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Survey Lists Extent Of Army STI Effort

Scientific and technical information (S&TI) activities at U.S. Army installations across the United States during FY 1964 utilized about $50 million, based on certain limiting criteria, and involved approximately 3,365 civilian and military personnel and 2,245 man-years of effort.

These statistics emerged from a limited-distribution, 1,500-page summary report on an in-depth, on-site survey of 500 organizational elements at 125 Army installations in the U.S. Evaluation by the U.S. Army Research Office staff and the On-Site Survey Committee is just beginning.

Conducted over a period of several

(*Continued on page 4*)

Featured in This Issue...

4 Decorations for Exceptional Civilian Service Won By R&D Personnel at 8th Annual SA Awards Ceremony

Five of seven citations at the Eighth Annual Secretary of the Army Awards Ceremony, Oct. 1, commended achievements of research and development workers, including all four of the Decorations for Exceptional Civilian Service.

Secretary of the Army Stephen Ailes, Under Secretary of the Army Paul R. Ignatius, Chief of Staff General Harold K. Johnson, Assistant Secretary of the Army (R&D) Willis M. Hawkins and Chairman of the Civil Service Commission John W. Macy, Jr., were among an array in depth of top dignitaries whose presence honored award winners.

Others included: Deputy Under Secretary of the Army (Personnel Management) Roy K. Davenport, Deputy Chief of Staff for Personnel Lt Gen J. L. Richardson, Director of Civilian Personnel Charles F. Mullaly, Army Surgeon General (Lt Gen) Leonard D. Heaton, Assistant Secretary of the Army (Financial Management) Edmund T. Pratt;

Deputy Assistant Secretary of Defense (Manpower—Civilian Personnel and Industrial Relations) Stephen N. Shulman and Maj Gen Floyd A. Hansen, CG of the Army Munitions Command, who represented General Frank S. Besson, Jr., CG of the Army Materiel Command.

The Decoration for Exceptional Civilian Service was bestowed upon Dr. Elson B. Helwig, Armed Forces Institute of Pathology, Washington, D.C.; Aaron Ismach, U.S. Army Medical Equipment Laboratory, Fort Totten, N.Y.; Victor Lindner, Picatinny

(*Continued on page 3*)

ASAP to Hear Reports On Priority R&D Areas At Quarterly Meeting

Progress reports on virtually all major areas of Army research and development activities will feature the Army Scientific Advisory Panel quarterly meeting, Oct. 15–16, at Army Materiel Command Headquarters, Washington, D.C.

Secretary of the Army Stephen Ailes, Army Chief of Staff General Harold K. Johnson, Vice C/S General Creighton W. Abrams, Jr., and most of the top-ranking leaders of Army R&D are expected to attend the important sessions.

General Frank S. Besson, Jr., CG of the Army Materiel Command, and Dean O'Brien, chairman of the Army Scientific Advisory Panel (ASAP), will make the welcoming and opening remarks at the initial session. Secretary Ailes is programed for the second day address of welcome.

Reports on AMC's major commodity commands' activities will be pre-

(*Continued on page 7*)

Recipients of Department of the Army's Highest Honor for Civilian Employees

Victor Lindner

Carrol H. Staley

Aaron Ismach

Elson B. Helwig

Army R&D Newsmagazine

Vol. 5, No. 10 October 1964

Editor_____Clarence T. Smith
Ass't Editor_____George J. Makuta
Editorial Ass't ____Joseph R. Weikel

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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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By-lined Articles: Accuracy and relevancy of contents of this publication to accomplishment of the Army R&D mission are of constant concern to the editors. Primary responsibility for opinions of by-lined authors rests with them; their views do not necessarily reflect the official policy or position of the Department of the Army.

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Camp Century PM-2A Power Plant Returns to U.S.

The world's first portable nuclear power plant, developed by the U.S. Army to furnish heat and electricity for Camp Century on the Greenland Icecap for 2½ years, until July 1963, has been dismantled and returned to the United States.

The Department of the Army announced late in September that the primary reactor system has been shipped to the National Reactor Testing Station in Idaho, and turned over to the U.S. Atomic Energy Commission for use in research testing.

The remaining equipment, comparable to that of a conventional electrical power producing facility, is being stored in the U.S. pending completion of the testing programs and final commitment for use in support of another mission, it was stated.

Conceived, designed and built by the U.S. Army Corps of Engineers, the nuclear plant designated as PM-2A was subjected to four months of operational tests beginning in October 1960, and became operational in February 1961.

Capable of generating 1,560 kilowatts of electricity and one million B.t.u. per hour of low-pressure steam for heating and snow melting requirements, the plant proved to have a capacity nearly double that actually required.

When U.S. Army Materiel Command reached a decision in the summer of 1963 to reduce the research and development activities at Camp Century—widely publicized as the Army's "City Under the Snow"—it followed that capacity of the PM-2A was in excess of requirements.

Operation of the plant was terminated July 9, 1963, at which time it had provided a total of 4.394 billion B.t.u.'s of thermal energy and 5.380 million kilowatt hours of net electrical power.

The core of nuclear fuel originally installed was still only partially used. During that time, it was estimated, nearly 50,000 barrels of fuel oil would have been required to produce an equivalent amount of heat and power.

Logistical economies and advantages provided through portable nuclear power plants for remote area military installations are being evaluated on the basis of the pioneering experiment in Greenland, and accurate comparison with other types of remote area power sources will be part of the study.

Nuclear power experts in the office of the Chief of Engineers, Lt Gen W. K. Wilson, Jr., said that utilization of the PM-2A at Camp Century demonstrated many of the military advantages of portable nuclear power plants.

Fabrication of such plants in packages transportable by air, ship or rail provides the choice of expedient shipping. The PM-2A was transported by ship from Greenland. Relocation of the plant demonstrates its capability for re-use after extended operation.

Pre-packaging by the manufacturer also permits rapid installation. Only 78 days were required for the PM-2A installation at Camp Century. It also avoids the cost of importing high-cost skilled labor to an isolated site for a lengthy construction project.

Engineers in General Wilson's office, which is responsible for the Army Nuclear Power Program and works in close cooperation with the Atomic Energy Commission, said the portable plant contributed immeasurably to the success of the U.S. Army Research Support Group (formerly the Polar Research and Development Center) in Greenland.

Since Camp Century is located 152 miles out on the Greenland Icecap from Thule Air Base, the logistical problem of moving 50,000 barrels of diesel fuel oil as compared to that of shipping a small core of nuclear fuel points to the major advantage of portable nuclear power plants.

DISMANTLED PM-2A moves out from Greenland Icecap to the United States.

4 R&D Personnel Win Army Exceptional Civilian Decorations

(*Continued from page 1*)

Arsenal, Dover, N.J.; and Carroll H. Staley, Headquarters U.S. Army Munitions Command, Dover, N.J.

Picatinny Arsenal reaped a third award when Jules G. Capone was presented a $2,135.00 check for a suggestion in the Civilian Incentive Awards Program that effected a saving of $330,042.00 by improving the effectiveness of training ammunition using the T336E10 fuze head. He is assigned to the Ammunition Inspection Engineering Branch, Quality Assurance Division.

The Outstanding Civilian Service Award (Bravery) was presented to Robert Ensley, Pelzer, S.C., for heroism that saved the lives of three soldiers. Herman B. Sneiderman, a truck driver at Fort Carson, Colo., was honored with the Meritorious Civilian Service Award (Bravery) for courage and competence in preventing an accident "that could have involved lives of many people."

DR. HELWIG, chief of the Pathology Division of the Armed Forces Institute of Pathology, was recognized for exceptional civilian service from Dec. 25, 1955 to July 29, 1964. The citation said:

"His skill and leadership augment the achievements and reputation of military medicine; his research, writing and teaching are nationally and internationally recognized; his philosophy and approach to pathologic interpretation have influenced those working for him; and his remarkable performance and significant contributions to the advancement of science and its application to human progress reflect great credit and distinction to the Department of the Army which he so energetically and devotedly serves."

AARON ISMACH, a supervisory general engineer at the Army Medical Equipment Laboratory, was honored for an achievement that has yielded, and will continue to yield, vast benefits to the civilian as well as the military population.

As related in the third anniversary edition of this publication (Dec.-Jan. 1964), which was centered on the theme of "By-product Benefits of Army R&D to the Civilian Community," his invention has helped to control the spread of disease in countries hit by epidemics and major disasters such as floods.

Mr. Ismach first won recognition for inventing a foot-controlled injector device for high-speed mass immunization. Weighing only three pounds, it was used by an Army Medical Service team to immunize victims in the 1963 earthquake in Yugoslavia and, later, in Morocco to protect flood victims against the threat of typhoid.

Jules G. Capone

Accepted for use by the U.S. Public Health Service as well as for the military, the jet injector has a potential recognized also for use by schools, health clinics, the Office of Emergency Planning, the U.S. Forestry Service and the American Red Cross.

The Decoration for Exceptional Civilian Service, however, was awarded to Mr. Ismach not for the original device but for a major improvement—design of an intradermal tip as an accessory to the injector. The tip greatly broadens its potential application, such as an anesthesia control device, tuberculosis testing, and smallpox vaccinations.

Immunization can be accomplished at the rate of 600 to 1,000 an hour with the jet injector, as compared to about 30 for the manual multiple-puncture method.

VICTOR LINDNER, deputy director of the Ammunition Engineering Directorate at Picatinny Arsenal, was decorated for exceptional civilian service, according to the citation, for: ". . . extraordinary and fundamental contributions of profound importance in increasing the non-nuclear military strength of the Armed Forces.

"As a result of his exceptional qualities of leadership and outstanding technical abilities as deputy director of the Ammunition Engineering Directorate at Picatinny Arsenal from 1960 to 1964, a complete new spectrum of highly efficient munition systems has been made available to the Armed Forces of the United States, materially strengthening the national defense.

"His creativity and exceptional technical abilities are a source of inspiration to his associates, reflecting great credit upon himself and the United States Army."

CARROL H. STALEY, technical director of the Research and Engineering Directorate at Headquarters U.S. Army Munitions Command, digressed greatly from his normal sphere of interest to earn his Decoration for Exceptional Civilian Service. The citation said:

"For exceptional performance as leader of a U.S. team conducting a survey of India's production potential and developing plans for U.S. military aid to India from 1 January 1963 to 21 May 1964. Mr. Staley's organization and leadership of the team and his ability to envision the manifold problems resulted in an outstanding report which has formed the continuing basis for planning military aid to India.

"The mutual confidence developed between Mr. Staley and Indian Government officials greatly assisted in the negotiations of implementing the programs. His performance reflects great credit upon himself, the Department of the Army and the United States."

Highlights of the ceremonies included presentation of the colors by the 3rd Infantry Color Guard, music by the United States Army Band and Chorus, and the invocation and benediction by Brig Gen W. J. Moran, Deputy Chief of Chaplains.

Army Sergeant Missile System To Test-Fly Navy SIGS in '65

The U.S. Army will test-fly for the U.S. Navy an experimental model of a simplified inertial guidance system (SIGS) "piggy-back" fashion aboard the Army's Sergeant missile.

Scheduled early in 1965 as part of a series of product improvement evaluation tests of the Sergeant missile, the test of the experimental model of the SIGS guidance system will be conducted by the Army in conjunction with Sperry Utah Co., Sergeant prime contractor. SIGS is under consideration for the Navy's Landing Force Support Weapon.

The Sergeant missile system is directed by the U.S. Army Missile Command at Redstone Arsenal, Ala., under Col J. Mort Loomis, Jr., as project manager.

Survey Lists Army Scientific, Technical Information Effort

(*Continued from page 1*)

months by 110 specially trained Army personnel, armed with an 86-page coded and segmented questionnaire, the review of S&TI facilities, personnel and "hardware" resources was made under contract with CEIR, Inc., of Arlington, Va.

Project officer of the survey is Martin H. Weik, Jr., head of the Systems Branch, Scientific and Technical Information Division, U.S. Army Research Office, Arlington, Va.

Designed to glean as comprehensive information as possible about Army S&TI activities, the survey began under former Director of Army Technical Information Col Andrew A. Aines, and was continued under his successor, Col Dale L. Vincent.

Analysis of the survey data, updating and maintenance of the data file will be conducted by International Business Machines Corp., Bethesda, Md., under an Army contract.

The final report contains breakout summaries of sources of funds, personnel and their educational level, equipment, scientific disciplines involved, organizational elements, information holdings, users, functions and activities in major Army commands related to the handling of scientific and technical information.

Selecting a few of the report statistics at random shows 80 percent of FY 64 funding Army-wide for S&TI activities, or $39,972,737, was expended by the Army Materiel Command with its 2,619 S&TI employees. This includes AMC subordinate commands and breaks down as follows:

Munitions Command, 817 personnel, $12,670,152; Electronics Command, 310 personnel, $8,615,756; AMC Headquarters, 261, $6,240,167; Test and Evaluation Command, 701, $5,923,415; Missile Command, 247, $3,109,058; Mobility Command, 177, $2,435,925; Weapons Command, 98, $876,275; and Supply and Maintenance Command, 8 personnel, $101,989.

Personnel and dollars for other Army commands were as follows: Department of the Army Headquarters, 43, $799,772; Army Medical Service, 146, $2,817,342; Corps of Engineers, 86, $883,776; Combat Developments Command, 163, $3,573,441; Continental Army Command, 153, $870,483.

In Department of Defense elements other than the military services, 157 persons work in scientific and technical information and FY 64 funding was $795,153.

Of the personnel engaged in S&TI activities, about 280 were military officers, preponderantly in grades of colonels and lieutenant colonels, and approximately 3,000 were classified Civil Service employees. A breakout of upper grades showed: GS-9, 417; GS-10, 27; GS-11, 407; GS-12, 364; GS-13, 284; GS-14, 168; GS-15, 70; GS-16, 7, and none in GS-17 or GS-18. The survey did reveal, however, 17 persons in S&TI in the PL-313 category.

The survey reveals that 509 organizational elements are performing one or more scientific information handling functions and activities.

The report lists 56 S&TI activities with the installation and organizational element performing the activity.

Thus, for example, one may scan the list under the activity of "disseminating new scientific and technical information" and find that the organizational element handling that function at the Harry Diamond Laboratories, Washington, D.C., is the Technical Information Office.

At the Army Research Office, Durham, N.C., it would be the Information Processing Office and the Engineering Handbook Office. At some of the large installations like Aberdeen Proving Ground, Md., or Redstone Arsenal, Ala., there are five or six branches or offices which disseminate new scientific and technical information.

The $50 million spent during FY 64 on scientific and technical information activities as revealed in the on-site survey is a minimum figure. The actual expenditures are considerably greater.

In order that the survey could be practicable, the contractor did not include organizational elements which devote less than 10 percent of their effort to scientific and technical information.

The primary criteria in the survey were that the S&TI items processed or held by the organizational element had a clearly scientific and technical character, and that the items were destined for or used by members of the RDT&E community in the conduct of their RDT&E tasks.

Information not included for purposes of the S&TI survey was:

- That used for management rather than for conduct of RDT&E.
- That used for education or training purposes or for field operational purposes.
- Engineering data at or beyond the stage of procurement and production.
- Intelligence information still within the intelligence community.
- Logistics information or public information.

A further exclusion in the survey was recording of personal or individual holdings. It was discovered that the majority of scientific and technical workers had at least one bookshelf of technical journals, reports or other reference sources. These were not included in the survey of S&TI holdings.

In commenting on the report, Army Research Office scientific and technical information leaders emphasized strongly that until the massive amount of data collected in the survey can be thoroughly evaluated and interpreted in detail, valid conclusions cannot be formulated.

GS–16 SUPER GRADES were approved by the Civil Service Commission recently for five Army Missile Command employees at Redstone (Ala.) Arsenal. Four members from the Directorate of R&D include (l. to r.) Charles W. Hussey, deputy chief of the Future Missile Systems Division; William C. Watson, director of the Ground Support Equipment Laboratory; Niles C. White, chief of the Solid Propellant Chemistry Branch; and William B. McKnight, chief, Applied Physics Branch. Not pictured is Carl A. Pinyerd, Jr., deputy project manager of the Pershing Missile System. Maj Gen John G. Zierdt, Missile Command CG, awarded the promotions.

Maj Gen Yu Kun Chang, ROK Army Deputy Chief of Staff for Personnel presents plaque symbolic of letter of appreciation from General Min Kisik, Korean Army Chief of Staff, to Dr. Karcher of the U.S. Army Research Office.

Col Casper Heads Korean Research Unit

In Seoul, Korea, the U.S. Army Human Factors and Operations Research Unit leadership changed Sept. 1 when Lt Col Paul N. Casper relieved Dr. E. Kenneth Karcher.

Director of the Unit's efforts since its activation in January, Dr. Karcher returned to the U.S. Army Research Office in Arlington, Va., as chief, Social Sciences Branch, Human Factors and Operations Research Division.

In broad terms, the mission of the Unit in Korea is to support military operations by studying cross-cultural relationships between Americans and indigenous peoples in terms of behavioral and social scientific principles.

Among the many areas which offer research possibilities in this respect are civic action, civil affairs, personnel training and others considered to aid relationships by effecting better personnel utilization and mutual understanding.

The first research report of the unit was completed by Dr. Leo Kotula, of the U.S. Army Personnel Research Office, Washington, D.C. It deals with problems of Selection and Classification of Republic of Korea soldiers.

Dr. Kotula's task was to determine what psychological measurements and selection devices would be appropriate for the Korean culture. In the past, the Korean Army used primarily tests which were direct copies of U.S. instruments.

The successful impact of the U.S. Army Human Factors and Operations Research Unit on the Republic of Korea Army and their personnel methods was perhaps best illustrated by a citation to Dr. Karcher for his achievements.

Presented by Maj Gen Yu Kun Chang, Deputy Chief of Staff for Personnel, Republic of Korea Army, and signed by General Min Kisik, Korean Army Chief of Staff, it was accompanied by an impressive plaque.

Col Casper assumed his new duties after nearly four years on the headquarters staff, Manpower Control Division, Fourth U.S. Army, Fort Sam Houston, Tex.

He is attached to the Human Factors and Operations Research Division, U.S. Army Research Office, monitor of the Unit in Korea.

From 1959–61, he served as assistant training officer and chief of the Operations Plans Division, G–1, V Corps, U.S. Army Europe. After receiving a B.S. degree in social sciences in 1947 from Oklahoma A&M and remaining there for a year of graduate work, he joined the U.S. Army in 1949 and is a graduate of the Command and General Staff College.

Original members of the Unit in addition to Dr. Kotula who will be working under Col Casper are: Dr. Dean Froelich and Dr. John McCrary, of the Human Resources Research Office (HumRRO), George Washington University, and Dr. Felix Moos, Special Operations Research Office (SORO), American University.

Expected to join the Unit within the next several months will be three more professionals, including another from SORO, one from the American Institute of Research and a third specializing in anthroprometric studies under monitorship of the U.S. Army Natick (Mass.) Laboratories.

Seoul, Korea, was selected as the site of the Human Factors Unit because it offered so many opportunities for human factors research.

Dr. Karcher visited Seoul for five weeks in the fall of 1962 to determine the city's possibilities as a site of the Unit and then spearheaded actual establishment of the project after Maj Gen C. W. Clark proposed the Unit in June 1963. General Clark at that time was Director of Army Research and now is commanding general of the U.S. Army in Japan.

Future study and analysis projects of the Unit are expected to deal with performance of U.S. military personnel in Korea; relations between U.S. and Korean military personnel and also the civilian population; promotion and facilitation of mutual understanding; analysis of political or cultural factors which influence the degree of acceptance or rejection of U.S. Armed Forces Assistance Programs; and application of U.S. military skills to aid the economy of developing nations.

DDR&E Assigns Behavorial, Social Sciences Chief

The Behavioral and Social Sciences Staff of the Director of Defense Research and Engineering has Dr. S. Rains Wallace as its new chief.

Formerly vice president for research, Life Insurance Management Association, Hartford, Conn., he assumed his duties in September.

After receiving B.S., M.S. and Ph.D. degrees from the University of Virginia, he taught at Ohio State University and later was chairman of the Psychology Department at Tulane University.

Commissioned in the Army in 1942, he assisted in the development of aptitude tests for men in the Air Corps. Immediately following the war, he was sent to Germany to direct a group of German research scientists.

Later, as a civilian, he served the Air Force as secretary of its Human Resources Research Advisory Board. In 1950 he was a member of a civilian research mission to Japan and Okinawa. More recently, he was a consultant to the Army Scientific Advisory Panel, and in 1959 was sent to Yugoslavia to serve the International Cooperation Administration.

The author of numerous articles in psychological journals and an editor of *Contemporary Psychology*, Dr. Wallace is vice president of the American Institute for Research and is a member of the Board of Directors of the Psychological Corp. He is currently serving as president of the division of industrial psychology, American Psychological Association.

ASAP Groups Study R&D Problem Areas

Three priority problem areas in Army research and development are being studied by Army Scientific Advisory Panel (ASAP) Ad Hoc Groups that have met in recent weeks for definitive orientation on their tasks as outlined by Army leaders.

The group on *Tactical Automatic Data Processing Systems* convened early in September under the chairmanship of Dr. William L. Everitt, dean of the College of Engineering, University of Illinois, and an ASAP consultant.

Former Army Chief of Research and Development Lt Gen James M. Gavin (USA, Ret.), chairman of the board of Arthur D. Little, Inc., and a consultant to ASAP, is a member of the group. Other members are Dr. Adrian M. McDonough, Wharton School of Finance and Commerce;

Dr. Maurice P. Wilson, Bell Telephone Laboratories, Whippany, N.J.; Dr. James Snyder, University of Illinois; Donald G. Fink, Institute of Electrical and Electronics Engineers, Inc.; and Arnold Nordsiek, General Motors Development, Inc.

Heading the group on *Target Acquisition* is Dr. Finn J. Larsen, former Assistant Secretary of the Army (R&D) and currently vice president for research of Minneapolis Honeywell Co. This group held meetings in July and August and is scheduled to convene again this month.

Members of the group are Dr. Daniel E. Noble, executive vice president of Motorola, Inc.; Dr. Andrew Longacre, professor of engineering sciences at Syracuse University; Dr. Hendrik W. Bode, vice president of Bell Telephone Laboratories; Dr. Max Garbuny, Westinghouse Electric Corp.; and Col Robert B. Partridge, Artillery Agency, U.S. Army Combat Developments Command.

The *Ad Hoc Group on Barrier Research* held its first meeting in August. Chaired by Maj Gen Leslie E. Simon (USA, Ret.) a member of the Army Scientific Advisory Panel, the group includes:

Dr. John R. Dunning, dean of the School of Engineering, Columbia University; Dr. Harold C. Weber, Chief Scientific Adviser, U.S. Army; Dr. Henry G. Houghton, head of the Department of Meteorology, Massachusetts Institute of Technology; Dr. Roger Revelle, University of California; and Dr. Theodore E. Sterne, Research Analysis Corp.

Army Delegation Attends AGARD Meeting in Lisbon

Representatives of the North Atlantic Treaty Organization (NATO) countries gathered for the 14th General Assembly of the Advisory Group for Aeronautical Research and Development (AGARD), Sept. 16–17, at the University of Lisbon, Portugal.

The 14th meeting completed the cycle of one General Assembly on the territory of each of the NATO nations participating in AGARD. Future meetings will be sponsored by technical panels and will concentrate on the basic mission of AGARD, which is to exchange technical information on aeronautical research and development with NATO countries.

Director of Defense Research and Engineering Dr. Harold Brown, along with Dr. Ing. Karl Fischer of the Federal Republic of Germany and Professor Lucien Malavard of France, presented the theme of the General Session, "The Role of Science in Defense."

The technical session was focused on "Man-Machine Relationships." Presentations dealt with man-machine synergy, adaptation of man to the machine, the role of the pilot in the Mercury and X–15 flights, some aspects of high-speed manned flight at low altitudes, and man-machine problems in VTOL aircraft.

U.S. Army representatives attending the General Assembly included Charles L. Poor, Deputy Assistant Secretary of the Army (R&D); Brig Gen John J. Tolson, Director of Army Aviation, Office of Assistant Chief of Staff for Force Development; Col Charles L. Beaudry and Charles Roach, U.S. Army R&D Group, Europe; Dr. Edward J. Baldes and Richard L. Ballard of the U.S. Army Research Office, Office of the Chief of Research and Development.

Mr. Ballard also represented the U.S. Army Research Office at the AGARD Meeting on V/STOL Aircraft in Paris, France, Sept. 1–5; the Farnsborough Air Display in London, England, Sept. 7–9; and the AGARD Boundary Layer Research Meeting in Lisbon, Portugal, Sept. 14–16.

Army Lets Two Contracts in Defense AIMS Program

The Department of Defense AIMS Program, potentially a multimillion dollar tri-service air traffic control system that eventually may involve 40 to 50 avionics contractors, is the basis of two recent Army contracts.

Project AIMS (AIMS stands for three other complex acronyms) is directed toward equipping military aircraft with transponders and ground sites with radar interrogators. They will have the capability of reporting identity and altitude in a manner compatible with air traffic control plans of the Federal Aviation Agency and air defense needs of the U.S. Armed Forces.

The initial awards by the U.S. Army Electronics Command in mid-September totaled only $215,202, but the AIMS Program eventually may cost several hundred million dollars, contracting officials indicated.

The Army contracts are noteworthy in that they call for development and production engineering to be carried out concurrently by the same contractor, the Admiral Corp. in Chicago. Time normally required for the acquisition of competitive procurement data for mass production will thus be minimized.

A $146,202 award is for developmental work. An additional $69,000 contract is for advanced production engineering services and pilot production of 60 receiver-transmitters and mountings for the AN/APX–68 airborne radar transponder beacon for military aircraft.

Responsibility for this equipment was assigned to the Army because it had already made some headway in preparing for a transponder that will meet the new national standards; also, because the Army will be the principal user of such equipment in its low-altitude, low-performance aircraft.

The Department of Defense program office for AIMS, located at the U.S. Air Force Aeronautical Systems Division, Wright-Patterson Air Force Base, Dayton, Ohio, is headed by Col Lawrence Blais, USAF. Col Roman I. Ulans of the Electronics Command, Fort Monmouth, N.J., is the Army AIMS program coordinator.

SM–1A Sets Operating Record

The SM–1A reactor at Fort Greely, Alaska, became the new Army Nuclear Power Program record-holder for sustained performance when it recently passed the 2,630-hour mark set by the PM–1 nuclear power plant at Sundance Wyo., in April.

The SM–1A then went on to establish a record 2,750 hours and 42 minutes continuous operation, 730 hours short of the U.S. record held by a commercial reactor, the 160,000 kw. Yankee Atomic Power Plant located at Rowe, Mass.

ASAP to Hear Reports on Priority R&D Areas

(*Continued from page 1*)

sented by the chairmen of each of the advisory groups for each command. Dean O'Brien is on the agenda for an introduction to the reports of the Ad Hoc Groups for studies on areas of major Army R&D effort.

Dr. Finn J. Larsen, former Assistant Secretary of the Army (R&D), will lead off the Ad Hoc Group reports with a presentation on "Target Acquisition," followed by Maj Gen L. E. Simon (USA, Ret.) speaking on "Barrier Research." Dean William L. Everitt, an ASAP consultant, will discuss "Tactical Automatic Data Processing Systems."

Donald G. Fink, also an ASAP consultant, is listed for a report on "Tactical Communications (RADA) and Satellite Communications." Lt Col K. C. Emerson, special assistant to Assistant Secretary of the Army (R&D) Willis M. Hawkins, will discuss "In-House Laboratories and Scientific Personnel.

Plans regarding White Sands (N. Mex.) Missile Range expanded activities and attendant problems will be explained by Lt Col J. A. Fields, Jr., Space Office, Office of the Chief of Research and Development (OCRD). Col John Dibble, Jr., chief of the Air Mobility Division, OCRD, is slated to report on "Army Aircraft R&D" and Lt Col C. W. Spann, Communications-Electronics Division, OCRD, will review "Tactical Communications."

One of the Army's priority R&D project areas, "Mobile Energy Depot Concepts" as a means of greatly reducing the logistical problem, is the topic of a report to be given by Lt Col James J. Cobb, chief, Atomic Office, OCRD. "Antitank Weapons" is a report that will be made by Lt Col C. M. Zilian, Combat Materiel Division, OCRD, and Lt Col Paul A. Kelley, Air Defense Division, OCRD, will speak on "Forward Area Air Defense Weapons."

ASA (R&D) Willis Hawkins is on the agenda for closing remarks on the opening day and Chief of Staff General Johnson has accepted an invitation to give the address at a dinner in the Fort McNair Officer's open Mess.

The second day of the meeting will be devoted to an orientation on the Army Materiel Command mission and organization, independent laboratories, technical scope and accomplishments in research, management of development and accomplishments, and the project manager system. General Besson is scheduled for summary remarks. An executive session of ASAP will conclude the meeting.

SA Ailes, CofS Johnson To Headline AUSA Meet

Secretary of the Army Stephen Ailes and General H. K. Johnson, Army Chief of Staff, will headline an outstanding group of speakers at the annual meeting of the Association of the U.S. Army (AUSA), Nov. 16–18, in Washington, D.C.

Approximately 3,000 members are expected to attend the program at the Sheraton-Park Hotel, which will feature presentations, exhibits and displays of special Army interest.

More than 50,000 square feet of space will be used by the Army and about 45 industrial concerns to show the latest hardware and concepts in areas such as electronics, aircraft, weapons and other equipment of military interest.

The Secretary of the Army and the Army Chief of Staff will be honored by the AUSA Nov. 16 at a reception. The concluding event will be the George Catlett Marshall Memorial Dinner at which AUSA's prized Marshall Medal will be awarded.

SATCOM Appoints Keyes as Technical Head

The U.S. Army Satellite Communications Agency (SATCOM), Fort Monmouth, N.J., has chosen Rollin G. Keyes as technical director to succeed James P. McNaul, who is completing Ph. D. studies under a Sloan Fellowship at Stanford University.

Rollin G. Keyes

The SATCOM Agency provides the ground complex for the Department of Defense Communications Satellite Program. It plans, conducts, and evaluates the communications tests with the National Aeronautics and Space Administration's SYNCOM satellites, including the recently launched SYNCOM III.

Since joining the Agency in 1961, Mr. Keyes has been primarily concerned with the testing and employment of the Agency's communications stations and the evaluation of their performance. He is the coauthor of a paper, "Communications Operations Through SYNCOM II," presented last March at the International Convention of the Institute of Electrical and Electronics Engineers.

CELEBRATING fourth birthday of U.S. Army Satellite Communications SATCOM) Agency, members of the original staff (then the U.S. Army ADVENT Management Agency) watch as Brig Gen J. Wilson Johnston, CG, lights candles on cake held by Samuel P. Brown, Agency technical director. Members who joined the Agency Sept. 8, one week after activation, include (l. to r.) George Brazee, Peter J. Kennedy, James T. Evers, Dudley E. Cline, Adamant Brown, Samuel P. Brown, General Johnston, George F. Senn, and Edward A. Stega. Other charter members who were absent include Alan S. Gross, Wilbur P. Lafaye, Peter T. Maresca and William Todd.

Brig Gen Vaughan Commands Natick Labs

Brig Gen Woodrow W. Vaughan became the new commander of the U.S. Army Natick (Mass.) Laboratories when Brig Gen Merrill L. Tribe retired recently after 26 years of active Army service.

A native of Oklahoma, he attended Texas A&M College and was graduated from the U.S. Military Academy with a B.S. degree in 1940.

World War II service of General Vaughan in the China-Burma-India Theater of Operations included command of the first General Depot in China, Assistant Chief of Staff and the Deputy, G–4, U.S. Forces, China Theater. He was promoted to colonel (1945) at the age of 27, making him one of the youngest officers of that rank in the Army.

Returning to the United States in 1946, he attended the first postwar regular class in strategy at the Naval War College and then was assigned to the newly created Research and Development Division of the War Department General Staff. There he served as a staff planning officer, charged with developing the facilities and resources required to support the expanding Army program of research and development.

After graduation from Stanford University Graduate School of Business with an M.B.A. degree in 1951, he returned to Washington for assignment with the Army General Staff and served until 1954 as an executive officer to the Deputy Assistant Chief of Staff, G–4, for Foreign Military Aid.

Duty in Europe followed as commander of the Army Quartermaster Market Center System until 1957. He returned to the United States to attend 1957–58 classes at the Industrial College of the Armed Forces (ICAF). Upon graduation, he was assigned as chief, Program Division, Office of the Deputy Chief of Staff for Logistics.

Brig Gen W. W. Vaughan

Transferred in 1960 to the Office of the Special Assistant for Programs, Office of the Joint Chiefs of Staff, he served until he was assigned to the Quartermaster School as assistant commandant in May 1963.

Promoted to general rank in May 1963, he was assigned to the Military Advisory Group as senior logistics advisor to the Republic of Korea Army until he assumed command of the Natick Laboratories in September.

Thayer Students Employed in Natick Summer Program

Selected from 70 top-flight science students in the New England area, 10 students from Thayer Academy in Braintree, Mass., participated in a 10-week summer program of advanced studies in science at the U.S. Army Natick (Mass.) Laboratories.

Founded by Col Sylvanus Thayer, "The Father of the U.S. Military Academy at West Point," the Thayer (Braintree) Academy initiated the science summer sessions seven years ago to encourage and assist students seeking careers in the scientific disciplines.

The Army Natick Laboratories provide the students with an ideal research climate and the latest in research equipment and techniques. Under the guidance of Army scientists, they organize, prepare, and develop reports in their fields of interest.

Students in the 1964 program and their projects included: Stephen Hobbs and Carol N. Roop, Food Chemistry; William Horne and Wayne A. Roop, Nutrition Studies with Small Animals; John M. Leventhal, Occlusion of Air in Freeze-Dried Foods; Philippa Laubin, Chemical Agents; Laurence A. Lyons, Jr., and William Nugent, Statistical Evaluation of Irradiation Induced Polymers; William Jajarian, Thermoanalytical Measurements on Polymers; Joseph SanClemente, Diet-Energy Relationship in Rats.

In addition to the annual summer program in science at Natick, the Thayer Academy offers summer courses in the Chinese and Japanese languages taught at the Institute of Asian Studies.

Established as one of Col Thayer's educational legacies, "in pursuit of duty and honor to rise from small beginnings to all achievements," the Academy opened in September 1877 with 30 students and 3 teachers.

Today, it comprises a complete school unit through grade 12, with a standard college preparatory program for more than 600 boys and girls. More than 400 students attended Thayer Academy this past summer.

ARMY NATICK LABORATORIES science students and advisers: L. to R., kneeling, John M. Leventhal; Dr. Edward F. Degering, head of Natick Radiation Chemistry Branch and coordinator of the summer program; Wayne A. Roop, Jr.; Stephen Hobbs. Standing, Kenneth R. Dobelbower, chief, Natick Training and Development Branch; Laurence A. Lyons, Jr.; William Nugent; Dr. Dale H. Sieling, scientific director of the Natick Laboratories; Joseph SanClemente, Carol N. Roop, William Horne and Philippa Laubin.

Army Prescribes Interim Policies on Electric Power Requirements

Current and projected electric power requirements for the field Army, now under an extensive study by the U.S. Army Combat Developments Command, are the subject of a recent TAGO interim policy guidance letter.

The letter notes that electric power has become a critical component of major weapons systems in the field Army. Combat effectiveness is dependent upon electric power for target acquisition and location, fire control, surveillance, communications, and many support activities.

Requirements are urgent for lighter and smaller generating equipment, lower fuel consumption, silence, reliability and operation under environmental extremes.

The letter states that these needs are beyond the capabilities of present equipment and technology, and that an aggressive R&D program must be supported for radical improvements in batteries and engine generators and for exploition of new systems.

Policies set forth in the letter pertain to all energy conversion systems for electric power. The scope includes, but is not limited to, batteries, fuel cells, engine-driven generators, static thermal energy converters, manual generators, solar cells, magnetohydronamics, electric power conversion, utilization and transmission systems, and mobile nuclear reactor power systems.

Among policy objectives are:

- Obtaining maximum reliability and versatility of employment in electric power for the field Army in operational and logistical environments which the Army may encounter with a high degree of probability in the 1965–75 time frame.
- Achieving a maximum degree of commonality in function and repair components or parts.
- Placing a premium on designs achieving bonus effects in the same units, e.g., utilization of waste heat, and multi-functional use, as combined electric power and environmental control.
- Maximizing total cost effectiveness of the complete power source-powered device system.
- Reducing the number of items in the supply system without compromising mission accomplishment.

The letter provides guidance to all R&D and procurement activities regarding support to be provided by the Army, justification for development, power ratings, military design preference, and quantity production savings. It states, in part:

"Families of general purpose batteries, engine generators, and other power sources will be developed. Each family will be designed to meet the broadest power-duration range with the fewest number of rated devices to meet high density requirements, excluding ratings to meet low-density special requirements.

"Special purpose power sources will be approved for development only if justification is provided that either mission, size or weight compromised by accepting an approved member is totally unacceptable. Considerable compromise on rating over-matches will be permitted to achieve a minimum of family members.

"While maximum fuel efficiency in all power sources is a desirable objective, it will not be an overriding consideration in power ratings of 45 kw. and lower. Consideration will be given to employment of multiple power sources as normal practice to meet single requirements,

"A highly realistic power rating system will be established. Ratings will be normalized to those environmental conditions (altitude and temperature) which on the average have a reasonably high probability of being encountered. Extreme situations will be met on a case-by-case basis as they occur and normally by providing the next higher rated units or by multiplying of units.

"Primary emphasis will be given to reliability, versatility, multi-fuel capability, weight and size reduction, and minimizing logistic support requirements.

"Solid state control/conversion technology will be exploited to permit the highest possible degree of versatile employment and application.

"Powered industrial-type equipment for general purpose Army use such as pumps, compressors and tools will normally be designed to be electrically driven unless clearly impracticable.

"In order to assure that general purpose power sources and associated equipment will meet stringent military requirements, military designs will be developed in preference to relying on performance specifications for procuring commercial items.

Gates Assigned as Assistant to ASA (R&D)

Nearly 25 years of diversified research and development experience support Howard P. Gates, Jr., for his assignment recently as assistant to Assistant Secretary of the Army (R&D) Willis M. Hawkins.

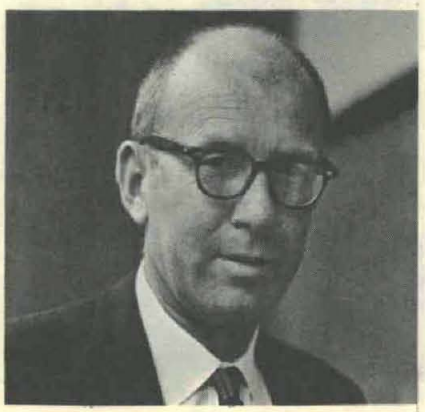
In his newly created position, he will oversee all Army research and development programs pertaining to electronics, communications and avionics systems.

For the past three years he has been vice president of Teledyne Systems Corp., Hawthorne, Calif. From 1954 to 1960, he was program manager of the Marine Corps Tactical Data Systems, followed by service as vice president and chief engineer of West Coast Electronics Co., a Litton Industries subsidary. In 1960 he became a consulting electronics engineer with Litton Industries.

After receiving a degree in electrical engineering in 1939 from the University of California, Mr. Gates worked from 1940–45 with the U.S. Navy Bureau of Ships, Washington, D.C. Then he was head of the Communications and Navigation Section, Navy Electronics Laboratory, San Diego, Calif., until 1951, when he became head of the Communications and Navigation Section with Hughes Aircraft Co., Culver City, Calif. He has served as a consultant to several major industrial corporations, educational institutions and private research organizations.

Professional affiliations include the Institute of Radio Engineers, the American Geophysical Union and the Aerospace Electrical Society. He was a member of the CINCPAC Command and Control Study Group in 1961 and the U.S. Marine Corps Delegation to NATO in 1959.

Mr. Gates' specialties include research, systems design and operations analysis related to tactical data processing and display systems, data transmission and communications systems, navigation systems, fire control systems and ionospheric wave propagation and air defense control.



Howard P. Gates, Jr.

AMC Appoints 11 Generals to Represent Army in Defense Contracts

U.S. Army Materiel Command stepped-up effort in the Defense Contractors Cost Reduction Program is assured by appointment of 11 general officers to work with 35 major contractors engaged in AMC projects.

General Frank S. Besson, AMC commanding general, recently dispatched letters to the contractors, notifying them they will be visited in the near future by AMC senior officer representatives to discuss their proposed programs to reduce defense costs.

The officers will function as personal representatives of General Besson to resolve any problems that may come to light in furthering contractor participation in the cost reduction program. They also will introduce the AMC Cost Reduction Monitor assigned to the plant to advance the program.

As explained by General Besson, the monitors will provide the bulk of liaison with plant management and will be either the commanding officer of a U.S. Army Procurement District or the director of Procurement and Production at a major AMC subordinate command, whichever is more appropriate.

Responsibilities of monitors will include a detailed review of the contractor's policies and procedures as proposed in the Defense Contractors Cost Reduction Program. When necessary, monitors will coordinate with the other military departments any problems that cannot be resolved on a single service basis.

Monitors also will ascertain that there is a uniform approach by the services in those cases where the contractor has several plant locations, some of which may be monitored by other military departments.

General Besson's action followed specific monitorship assignment of plants by the Assistant Secretary of Defense (I&L) to the Army, Navy and Air Force. AMC was assigned monitorship of all plants designated for monitorship by the Army.

The Defense Contractors Cost Reduction Program is a direct outgrowth of President Johnson's December 1963 letter to major contractors. In a concurrent appeal, Secretary of Defense Robert S. McNamara urged contractors to propose cost savings ideas to the Department.

Numerous voluntary responses have indicated planned cost reduction programs contractors believe should decrease the cost of Defense procurement by 5 to 10 percent. Much of this improvement is expected to result from the use of more competitive and more tightly controlled subcontracts, involving about half of the prime contract dollar.

General officers designated by General Besson are: Maj Gen Alden K. Sibley, CG, U.S. Army Mobility Command, Warren, Mich.; Maj Gen F. W. Moorman, CG, U.S. Army Electronics Command, Fort Monmouth, N.J.; Maj Gen Floyd A. Hansen, CG, U.S. Army Munitions Command, Dover, N.J.; Maj Gen J. G. Zierdt, CG, U.S. Army Missile Command, Redstone Arsenal, Ala.;

Maj Gen J. W. Sutherland, Jr., CG, U.S. Army Test and Evaluation Command, Aberdeen Proving Ground, Md.; Brig Gen Roland B. Anderson, CG, U.S. Army Weapons Command, Rock Island, Ill.; Brig Gen H. A. Miley, deputy director of Procurement and Production, Hq, U.S. Army Materiel Command, Washington, D.C.;

Brig Gen Raymond C. Conroy, deputy commanding general for Western Operations, AMC, Oakland, Calif.; Brig Gen Howard F. Schiltz, CG, U.S. Army Aviation Materiel Command, St. Louis, Mo.; Brig Gen Thomas B. Simpson, CG, U.S. Army Mobility Equipment Center, St. Louis; Brig Gen B. J. Leon Hirshorn, CG, U.S. Army Tank Automotive Center, Warren, Mich.

AMC Names Brig Gen Bayer Deputy R&D Director

Announcement that Brig Gen Kenneth H. Bayer was appointed early in September to take over as deputy director of Research and Development, U.S. Army Materiel Command, is expected to be followed by other AMC organizational realignments.

At least two new general officer assignments to the AMC were reported to be pending as this publication went to press, but the identity of the officers and the nature of their assignments could not be determined.

General Bayer is an Artillery officer with broad experience in weaponry. Previously, he served as Artillery commander, III Corps, Fort Chaffee, Ark., and assistant commander of the 7th U.S. Infantry Division in Korea.

After graduating from the University of Alabama in 1940 he entered the Army and served in World War II in the Pacific Theater. In 1949 he received an M.S. degree in electrical engineering from the University of Pennsylvania.

Prior to serving as executive assistant to the Secretary of the Army in 1961–62, he was chief of the Air Defense Division, Office of the Chief of Research and Development, Department of the Army. He is a graduate of the Command and General Staff College, the Armed Forces Staff College, and National War College.

Brig Gen K. H. Bayer

Study Seeks Troop Reaction To Army Tropical Equipment

An Army contractor recently completed a study on how U.S. Army troops stationed in the hot, humid tropics feel about their present equipment. The tabulated data has been sent to the U.S. Army Natick (Mass.) Laboratories for analysis.

Items to which reactions were sought ranged from boots and uniforms to canteens and ponchos. The final phase of the study took place in the Panama Canal Zone and involved 800 troops, 200 from the U.S. Army Forces, Southern Army Command, who were receiving tropical training in Panama.

Previously, the contractor had quizzed 500 troops stationed in Okinawa, most of whom had just returned from a 6-month tour in Viet Nam, and 600 troops in Hawaii.

The research in Panama was conducted by a combined task force of specialized personnel from the U.S. Army Tropic Test Center, Fort Clayton, C.Z., and the contractor, Rowland & Co., Haddonfield N.J.

An interesting aspect of the research was that about 150 of the Canal Zone troops had been tested the day before the disturbances erupted there Jan. 9 and 10. The same individuals were retested following the incidents to see if attitudes had changed due to the situation.

Sulzberger Heads Letterman Dermatology Program

Coincident with transfer of the Army Medical Service dermatology research program centralization from Walter Reed Army Institute of Research to Letterman General Hospital, Sept. 1, Dr. Marion B. Sulzberger began a challenging new assignment.

Internationally renowned for his research and teaching in dermatology and allergy, Dr. Sulzberger has served as a PL 313 since February 1962 as Technical Director of Research at the Medical R&D Command in Washington, D.C. He will have that same title in his new assignment at Letterman in San Francisco and will serve also as chief of the dermatology laboratory.

Transfer of the dermatology research program is in line with an Army Medical Service objective of establishing clinical research facilities at the Army's major "teaching" hospitals. Various other clinical research facilities also are being expanded at Letterman.

The logic behind the move to establish clinical research facilities as an integral part of the medical organization at selected Army hospitals is that residents and internes will benefit greatly from contact with research activities; also, that the depth and variety of knowledge available in the hospital clinical staffs will substantially augment capabilities for productive research.

Letterman is the first of the Army General Hospitals to expand clinical

Dr. Marion B. Sulzberger

research facilities through a planned construction program. Clinical research will be expanded at other hospitals when facilities and personnel can be provided, a Medical R&D Command spokesman said.

Dr. Sulzberger is backed for his new duties by an illustrious career, some of the highlights being: Prosser White Orator, British Association of Dermatology, Royal Society of Medicine in London (1949); Ritter Von Zumbusch Memorial Lecturer, University of Munich, Germany (1954); Lloyd Detron Lecturer, Johns Hopkins University Medical School (1959); Dohi Memorial Lecturer, Japan (1960); Paul O'Leary Memorial Lecturer, Mayo Clinic (1961).

During World War II he served more than four years active duty with the U.S. Naval Reserve Medical Corps, for which he was awarded the Legion of Merit and Permanent Citation by the Navy and the Decoration of Chevalier of the Legion of Merit presented by the President of the Republic of France.

Author or coauthor of 12 medical textbooks and more than 300 scientific articles and monographs, he has served as editor or coeditor of the Year Book of Dermatology and Syphilology, the Journal of Investigative Dermatology, the Journal of Allergy, Current Medical Digest, Medical Clinics of North America, and a number of foreign professional journals.

Among his major teaching assignments have been professor of clinical dermatology and syphilology at New York Post Graduate Medical School, Columbia University; professor and chairman, Department of Dermatology and Syphilology, Post Graduate School, New York University Medical Center; and attending physician at Bellevue Hospital in New York, where he achieved Professor Emeritus status.

Dr. Sulzberger founded and served as president of the Society of Investigative Dermatology, is a past president of the American Dermatological Association, and has served as chairman of numerous national and international committees and working groups in his professional field.

New Organizational Flag Presented to AFIP

The Armed Forces Institute of Pathology, Washington, D.C., was awarded double honors Sept. 17 as it received its new organizational flag and an Air Force Outstanding Unit Award.

An estimated 500 persons—including nearly 100 high ranking governmental, military and civilian officials—attended the colorful presentation ceremony at the Institute.

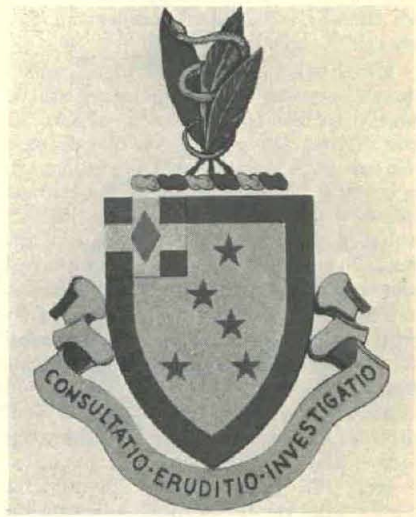
Dr. Shirley C. Fisk, Deputy Assistant Secretary of Defense (Health and Medical), presented the organizational flag, which was designed by the U.S. Army Institute of Heraldry; to the AFIP Board of Governors.

Navy Surgeon General Rear Adm E. C. Kenney accepted the flag for the Board, composed of Surgeons General of the Army, Navy and Air Force.

Maj Gen R. L. Bohannon, Surgeon General of the Air Force, presented the Outstanding Unit Award to AFIP Dirctor Brig Gen Joe M. Blumberg. The citation stated: "The Armed Forces Institute of Pathology has distinguished itself by exceptionally meritorious service of both national and international significance which has assured the Institute of a dynamic role as the world leader in military medicine and pathology.

"The superb accomplishment of its 3-fold mission of consultation, education and research has contributed substantially to the success of the Air Force Medical Service, and its performance of duty is in keeping with the finest tradition of service to the Air Force, the United States and to humanity."

In presenting the award, General Bohannon praised the "completely unique" nature and performance of the multi-service Institute, which was founded as the Army Medical Museum in 1862.



COAT OF ARMS on new AFIP flag carries a motto that reflects a mission of consultation, education and research. The field is gold and the border and five stars, which represent the investigative mission, are green. Three green bay leaves represent the U.S. Military Services and the gold serpent symbolizes the medical services performed by AFIP.

DoD Military Psychological Research Effort Told at APA Parley

The full range of military psychological research throughout the Department of Defense was delineated to the delegates in the Division of Military Psychology at the 72nd annual convention of the American Psychological Association (APA).

Invited presentations during the Sept. 4-9 sessions in Los Angeles, Calif., for the first time were not limited to the approach of a particular agency to military psychology but transcended all military services and other Department of Defense elements. Speakers discussed 10 separate aspects of military psychology in across-the-board fashion.

The comprehensive and integrated program was conceived and directed by Dr. Julius Uhlaner, director, Research Laboratories, U.S. Army Personnel Research Office (USAPRO), Washington, D.C. He served as chairman of the program committee for the Military Psychology Division.

Twenty-four divisions of the APA and more than 11,000 delegates met simultaneously in 22 conference rooms in two large Los Angeles hotels.

Dr. Uhlaner introduced the program, which was developed during a year of planning. His remarks were followed by a discussion of the oldest phase of military psychology techniques—screening and classification—presented by Edmund F. Fuchs, chief of USAPRO's Military Selection Research Laboratory.

Mr. Fuch's report and three subsequent reports concerned the status and direction of research efforts of the Army, Navy and Air Force presented in overview with respect to screening of young men for enlistment or induction, classification of enlisted men for various job assignment areas, and screening of potential officers and noncommissioned officers.

The second broad area of discussion concerned training requirements, which became important in military psychology near the end of World War II. Dr. Meredith P. Crawford, director of the George Washington University Human Resources Research Office (HumRRO), Alexandria, Va., made the principal presentation on training research on programs for new recruits, methods which determine commissioned or noncommissioned status for the recruit, and assignment of occupational specialty.

The state of training technology and studies of motivation and attitudes in training also were reviewed. Dr. Glenn L. Bryan, head of the Personnel and Training Branch, Office of Naval Research (ONR), Washington, D.C., discussed technical jobs and new ways to train modern technicians. Dr. Richard Trumbull, director of the Psychological Sciences Division, ONR, chaired and summarized the session on "Psychophysiological Factors Influencing Military Performance."

It was observed that military requirement of operating in all environmental conditions frequently imposes major constraints and stresses on man's sensing, decision-making and controlling abilities. Assuring his maintenance and continuation of function has required ingenuity and critical sharpening of human factors research to achieve the broad variety of military missions in a global capability concept.

Beginning in about 1948 with the Air Force and 1954 with the Army, another major concept of personnel psychology came into being—human engineering of military systems, which formed the basis of the next discussion session.

Dr. Julien M. Christensen, chief, Human Engineering Division, Aerospace Medical Research Laboratories, Wright-Patterson Air Force Base, Ohio, chaired the session and introduced the subject. He discussed the history of human engineering, the current status of the field, and projected future trends.

Dr. James W. Miller, head of the Engineering Psychology Branch, Office of Naval Research, Washington, D.C., spoke on current typical data collection sources and methods of collection. Dr. Leon T. Katchmar, chief, Systems Research Laboratory, U.S. Army Human Engineering Laboratories, Aberdeen Proving Ground, Md., reviewed present and future preliminary design and development and test and operational evaluation methods in human engineering.

Launor F. Carter, director of the Advanced Technology and Research Directorate and senior vice president of the System Development Corp., Santa Monica, Calif., was the chairman of the session devoted to major problems in developing information processing systems. Considered were a scheme for systems analysis, a typical command and control system, and various methods of characterizing such systems and problems of managing them.

In another session, Dr. R. Ernest Clark, director of the Human Factors Division, U.S. Army Research Institute of Environmental Medicine, Natick, Mass., led discussion of environmental factors influencing individual performance, including climate, food, clothing and protective devices and adjustments to be considered in relations to military stress factors.

Dr. Theodore R. Vallance, director, Special Operations Research Office, American University, Washington, D.C., chaired the session dealing with research on influence exerted by U.S. military systems on attitudes and behavior of indigenous people overseas. The emphasis was on use of propaganda, interpersonal communication, civic action programs and other nonviolent techniques.

Military posture, strategy and weapon systems as instruments of influence were considered during the session on war-gaming techniques, decision theory and variables in deterrence, which was chaired by Dr. Thomas W. Milburn, U.S. Naval Ordnance Station, China Lake, Calif.

Dr. William C. Biel, dean of the University of Southern California, led discussion concerning functional analysis, model development and evaluation research activities conducted in typical system simutation.

Chairing the session which explored the implications of data techniques and information processing methodology in command and control was Dr. J. C. R. Licklider, until recently director of information processing techniques, Advanced Research Projects Agency, Department of Defense. He presently is associated with the Thomas J. Watson Research Center, International Business Machines.

In addition to the invited presentations on psychological research in national defense, a number of specific technical papers were presented during a separate schedule of meetings.

Dr. Uhlaner is assembling the papers presented on military psychology and intends to have them published as perhaps the most comprehensive reference work on military psychology in existence.

TIMELY TIP. Required reading for anyone concerned with the progress of the U.S. Army Materiel Command is the report on its first two years of operation in the September issue of *Armed Forces Management.* In a by-lined article publisher C. W. Borklund reviews AMC accomplishments under the heading of "Has Army Materiel Command Earned its Fourth Star?" Another article on the AMC is titled "Has Project Management Paid OFF?"

HDL Using Fluid Mechanics to Power Missile Control

Fluid mechanics techniques developed at the Harry Diamond Laboratories (HDL) in Washington, D.C., are now being employed by research engineers to power a missile control system with no moving parts.

Fluid amplification controls were invented at HDL about five years ago. The compressed gas system currently under development at HDL consists of three digital fluid amplifiers cascaded so that a high-flow gain of the order of several thousand can be achieved. A pneumatic R-C oscillator, coupled to the first stage, drives the system to produce an alternating pulsed output, with zero net thrust.

The first-stage amplifier has two sets of controls. The oscillator is connected to one set, and a correction signal is applied to the second set.

In the model shown in the accompanying photograph, an air-driven air-pickoff gyro provides a correction signal proportional to the attitude error. This signal modulates the oscillation, causing the output to dwell longer on one side than on the other and producing a net thrust to overcome the attitude error.

Electronic control systems can accomplish a similar result, but there appear to be many advantages to this new fluid system, HDL research engineers contend.

Virtually impervious to environmental factors, the fluid mechanics system is highly resistant to shock and vibration, is unaffected by radiation, and its shelf life appears to be without limit, they say in support of the all-gas system.

Although this fluid system in its present form could be used to control supersonic capsules, missiles and ramjet engines, more sophisticated systems will be developed in the near future as an outgrowth of the first effort.

HDL's Carl J. Campagnuolo and Leonard M. Sieracki are currently investigating the control of large supersonic elements by these techniques to be applied to thrust vector control or reaction jets.

FLUID AMPLIFIED missile pitch control system, operating with no moving parts, gets boost with HDL's Shirley McClain at the controls.

Military Surgeons to Review Medical Progress

Medical progress resulting from environmental challenges posed by modern man's exploration of the unknown, ranging from the bottom of the deepest oceans to outer space, will be reported at the 71st annual meeting of the Association of Military Surgeons of the United States.

Scheduled Oct. 20-22 in Washington, D.C., the conference is expected to attract about 3,000 participants. The general theme is "Military Progress Through Scientific Achievement." General chairman is Brig Gen Joe M. Blumberg, director of the Armed Forces Institute of Pathology.

Dr. Robert M. Zollinger, University Hospital, Columbus, Ohio, president of the Society of Medical Consultants to the Armed Forces, is scheduled for the keynote address.

Col Robert C. Kimberly, Association president, will preside at the opening session. Among featured speakers will be Lt Gen Lewis B. Hershey, director, Selective Service System, and Dr. Shirley C. Fisk, Deputy Assistant Secretary of Defense (Health and Medical).

Other leading speakers will include Lt Gen Leonard D. Heaton, U.S. Army Surgeon General; Rear Adm Edward C. Kenney, U.S. Navy Surgeon General; Maj Gen Richard L. Bohannon, U.S. Air Force Surgeon General; Dr. Luther L. Terry, Surgeon General, U.S. Public Health Service; and Dr. Joseph H. McNinch, Chief Medical Director of the U.S. Veterans Administration.

Capt. G. F. Bond, U.S. Naval Medical Research Laboratory, New London (Conn.) Submarine Base, will make one of the major presentations on underwater habitations. Reports also will be made on clinical studies on acute mountain sickness and on psychological aspects of living in the Antarctic. Other speakers will discuss infectious hepatitis in Korea, leptospirosis in Malay, and new developments in malaria research.

Included in the program is a report on a broad study of advances in medical techniques resulting from developments in modern weaponry, the results of a study of the medical aspects of operations of the Army Special Forces, and a survey of interagency and intergovernmental cooperation in the investigation of aircraft accidents as related to medical treatment.

Awards for the most outstanding contributions to military medicine will be presented Oct. 21, including: The Andrew Craigie Award, Federal Nursing Service Award, Founder's Medal, Gorgas Medal, John Shaw Billings Award, Major Louis Livingston Seaman Prize, McLester Award, Sir Henry Wellcome Medal and Prize, Stitt Award and Sustaining Membership Award.

Engineer Technicians Elect Missile Command Man as V.P.

U.S. Army Missile Command employee Donald J. Southard was recently elected vice president of the Southeast Region of the American Society of Certified Engineering Technicians (ASCET).

Sponsored by the National Society of Professional Engineers, ASCET currently is made up of more than 2,000 engineering technicians who work alongside engineers. Membership applications are being received at the rate of about 100 a month.

Southard is one of seven vice presidents of the newly formed organization. It was created to increase status of its members in the eyes of industry, to improve the service of its members as a vital component of the engineering and scientific fields, and to establish cooperative relations with other societies.

Engineering technicians interested in joining the new organization may contact Southard at 318 Harold's Drive, N.W., Huntsville, Ala.

World Progress in Radiation Preservation of Food Reviewed

Advances in irradiated foods technology were detailed to more than 300 Free World scientists attending the International Conference on Radiation Preservation of Foods in Boston, Mass., Sept. 27-30.

The conference was jointly sponsored by the U.S. Army Natick (Mass.) Laboratories, the Atomic Energy Commission (AEC) and the National Academy of Sciences-National Research Council (NAS-NRC).

In addition to hearing 29 technical papers by U.S. and foreign scientists, participants witnessed the dedication of the AEC Marine Products Development Irradiator Facility at Gloucester, Mass. The Bureau of Commercial Fisheries, U.S. Department of Interior, is operating the facility to study the radiation pasteurization of seafood on a semi-commercial basis.

Joseph Slavin, Bureau of Commercial Fisheries, and Dr. Paul C. Aebersold, U.S. Atomic Energy Commission, gave the prinicpal addresses at the dedication ceremony. Participants later lunched on irradiated seafood before departing for Natick, Mass., where they toured the Army Natick Laboratories (ANL) and were briefed by Brig Gen W. W. Vaughan, commanding general, Dr. Dale H. Sieling, scientific director, and Dr. Ferdinand P. Mehrlich, director, Food Division.

Dr. E. S. Josephson of ANL presided at the opening session of the conference. Speakers included Dr. S. A. Goldblith, Massachusetts Institute of Technology, "Worldwide Status of the Treatment of Foods by Ionizing Energy"; Dr. R. A. Silow, Food and Agriculture Organization of the United Nations, "Aspects of International Cooperation";

Dr. W. T. L. Neal, Ministry of Agriculture, Fisheries and Food, London, England, "Prospects for Radiation preservation of Foods in Britain"; Dr. D. deZeeuw, Institute for Atomic Sciences in Agriculture, the Netherlands, "European Radiation Preservation of Fruits and Vegetables"; Dr. E. C. Maxie, University of California, "Irradiation of Fruits and Vegetables."

Speakers from Denmark, Sweden, Canada, France, other British agencies and universities, Government agencies and commercial firms in the United States made technical presentations. Their papers concerned radiation preservation in meats, shellfish and other foods. Discussions covered problems of wholesomeness, packaging, amounts of radiation necessary for preservation and other international efforts.

The conference marked a high point in the 15-year history of increasing U.S. and international cooperation in research and development of radiation preservation of food.

The general possibilities of the preservation of food by ionizing energy were established on a theoretical and laboratory basis before 1949. Several points were clear. Foods could be preserved by ionizing energy without any significant rise in temperature. In some cases, however, undesirable changes in odors and flavors, as well as texture and color, were experienced.

Experimentation to solve these and other problems, including U.S. Food and Drug Administration clearance for wholesomeness, it became obvious, would entail time-consuming and expensive programs. Such a venture appeared unreasonably high for industry as a whole to assume, although a few organizations were subsidizing a significant effort. Universities likewise did not possess sufficient financial resources to go forward on their own.

Before 1950 there was only meager Federal Government support in research food processing by ionizing energy. Various agencies had been supporting fundamental research in the nuclear and biological sciences at several universities.

Early in 1950 the U.S. Atomic Energy Commission began looking for ways and means of utilizing the waste fission products of nuclear reactor operations. Their potential use in the ionizing processing of food appeared promising and, under the general supervision of the AEC, research contracts were negotiated to explore the possibilities.

In the meantime, the Navy, concerned with its needs for reducing refrigerated storage facilities aboard ships, let a research contract to the Massachusetts Institute of Technology (M.I.T.). During this period, the late Dr. Bernard E. Proctor and Dr. Samuel Goldblith obtained encouraging results in extending the refrigerated shelf life of certain perishables by ionizing preservation.

The U.S. Army Quartermaster Corps also sponsored a research contract at M.I.T. in 1951. The Quartermaster Corps had been interested in preventing insect infestation of cereal bars in military rations. Dr. Proctor was asked to evaluate the effectiveness of ionizing energy to disinfest the items. The overall results of the work were most encouraging.

The contracts were somewhat restricted in scope and generally of an exploratory nature. They were not designed to attack the larger questions, such as the development of a finished commodity, the construction of pilot plants and production-size ionizing sources, or the securing of toxicity clearances for the marketing of foods processed by this method.

The U.S. Army in 1953 undertook a feasibility study to determine its role in this new area of food processing. The study concluded that the successful development of the ionizing treatment of food would improve the acceptability of military field rations, reduce the logistical loads involving refrigeration, make possible the in-

FDA Approves Radiation Processing of White Potatoes

The U.S. Food and Drug Administration has approved white potatoes irradiated to inhibit sprouting, the U.S. Army Natick (Mass.) Laboratories have announced.

One of 21 foods in the Army radiation preservation of foods program, jointly conducted by Natick Labs and the Office of The Surgeon General, the potatoes were preserved by Natick scientists within a low-dose range of 5,000-10,000 rads from a cobalt-60 source.

In ionizing energy processing, potatoes are passed through the radiation field of the cobalt 60. The rays go completely through the tubers and interact with the germination cells so that they no longer can divide. Sprouting is permanently inhibited.

A major item in the military ration system, the potato is generally regarded as the most important vegetable in the domestic diet. Annual production is estimated as more than 26 billion pounds, valued at more than $500 million.

The anticipated gain to industry and the military through processing by irradiation will be significant. About 70-75 percent of the U.S. potato crop is harvested in the fall and cannot be kept in unrefrigerated storage later than early spring.

Under normal storage conditions, sprouting and softening occur in about four months. When temperature and humidity are controlled, they may be kept up to a maximum of eight months without deterioration. The new process will permit storage from one harvest season to the next.

corporation of more fresh foods into the diet of men overseas, as well as realize considerable savings in the cost of military subsistence.

Beginning in 1954, a major part of the Government's program on the treatment of food with ionizing radiation was borne by the Quartermaster Corps. Since August 1962, the U.S. Army Materiel Command has supported a major portion of the program through its Radiation Laboratory at Natick, Mass.

In 1960 the Atomic Energy Commission initiated an extensive program in the radiation pasteurization of foods. While the Army program focuses on applications for military utilization, that of the AEC emphasizes products for civilian consumption.

The Office of The Surgeon General of the Army has conducted extensive wholesomeness studies on foods developed for use by the U.S. Armed Forces, and the Department of Health, Education, and Welfare has served in a consultative and advisory capacity through its Food and Drug Administration.

The Department of Interior has cooperated with the Army in preliminary screening experiments on the effect of ionizing energy on selected fish products and is now working closely with the AEC on further development of irradiated marine products.

The Department of Commerce has made significant contributions by reporting progress in radiation preservation of foods to interested trade associations, industry and the general public.

Coincidental with this sequence of events within the operating agencies of the Government, the Nation's highest policy councils have been orienting national policy toward the peaceful uses of atomic energy.

On Dec, 8, 1953, President Eisenhower described the policy of this country in an address before the United Nations. He urged the establishment of a mechanism for taming the atom for man's benefit.

His proposal for international cooperation toward this goal was adopted unanimously by the Political and Security Committee of the General Assembly on Nov. 23, 1954 and by the General Assembly itself on Dec. 4, 1954. This action led to the first International Conference on the Peaceful Uses of Atomic Energy in Geneva, Switzerland, Aug. 8-20, 1955.

Scientists from 72 nations congregated to present papers and exchange information on the peaceful exploitation of atomic energy. The U.S. delegation accounted for six papers presented on the treatment of food by ionizing energy. The President's initiative set the pattern for atomic research motivation.

In Fiscal Year 1961, the U.S. Army launched a 6-year $5.13 million revised program with these objectives:

1. To obtain wholesomeness clearances permitting unrestricted use of foods preserved by ionizing energy.

2. To conduct the necessary basic research to advance the technology of food processing by ionizing energy so that items of military significance and of quality far superior to analogous items available in the combat theater can be procured.

   a. Primary emphasis to be placed on high-dose treated (sterilized) pork, smoked ham, chicken and beef.

   b. Secondary emphasis to be placed on low-dose treated (pasteurized) items of special military significance.

3. To conduct timely economic analyses.

4. To formulate such items into logistic-saving components for use in Army ration systems for those in support areas to and including individual military feeding in the forward areas.

5. To develop components meeting special requirements of the Navy, Air Force and Marines.

6. To develop process engineering data for efficient transition into industrial sponsorship.

7. To establish a reservoir of basic information for future improvement of foods processed by ionizing energy.

The U.S. Army Radiation Laboratory at Natick, Mass., is a primary research tool to meet these objectives. Designed to serve as a research facility, it has the capability for future expansion into a semi-production facility if necessary.

Divided into an "uncontrolled (nonradiation) area" of about 11,500 square feet and "controlled (radiation) area" of 9,500 square feet, the laboratory includes a pilot plant area for food preparation, a taste-test kitchen, and administrative support areas.

Activities within the radiation cells may be observed by closed circuit television. Radiation sources include the linear accelerator and the cobalt-60 cell. The linear accelerator is the Varian 24 MEV 18 kw. unit, modified for simplicity and for reduction of research, development and constructional costs. The main components of the Linac are the electron gun, a scanner, a conveyer system, the power supply, and the control panel.

The cobalt-60 gamma radiation complex consists of the irradiation cell with its labyrinth entrance, the source elevator (or storage) pool, the source loading pool, and the gamma cell control room. The cell is designed to contain three megacuries of cobalt 60. The initial loading was 1.3 megacuries. Food packages to be irradiated are carried into the cell by means of a continuous conveyor of the overhead trolley type.

Progress in the development of the food irradiation process and of a number of usable products have brought the Army's program close to realization. The Food and Drug Administration has approved for human consumption canned bacon sterilized with ionizing radiation. The bacon may be processed with a 4.5 megarad dose utilizing cobalt 60, cesium 137 or electrons having 5 MEV energy or less. The Natick Laboratories have prepared a limited production purchase description on which the first commercial production test of irradiated bacon will be made.

The FDA has, in addition, approved the disinfestation of wheat and wheat products and the sprout inhibition of potatoes with gamma radiation at energy levels below 2.2 MEV. A clearance petition has been filed for the pasteurization of oranges with ionizing radiation.

Missilemen Hold TOW Review During 2-Day Redstone Meet

Missilemen developing the Army's TOW (tube launched, optically tracked, wire guided) antitank missile system recently held a 2-day progress review meeting at Redstone (Ala.) Arsenal, headquarters of the U.S. Army Missile Command.

Representatives from most of the Army agencies concerned with the development of TOW as well as personnel from the system's prime contractor participated in the discussions.

One of the highlights of the meeting was a demonstration of the TOW system at one of the Missile Command's test ranges.

Col Cyril D. Sterner, commodity manager for Antitank and Aircraft Weapons, conducted the meeting. E. A. Hayes, TOW program manager, represented Hughes Aircraft Co., prime contractor.

The TOW Missile, which may be carried by soldiers or mounted on light vehicles, is under development for Infantry troops for use against heavily armored tanks.

Posthumous Award Slated for Dr. Skifter

Posthumous award of the Department of the Army Outstanding Civilian Service Medal to Dr. Hector R. Skifter, a distinguished member of the Army Scientific Advisory Panel until his death July 25, 1964, has been approved.

As the Newsmagazine went to press, the presentation to his widow was being arranged.

The award will recognize Dr. Skifter for his service to the Panel from Aug. 9, 1960, until his death. Although his noteworthy contributions to the Panel during this period were numerous, the most profound impact was effected by the Skifter Committee Report on Army In-House Laboratories in the fall of 1963.

That sharply penetrating study, which included committee visits to eight Army in-house laboratories for in-depth observations, supplemented by results of questionnaires to 42 additional laboratories, was in many respects an analysis of long-recognized problems.

The classified report, termed a "must" on the reading list of everyone concerned with Army R&D management, was strongly critical of certain management and long-range research planning shortcomings.

When reviewed by Assistant Secretary of the Army (R&D) Willis M. Hawkins, the Skifter Report became the basis of establishment of The Army Research Council, composed of nine of the Army's most eminent scientists, in January 1964. The 434-page report of the Council, released in August, has been acclaimed widely as the most comprehensive and important research program document ever prepared for the Department of the Army.

Dr. Skifter, however, distinguished himself in many other ways during a 22-year period of service to the Department of Defense as a member of several top-level committees, as a consultant to the President's Science Advisory Committee (Executive Office of the President), and as a consultant to numerous national defense and economic agencies.

From 1942-1945, he served on both Division 6 and Division 15 of the National Defense Research Committee; from 1945 until his death, he was a member of the Ad Hoc Committee on Air Navigation of the Research and Development Board, including a period as chairman. He also was a member of the Technical Advisory Panel on Electronics, Department of Defense, including a special panel on electronic countermeasures.

Included in his services to the Nation was duty as a member of the Gaither Security Resources Panel of the President's Science Advisory Committee. Dr. Skifter also served as a consultant to the Assistant Secretary of Defense for Research and Development, to the Air Navigation Development Board, and to the Director of Defense Research and Engineering, Department of Defense.

Frequently cited for his achievements by the agencies he served, Dr. Skifter was credited for development of new and improved defensive systems and their control environment, including antiaircraft, antimissile missiles and interceptor aircraft.

During his final year on the Army Scientific Advisory Panel, he devoted 43 days of his time to the work of the Panel without compensation. In addition to his service on the Army In-House Laboratories Study Committee, he was a member of a group tactical communications.

The citation to be read at the presentation of the Outstanding Civilian Service Award to Mrs. Skifter will recognize her late husband for "dedicated interest in the Nation's defense problems" and for contributing 'immeasurably to the advancement of research and development programs of the U.S. Army."

Air Assault II Testing Army Mobility Concept

About 32,000 troops began testing the U.S. Army's air mobility concept Sept. 20 during training exercise Air Assault II in North and South Carolina and Georgia.

The exercise will continue until Nov. 15 and is designed to determine whether advances in light aircraft capabilities and new technology can be used to improve battlefield mobility and combat effectiveness of U.S. ground forces.

Director of the exercise is Lt Gen C. W. G. Rich, CG, Third U.S. Army. Being conducted on approximately 4.5 million acres of privately owned land in the Carolinas and Georgia, the exercise is headquartered at Fort Jackson, S.C.

In the portion of Air Assault II scheduled from Oct. 14 to Nov. 12, the 11th Air Assault Division (Test) will oppose an aggressor force from the 82nd Airborne Division of Fort Bragg, N.C., under command of Maj Gen Robert H. York.

The 11th Air Assault (Test) and the supporting 10th Air Transport Brigade (Test) were formed at Fort Benning, Ga., in February 1963 to provide the units required to test the air mobility concept. These units will culminate nearly two years of intensive unit training during the pre-test division-size exercises.

Dr. Nebesky Heads Natick Labs Container Division

The U.S. Army Natick (Mass.) Laboratories' Container Division is now under the leadership of Dr. Edward A. Nebesky, former Rutgers University professor and also director of the Rutgers Food Industry Science School and Graduate Packing Center.

Dr. Nebesky reported for duty this past month and will direct research, development, applications engineering and standardization programs on containers, preservation, materials and methods for packaging military supplies, including food and clothing.

A native of Amesbury, Mass., he attended the University of Massachusetts, earning B.S., M.S. and Ph. D. degrees (1943-1948-1950), all in food science and technology. Retained at the university as an instructor until 1951, he then joined the Cryovac Co., Simpsonville, S.C., as product manager for developing new products, applications and markets for packaging foods, drugs and non-food items.

Dr. E. A. Nebesky

In 1956 he became associate professor and head of the Division of Food Technology, Dairy Department, at Cornell University, Ithaca, N.Y. There he established an undergraduate teaching program in food technology, preservation, manufacturing methods, and packaging.

Dr. Nebesky joined the faculty at Rutgers in 1959 as a professor and food science extension specialist, with responsibility for developing a comprehensive curriculum of teaching, research and extension oriented to consumer packaging of foods and drugs. During World War II, he served in the Army as an enlisted man and officer in the Cavalry and Quartermaster Corps.

Contractor to Develop Improved Multichannel Radio Sets

Award of a $22.7 million contract by the U.S. Army Electronics Command is expected to yield greatly improved communications capabilities for the Army.

Providing for transmission of as many as 96 voice messages simultaneously on cable or radio channels, the award was made recently to the Raytheon Co. It calls for initial production of equipment that will enable telephone conversations to be transmitted in binary form—digits or numbers—instead of vowels and consonants.

Called Pulse Code Modulation (PCM), the equipment is designed for use with present Army radio relay equipment as well as future sets now being developed. It is intended to become the standard multichannel transmission equipment for Army communications.

The value of the PCM theory was recognized 20 years ago by the Electronics Command's Fort Monmouth (N.J.) Laboratories, but field application was forced to await research and development of micro-miniaturization and substitution of solid state devices—transistors, diodes and similar equipment, for efficient but bulky, heat-producing and power-consuming vacuum tubes.

As each voice message is fed into the PCM equipment, it is combined with the other messages and then converted into digital form. At the destination, the digits are sorted out and reassembled into the original voice messages. This it does at the rate of 48,000 bits of information per second on each channel.

Considered a major advance in the Army's plan to increase communications capabilities, the PCM equipment will permit handling up to eight times as many voice messages simultaneously as are now possible between communications centers.

Military communications trends point to an increasing use of digitalized handling equipment as data processors and computers become more prevalent. The digital format of the PCM equipment makes it possible to transmit messages between data processors and computers with high efficiency and accuracy.

PCM equipment offers the Army many other advantages:

- Lower cost transmission links can be used. PCM needs only to recognize the presence or absence of a pulse.
- Long distance transmission is possible. Technically, messages can be sent a considerable distance without any reduction in quality by using repeaters. In a radio link, the repeaters will be 30 miles apart to a maximum of 240 miles. For cable use, unattended repeaters will be spaced every mile; attended repeaters, every 40 miles to a maximum of 240 miles.
- The unattended repeaters are small and extremely rugged and fit into the strong and lightweight twin coaxial cable. The cable, with repeaters installed at each mile interval, can be laid by truck.
- The equipment is rugged, lightweight, transportable on the battlefield, and works in jungle swamp, or arctic tundra. The equipment is completely transistorized—more than 1,000 commercially available, highly reliable military grade transistors are used in a single PCM terminal.
- Field maintenance is simple. Inexperienced operators can check performances rapidly with its built-in tester.

The new equipment climaxes continuous research and development in PCM by the U.S. Army Electronics Laboratories since 1943. However, prior to recent advances in packaging and systems designed by the Electronics Command and Raytheon, PCM had proved impractical for tough tactical use.

The development tasks were carried out by teams from the U.S. Army Electronics Laboratories and Raytheon's Communications and Data Processing Operations at Norwood, Mass. Full field trials of prototype models of the equipment were conducted during 1963 at the U.S. Army Electronics Proving Ground, Fort Huachuca, Ariz.

Ultrasonic Probing Method Advances Flaw Detection

Non-destructive testing technology developed at Watervliet (N.Y.) Arsenal to detect flaws in cannon tubes has been advanced notably by a new method of automatic ultrasonic probing.

The technique developed by Richard C. Muller, an electrical engineer in the Research and Engineering Division, has proved superior to the conventional ultrasonic manually operated pulse echo technique. It detects flaws in material by "through" transmission of ultrasonic energy rather than by the transmission of reflected pulses.

Termed the "shadow" method because the flaw casts a shadow of sound, the improved technique has proved to be more reliably accurate than pulse echo testing at the Army's upstate New York cannon research and development center.

Through transmission is accomplished by a cylindrical, motor-driven device within the tube. Two transducer crystals automatically scan for flaws as they are drawn from one end of the cannon bore to the other. This use of both a transmitting and receiving transducer is the major difference between the methods. In pulse echo testing one transducer, manually operated from the tube's outside diameter, performs both functions.

The shadow method has proved preferable to the pulse-echo technique principally because it is better able to record the position and size of flaws as small as $\frac{3}{16}$ inch in depth. The pulse echo method may miss some flaws and size is difficult to guage.

The new method may be applied in testing the entire array of thick-walled gun tubes developed at the Arsenal—ranging in size from the 90 mm. tank gun to the 175 mm. self-propelled gun, the Army's largest conventional weapon.

Perfection of this testing technique may eventually eliminate surface methods of inspection, such as the magnetic particle and boroscope techniques, which are not capable of determining flaw depth, Arsenal officials believe.

The description of the method was set forth by Muller in his paper, "Automatic Non-Destructive Testing Method for Hollow Thick Wall Cylinders," delivered at the recent 14th Annual Defense Conference on Non-Destructive Testing.

WATERVLIET ARSENAL engineer, Richard C. Muller points out transducer on automatic testing device held near 105 mm. tank gun barrel by technician Thomas Muckle.

Much to Do About (Almost) Nothing

(OR: Accenting Lightweight Military Materiel Requirements)

By Lt Col H. A. Davis, Jr.

Research in Review...

Until assigned recently to the 27th Field Artillery, 2nd Battalion, Lt Col Harry A. Davis, Jr., served with the U.S. Army Research Office, Physical Sciences Division, since November 1961. He is a graduate of the U.S. Military Academy (1946) and Georgia Institute of Technology (1956). Military experience includes troop duty, Korea (1947–51), radar and electronics as student-instructor (1951–59), troop duty, Korea and Fort Hood, Tex. (1960–61). Military schooling includes artillery basic and advanced courses, Command and General Staff College, and radar courses.

The Garand rifle weighs about 8.72 pounds. During World War II, and undoubtedly during the Korean police action, it was often said that when one carried the rifle for an hour the decimal point disappeared.

Similar remarks could well have been made about the Army's portable communication equipment. Besides being heavy, radios had a very bad habit of not working just when they were most urgently needed. Additionally, all of our radios were great consumers of power. Portable sets required batteries to be replaced every 8 to 10 hours and even more frequently when transmission rates were high.

Vehicular-mounted equipment required that the engines be operated 15 to 20 minutes out of every hour to avoid running down the vehicle battery. Some equipment required the vehicle to operate continuously while still others required such large amounts of power that separate electrical generators were required for operation.

Other deficiencies were evidenced by often-heard complaints about insufficient channels, mutual interferences, and interference from vehicle ignition systems and electrical generating equipment.

These problems and difficulties will be relieved to varying degrees in future communication equipment—and nearly all other types of electronics equipment—as a result of the Army's current research program in microelectronics.

What is meant by the term microelectronics? Actually, microminiaturization or microelectronics has never been clearly defined. However, basically it means making an electronic circuit as small as possible. It encompasses the whole spectrum of electronics art connected with, or applied to, the assembly and fabrication of electronic circuits, systems or equipments from extremely small components.

As far as the military is concerned, microelectronics had its birth during World War II in connection with the development of the VT fuse. The smallest electronic devices then available were hearing aids. Components and tubes making up these hearing aids were taken apart, examined, redesigned, and rebuilt in considerably reduced size to fit the space allowed for the fuse in artillery shells.

Perhaps the next major step in the art of microminiaturization was the development in 1948 of the printed wiring techniques by the Signal Corps Research and Development Laboratories (now the U.S. Army Electronics Laboratories) at Fort Monmouth, N.J. For the first time, machine assembly of circuits was possible and the time- and space-consuming under-chassis wiring was eliminated.

Industry acceptance of the technique was so rapid that within the space of five years the printed wiring concept was in use on the assembly lines of nearly all the largest manufacturers in the United States. Military designers rapidly adapted the technique to military applications.

Almost concurrent with the development of printed wiring was the discovery in 1948 that a germanium point contact triode could function in a manner similar to an electron tube in amplifying, oscillating, or controlling electrical energy. Thus the transistor was born. A whole new technology based on the use of semiconductor crystals emerged as a complementary approach to miniaturization of electronic circuits.

In 1957, the micromodule concept was adopted as the best approach to the problem of size reduction for military applications. In this concept, individual components were mounted on small wafers and assembled into a package that represented a complete circuit function (Fig. 1).

Research and development in thin-film technology and solid-state circuitry was expanded at that time to provide possible new techniques for the growth and expansion of the

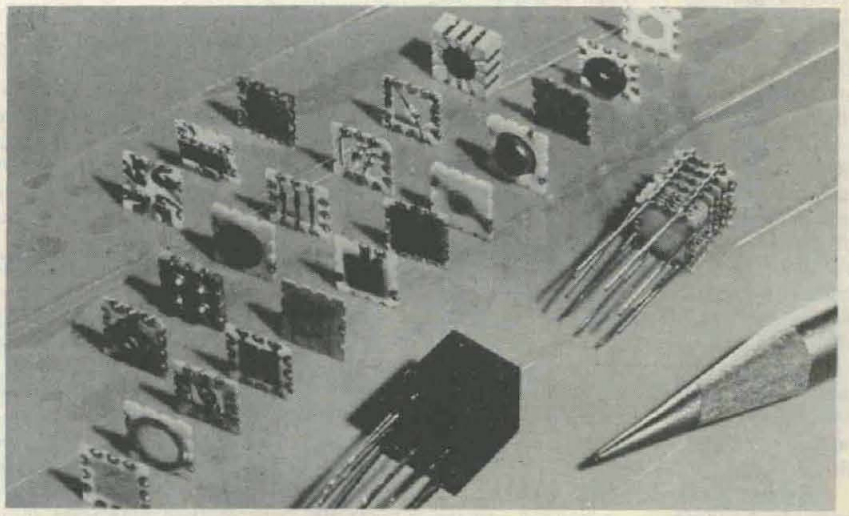


Figure 1. MICROMODULE concept of electronic devices showing individual components mounted on wafers, assembled package, and encapsulated unit.

micromodule concept. The result is that the micromodule concept is now available to provide reliable, microelectronic-designed equipment for Army use. More than 700 different circuits have been reduced to micromodule designs and are now available to the equipment designer.

Generally speaking, three different approaches are being followed in the art of microelectronics—miniaturization of discrete components, thin-film circuits, and integrated circuitry. In the first approach the individual components such as resistors, transistors, capacitors, inductors, etc. are made as small as possible. This approach lends itself readily to the use of printed wiring techniques and machine assembly for circuit fabrication.

Perhaps the greatest advantage gained by this approach is that, in addition to providing a good degree of miniaturization, it is readily inexpensive for use when small numbers of end items are desired. Other approaches are not economical for for small production runs.

A disadvantage of this approach is that there is a limit to how small and how economical an individual component can be made. This limits the degree to which an end item of equipment can be miniaturized.

With conventional components packing densities of 75,000 parts per cubic foot can be realized. Utilization of discrete miniaturized components allows packing densities of about 150,000 to 600,000 parts per cubic foot. When utilized in conjunction with the micromodule concept, packing densities of 250,000 to 1,000,000 parts per cubic foot can be obtained.

Electronic equipment constructed from miniaturized discrete components can be reduced in size to about one-sixth to one-tenth of the size of similar equipment using conventional components.

For thin-film circuits, the component parts of the circuit are formed by evaporation, electroplating, or similar processing of appropriate materials on an inert base or substrate. The substrate functions only as mechanical support for the circuit being formed. Required interconnection of component parts is accomplished during fabrication so that the end result is a complete and functional circuit (Fig. 2).

Thin-film techniques readily lend themselves to mass production so that large numbers of thin film circuits can be produced in a single production run. However, thin-film circuits are not economically produced when only small numbers are required.

Initial work with thin films was concerned only with the passive circuit elements such as resistors, capacitors, and circuit interconnections. Currently, research efforts are being directed toward the development of active circuit elements such as transistors and diodes by thin-film techniques.

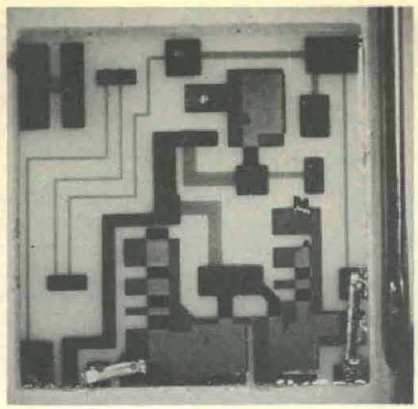


Figure 2. IN THIN FILM network, dark areas are resistors, light areas are capacitors, and intermediate gray strips are interconnections.

Packing densities possible using thin-film techniques are about 2,000,000 to 4,000,000 parts per cubic foot, which in turn allows equipment size reductions of the order of 20-40 to 1 over conventional methods.

When discussing integrated circuits one must be careful to define what he considers an integrated circuit. Some people consider an integrated circuit one in which a semiconductor device such as a transistor or diode is used in conjunction with thin-film circuits. Thus a semiconductor device is "integrated" into the circuit.

In this discussion, and within the Army, an integrated circuit is considered to be a single piece of semiconductor material processed to function as an entire circuit or part of a circuit. This concept of the integrated circuit is frequently referred to as the "functional block."

Integrated circuits are fabricated by carefully controlled processes of milling, etching, doping (adding impurities) and welding a block of semiconductor material such as silicon. By properly shaping a piece of material and then by diffusing into it at prescribed locations the appropriate impurity material, various sections of the block of semiconducting material will function as a transistor, diode, capacitor, resistor, or an interconnection (Fig. 3). Thus, a solid block of material may function as a complete circuit such as an oscillator, amplifier, or electronic switch. For this reason, integrated circuits are often called functional blocks.

Integrated circuits at this time provide the ultimate in packing density and equipment miniaturization. Packing densities of up to 8,000,000 parts per cubic foot and size reductions of the order of 80 to one are possible with integrated circuits. As with thin-film circuits, integrated circuits are adaptable to mass production techniques. However, they are much more expensive than thin-film circuits when only small numbers are required.

When the maximum degree of miniaturization is not required in a piece of equipment, or when special circuits are required, any or all of the techniques of microelectronics may be used in combination. Circuits fashioned in this manner are called "hybrid" circuits and may consist of thin films with discrete parts, integrated circuit devices in combination with thin films, and so on. Also, all of these techniques may be utilized in the micromodule concept to produce

(*Continued on page 28*)

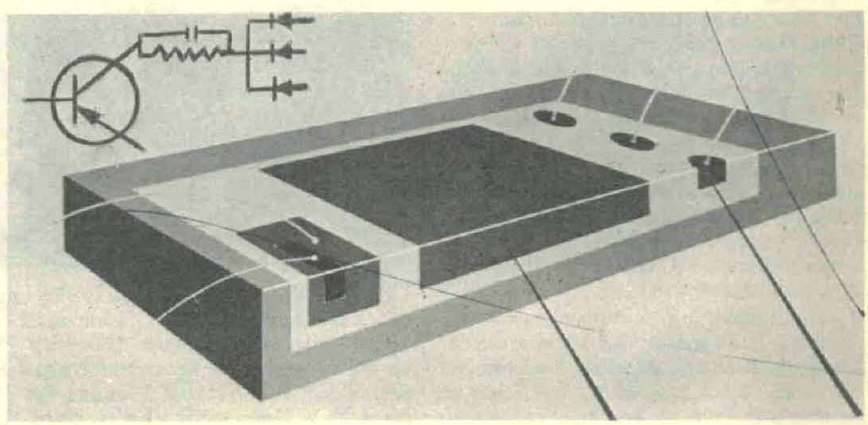


Figure 3. INTEGRATED CIRCUIT or functional block, made up of transistor, resistor, capacitor and diode, functions as a complete circuit (diagramed).

Fort Rucker Hosts Tenth Annual Army Human Factors R&D Conference

The 10th Annual Army Human Factors Research and Development Conference is expected to draw about 250 scientists, psychologists, engineers and top management personnel of the Army, industry and nonprofit research firms to Fort Rucker, Ala., Oct. 5–8

Brig Gen George B. Pickett, Jr., Chief of Staff, Army Combat Developments Command, is scheduled for the keynote address on "The Army's Tactical Mobility Concept." Brig Gen John J. Tolson, director of Army Aviation, will welcome conferees.

Dr. Lynn E. Baker, chief Army psychologist, has announced that the general theme will be "Human Factors in Tactical Mobility."

The conference is sponsored by the Army Chief of Research and Development. Hosts are the U.S. Army Aviation School, Army Combat Developments Command Aviation Agency, Army Board for Aviation Accident Research, Army Aviation Test Board, Army Aeromedical Research Unit, and Army Aviation Human Research Unit.

Human factors engineering of materiel, communications and control, reconnaissance and security, and performance decrements in air mobility are among the principal topics on the program, which includes the following papers:

Ten Years of Progress: Philip I. Sperling, deputy director, Special Operations Research Office, Washington, D.C. *Current Army Human Factors Research and Development Program:* Lynn E. Baker, Office of the Chief of Research and Development, Washington, D.C. *Anthropometry of U.S. Army Aviators:* Robert M. White, Psychology Laboratories, U.S. Army Natick Laboratories.

Human Vibration Response: F. Pradko, U.S. Army Tank-Automotive Center, Warren, Mich. *Training Oriented Human Factors Engineering of Army Aircraft:* Robert H. Wright, U.S. Army Aviation Human Research Unit, Fort Rucker. *Helicopter Cyclic Control Grips—A Human Engineering Design Study:* Bernard M. Corona, U.S. Army Human Engineering Laboratories, Aberdeen Proving Ground (APG), Md.

Technique of Performing a Missions Analysis on Army Fixed and Rotary Wing Aircraft: Stephen Moreland, U.S. Army Human Engineering Laboratories, APG. *Information Extraction and Assimilation From Command System Displays:* Charles H. Hammer, U.S. Army Personnel Research Office (USAPRO), Washington, D.C. *The Value of a New Reference Technique for Image Interpretation:* Harold Martinek, USAPRO.

Studies in Electrocutaneous Information Transfer: Arthur I. Siegel, Applied Psychological Services, Wayne, Pa. *Effects of Target/Ground Parameters on Target Identification:* John A. Whittenburg, Human Sciences Research, Inc., McLean, Va. *Conducting Helicopter Reconnaissance Experiments With Air Cavalry Elements:* Harrison N. Hopps, Barry M. Kibel, Arthur R. Woods, Research Analysis Corp., McLean, Va.

Effects of Physical Location of Stimuli in the Visual Field on Simple Reaction Time: John L. Kobrick, U.S. Army Research Institute for Environmental Medicine, Natick, Mass. *Pilot Performance in Simulated Low-Altitude High-Speed Flight Under Varied Task Loading Conditions:* Stanley M. Soliday, North American Aviation, Inc., Columbus, Ohio.

Army Low-Altitude Navigation: System Considerations and Procedural Solutions: Robert H. Wright and T. Harrison Gray, U.S. Army Aviation Human Research Unit, Fort Rucker. *Need for Measurement Research in Physical Abilities Related to Mobile Activities of Combat Troops:* Adrian U. Dubisson, USAPRO. *Predicting Success in Army Aviation Courses:* A. J. Drucker and Harry Kaplan, USAPRO.

Career Considerations for Army Aviators: Maj Samuel P. Kalagian, Office of Personnel Operations, Department of the Army, Washington, D.C. *Automated Education in the Training of Low-Altitude Aerial Observers:* Peter B. Dawkins, U.S. Army Aviation Human Research Unit, Fort Rucker.

Flight Training Quality Control: John O. Duffy, U.S. Army Human Research Unit (USAHRU), Fort Rucker, Ala., and Edgar N. Anderson, U.S. Army Primary Helicopter School, Fort Wolters, Tex. *Aviator Performance in the Light Weapons Helicopter During Nap-of-the-Earth Flight:* Francis H. Thomas, USAHRU, Fort Rucker.

Col Reed New Project Manager Of Redeye at Missile Command

New project manager of the Redeye Weapon System is Col Arthur W. Reed who recently was chief of the Plans Division, G–3, with the Eighth U.S. Army in Seoul, Korea.

Redeye is the Army's smallest guided missile—a man-portable, shoulder-fired weapon which is designed to provide combat troops with the capability of destroying low-flying enemy aircraft. It is managed by the U.S. Army Missile Command, Redstone Arsenal, Ala.

After studying for two years at Wichita University, Col Reed entered the U.S. Military Academy, where he obtained his B.S. degree. He holds a master's degree in aeronautical engineering from the California Institute of Technology and has attended both the Army and Navy War Colleges.

INTERNATIONAL SCIENTISTS pause for coffee during Army Research Office-Durham (AROD) sponsored conference, Aug. 26-27, on "Quantum Electrodynamics of High Intensity Photon Beams" at Durham, N.C. Among about 50 scientists from the United States and abroad were (l. to r.) Dr. F. Schwabl, University of Vienna; Dr. Willis E. Lamb, noted American scientist from Yale University who received the Nobel Prize in Physics in 1955; Dr. L. Mandel, formerly of Imperial College, London, who recently joined the faculty of the University of Rochester; Dr. Hermann Robl, deputy chief scientist of AROD (conference chairman); and Dr. T. W. B. Kibble, Imperial College.

DoD Lets Contract for COIN Prototypes

An aircraft for air support of counterinsurgency and limited war operations—COIN—is to be developed under a Department of Defense program recently approved by Secretary of Defense Robert S. McNamara.

Seven protoypes of the plane, which has been termed the airborne equivalent of the "jeep," will be built at a cost of approximately $18 million by North American Aviation Co.

COIN will use two turboprop engines of the 600-horsepower class. Its capabilities will include peacetime emergency functions such as disaster relief, medical missions and riot control, as well as military missions to include light armed reconnaissance, helicopter escort and attack and support of ground troops.

Ruggedness, simplicity of operation and moderate cost have been emphasized in the specifications, which combine the requirements for weapon delivery and light transport; also, operation from rough clearings, primitive roads and waterways, prepared airfields and aircraft carriers.

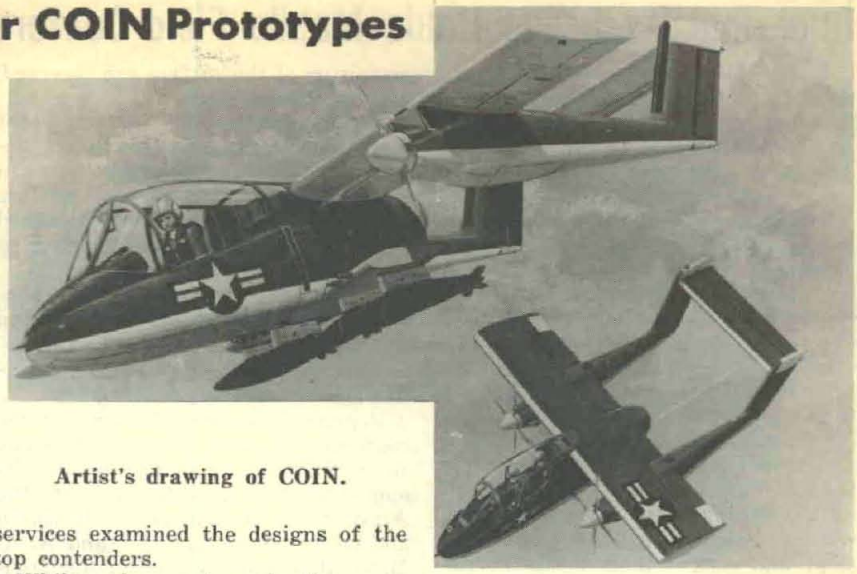
The aircraft is to be capable of takeoff over a 50-foot obstacle in less than 800 feet with a 1,200-pound ordnance load and three hours of fuel. An ordnance load capacity of 3,600 pounds can be employed where longer takeoffs are possible.

Additional requirements call for a maximum level flight speed of 275 knots for helicopter escort and a minimum usable speed of less than 100 knots for such purposes as jungle search; and the capability of carrying six passengers or 3,000 pounds of cargo internally and airdropped.

COIN has been extensively studied by all the Military Services and by a joint steering committee headed by Dr. Harold Brown, Director of Defense Research and Engineering. Members included Assistant Secretaries for Research and Development of the Army, Willis M. Hawkins, the Navy, James H. Wakelin, Jr., and the Air Force, Alexander H. Flax.

The Marine Corps initially stated a formal requirement for a light armed reconnaissance aircraft and the Air Force subsequently confirmed the need for such an aircraft. The Marine Corps supplied the specifications which were the basis for the deliberations resulting in the COIN developmental program.

The Navy was designated the developing agency for the plane by the Department of Defense and industry was solicited for designs in March of this year. All the military services examined the designs of the top contenders.



Artist's drawing of COIN.

While subsequent evaluation may indicate the Army has a requirement to procure COIN, the decision will be dependent upon its performance during prototype testing and its final cost per unit.

The contractor claims that COIN will be lighter and smaller and will cost substantially less than the Mohawk, but possible Army purchase and use of COIN will be contingent on its performance during prototype testing and final cost per unit.

The development schedule of COIN is timed to allow service introduction and operational testing prior to delivery of aircraft to U.S. allies. First flight of the new aircraft will be in about one year.

An extensive joint service flight evaluation program will be conducted prior to production, during which the design concepts will be compared and integrated with the capabilities of existing aircraft for counterinsurgency missions.

SIMPLE SOLUTIONS. Some of us seemed to have forgotten the last word of H. L. Menchen's statement: To every human problem there is a solution—neat, simple and wrong.

Springfield Armory Value Engineers Save $1.5 Million

Value engineering leaders at Springfield (Mass.) Armory achieved, by close scrutiny of test versions of weapons being produced by the Army Weapons Command, savings in excess of $1.5 million in FY 64.

The value engineering group was formed at the Armory five years ago to take that all-important second look at new test weapons which the development engineers sometimes cannot take. Weapons and weapons systems are being developed in such condensed time frames that design engineers are not always able to explore the full range of alternatives.

Since it is possible that continued improvement can be made on any given design, it becomes necessary to stop development at some point and produce hardware. Some items inevitably go into production before costs can be reduced or minimized by design changes.

In vigorously attacking this problem, the Springfield value engineering group has exercised "Yankee ingenuity" to reduce costs without compromising quality, performance, safety, reliability or maintainability of weapons and weapons systems developed within the technical responsibility of the Armory.

Founded in 1794, the Armory is the scientific and technical center for research and development, engineering and pilot fabrication of "hardware" for the U.S. Army Weapons Command.

More than 100 value-engineering, cost-reduction proposals have been approved and documented at the Armory since 1959. Examples include:

- Review of the M73 tank machine-gun resulted in the manufacturing cost being reduced by $125 per weapon.
- Cost of the brazed assembly in the M14 rifle was cut from $1.34 to $0.98 per item by reducing the 2-piece assembly to a single component.
- Nineteen finish machining operations were eliminated in the M79 grenade launcher barrel, trimming cost per barrel by $6.65.

Quadripartite Group Holds Mobile Field Conference on Terrain Problems

Twenty-one environmental scientists from 3 Quadripartite nations, including two representing the U.S. Army, recently "roughed it" in the Australian hinterlands for three weeks to study desert terrain as related to combat mobility problems.

Scientists from the U.S., United Kingdom, Union of South Africa, Canada and Australia initiated a cooperative research effort to eliminate eventually the guesswork in mobility concepts and in designing military vehicles which can cope with various terrain obstacles.

Officially called the "Mobile Field Conference on Terrain Evaluation," the meeting involved a 1,900-mile trip by bus through the desert from Darwin to Cairns, Australia. Scientists slept and cooked their meals in the open and made numerous stops to examine specific sections of land for terrain characteristics.

Terrain analysis includes use of techniques and data from a variety of scientific fields such as geography, geomorphology and hydrology.

In the process of analysis of terrain, the incline of slopes, soils, vegetative covering, density of undergrowth, location and depth of streams and slopes of banks, erosion characteristics of land and other characteristics of the surface are observed, studied and categorized.

Ultimately, the information is sent to the design engineer for use in improving vehicle design and use in ground mobility concepts. Because the field commander cannot afford equipment useless in certain types of terrain, this work is important.

The mobility conference was sponsored by the Australian Army and the Commonwealth Scientific and Industrial Research Organization (CSIRO), an Australian civil agency.

Representing the U.S. Army at the conference were Robert Jackson, chief, Earth Sciences Section, Environmental Sciences Branch of the Army Materiel Command's Research and Development Division, and A. A. Maxwell, assistant chief, Soils Division, U.S. Army Engineer Waterways Experiment Station, Vicksburg, Miss.

CSIRO hopes to undertake for the Australian Army a program of research in ground mobility and related terrain analysis to develop high-mobility hardware concepts and to support engineering evaluation of terrain.

Results of the research will be presented to a future meeting of the Quadripartite Standing Working Group on Ground Mobility (SWGGM). Research is being founded on CSIRO's present capability and past experience in terrain analysis for agricultural purposes.

One of the primary objectives of the conference was to compare the work which has been done by the Quadripartite nations in this area.

The United States Army has been using terrain analysis research to support engineering of military ground mobility concepts and vehicles for several years. The United Kingdom has been primarily interested in broader geographical work.

It is anticipated that through mutual sharing and joint effort among the Quadripartite nations, much valuable research of land characteristics can be mutually gained.

The U.S. Army member of the SWGGM is Dr. Leonard S. Wilson, chief, Environmental Sciences Division, U.S. Army Research Office, and member of The Army Research Council. Merrill V. Kreipke, also of the Division, is SWGGM permanent secretary.

DDC Liaison Officer Assignment Retraces 21 Years

When Lt Col Oliver R. Dinsmore, Jr., reported recently as Army liaison officer to the Defense Documentation Center (DDC), Alexandria, Va., his new chief was familiarly mindful of the passage of 21 years.

The administrator of the DDC is Dr. Robert B. Stegmaier, Jr. In 1943, when Col Dinsmore was a lieutenant, his first assignment was at the U.S. Army Engineer School, Fort Belvoir, Va. He reported then to Capt Robert B. Stegmaier, Jr., also an instructor.

Col Dinsmore will work closely with the Army scientific and technical information officers in promoting the interchange of research, development, test and evaluation (RDT&E) reports received by DDC.

A native of Olympia, Wash., he received his B.S. degree in civil engineering from Washington State University in 1943, a master's degree in naval architecture and marine engineering at the University of Michigan in 1948 and a master's in nuclear engineering from the University of Arizona in 1961.

He is a graduate of the Career Course of the Army Transportation School at Fort Eustis, Va., and the Command and General Staff College at Fort Leavenworth, Kans.

His assignments have included marine research and development projects; assistant G–4, Hq Eighth Army, Korea; Transportation Corps liaison officer, Operations Research Office (now Research Analysis Corp.) at Bethesda, Md., and at the U.S. Army Research Office, Durham, N.C.; and project officer, Army Reactors Branch of the U.S. Atomic Energy Commission.

Before coming to DDC he was commander of the U.S. Army Transportation Terminal Unit at Sondrestrom Air Base, Greenland.

Lt Col O. R. Dinsmore, Jr.

Scientific Calendar

10th Conference on Design of Experiments in Army Research, Development and Testing, sponsored by ARO–D, Washington, D.C., Nov. 4-6.

Data Processing Management Association Conference and Business Exposition, San Francisco, Calif., Nov. 4-6.

AIAA/NASA 3rd Manned Space Flight Meeting, sponsored by the American Institute of Aeronautics and Astronautics, Houston, Tex., Nov. 4-6.

19th Annual Armed Forces Chemical Association Meeting, Washington, D.C., Nov. 4-6.

Conference and Show on Design, sponsored by the American Society of Mechanical Engineers, Chicago, Ill., Nov. 5.

10th IEEE PTGCT National Communication Symposium, sponsored by IEEE, Utica, N.Y., Nov. 5-7.

5th Annual Symposium on Switching Circuit Theory and Logical Design, sponsored by the IEEE, Princeton, N.J., Nov. 8-14.

Symposium on Optical and Electro-Optical Information Processing Technology, sponsored by ONR, Boston, Mass., Nov. 9-10.

Space Simulation Testing Conference, sponsored by the American Institute of Aeronautics and Astronautics, Pasadena, Calif., Nov. 16-17.

Role of Grain Boundaries and Surfaces in Ceramics and Related Materials, sponsored by ARO–D, University of North Carolina and ONR, Raleigh, N.C., Nov. 16-18.

17th Annual Conference Exhibit on Engineering in Medicine and Biology, sponsored by the Instrument Society of America, Cleveland, Ohio, Nov. 16-18.

3rd International Symposium on Bioastronautics and Exploration of Space, sponsored by the USAF, San Antonio, Tex., Nov. 16-18.

15th Annual Machine Tools Industry, sponsored by IEEE, Hartford, Conn., Nov. 16-18.

10th Conference on Magnetism and Magnetic Materials, sponsored by IEEE, Minneapolis, Minn., Nov. 16-19.

Symposium of Microelectronics and Large Systems, sponsored by ONR and Sperry Rand Corp., Washington, D.C., Nov. 17-18.

Northeastern States—Navy Research and Development Clinic, sponsored by ONM, Philadelphia, Pa., Nov. 18-20.

8th International Automation and Instrumentation Exhibition and Convention, Milan, Italy, Nov. 19-25.

Reserve Officers Hold 7th Annual R&D Seminar

Assistant Secretary of the Army (R&D) Willis M. Hawkins addressed participants in the recent 7th Annual Research and Development Seminar for Reserve Officers.

Mr. Hawkins outlined the technical breakthroughs critically needed by the Army and discussed the requirement for career Army officers in R&D program management.

Chief of Research and Development Lt Gen William W. Dick, Jr., in a classified presentation, spoke on various aspects of current Army R&D activities.

Held at the U.S. Army Management School and sponsored by the U.S. Army Engineer Research and Development Laboratories (USAERDL) through Reserve Mobilization Designation Detachment 39, Fort Belvoir, Va., the 2-week seminar drew Reserve officers from all over the country.

The seminar is designed to acquaint R&D Reserve officers with the latest engineer equipment developments and plans for future developments to assure that they will continue to provide "strength in depth" to the Army with up-to-date scientific and military knowledge.

During his keynote address, Mr. Hawkins observed that the Army should begin serious consideration of career planning for officers who may become program managers or part of the management system.

Certain objectives, he stated, must be paramount in the minds of program managers. These he listed as shortening lead time, controlling costs, product utility, effective utilization of scientists and engineers, contractor selection, engineering changes, mutual specification control and reporting.

Recent annual R&D budgets have included needed increases in salaries of military scientists and engineers but not any increase in the number of such individuals, he said, adding: "This pattern cannot continue without serious implications to our country's defense operations."

In discussing contractor selection, Secretary Hawkins pointed out that one of the greatest wastes of the Nation's scientific manpower is in the system of contractor selection. Proposals submitted by a dozen contractors may require more engineering effort than the development project.

RESERVE OFFICERS Col Adoph C. Topinka (right) and Maj Armand G. Morin examine helmet-mounted infrared binoculars at 7th Annual R&D Seminar at Fort Belvoir, Va.

AEC Nuclear Scientists Brief Army Reservists at Oak Ridge

Many of the Nation's top leaders in nuclear science and technology provided up-to-date information to 77 Reserve officers at the recent 2-week Army Nuclear Science Seminar at the Oak Ridge (Tenn.) National Laboratory of the U.S. Atomic Energy Commission.

Conducted by the 3252nd U.S. Army Reserve R&D Unit at Oak Ridge for the fourth successive year, and sponsored by the commanding general of the Third U.S. Army, the seminar featured a classified presentation given by Army Chief of Research and Development Lt Gen William W. Dick, Jr.

Opening day ceremonies included welcoming addresses by S. R. Sapirie, manager, Oak Ridge Operations, U.S. Atomic Energy Commission (AEC); Dr. C. E. Larson, vice president, Union Carbide Nuclear Division; and Dr. R. A. McNees, mayor, City of Oak Ridge. Maj Gen Howard Snyder, Jr., CG, XII U.S. Army Corps, gave the opening address.

ARO Tech Forecaster Takes New Assignment With NIH

Lester H. Geiger, technological forecaster for three years in the Advanced Technology Branch, Research Plans Office, U.S. Army Research Office, resigned in August for a job with the National Institutes of Health, Bethesda, Md.

He will work in the Special Resources Branch, Division of Research Facilities and Resources. From 1959-61 he was chief, Computer and Data Processing Section, Office of the Army Chief Signal Officer and an electronic engineer in the section for 1½ years.

RAC Announces Key Professional Staff Changes

Philip Compton

The Research Analysis Corp. (RAC) announced recently the appointment of Philip R. Compton as planning manager and Marshall Andrews, who retired recently after serving as a member of the technical staff for the past 12 years, as a consultant.

Compton will serve as a member of the Operating Committee and participate in other committee activities relating to the development of RAC research capabilities. He was formerly technical assistant to the vice president and general manager of the Space Program Division of the Lockheed Missiles and Space Co. in California.

Holder of B.S. and M.S. degrees in aeronautical engineering from Virginia Polytechnic Institute and Georgia Institute of Technology, respectively, Compton also served with the U.S. Army Corps of Engineers (1944-46), the Ford Motor Co., and Douglas Aircraft Co., Inc.

Andrews joined the Operations Research Office, predecessor to RAC, in 1952 as an operations analyst. As a historian, reporter, editor, researcher, military expert and Civil War authority, he has written numerous books on military history and articles for magazines and newspapers.

His journalism career includes work with the Memphis Press Scimitar, Chicago Daily News, Indianapolis News, Columbia (S.C.) Record, Columbus (Ga.) Enquirer, Augusta (Ga.) Chronicle, Richmond Times-Dispatch, the Washington Post, Associated Press, United Press and International News Service.

Marshall Andrews

Army R&D Contracts Total $122 Million

Army research and development contracts totaling $122 million during the past month were topped by $22,777,088 to Raytheon Co., Norwood, Mass., for pulse code modulation equipment.

Hughes Aircraft Co., Culver City, Calif., won a $14,375,776 award for continuation of TOW missile system research and development for a 12-month period. Bowen-McLaughlin-York, Inc., York, Pa., received the second increment of a 3-year buy for various quantities of M110 vehicles, 8-inch howitzers and M578 recovery vehicles.

Olin Mathieson Chemical Corp., New York, N.Y., will produce miscellaneous propellant charges for $8,129,344 and Day and Zimmerman, Inc., Philadelphia, Pa., will load, assemble and pack mortars and components for $7,453,813. Continental Motors Corps., Muskegon, Mich., was awarded a $7,358,728 pact for engines with power pack for use with the M60A1 tank, the T118E1 combat engineer vehicle and the armored bridge launching vehicle.

Firestone Tire and Rubber Co., Akron, Ohio, was awarded $6,615,772 in contract actions for HEAT projectiles with fin assemblies and for 105 mm. HEAT-FS projectiles.

Holston Defense Corp., a subdivision of Eastman Kodak Co., Kingsport, Tenn., received a $4,980,130 modification for various types of explosives. Varo, Inc., Garland, Tex., was awarded a $4,040,605 contract for infrared searchlight sets.

Radiation, Inc., Melbourne, Fla., will modify two fixed and two transportable satellite communications ground terminals for $3,835,000. Consolidated Diesel Electric Corp., Stamford Conn., received $3,111,000 in the reinstating of a portion of an existing contract for light amphibious resupply cargo vehicles (LARC V).

Sperry Rand Corp., New York, N.Y., was awarded a $3,025,555 modification to a previously awarded contract for loading, assembling and packing of classified ammunition.

Philco Corp., Aeronutronics Division, Newport Beach, Calif., is being issued a $3,000,000 modification to an agreement for research and development work on the Shillelagh. General Precision, Inc., Little Falls, N.J., will provide hydraulic actuation systems for the Pershing missile system for $2,999,796.

Hol-Gar Manufacturing Corp., Clifton Heights, Pa., will produce gasoline engine driven generator sets under a $2,789,337 contract. McDonnell Aircraft Corp., St. Louis, Mo., was issued a $2,178,960 contract for an exploratory development program for missile antitank assault weapons (MAW).

Kaiser-Jeep Corp., Toledo, Ohio, received a $2,329,896 definization of a letter contract for 1,025 ¼-ton utility trucks. Northrop Corp., Newberry Park, Calif., was issued a $1,998,001 contract for MQM57B surveillance drones, including engineering data, provisioning data for spare parts, ground support equipment and special tools.

M-R-S Manufacturing, Flora, Miss., is to get a $1,645,111 contract for diesel engine driven wheeled tractors, towed scrapers and 4-wheel converter dollies. Sperry Utah Co., a division of Sperry Rand Corp., Salt Lake City, Utah, was awarded a $1,316,720 agreement for components for the Sergeant missile system.

Saco-Lowell New England Division, Maremont Corp., Saco, Maine, will produce 7.62 mm. M60 machineguns with barrel and bipod assemblies, 7.62 mm. M60C machineguns and barrel assemblies under a $1,136,349 contract modification.

Boroco Electric Construction Co., Pensacola, Fla., was awarded a $1,097,876 contract for the conversion of an electrical distribution system at Fort Benning, Ga., Western Electric Co., New York City, received a $1,088,787 award for engineering services, modification and maintenance of equipment in support of the Sleighride program.

Systems Development Corp., Santa Monica, Calif., was awarded a $1,034,175 modification for services and materials in conducting a systems training program for Army Air Defense Systems, AN/FSG-1 and AN/GSG-5.

Kanarr Corp., Kingston, Pa., received a $1,027,497 modification for M79 grenade launchers. General Motors Corp., Detroit, Mich., received a $749,971 contract for concept studies and management studies for the U.S.-Federal Republic of Germany Main Battle Tank Development Program.

Springfield Armory's New Data System Slashes Costs

Springfield Armory's Automatic Data Collection System will achieve cost reduction in excess of $100,000 during its first full year of operation and increasing amounts as it is expanded.

In operation since March 1964, the system recently was praised by Brig Gen Roland B. Anderson, CG of the U.S. Army Weapons Command, in a letter to Col William J. Durrenberger, Armory commander. The letter said, in part:

"The Army is to be commended for its effort in designing and installing the Data Collection System and combining this system with the newly installed GE 225 computer to provide management information. . . ."

Design and installation of the system was accomplished after months of intensive applications study by the Management Science Office at the Armory, which also trained personnel in the intricacies of its operation.

Capable of collecting source data on labor charges and accomplishments throughout the Operations Division, the system involves the use of 29 transmitting units strategically located throughout the fabrication areas. Plans are underway to extend the system into several other areas which promise greater savings, Armory officials said.

The Armory's responsibilities include research, engineering, development, procurement and pilot-line fabrication of ground and small arms weapons.

NEW HELMET LINER for the combat soldier (right) developed by the Army Natick (Mass.) Laboratories is an improvement over older model (left). Worn with the standard steel helmet, it provides increased ballistic protection. Made of laminated nylon material, it has a new suspension system which stabilizes the liner on the head of the wearer by use of an adjustable suspension band and nape strap. The chipstrap has been eliminated. Approximately one million of the new liners are being procured for forward area and support troops.

Merit Placement, Promotion Program Seeks Uniform Administrative Policies

Uniformity of administration for fairness to employees is expected to result from the new Army Staff Merit Placement and Promotion Program for filling vacant positions in all agencies and activities serviced by the Staff Civilian Personnel Division.

Issuance of Chief of Staff Regulation 690-335, "Merit Placement and Promotion Program," revises procedures in operation since the 1962 reorganization of the Army.

Objectives are to provide a uniform method for filling vacancies by competition among the best qualified candidates and to broaden the areas of competition to enhance the consideration of all employees in the work force.

Principal changes in procedures are a revised method of announcing vacancies open for competitive selection, the provision for automatic consideration of all employees whose qualifications match the vacancies, and the extension of the organizational areas wherein employees will be grouped for promotional consideration.

The following group of employees will receive automatic consideration in filling vacancies without having to apply for an announced vacancy:

Surplus employees whose positions are abolished; employees who have been demoted without personal cause and who are receiving retained pay; employees who have been identified as underutilized; those who are absent on extended military duty who have restoration rights.

In addition, all qualified employees at the next lower grade in the applicable area of consideration will receive automatic consideration through the use of the Qualifications Inventory File on all employees now maintained by the Staff Civilian Personnel Division (SCPD).

The areas of consideration are as follows:

For vacancies at GS-6 and below and nonsupervisory Wage Board positions, including leaders, the organization segment where the vacancy exists, provided there are 25 or more persons at the next lower grade who are qualified to be considered for the particular vacancy;

The area of consideration will be broadened sequentially to the next higher organizational segment and on to the agency as a whole until there are at least 25 candidates in consideration.

If there are not 25 candidates in the whole agency, candidacy will be broadened to the total area serviced by SCPD, which is the area of consideration for GS-7 through GS-13 and Supervisory Wage Board Positions. For vacancies at GS-14 and above, candidates Army-wide will be considered.

Announcements under the heading "Promotion Opportunities" will be prominently posted on bulletin boards in work areas, but will not be circulated, as they have been, through the various offices.

Persons from outside the announced area of consideration may apply but will not be selected unless they are clearly better qualified than the candidates from within the area. All employees ranked in the best qualified group for a given vacancy and others who applied will be advised of the results of their candidacy.

The Staff Civilian Personnel Division advises all employees to demonstrate competence and readiness for advancement by rendering effective performance in their present job; and also, to keep their Qualification Record file up-to-date by furnishing SCPD with information on training or self-development activities.

Army Tropic Test Center Supports Jungle Noise Study

Can the presence of persons in the jungle, such as guerrilla forces, be detected by sonic recordings of the differences in wild life sounds?

This information is the objective of a U.S. Army Limited Warfare Laboratory study conducted recently with the support of the U.S. Army Tropic Test Center at Fort Clayton, Canal Zone, Panama.

The project team was headed by Harold Forst of the Limited War Laboratory at Aberdeen Proving Ground, Md., with Charles Kindrick serving as project officer for the Tropic Test Center. Eugene Morton of Cornell University and three employees of General Electric Co., James Loughran, Bruce Tatge and Richard Wells, completed the team.

Barro Colorado Island, maintained by the Smithsonian Institution as a tropical wild life preserve and as a Canal Zone biological research area, was the scene of the project. Involved was a comparative study of natural animal or bird sounds, both within and above the range of man's hearing, measured against changes occasioned by the presence of humans.

Troops of Co A, 4th Bn, 10th Infantry, U.S. Army Forces, Southern Command, provided the human intrusion into the test area. Special tape recorders made a record of the sounds elicited by the intruders as compared with the sounds of animals before the intrusion.

Aided by Mr. Morton, an experienced naturalist at Cornell University who served as adviser, the Advanced Technology Laboratory of General Electric Co. recorded the sounds on four stereo microphones set up in the dense jungle as far as a mile away from the base station laboratory. Another microphone captured sounds inaudible to man.

The base station laboratory recorded the sounds on a highly sensitive 7-channel tape recorder. Visual monitoring was accomplished by means of a 4-channel oscilloscope, in addition to a regular headset listening device.

Preparation of the test site and base laboratory required movement into the jungle of more than two tons of equipment. Assistance in this task came from the U.S. Army Meteorological Team (RDT&E Support), attached to the U.S. Army Tropic Test Center.

The equipment enabled scientists to "hear" into the dense jungle without disturbing the sensitive animal and bird movements which predetermine their normal sounds. More than 15 miles of one-inch magnetic recording tapes were filled with sounds during the tests.

Final evaluation and analysis of the study is in progress.

SONIC RECORDINGS of jungle sounds are taken by Pvt Joseph Scott (left) and Sp/4 Gary Cox, members of Company A, 4th Battalion, 10th Infantry. The recordings are used in conjunction with studies of jungle natural sounds and those that occur when humans are present.

Army Electronics Training Unit Operates Worldwide

A group of U.S. Army Electronics Command globetrotters who teach U.S. soldiers all over the world how to operate and maintain their electronic combat equipment have had a change in name and chain of command, as announced recently.

The New Equipment Assistance Element was known formerly as the New Equipment Introductory Company; their mission remains essentially the same. Now the group is a part of the Materiel Readiness Directorate, headquartered in Philadelphia, instead of the Electronics Laboratories at Fort Monmouth, N.J.

When the officers and men of the NEA Element are not on the road, they are still quartered at Fort Monmouth, which is Command headquarters.

The chief of the element is 1st Lt Robert E. Stynes, who has under his command three officers, four warrant officers, and 148 highly qualified enlisted men, over 100 of whom are senior noncommissioned officers. The Element has 20 teams averaging six men each.

To keep up their standing as experts, the teams work closely with the Electronics Command's Laboratories and equipment makers before leaving on a teaching tour. The equipment which they tell troops how to use and care for may be either newly developed or modified items. In the fast-changing field of military electronics, keeping up to date on changes requires frequent instruction revisions.

In addition to their regular teaching duties, the teams provide specialized knowledge in support of arctic tests, Airborne Electronics and Special Warfare Board tests, and service tests.

One of the busiest of the teams is the 20-man group which during the past year has taught some 7,000 men in Europe to operate and maintain the versatile forward-area tactical AN/VRC-12 AND AN/PRC-25.

E-Command Engineers Receive 3 Special Act Awards

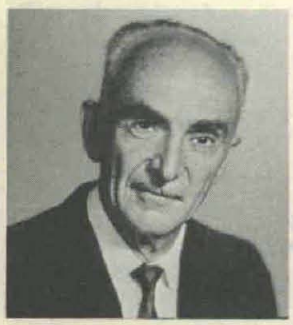
Three Special Act Awards have been presented in three months to two research and development engineers of the U.S. Army Electronics Command, Fort Monmouth, N.J. The honors were accorded to Nathan W. Feldman and Gordon P. Tripp, both assigned to the Switching and Multiplexing Division, Electronics Laboratories.

The latest award, consisting of cash and a certificate, was for their presentation of a technical paper, "Design of the Voice Portion of the SYNCOM Ground Station," at the 1964 international convention of the Institute of Electrical and Electronics Engineers. The paper has since been published.

Six weeks ago, the two men received a Special Act Award for a joint invention disclosure, "Four-wire Monitoring Circuit." Four weeks before that, they were presented a similar award for presentation and publication of another technical paper.

The Special Award is authorized under the Department of the Army Incentive Awards Program for individual employees, or groups of employees, who have performed acts or services of special benefit to the Army.

Nathan W. Feldman



Gordon P. Tripp

In the last five years, the two engineers have been coauthors of six technical papers which have been presented at technical meetings held in some of the major cities of the United States. Separately and jointly, they have been responsible for some 45 patent disclosures.

Their previous technical papers were titled: An Analysis of Radio Flutter in Future Communications; Evaluation of Total Trunk Noise in Multi-trunk Communication System; Effect of Field Wire Stability on Maximum Length of Line; An Analysis of Cross-talk in the Unbalanced Cabled Circuits; Calculating the Distribution of Total Trunking Losses in a Multi-trunk Military Communication System; and a Discussion of Quality Factors in an Earth-Satellite-Earth Communication System.

Tripp, a graduate of Union College, Schenectady, N.Y., has been in communications work for more than 25 years, the past 22 with E-command laboratories. His main interest lies in the field of switching, including the application of manual switching, automatic switching, and automatic electronic switching techniques.

Feldman has B.S. and M.S. degrees from Newark (N.J.) College of Engineering. During 15 years in communications, he specialized first with transmission equipment and more recently has worked on automatic electronic switching equipment.

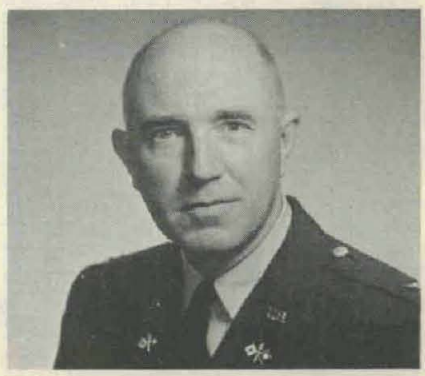
E-Command Spurs Program In Professional Societies

To stimulate participation of U.S. Army Electronics Command scientific personnel in professional societies and technical associations, Maj Gen Frank W. Moorman, CG, has appointed a special assistant for technical relations.

The first incumbent of the position is Col Deane A. Dunloy and his responsibilities will include coordinating, broadening and further improving the already significant part E-Command civilian and military personnel have in professional group activities.

Col Dunloy commented that General Moorman's interest in professional groups parallels that of the parent Army Materiel Command, in which Henry Handler, a civilian executive, is technical relations adviser to General Frank S. Besson.

Graduated from Cornell University with a bachelor of arts degree in English and psychology, Col Dunloy until reassigned was professor of military science at Texas College of Arts and Industries, where he obtained a master's degree. He is a graduate of the Command and General Staff College, Logistics Management School, and the Fort Slocum (N.Y.) Army Information School, where he also was on the faculty.



Col Deane A. Dunloy

USAEPG Tests New Surveillance Drone

A surveillance drone which can safely take photographs behind enemy lines was tested recently for acceptability at the U.S. Army Electronic Proving Ground (USAEPG), Fort Huachuca, Ariz.

The USAEPG also tested a new telegraph repeater designed to interconnect the military telegraphs and teletypewriters of the United States, Britain, France, West Germany, and other NATO countries.

Daniel P. Gallagher, AMC project manager of the surveillance drone system and director of all drone tests on this system said that they are an important step in the Army's search for a faster and bigger drone.

Designated the MQM-58A Airborne Surveillance System, it is manufactured by Aerojet General Corp., of Downey, Calif. It is launched from a carriage by rocket motors which give it initial air speed until its motor-driven propeller takes over. Details of its speed and range are classified, but it reputedly greatly outperforms the old SD-1 drone which has been in use for several years.

Like the SD-1, it is radio-controlled, but since it flies at distances beyond the line of sight, where the operator would not be able to follow it, more elaborate control aids are needed. During flight, the compass heading and altitude of the drone are radioed back to a control station where a computer plots its course.

The operator watches the course of the flight on a display panel and although he makes the decisions to change the course, the computer flies the drone. All changes in direction and altitude are fed into the computer, which then radios the proper commands to the drone, controlled by an automatic pilot.

The drone parachutes to earth at the end of each flight where the ground crew recovers it and removes the films from the cameras. In addition to the still photography camera, the drone also carries a live photo transmission device which radios back pictures of the ground as seen from the drone during flight.

The drone under test is known as a limited production model. Previous testing has been conducted on a research and development model. Chosen from over other designs submitted to meet the surveillance needs of the Army, it is still considered a low-endurance drone because of its range.

The telegraph repeater being tested was manufactured for the Army by Radiation Inc., of Melbourne, Fla., and will operate on either 115 or 230 volts at any frequency from 47 to 60 cycles per second.

Unlike most other repeaters, it has no moving parts such as relays. Instead, its circuit consists of transistors and magnetic amplifiers. Designated the Telegraph Repeater TH-38, it acts as an interpreter between the equipment of one country and that of another, converting the signal from one set to be usable for another.

Most of the Nato country equipment cannot be linked without some kind of a converter-repeater. The old U.S., TH-30 Telegraph Repeater and several European models—modified as converters—are being used for this purpose. The TH-38, if successful in service tests to be conducted in Europe, would replace all of them.

BRL Weapons Expert Receives Annual Kent Award

David C. Hardison, one of the Army's leading weapons systems experts with the U.S. Army Ballistic Laboratories, Aberdeen Proving Ground, Md., received the Robert H. Kent Award for 1964 in Sept. 18 ceremonies.

Conferred annually by BRL for scientific or engineering achievement of personnel of the Laboratories meriting special recognition, the award was presented by Col Charles D. Y. Ostrom, Jr., BRL commander. It was established in 1956 in honor of Dr. Kent, BRL's most famous scientist and ballistician.

Now scientific adviser to the commanding general, U.S. Army Combat Developments Command, Fort Belvoir, Va., Hardison has been at the Proving Ground since 1952.

The 37-year-old native of Arapahoe, N.C., is credited with originating the method of predicting the accuracy of direct fire weapons adopted by the U.S. Tripartite and NATO countries. He was also responsible for planning test and data analysis resulting in recommendations for the armament system adopted for the M-60 tank, now the Army's Main Battle Tank.

As chief of the Armored Systems Evaluation Branch in the Weapon Systems lab, Hardison initiated the idea and specified preliminary design for the TOW (tube-launched, optically tracked, wire-linked) missile system and for the Shillelagh system now being developed for the air-droppable light tank.

Among more than 200 persons present for the ceremonies were: Maj Gen James W. Sutherland, Jr., CG, U.S. Army Test and Evaluation Command; Brig Gen G. B. Pickett, Jr., Chief of Staff, Combat Developments Command; Brig Gen W. C. Gribble, Research and Development Directorate, U.S. Army Materiel Command (AMC); and Dr. C. M. Crenshaw, chief scientist, AMC.

David C. Hardison, scientific adviser to the Commanding General, U.S. Army Combat Developments Command, receives Kent Award from Col Charles D. Y. Ostrom, Jr., CO of the U.S. Army Ballistics Research Labs.

Chemical R&D Labs Study May Aid Cancer Research

Prospects for development of new drugs effective in the treatment of cancer have been enhanced by investigations conducted by the Army Chemical R&D Laboratories, Edgewood (Md.) Arsenal, over an 8-year period.

Information on mustard compounds for chemical treatment of certain types of cancer has become a by-product of the study of effects of mustard gas, stimulated originally by observations during World War II. It was noted then that mustard gas caused an abnormal reduction in the number of white blood cells.

Since 1956, several new drugs with a potential value in cancer chemotherapy have been produced through cooperative studies of the Army Chemical R&D Laboratories and Dr. Arnold M. Seligman, surgeon-in-chief at Sinai Hospital, Baltimore, Md., and his staff.

The CRDL research was reported at the recent 1964 Army Science Conference by four employees. Charles E. Williamson, Jacob I. Miller, Samuel Sass and Dr. Benjamin Witten coauthored a technical paper, "Design and Reaction Mechanism of Short-Living Alkylating Agents," which won a $500 award.

Research In Review...

(*Continued from page 19*)

circuits and circuit functions.

Why is the Army so interested in microelectronics? There are a number of answers to this question and it is practically impossible to say which is the most important. Reduction in equipment size is of importance because it permits more to be installed in available space.

In Army aircraft, for example, reduction in size makes possible the use of equipment such as navigation radars and auto pilots, which up to this time have been too large to install in the space available.

Weight reduction is important for airborne equipment and for the portable communication equipment used by tactical units. Microelectronics has made possible weight reductions of the order of five to one in portable field communication equipment being issued today with another ten to one reduction possible in the near future.

Another very important benefit derived from microelectronics is a great reduction in the power required to operate electronic equipment. Circuits composed of conventional components require fractions of a watt to several watts of power for proper operation. Through the art of microelectronics, power requirements of similar circuits have been reduced to the order of a few milliwatts of power. (One milliwatt equals 1/1000 of a watt).

As a result of research now in progress, power requirements of such circuits may soon be reduced to microwatts (1/1,000,000 watt). For portable equipment, this means longer battery life and reduced battery size. For nonportable equipment, this means reduced size in power supplies (generators) and reduced fuel consumption.

The advantages offered by microelectronics of reduced size, weight, and power consumption may be used by the equipment designer in a number of trade-offs to design more versatile equipment. A single radio, for example, may now have several hundred channels where previous radios had only a few. This eliminates the need for several different radios.

The currently used "Handy-Talky" radio can be built so small as to be worn on the soldier's helmet and have the same or better performance. With reduced power requirements, battery packs may be expected to last upwards of 100 hours before having to be replaced.

This all adds up to a greatly reduced logistic requirement to support the Army's electronic needs.

With the utilization of microelectronics, ruggedness and therefore reliability of electronic equipment is improved. The smaller and more compact the components and circuits are, the less they are susceptible to damage from shock and vibration. Since the circuits and sub-assemblies are normally encapsulated on a plastic of some type, additional mechanical support is given to the components and damage potential is reduced.

Maintenance concepts for miniaturized equipment are greatly simplified when compared to conventional equipment. In miniaturized equipment the individual circuit components are either nearly impossible to identify or are impossible to get at due to encapsulation. Trouble shooting of electronic equipment is reduced to locating or determining the defective circuit rather than the defective component.

Maintenance is therefore reduced in large measure to replacement of plug-in circuit modules. This further improves the logistic picture by requiring fewer spare parts. For example a simple broadcast receiver might re-

HumRRO Director Takes APA Division President Post

Dr. Meredith P. Crawford, director of the Human Resources Office (HumRRO) since it was established in 1951, is the new president of the Division of Military Psychology, American Psychological Association.

HumRRO is a George Washington University contract agency of the Department of the Army which performs research-and-development in training, needs for training devices, motivation and leadership.

Dean of the College of Arts and Sciences at Vanderbilt University when he was asked to head HumRRO, he holds a B.A. degree from Vanderbilt (1931) and M.A. and Ph. D. degrees from Columbia University (1932, 1935).

During World War II he served in the U.S. Army Air Force, rising to the rank of lieutenant colonel. In 1961, the Secretary of the Army awarded him the Distinguished Civilian Service Medal for "significant studies in the fields of training, motivation, leadership and man-weapon systems analysis."

In addition to serving as president of APA's Division of Military Psychology, Dr. Crawford will continue as treasurer of the American Psychological Association, a post he has held since 1957.

Dr. Meredith Crawford

HumRRO Technical Adviser Accepts Industry Position

Dr. Jesse C. Rupe resigned recently as adviser for Technical Advisory Services, Human Resources Research Office of George Washington University, to accept a position with North American Aviation, Inc.

Assigned to a disarmament research project of that organization's Space and Information Services Division in Washington, D.C., Dr. Rupe had been with HumRRO, an Army contract agency, since 1959. He served at the U.S. Army Air Defense Human Research Unit, Fort Bliss, Tex., before coming to the HumRRO Central Office.

After receiving a Ph. D. degree from Purdue University in 1950, he served seven years as a research psychologist for the U.S. Air Force Personnel and Training Research Center. From 1957 to 1959, he served in a similar capacity with Lockheed's Missile and Space Division.

Dr. Jesse C. Rupe

quire only six or seven modules in spare parts as opposed to about 50 separate resistors, tubes, capacitors, etc.

The question arises that if microelectronics offers all the advantages of reduced size, weight, and power consumption and improvement of the logistic and maintenance pictures, why isn't the Army making more use of the techniques in the field equipment being issued today? The answer is partly in terms of cost and partly in terms of the state-of-the-art.

Considering the cost aspects, it was previously stated that it was uneconomical to use thin film or the integrated circuit techniques when only small numbers of circuits are required. To take advantage of the potential savings made possible by mass production, the Army must purchase equipment in larger quantities than are required for peacetime operations.

The fact that equipment is more versatile makes it more complicated and hence more expensive. For example, a unit commander's radio that formerly had only 20 or 30 channels for voice communications may now have possibly 400 channels and the additional capability of transmitting and receiving teletype and facsimile.

Until recently the state-of-the-art in microelectronics limited the type of equipment that could profitably be miniaturized using the thin-film or integrated-circuit approaches, which provide the most significant results and advantages from miniaturization. The first, and still most extensive, use of these approaches was in saturable-type circuits, the type found in a digital computer.

The reason for this is quite simple —the digital computer circuit is either on or it is off. The fact that the components might not be perfect or might be nonlinear in operation does not make a great deal of difference. When a circuit is off, it is not operational; when it is on, it is operating in a saturated condition so that nonlinearities are masked.

The saturable or nonlinear type of circuit, however, is not suitable for a host of other applications such as radio communications and certain radar circuits. In these circuits component imperfections and nonlinear operation cannot be tolerated because they distort signals, which may result in incorrect data being transmitted or poor equipment operation.

Improvements have been made recently in materials and in manufacturing techniques so that component defects which result in nonlinear circuit operation are greatly reduced or eliminated entirely. It is expected that in the not-too-distant future radios and other equipment requiring linear circuit operation will become available in fully miniaturized configurations.

As is usually the case, certain problems must be solved before full advantage may be taken of the advantages offered by microelectronics. These problems include the inability to produce by thin-film techniques efficient circuit inductances (coils), large values of capacitance, and the higher values of precision resistors.

Other problems involve miniaturization of switches, plugs, tuners, interconnection devices and controls which must be operated manually. In many cases these items may well be the limiting factor on the degree to which an item of equipment can be practically and profitably miniaturized.

With the ultra-high packing densities possible through microelectronics, heat removal presents a serious problem. Each circuit component consumes a small amount of electric power that is converted to heat. With highpacking densities possible, rather large amounts of heat can be generated. If not removed the heat can degrade circuit performance and greatly reduce operating life.

Frequency and power handling capabilities of solid-state devices further limit miniaturization of some equipment. Current research projects conducted on contract and in-house at the Harry Diamond Laboratories in Washington, D.C., and at the U.S. Army Electronics Laboratories, Fort Monmouth, have shown a great deal of success in finding solutions to these problems.

A great deal remains to be accomplished, however, before the Army can realize the maximum benefits potentially possible from application of microelectronics to military electronic equipment.

MEC Gets Amphibian Program In Transfer From AVCOM

The Army Aviation Materiel Command (AVCOM) at St. Louis, Mo., discontinued its responsibility for the operational management of the Army's amphibian program early in September.

The program is now managed by the Army Mobility Equipment Center (MEC), also in St. Louis. Effective Sept. 4, AVCOM assumed exclusive logistical responsibility for the Army's aviation equipment on a global basis. About 22 AVCOM personnel engaged in the amphibian program were transferred to the MEC.

AVCOM is commanded by Brig Gen Howard F. Schiltz and the MEC is headed by Brig Gen Thomas B. Simpson.

SUPPLY AND MAINTENANCE COMMAND employee Richard C. Kettering checks tolerances on a "rebuilt self-aligning static tube" for which he and co-developer Merl C. Meek were recently presented Certificates of Merit by President Johnson for their contributions to the DoD Cost Reduction program. Kettering and Meek used more than 400 hours of their own time to develop present procedures and methods to rebuild the static tubes which are used in the Nike Hercules missile. The tubes, which originally cost $582 each, now are rebuilt at an average cost of $38 each. Rebuilding of the tubes by the Pueblo (Colo.) Army Depot has saved $865,000.

LOLEX Final Tests to Define Air Drop Capability

A safe and reliable air-drop method for delivering supplies and equipment to Army field soldiers is in final stages of testing to determine its limits and procedures.

Tests at the U.S. Army Airborne, Electronics and Special Warfare Board, Fort Bragg, N.C., have been conducted on the Low Level Extraction System (LOLEX), using Army CV-2B (Caribou) Aircraft. The service tests followed engineering tests at the U.S. Army Yuma Proving Ground, Yuma, Ariz. and U.S. Army Aviation Test Activity, Edwards Air Force Base, Calif.

Support was provided by the U.S. Army Aviation Test Board, Fort Rucker, Ala., in determining pilot procedures. These four test activities are subordinate commands of the U.S. Army Test and Evaluation Command, Aberdeen Proving Ground, Md.

With LOLEX, delivery of supplies and equipment is accomplished while the aircraft is flying at the lowest possible altitude at reduced speed. An extraction parachute, attached to the goods to be delivered, provides a deceleration force to reduce the forward momentum of the load during descent and after ground impact.

During Exercise Swift Strike III, August 1963, a detachment from the Airborne Department, U.S. Army Quartermaster School, Fort Lee, Va., in coordination with the 187th Airplane Transport Co., 10th Air Transport Brigade, 11th Air Assault Division, Fort Benning, Ga., demonstrated LOLEX. Since then other Army units and agencies have used it.

After determination of the physical characteristics of LOLEX's major components, the Board is evaluating extraction time and relative velocity of dropped loads of 1,000, 2,000, 3,000, and 4,000 pounds from 1,500 feet absolute altitude and 100, 85, 75 and 65 knots, using standard parachutes.

Tests were designed to seek out approximate minimum level flight distances required for safe employment of the system, impact requirements and the feasibility of using multiple extraction zones by single aircraft during a sortie.

The Board's evaluation report will spell out just how safe and reliable LOLEX is for field Army use and will contain recommendations for certain procedures and techniques that should be applied to make it work.

Col Carnahan Assumes Duty As Director of R&D at AWC

Assignment of Col George D. Carnahan as director of research and development for the Army Weapons Command at Rock Island (Ill.) Arsenal was announced Sept. 10.

Returned from a year's assignment in Korea, where he commanded an Ordnance group, he succeeds Col R. W. Burkett, who recently retired.

Graduated from the U.S. Military Academy in 1940, Col Carnahan also holds bachelor's and master's degrees in mechanical engineering from Rensselaer Polytechnic Institute, Rensselaer, N.Y., and an M.A. degree from George Washington University.

In addition to command and staff positions, the new R&D chief has eight years experience in the teaching field—equally divided at the U.S. Military Academy and at the Command and General Staff College, Fort Leavenworth, Kans.

A battery commander with an anti-aircraft unit at Pearl Harbor when the Japanese launched their 1941 air attack, he also served in Korea in 1952 and 1953.

EXAMINING SCALE MODELS of an M–60 tank and a new concept tank are AWC's new director of R&D George Carnahan (right) and Richard Meyers, AWC development engineer.

Operation Blackout Proves Night Mobility Capability

Under the strictest blackout to simulate wartime conditions, the U.S. Army and Navy proved recently the feasibility of loading onto a ship and unloading combat troops and equipment in a maneuver at night.

Operation Blackout was a Department of Defense exercise that began at Hampton Roads Army Terminal, Norfolk, Va., and was completed at Bremerhaven, Germany. The experiment was conducted by the U.S. Army Supply and Maintenance Command (USASMC) in cooperation with the Military Sea Transportation Service (MSTS), using the *USNS Comet*.

Included in the tonnage loaded at Norfolk was 6,791 measurement tons of wheeled combat equipment—297 pieces of equipment such as howitzers, tanks, flame throwers and trucks.

Only low-intensity lights known as "cats' eyes" were allowed on the front and rear of the vehicles. Battery-powered wands were used to direct traffic. Loading was accomplished in three hours and 10 minutes. Unloading required one hour and 21 minutes.

Effectiveness of the blackout conditions was confirmed by an aerial reconnaissance photographer from a helicopter. Not only did he *not* get pictures which showed any light, but it took the pilot over a half hour of hovering to spot the *Comet* at the terminal pier.

An Army officer evaluating both phases of the test, said: "It proves conclusively that the *USNS Comet* possesses a unique capability. She can enter a combat area port under complete blackout conditions, discharge cargo and clear port before daylight. This capability is vitally important because it reduces the vulnerability of the vessel and its cargo to attack."

Earlier tests of the *Comet* took place in July and August 1963. They were joint Army-Navy-industry evaluations of the conventional (Lift-On/Lift-Off) cargo ships versus the Roll-On/Roll-Off design in the *Comet*.

Conducted in daylight, these tests were made to provide data for comparing the relative merits of two different types of ships. All tests have coincided with actual overseas cargo shipping requirements.

M–60 TANK moves up ramp of *U.S.N.S. Comet* under blackout conditions during DoD exercises at Hampton Roads Army Terminal. Photo was taken by infrared lighting.

Ordnance Center Gives Realistic R&D Program Course

The United States Army Ordnance Center and School at Aberdeen Proving Ground, Md., is teaching career officer students how the modern Army research and development program operates by letting them conduct a small-scale program.

Dubbed Standardized Student Project (SSP), the training idea was conceived by Brig Gen David W. Hiester, CG and commandant of the ordnance and supply and maintenance training facility.

As the initial phase of more than 50 hours of instruction on National Support Services included in the 6-month curriculum, the students, staff and faculty organize into agencies to develop, procure, maintain, and support items of equipment.

With the current class, the end item has been established as a clothing maintenance and storage for fabric, metal and leather uniform components. This practical approach to the R&D process amplifies formalized instruction through the functioning of simulated commodity commands.

Student commodity commands made their debut in the Ordnance Officer Career Course curriculum in July 1963. Four classes graduated during FY 1964 and a fifth is working through the materiel cycle.

Each student commodity command becomes a subordinate of the Materiel Command (which in this case consists of the commandant and members of the USAOC&S staff and faculty) and receives a Qualitative Materiel Requirement. From here on, everything becomes realistic and follows Army regulations.

In-process reviews are required at each critical point. Since the exercise is conducted over a 12-week period, a 4-year development cycle is represented by four 3-week periods, each equalling one year. Most of the work is done during nonacademic time.

Full documentation is made by each commodity command so that, upon completion of the project, a complete record can be issued to each member, including the procurement packages required to produce the prototype and limited production. Each command must account for all funds expended during development.

NASA Draws ARO's Dr. Adams For Advisory, Analysis Unit

Dr. T. W. Adams resigned recently from the staff of the Research Plans Office, U.S. Army Research Office, Arlington, Va., to accept a position with the National Aeronautics and Space Administration (NASA), Washington, D.C.

Assigned to the Policy Planning Division, Office of Technology and Policy Planning, Dr. Adams joins a small group of policy advisers and analysts responsible for determining the impact of aerospace developments.

A political scientist assigned to the Army Research Office since May 1962, he prepared his master's thesis and doctoral dissertation on the subject of Cyprus, based on his residence there and travel in the Eastern Mediterranean area between 1955 and 1957.

Earlier this year he was chairman of a 4-member study group that prepared a handbook on the Republic of Cyprus for the Special Operations Research Office, American University, under an Army contract.

Engineer R&D Labs Contract For Gas Turbine Development

A $2,136,365 contract for gas turbine development was awarded in mid-September by the U.S. Army Mobility Command's Engineer Research and Development Laboratories, Fort Belvoir, Va.

The end item is to be a compact, lightweight, high-performance gas turbine for driving ultra-high-speed and precise power electric generators, air compressors and similar equipment to improve mobility in any ground support application.

The contract provides for the design of a simple, regenerative-cycle, gas-turbine engine rated at 60, 90 and 120 hp., and for the design, fabrication and engine development testing of a simple cycle gas turbine rated at 120 hp.

The cost-plus-incentive-fee type contract was awarded to Continental Aviation and Engineering Corp., Detroit, Mich., after solicitation of bids from 21 firms. It carries a 37-month completion date.

FOLLY SHIELDING. Kind-hearted managers hesitate to point out the errors of subordinates even though such actions may help them considerably. Herbert Spencer (1829-1903) in *State Tamperings with Money Banks*, thinks such practices to be unwise. "The ultimate result of shielding men from the effects of folly," says he, "is to fill the world with fools."

By Ralph G. H. Siu

THE GOOD SAMARITAN. Before one gets too eager about enacting some regulation to help the laboratory bench man, he should first ascertain whether or not he knows what he is really doing. He should remember the story of the good citizen who bumped into a staggeringly drunk man leaning against the doorway of a small apartment building:

"What's the matter?" he asked, "Drunk?" "Yup," came the reply. "Do you live in this house?" "Yup," came the reply. "Do you want me to help you?" "Yup," came the reply.

With great difficulty, he half dragged, half carried the drooping figure up to the second floor.

"Is this the floor you live on?" asked the good Samaritan. "Yup," came the reply.

The corridor was rather dark and all he could see was one tiny door on the far end. He tried the door and it was unlocked. So he shoved the limp fellow through it and came back downstairs.

Just as he finally groped his way through the dark vestibule he bumped into a second fellow who was even worse off than the first.

"What's the matter," he asked, "Drunk?" "Yep," came the reply. "Do you live in this house?" "Yep," came the reply. "Do you want me to help you?" "Yup," came the reply.

So the good Samaritan pushed, pulled, and carried him to the second floor, where this second man also said he lived. The kind fellow opened the same door, pushed him through, and then groped his way down the dark stairway again. As he came into the vestibule, he bumped into a third person much, much worse off than the other two. He was just about to help the poor fellow when the latter took one look at him, let out a loud shriek, lurched into the street, and threw himself into a policeman's arms.

"Off'shur! Off'shur" he gasped, "protec' me from that man. He's done nothin' all night long but carry me upstairs and throw me down the elevator shaft!"

THE BIG ITCH. There is a tendency on the part of top management to concentrate on the "big" issues and let the little petty annoyances continue uncorrected. Yet there's an old proverb to the effect that "it is easier to stand pain than to stand itch."

Farmer's 'Flying Saucer' Call Earns $25 . . .

BRL Recovers $5,000 Atmosphere Probe Package

What looked like a flying saucer landing in the walnut trees of an astonished Rhodesdale, Md., farmer turned out to be a 2-part airborne package of assorted batteries and electronic instruments attached to an orange-and-white parachute.

The curiosity bore the address and the phone number of the Ballistic Research Laboratories (BRL), Aberdeen Proving Ground, Md. The farmer was further astonished when told later by a BRL scientist on the telephone that he had just earned a $25 reward for recovering their "flying saucer."

The recent incident was not some kind of generous treasure hunt game being played by the U.S. Army research installation. The $25 was a sincere token of appreciation, since the farmer's walnut trees were embracing $5,000 worth of meteorological equipment.

Ballistics Measurement Laboratory scientists send the equipment aloft periodically to measure water vapor content in the stratosphere at altitudes of over 20 miles above sea level. Wind currents at that height are not always predictable and some payloads occasionally may come to earth in some farmer's trees or pasture.

Initiated by BRL in 1956, the atmospheric research program is designed to acquire meteorological data for use in the U.S. Army's study of upper air conditions. Emmet J. Pybus and Jacob Leeder are the two physicists in charge of the atmospheric water vapor studies.

Supplementary data about the atmosphere are gathered throughout the world by the Ballistic Research Laboratories team. Recently the team traveled with a mobile laboratory and telemetry trailer to the flat plains of Palestine, Tex., where the National Center for Atmospheric Research has established a balloon flight station.

The Texas station provides a good location and facilities to compare two BRL-designed types of instruments. One is an infrared absorption hygrometer. Normally flown on a rocket, it can detect very small amounts of moisture at high altitudes. The second instrument is a dew-point hygrometer, designed to be flown on radiosonde weather balloons into the stratosphere.

Information from the two instruments was radioed back to the Texas ground station as they both rose into the stratosphere on a single balloon. Comparison of the data enabled the scientists to tell that both instruments were working properly.

A further advantage of the Texas location is the highly experienced station crew which tracked and recovered the instruments. Four times the crew has been able to return the valuable payloads to the BRL scientists for further flights.

Previous tests have been conducted in the Arctic, the Antarctic, the Canal Zone in Panama, Thule in Greenland, the Caribbean Sea, (from a downrange ship out of Puerto Rico), Fort Churchill in Canada, White Sands (N. Mex.) Missile Range, Patrick Air Force Base, Fla., and Fort Monmouth, N.J.

The balloons range from half-million-cubic-foot capacity plastic bubbles to 8- or 10-foot diameter rubber balloons. The larger polyethylene types are used to carry heavier payloads, such as the two hygrometers flown on a single balloon in Texas.

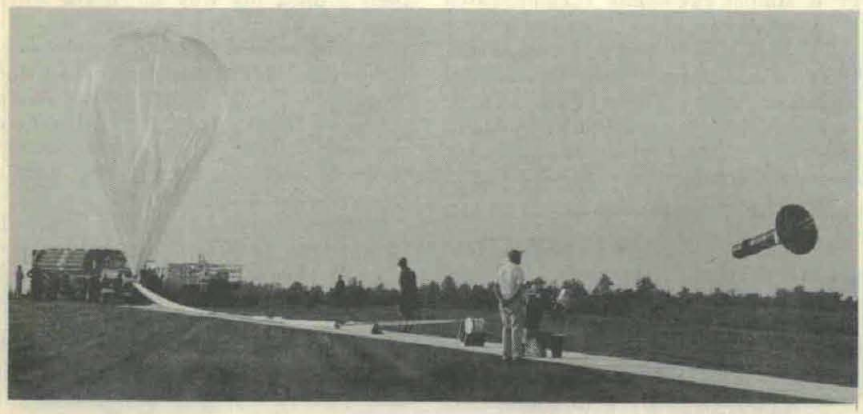
For routine data-gathering flights, however, the smaller neophrene rubber balloons are used. They may be observed in the local atmosphere when tests are under way at Aberdeen.

When airborne, they float like mammoth teardrops over the Chesapeake Bay area. To flying saucer enthusiasts, they may bring occasional moments of excitement, adding to their conviction that the Martians are able to reach the Earth.

All information gleaned from the study is dispatched via radio from balloons to ground-level receivers to be recorded on magnetic tape for study and publication in journals.

After the balloons are inflated and airborne, it takes about two hours for them to reach 100,000-foot altitudes. They remain aloft at this altitude for over an hour, during which the meteorological information is being relayed by radio instruments to receivers on the ground.

As soon as each test is completed, the radio instruments become inactive and the balloons and their payloads of instruments float down as wind currents direct.



INFLATED BALLOON, parachute (on the mat), let-down reel, dew-point hygrometer and infrared absorption hydrometer are adjusted prior to launching during BRL water vapor experiments at Palestine, Tex.

NATO Working Group Meets On Semiconductor Devices

Representatives of five nations on the North Atlantic Treaty Organization (NATO) Special Working Group on Semiconductor Devices met at the U.S. Army Electronics Command, Fort Monmouth, N.J., Sept. 28 to Oct. 2.

Military and industrial representatives of Canada, France, the Netherlands, the United Kingdom and the United States began work on unification of various national specifications.

Bernard Reich of the Electronics Command, the U.S. member of the working group, presided as chairman. In previous NATO semiconductor device meetings, it was found that device specifications differed so widely that it was difficult to compare one device with another.

The Fort Monmouth meeting was designed to lay the groundwork for a NATO guide to the preparation of detailed specifications embodying the latest state-of-the-art and reliability practices.

When published, the guide will serve to unify technical practice on semiconductor device detailed specifications within the NATO countries. The aim is a common interpretation of style, format and general technical content of the specifications.

Kudos

The Nation's second highest peacetime award, the Legion of Merit, was presented on the occasion of his retirement to Col Fred D. Maurer, head of the Department of Pathology and director, Division of Medicine, Fort Knox, Ky.

Making the presentation was Maj Gen Joseph E. Bastion, Jr., CG. The award covered Col Maurer's string of outstanding services over a 9-year period. His biggest contributions have been in the field of foreign livestock disease control, the subject of many technical publications and films to his credit.

Previously, Col Maurer was chief of the Veterinary Virology Section, Armed Forces Institute of Pathology. He holds a Doctor of Veterinary Medicine degree from Washington State College and a Ph. D. from Cornell University.

Capt Luther S. Lollar, a project officer in the U.S. Army Test and Evaluation Command's Aviation Materiel Testing Directorate, recently received the Fourth Oak Leaf Cluster to the Air Medal.

Cited for aerial combat support of forces in the Republic of Viet Nam, last year, he earned his first through fourth air medals during the period Nov. 23, 1962 to July 19, 1963. Maj Gen James W. Sutherland, Jr., CG of the Army Test and Evaluation Command, presented the award.

Six U.S. Army Missile Command employees received awards for noteworthy civilian service. Three took home cash awards totaling $1,780.

The Army Meritorious Civilian Service Award was presented to Dr. William C. McCorkle and John A. Muller. Dr. McCorkle, of the Missile Command's Directorate of Research and Development, developed a mathematical theory relating to missiles which led to a new and simplified guidance system.

Mr. Muller, of the Directorate of Procurement and Production, renegotiated a contract which resulted in the recovery of $2,250,000 to the Army. Mrs. Edith Gibbs, chief of the Data Processing in the Missile Command Directorate of Supply and Maintenance, was nominated by the Secretary of the Army for the Federal Woman's Award and received a plaque for developing a more efficient data processing system.

Miss Marilyn Bozeman, a microbiologist at Walter Reed Army Institute of Research was awarded a Medal and Certificate of Commendation for research on the mechanics of growth and metabolism of rickettsia and the ecology of Rocky Mountain Spotted Fever in the eastern United States.

In addition, Miss Bozeman developed a much-needed specific serological test for the diagnosis of scrub typhus.

Col Charles D. Y. Ostrom, Jr., CO, U.S. Army Ballistic Research Laboratories, Aberdeen Proving Ground, Md., recently received the Second Oak Leaf Cluster to the Army Commendation Medal.

Presenting the award was General Frank S. Besson, Jr., commanding general, U.S. Army Materiel Command. Col Ostrom was cited for exemplary service as chief, U.S. Army Research and Development Group, Europe, during the period from July 25, 1960 to June 16, 1963.

The Joint Service Commendation Medal was recently presented to Lt Col Robert H. Calahan, deputy CO, U.S. Army Transportation Research Command, Fort Eustis, Va. by Maj Gen John J. Lane, Fort Eustis CG.

The award cited Col Calahan's significant improvements in Viet Namese military transportation procedures and techniques during his Viet Nam tour last year as chief, Transportation Branch, Logistics Div., Military Assistance Advisory Group.

HDL Summer Interns Receive Army Commendation

Eight college students received Army Commendation Certificates, Army Certificates of Achievement and $50 cash awards at the recent 5th Annual Harry Diamond Laboratories (HDL) Summer Student Technical Symposium.

Initiated by Dr. Maurice Apstein, HDL associate technical director and chairman of the Staff Development Committee, the Symposium climaxes the HDL summer job program. This year 82 college undergraduate and graduate students were employed.

The honors recognized students selected from among 26 who prepared technical papers connected with their laboratory assignments and presented them at the Symposium to their supervisors, senior HDL staff members and fellow summer employees.

Selected by a committee of judges headed by Israel Rotkin, assistant to the technical director, the winners, educational institution they attend, and the titles of their papers are:

FIRST PLACE (Army Certificate of Achievement and $50 cash award) —Bruce M. Fonoroff, undergraduate, Case Institute of Technology, Use of the HDL Light-Gas-Gun in a Study of Impact Phenomena; Ronald J. Sheppard, graduate, Howard University, The Effect of Secondary Electrons on the Transient Charge Distribution in an Aluminum Plate.

SECOND PLACE (Army Certificate of Achievement)—Charles J. Hardy, undergraduate, Haverford College, An Application of the Monte Carlo Technique; Colin E. Jones, graduate, University of Illinois, Calculation of Diffused Base Transistor Parameters and Radiation Effects.

HONORABLE MENTION (Army Commendation Certificate) — Undergraduates Richard R. Fuselier, Tulane University, An Integrated, Dual Channel RF Head Using YIG Filter-Limiters; Sterling J. Haidt, University of Virginia, The Effect of Radiation-Induced Defects on the Capacitance of P-N Junctions; Joel B. Swartz, Harvard College, Neutron Detector Threshold Determination by Attenuation; Graduate Joel Seymour Cohen, University of Maryland, Analysis of a Voltage Controlled Oscillator Employing Tunnel Diodes.

L. to R.: Dr. Maurice Apstein, Charles J. Hardy, Joel B. Swartz, Richard A. Fuselier, Sterling J. Haidt, Ronald J. Sheppard, Joel Seymour Cohen, Bruce M. Fonoroff, HDL commanding officer Lt Col M. S. Hochmuth.

USAEPG Study Seeks Better Man-Machine Systems

Psychologists and improved test and evaluation procedures for military materiel were linked in a recent month-long study at the U.S. Army Electronics Proving Ground, Fort Huachuca, Ariz.

Under the guidance of Col James L. Burke, chief of the Test Plans and Evaluation Department, the psychologists examined previous testing methods with a view to better test design in the light of human factors engineering.

The group of nationally known psychologists included Dr. George E. Rowland, Rowland and Co., Inc., Haddonfield, N.J.; Dr. Alphonse Chapanis, Johns Hopkins University, Baltimore, Md.; Dr. Alan D. Swain, Sandia Corp., Albuquerque, N.Mex.; Dr. John C. Townsend, Catholic University of America, Washington, D.C.; and Dr. Warren H. Teichner, University of Massachusetts.

Human factors engineering, an offshoot of psychology and engineering, seeks the tool or the machine which best fits the capabilities of its human operator. This is important because human beings do better work and make fewer errors when using tools or machines suited to human eyes, ears, muscles and nerves.

Human factors engineers call any tool and its user or machine and its operator a man-machine system. They continually examine the linkage between the human and the non-human part of the system to find out whether it can be improved.

Operators can be carefully selected and trained for their part, but this practice has its limitations. Only a a few select individuals may qualify and their training may be time-consuming and costly.

As Dr. Swain commented, "If people would just do things right, the world would be perfect." Since few people attain this ideal, the machine gets the critical eye of the human factors engineer, who asks himself: "How can it be better adapted to human beings?"

Radios, radars and other electronic devices are machines and the Proving Ground is interested in how well they adapt to their operators. Up to now, the emphasis in testing has been on the machine's performance and not so much as a partner in the man-machine system.

The group of psychologists explored ways of improving test designs as a whole. With the methods of statistical analysis, tests were tailored so that the data collected can be used more profitably. In some cases, this may mean a saving in testing time, since the effort to gather extraneous data will be eliminated.

Services of the group were obtained through the U.S. Army Research Office-Durham, N.C., which lists specialists in many fields who are available for consultation and assistance.

Redstone Plans Calibration Center

A $2,389,000 Congressional appropriation approved for military construction at Redstone (Ala.) Arsenal will be used partially for a new Army Missile Command Calibration Center.

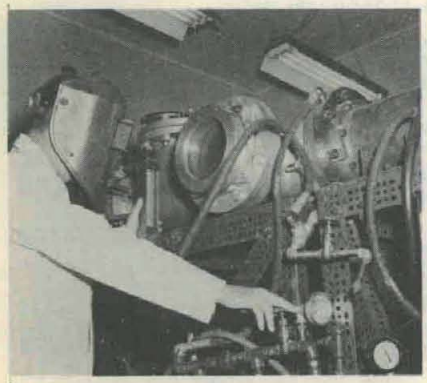
The sum was part of a $1.5 billion military construction appropriation bill signed recently by President Johnson.

The one-story calibration center, with some 39,500 square feet of laboratory and office space, will be built adjacent to the Army Missile Command's new Research and Development facility at Redstone.

Picatinny Engineers Test Ammunition in Wind Tunnels

Practically every model item of ammunition developed at Picatinny Arsenal, Dover, N.J., is tested in one of its three wind tunnels—subsonic, supersonic and plasma jet air arc—in which velocity ranges from 30 to 6,000 miles an hour.

Temperatures soar to about 8,000 degrees F. at 6,000 m.p.h. An ammunition item under test is, of course, stationery. A wind tunnel creates the same velocity, altitude, and temperature conditions an airplane or baseball or any other free-flying object encounters in the air.



PICATINNY ARSENAL technician peers into test section (thick glass circular door) of plasma jet air arc wind tunnel, which can whip up a 6,000 mile-an-hour blast that produces a temperature of 8,000° F.

By using a wind tunnel, engineers can observe the test item as it might perform high in space, and can study its reaction to such forces and moments as lift, drag, roll, pitch and yaw. Data is gained to plot trajectories and forecast the performance and accuracy of ammunition.

Built of corrosive-resistant steel, Picatinny's wind tunnels average about 18 inches in diameter and run from 40 to 80 feet long. Most of this overall size is piping which carries the air supply to the test section of the tunnel—so small it is measured in inches.

For example, the plasma jet air arc tunnel which can create a wind velocity of 6,000 miles an hour has a test section diameter of only three inches and is a mere nine inches long. (The biggest wind tunnel in this country at Moffett Field, Cal., has a 40 x 80-foot test section—big enough for most full-size airplanes).

Picatinny's wind tunnels use air collected, compressed and purified much like the air that goes into scuba tanks for skindivers. Any moisture is removed and oil which forms during compression is removed.

The air is then ready for some of the biggest tanks at Picatinny—eight galvanized steel cylinders which rise 50 feet and have a total capacity of 16,000 cubic feet. Both subsonic and supersonic tunnels use dry air piped to them from the compressed air tanks. However, heated air goes into the plasma jet air arc.

A routine test lasts about 30 seconds and uses up approximately 6,000 pounds of air. It creates a tremendous "whoosh," like the simultaneous takeoff of a whole squadron of turbojets, heard for more than a mile across the Arsenal.

The Aeroballistics Branch of the Engineering Sciences Laboratory, which operates the tunnel, functions under the supervision of Richard Bradford (testing) and of Dale Mertz (analysis).

Alfred A. Loeb, one of the founders of the branch in 1952 and its current chief, came to Picatinny in 1948 from New York University, where he earned degrees in aeronautical engineering.

Engineers on the 17-member staff of the branch have designed, in part, all three of Picatinny's wind tunnels, as well as the new one which will be installed later this year.

This is a 17-inch transonic wind tunnel in which engineers will concentrate on studies of ammunition items at the speed of sound—about 757 miles an hour at sea level.

Army's GOER Vehicles Undergo Troop Tests in Germany

Troop testing of the experimental 8- and 16-ton GOER has entered phase two and is programed through Oct. 15, after extensive driver-mechanic training and demonstrations conducted under Seventh Army supervision for possible Army-wide adoption.

GOERS are supporting the 5th Medium Tank Battalion, 32nd Armor, during tank gunnery practice at Grafenwoehr, Germany. In phase three, scheduled to end Dec. 15, 42 of the giant, rubber-wheeled vehicles will be assigned to the 24th Division for intensive workouts in garrison and field missions.

Lt Gen William W. Quinn, Seventh Army commander and director for the test project, was briefed recently on the vehicle's capabilities and progress and viewed phase one tests at the demonstration site near Augsburg, Germany.

The general and his party were welcomed at the site by Maj Gen W. A. Cunningham, commanding general, 24th Infantry Division; Col Richard H. Oliver, deputy test director, Seventh Army Headquarters (former chief, Research Programs, U.S. Army Research Office); Lt Col Robert M. Peach, chief test evaluator, V Corps; and Capt Paul Dinsmore, 533rd Transportation company commander.

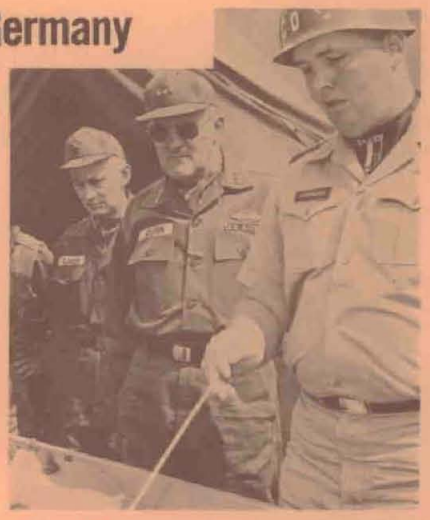
GOERS being tested include both the 8-ton Caterpillar class and the 16-ton LeTourneau-Westinghouse product. They share essentially the same basic characteristics of oversized tires, wagon-steer principle, and an inherent swim capability.

Designed to provide logistical support to Army combat units under all types of conditions, the vehicle is composed of two integral components power unit and driver's cab, and one of three types of bodies (wrecker, tanker, and cargo carrier).

During the demonstrations, the party watched a GOER tanker refuel five M–60 tanks in five minutes. The "off-road" vehicles swung in and out of 6-foot gulleys, swam ponds to demonstrate amphibious capabilities, and went through the paces over 60-percent grades and pits of mud.

A demonstration on efficiency of the GOER wrecker, in which the power pack of an M–60 tank was lifted clear of its compartment and placed into the GOER for transport, was given by the 22nd Ordnance Company. Personnel from the 724th Maintenance Battalion, who were factory-trained on the vehicles, participated in maintenance activities.

The evaluation teams conducting the tests will remain with the vehicles throughout the project, submitting reports until the conclusion of the tests in December.



Capt Paul Dinsmore, CO, 533rd Transportation Company, briefs Lt Gen William W. Quinn, Seventh Army Commander, and Col Richard Oliver of Seventh Army Headquarters, on test project for GOER vehicles.

EXPERIMENTAL GOER, in photos at left, rolls through deep gully and demonstrates amphibious capabilities in a series of tests conducted under Seventh Army supervision in Germany. Below, 6-foot tires of GOER claw for traction as vehicle emerges from a pond. The tires can be automatically inflated or deflated by driver to obtain maximum traction.

Army R&D Reserve Exhibit at AUSA Conference to Show Support of NSF-1

Interest of Army Reserve R&D Units in encouraging young scientists as "Tomorrow's Reserve in Research and Development" will be highlighted for the first time at the Association of the United States Army annual conference in Washington, D.C., Nov. 16-18.

An idea developed by the 2199th USAR R&D Unit in Wilmington, Del. —the genesis of the 70 units now active in 33 states—will result in an exhibit of the work of three of the top high school scientists selected by Army judges at the 15th National Science Fair-International in May 1964.

Approved Sept. 22 by Army Chief of Research and Development Lt Gen William W. Dick, Jr., following a briefing on the exhibit concept by three members of the 2199th Unit, the proposal had earlier received an "excellent project" rating from Maj Gen W. J. Sutton, chief, Army Reserve.

Set up in the foyer adjacent to the conference assembly hall at the Sheraton-Park Hotel, the exhibit will be the first ever shown at the AUSA parley to publicize the USAR R&D Unit Program.

A few steps away will be the most elaborate 40-foot long exhibit ever arranged at the conference to herald the U.S. Army Reserve training program. Cooperation of the Army Reserve cleared the way for the 2199th exhibit.

The purpose of the 2199th Unit-Office of the Chief of R&D exhibit is to show the widespread support the USAR R&D Units throughout the Nation provided at local, regional and state fairs leading up to the 15th National Science Fair-International (NSF-I).

PAUL STEPHEN KAPLAN shows exhibit, "Inducing Pregnancy by Artificial Insemination in C-27 Mice."

In February, 1963, the Chief of Research and Development issued instructions to USAR R&D Units to support the NSF-I at all levels by providing career guidance counseling, serving as judges, and giving other aid as requested when feasible. As requested by local authorities, Army Certificates of Achievement are made available for presentation to winners.

The 2199th Unit has been among the most active in support of the NSF-I throughout Delaware, and Army Certificates of Achievement also were presented in the name of the unit at the 1964 NSF-I competition at Lancaster, Pa.

The three students whose scientific research accomplishments will be displayed at the AUSA conference and the titles of their exhibits are: Thomas F. McGahee, 17, Satellite Beach, Fla., "X-ray Power Supplies"; H. Grady Rylander III, 16, Austin, Tex., "Simultaneous Oscillations in Negative Resistance Devices"; and Paul Stephen Kaplan, 16, Lebanon, Pa., "Inducing Pregnancy by Artificial Insemination in C-57 Mice."

Each of the students will be a joint guest of the Office of the Chief of Research and Development and the 2199th USAR R&D Unit at the AUSA conference. They will be available near their exhibits to answer questions and explain the nature of their research.

Arrangements of the 2199th Unit for the exhibit have been handled primarily by the team that briefed General Dick, consisting of Lt Col Edwin D. Lowthian, Lt Col Gordon E. Falkenau and Lt Col Florian J. Zukas.

Plans were coordinated through Lt Col William B. Murray, assistant for Reserve Affairs on General Dick's staff, Lt Col Charles M. Hoover, Office of the Chief of Army Reserve, and Joseph Kraus of Science Service, which conducts the NSF-I program.

Col Hoover also has project officer responsibility for arranging for the Army Reserve exhibit at the AUSA meeting. The exhibit will consist of a series of panels to depict the story of Reserve activities. Outdoors, there will be a "country fair" showing of guns, other equipment and an Artillery meteorological section.

Founded in 1947 under the leadership of Col Norman M. Lack (Brig Gen, Ret.), the 2199th Unit provided the concept for the establishment of the Army Reserve R&D Unit Program by the Department of the Army in 1948.

Currently, the Unit has about 20 officers, including six who have Ph.D. degrees and one with an LL.B. degree. Most of them have advanced degrees and hold responsible jobs in industry, the majority of them with Dupont de Nemours & Co., Inc.

Professional skills of members of the unit are widely varied. Pridefully, one member commented: "If we formed a research consultants company, we could provide service in a majority of the scientific disciplines."

H. GRADY RYLANDER, III, displays "Simultaneous Oscillations in Negative Resistance Devices."

THOMAS M. McGAHEE presents project, "X-Ray Power Supplies."