.

The inoculum was essentially a composite of microbially contaminated JP–4 storage tank water bottom samples from Ramey AFB in Puerto Rico and Bergstrom AFB in Texas. To insure that the inoculum included strains of both bacteria and fungi, it was fortified by the addition of 41 cultures isolated from storage tank sludges collected at Lajes AFB in the Azores, Nouasseur AFB in Morocco and Ascension Island AFB. Some of the representative genera included in the inoculum were pseudomonas, ser-

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A native of Chicago, Ill., he obtained a B.S. degree in chemical engineering from Illinois Institute of Technology. Later, he took graduate courses at Temple University, Philadelphia, Pa., and Akron University, Akron, Ohio. He served in the Navy during World War II and holds the rank of lieutenant commander in the U.S. Naval Reserve. He entered Civil Service in 1961.

ratia, desulfovibrio, cladosporium, penicillium and fusarium.

A 2-month static incubation period was allowed prior to the first operational and data recording visit of the project investigative team, which included a leader, two test mechanics to construct, operate and maintain facilities, two microbiologists and two chemists to perform analyses. The team made nine separate 2-week investigative tours, with the final data recording visit in January, 1964.

Investigations were divided into three general areas, including:

- Microbial activity in inoculated fuel stored in 50,000-gallon underground tanks.
- Microbial activity and effects on properties of fuel containing various additives and stored statically in 55-gallon drums above ground.
- Effects of microbial contamination on performance of filter/separators and other components of an operating aircraft fueling system.

In all, approximately 5,600 physiochemical and microbiological analyses were made during investigations. Analyses provided required information on system conditions, microbial counts, and the effectiveness of fuel filter/separators in the presence of microbial contamination.

Major findings from the Project BEARS investigations are summarized as follows:

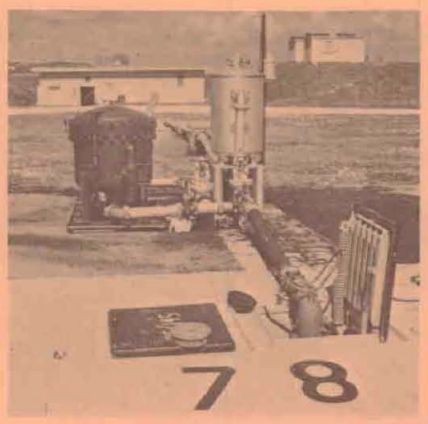
(1) JP–4 and 115/145 Avgas fuels did not support deleterious microbial activity when stored in tanks free of water or when a water bottom was present.

(2) Significant increases in microbial population occurred in the water bottom of both the inoculated and non-inoculated fuel storage tanks for approximately 12 months, followed by relatively sudden decreases, which is consistent with typical microbial population curves.

(3) Filter/separators continued to function satisfactorily with JP–4 in the presence of tank water bottoms containing a high level of microbial contamination, sea water, and AC test dust.

(4) Filter/separators afford a high degree of microbial decontamination, since they continue to remove free water, and the bulk of the microbial contamination is associated with the free water phase.

(5) The differential pressure across the filter/separator did not increase significantly from the injection of water bottoms heavily contaminated with microbial organisms, no clogging of filter/coalescer elements was evidenced, and there was no apparent effect on the automatic controls or other component parts.



FILTER / SEPARATORS installed in Project BEARS test facility, a full-scale segment of the Kindley Air Force Base fueling system in Bermuda.

(6) The potential ability of filter/separators to remove water from fuel, as reflected by the WSIM, was decreased by the addition of anti-icing, rust preventive, and biocidal additives, but the additives, themselves, had little if any deterrent effect on microbial growth.

(7) The critical characteristics of the aviation fuel were not affected by intimate contact with microbially contaminated storage tank water bottoms and sea water. Complete analyses at the conclusion of Project BEARS indicate the fuel was still suitable for aircraft use after final clean-up through filter/separators.

From the Project BEARS findings it is concluded that, while the microbial contamination problem cannot be lightly regarded, it is not as severe as originally envisioned. Further, that maintenance of proper housekeeping procedures, designed to eliminate accumulation of water in fuel handling and storage systems, can virtually eliminate the possibility of gross microbial contamination.

A USAERDL Technical Report covering the Project BEARS investigations in detail is being prepared for submittal to Systems Engineering Group, Wright-Patterson AFB.

USAERDL Seeking Potential Industrial R&D Sources

The U.S. Army Engineer Research and Development Laboratories (USAERDL) are seeking potential research and development sources in fields ranging from image intensification to electrical generating equipment and direct energy conversion devices.

Interested firms are invited to submit information on their qualifications in fields listed below to the R&D Procurement Office, USAERDL, Fort Belvoir, Va.

Image Intensification: Intensifiers, SEC vidicons and image orthicons, design assembly and fabrication techniques and equipment, materials and studies.

Optics: Lightweight, low-cost, high-quality reflective and reflective optical designs and systems, reflectors, infrared filters, fiber optics, special optical glass, and optical contrast response measuring equipment.

Near Infrared and Visible Light Sources: Continuous and pulsed or modulated sources, auxiliary components and materials, including such sources as Lasers, gallium arsenide, xenon, vortex stabilized and other gaseous discharge arcs, carbon arcs, high brightness tungsten, and phosphor type sources.

Miniature High Voltage Power Supplies: For operating image intensifier tubes 6 k.v. to 45 k.v., night-vision systems, and associated laboratory and test equipment.

Engine-Driven Electrical Generating Equipment: Spark ignition and compression ignition engine-driven electrical generator sets; turbine engine-driven electrical generator sets; acoustical enclosures for suppression of audible noise from engine-generator sets; ultra-high-speed, high frequency generators and motors and associated controls; and studies of the distribution of magnetomotive forces in the air gap of rotating machines.

Direct Energy Conversion Devices: Liquid hydrocarbon fueled thermal-photo-voltaic power sources; electrochemical energy conversion systems capable of operation from saturated hydrocarbons and/or anhydrous ammonia with the oxidant supplied from ambient air in both cases; studies of the mechanism of electrochemical oxidation of hydrocarbons; and studies of factors affecting electron and ion separation required for electrochemical processes.

Other fields include: Solid state frequency and/or power conversion devices in the power levels of 10 to 500 k.v.a.; investigations of hybrid fuels for high conductivity plasma production; design and fabrication of electrical drives for terrestrial vehicles; studies of electrical power transmission and distribution techniques and systems; and studies of the effects of electromagnetic radiation released by nuclear detonations on electrical power systems.

Commanders, Technical Directors Meet at Natick

Top military and civilian leaders responsible for U.S. Army research and development met for the second annual Laboratory Commanders and Technical Directors Conference, Aug. 3–4, at the U.S. Army Natick (Mass.) Laboratories. Purpose: To assess current and future Army plans, programs and problem areas.

These key people, in the words of Assistant Secretary of the Army (R&D) Willis M. Hawkins, "spend almost $1½ billion per year and, to a large extent, determine our national defense capability for the future."

In the keynote address, he told conferees representing all areas of Army R&D throughout the Nation, that:

"We must be prepared to institute changes in organization, administration, procedures and objectives" in terms of "political, economic and technological situations and suggest changes needed in our RDT&E (Research, Development, Test and Evaluation) program."

Mr. Hawkins then turned to in-house scientific and engineering personnel and stated that they should be characterized by "an intellectually adventurous spirit of being first to bring the major scientific and engineering leads into the range of Army thinking and exploitation."

Stating that Army personnel policies should be tailored to this end, he laid down his ideas for improving personnel policies, which are briefly summarized here:

- Each laboratory and command can immediately launch into "Operation Talent Upgrade" for the recruitment of professional personnel.
- Improve the career development program and promotion system.
- Adopt a more liberal interpretation of existing regulations to encourage professional leaves for advanced professional training.
- Create and maintain an environment conducive to creativity and productive work and encourage and permit personnel to continue advanced education and training while working.

Secretary Hawkins concluded his remarks with a detailed discussion of funding and program management procedures, stressing the importance of research programs unified at all echelons.

Other speakers and their topics included: Dr. Chalmers W. Sherwin, Deputy Director of Defense Research and Engineering (Research and Technology), who discussed methods of increasing in-house laboratory creative productivity.

Lt Gen William W. Dick, Jr., Chief, Army Research and Development, "Trends in Army Research and Development." Brig Gen Walter E. Lotz, Jr., Director of Army Research, "The Army Research Program for Fiscal Year 1965."

Dr. Ralph G. H. Siu, scientific director, Research Division, Army Materiel Command, and chairman of The Army Research Council, who explained the work of TARC since January this year. Charles L. Poor, Deputy Assistant Director of the Army (R&D), "In-House Independent Research."

Brig Gen William C. Gribble, Jr., Deputy Director of R&D, Army Materiel Command, "The Army Exploratory Development Program for FY 65." General Frank S. Besson, CG of The U.S. Army Materiel Command, "Project Manager Relationship with R&D Laboratories."

Maj Gen Robert F. Seedlock, Director of Military Personnel, ODCSPER, "Military Personnel in R&D." Lt Gen Walter K. Wilson, Chief of Engineers, "MCA and Minor Construction for R&D Laboratories." Brig Gen George B. Pickett, Combat Developments Command, "Combat Developments Command Relations with R&D Laboratories."

Col Clifford T. Riordan, CO, Natick Labs, and Dr. Dale H. Sieling, Natick scientific director, welcomed participants. Program chairman was Dr. G. G. Quarles, scientific director, Office, Chief of Engineers.

CONFEREES at Second Annual Laboratory Commanders and Technical Directors Conference, pictured from top, include: Dr. Chalmers W. Sherwin, Deputy Director of Defense Research and Engineering (R&T) and conference dinner guest speaker. Second photo (l. to r.) Dr. Dale H. Sieling, scientific director, U.S. Army Natick Laboratories; Willis M. Hawkins, Assistant Secretary of the Army (R&D) and keynote speaker; Col Clifford T. Riordan, Commander, Natick Labs. Third photo, Maj Gen F. J. Clarke, director, Military Construction, Office, Chief of Engineers; and Maj Gen A. W. Betts, Deputy Chief of R&D. Bottom photo, Charles L. Poor, Deputy Assistant Secretary of the Army (R&D); Dr. Ralph G. H. Siu, chairman, The Army Research Council; Dr. Harold C. Weber, scientific director, Office of the Chief of R&D; and Brig Gen A. Feyereisen, deputy commander for Plans and Programs, U.S. Army Electronics Command.