ARMY RESEARCH AND DEVELOPMENT

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Resor Announces Selection Of Industrial Physicist as AMC Laboratories Director

Creation of the position of Director of Research and Laboratories, U.S. Army Materiel Command, and selection of Dr. Jay Tol Thomas to fill it, was announced Jan. 6 by Secretary of the Army Stanley R. Resor.

As a Deputy to AMC Commanding General Frank S. Besson, Jr., Dr. Thomas takes into his new responsibilities broad experience in prominent industrial organizations and as a professor in major universities.

The position makes him one of the most powerful leaders in Army science, with complete authority over AMC's nine independent laboratories and staff responsibility for work performed by major AMC subordinate command laboratories.

Affiliated with industrial companies in research and development as a research physicist and a scientific

(Continued on page 3)

Army Slates National JSHS at ECOM, May 5-7

Maj Gen Austin W. Betts, deputy chief of Army Research and Development, and leading academicians will speak to some 150 outstanding students May 5–7 at the 4th National Junior Science and Humanities Symposium (JSHS) at the Army Electronics Command (ECOM) and Princeton University.

Dr. Jay Tol Thomas
Director of Research & Laboratories

The JSHS is sponsored by the Office of the Chief of Research and Development. Opening of the symposium will be at Fort Monmouth, N.J., where the high school boys and girls will be welcomed by ECOM's commanding general, Brig Gen W. B. Latta.

Dr. Henry Eyring of the University of Utah will address the symposium during the first morning, to be followed by General Betts.

Students present will be approximately 130 selected from those who presented papers at the 22 regional JSHS meetings during the year. In addition, there will be 23 students drawn from the participants at Science Youth Congresses sponsored by the U.S. Department of Health, Education and Welfare.

Approximately 70 adults, including directors of regional JSHS meetings, science teachers and state science supervisors, will attend. All participants

(Continued on page 4)

Dr. Harold Agnew Selected ASAP Chairman

Dr. Harold M. Agnew, Weapons Division Leader of the Los Alamos (N. Mex.) Scientific Laboratory, is the new chairman of the Army Scientific Advisory Panel (ASAP).

Taking his place as vice chairman is Dr. Ralph E. Fadum, dean of the School of Engineering at North Carolina State University, Raleigh.

Dr. Agnew succeeds Dr. Finn J. Larsen, former Assistant Secretary of the Army for R&D, who resigned as ASAP chairman when he was appointed by President Johnson in December as Principal Deputy Director of Defense Research and Engineering. *(Continued on page 3)*

Dr. Harold M. Agnew
ASAP Chairman

Featured in This Issue . . .

OCRD Offers Reservists 86 Mob Des Assignments

Eighty-six opportunities for Mobilization Designee assignments are open on the staff of the Office of the Chief of Research and Development, Department of the Army.

The positions are vacant in OCRD Headquarters in the Pentagon and Class II activities in the Washington area, Aberdeen Proving Ground, Md., and the Army Research Office, Durham, N.C. The grades range from colonel to major and vacancies exist in every branch of service, the OCRD Military Personnel Branch has announced.

The duty MOS of 2167, Research and Development Coordinator, represents many fields of experience. Officers with training (military or civilian) in nuclear physics, international affairs, life sciences, engineering, space physics, operations research,

(Continued on page 3)

Army R&D Newsmagazine

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CHANGES OF ADDRESS for AE and R&D Officer Specialist Program enrollees should be addressed to: Specialist Branch, ECP, OPD, Office of Personnel Operations, Department of the Army, Washington, D.C. 20315. Reserve R&D Unit members should contact: Special Assistant for Reserve Affairs, OCRD, Department of the Army, Washington, D.C. 20310.

OTHER GOVERNMENT AGENCIES' requirements should be submitted directly to the Army Research Office, OCRD, Department of the Army, Washington, D.C. 20310, ATTN: Scientific and Technical Information Division.

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Vice Chief of Staff Keynotes ASAP Meet

Army Vice Chief of Staff General Creighton W. Abrams, Jr., will keynote the Feb. 17–18 meeting of the Army Scientific Advisory Panel (ASAP) at Walter Reed Army Institute of Research (WRAIR), Washington, D.C.

More than 60 ASAP members, Army staff representatives and guests in the R&D field are expected to attend the session which will be concluded by an en masse visit to the Army Limited War Laboratory at Aberdeen (Md.) Proving Ground.

Host for the meeting and the WRAIR banquet will be Lt Gen Leonard D. Heaton, The Army Surgeon General, Col Robert W. McEvoy, CO of the Limited War Laboratory, is project officer of the sessions at Aberdeen Proving Ground.

This is one of three annual meetings of the Department of the Army's senior scientific advisers. Sessions normally are held at military installations where ASAP personnel are briefed on subjects of current interest in the R&D program and given first-hand knowledge of capabilities of the installation.

Paramount problems in the area of Army medical R&D will highlight the WRAIR briefings while the visit to the Limited War Laboratory will concern Army hardware developments for limited warfare. Special emphasis will be placed on materiel designed specifically for use in Viet Nam.

Ad hoc group activity within the ASAP reflects the urgency with which members are responding to some of the Army's most significant R&D problems.

Maj Gen Leslie E. Simon (USA, Ret.), chairman of the Barrier Research Group, has presented the final report findings and recommendations to Assistant Secretary of the Army (R&D) Willis M. Hawkins and to Lt Gen William W. Dick, Jr., Chief of Army Research and Development.

January meetings included the Ad Hoc Group on Design Criteria for Future Armored Vehicles which met for the first time in November 1965. This group is chaired by Dr. Allen E. Puckett, executive vice president, Hughes Aircraft Co., Culver City, Calif.

The Combat Vehicle Weapons System Ad Hoc Group, which first began deliberations June 30, 1965, also met last month. Dr. William C. Tinus, vice president of Bell Laboratories, Inc., Whippany, N.J., is chairman.

In an effort to expedite interim findings, the ASAP's Tactical Air Defense Group met twice recently under the chairmanship of Prof. Lawrence H. O'Neill of Columbia University.

Gen Creighton W. Abrams, Jr.
Army Vice Chief of Staff

The ASAP Secretariat in the Pentagon reports an unusual demand for the final summary of findings by the Target Acquisition Ad Hoc Group which was headed by Dr. Finn J. Larsen, now Principal Deputy Director of Defense Research and Engineering. This demand was noted as indicative of Army-wide interest in the critical area of target acquisition.

The Limited War Laboratory has been provided with individual consultations by ASAP members in recent months in its research program for improved personnel- and materiel-detection techniques.

Two ASAP consultants have been asked to assist the Life Sciences Division of the Army Research Office (ARO) to determine the feasibility of a study to develop prophylaxes against toxic chemicals. They are Dr. Walter J. Nungester, chairman of the Department of Bacteriology, University of Michigan Medical School, Ann Arbor; and Dr. John L. Schwab, vice president and research director, William S. Merrell Co., Cincinnati, Ohio.

Zeigler Named to IEEE Panel As Only Army Representative

Dr. Hans K. Zeigler, chief scientist of the U.S. Army Electronics Command, has been appointed to the Research Committee of the Institute of Electrical and Electronic Engineers. Top national industrial executives and university officials comprise the 29-member civilian committee.

Dr. Zeigler, one of 13 new members named by the IEEE, is the only Department of the Army employee on the civilian panel and will serve throughout 1966.

Dr. Agnew Succeeds Larsen as ASAP Chairman

(Continued from page 1)

Dr. Agnew, a physicist, was appointed to the ASAP in April 1964. He served with the Manhattan District, University of California, Los Alamos, from 1942 to 1946 and was a National Research Fellow, University of Chicago, from 1946-1949. After holding various positions at the Los Alamos laboratory, Dr. Agnew took leave from 1961-1964 to become scientific adviser to the Supreme Allied Commander, Europe. He became head of the Los Alamos Weapons Division in 1964.

Among his scientific interests are neutron physics, light particle reactions and particle accelerators. Dr. Agnew received his baccalaureate degree from the University of Denver (Colo.) and MA and PhD degrees from the University of Chicago.

DEAN FADUM, who has headed the engineering school at North Carolina State since 1962, has been an ASAP member since July 1959. He has held numerous national and state advisory positions, including membership on the Advisory Panel for Engineering, National Science Foundation, and the Advisory Panel on General Sciences, Office of the Assistant Secretary of Defense (Research and Engineering) from 1954-1958. He has been a member of the U.S. Army Mobility Command Advisory Group since 1963, among the several engineering committees and boards on which he is still active.

Dr. Fadum earned MS and PhD degrees in engineering at the University of Illinois and Harvard University. He holds an honorary doctorate from Purdue University.

Dr. Ralph E. Fadum

OCRD Offers Reservists 86 Mob Des Assignments

(Continued from page 1)

metallurgy, mathematics, chemistry, psychology, ADPS, environmental sciences, budgeting, plans and programming are in demand.

Several vacancies also exist for officers possessing MOS 2230.

Application should be made on DA Form 2976 (ARs 140–10 and 140–145), addressed to: Commanding Officer, USA Reserve Components Personnel Center, Fort Benjamin Harrison, Ind., through the appropriate USA Corps commander.

Requests for assignment to the Office of the Chief of Research and Development should be entered in Item 15 of DA Form 2976. It is important that Item 14 be completed in detail, using additional sheets if necessary. A complete description of civilian experience and education is essential, as selection is made mainly on the basis of this information.

Officers assigned as Mobilization Designees to OCRD have their training carefully monitored to insure continuing career development, the call for applicants emphasized. ANACDUTRA may be with OCRD, R&D laboratories, or even at R&D seminars.

Officers who have difficulty earning sufficient annual retirement point credits may have arrangements made to engage in a special project for which points are awarded upon its completion. Opportunity is given also to officers to attend USAR Command and General Staff College or Branch USAR schools in lieu of mandatory ANACDUTRA in order to qualify for promotion.

If application forms are not available locally, a request addressed to the Office, Chief of Research and Development, Department of the Army, ATTN: Military Personnel Branch, Washington, D.C. 20310, will yield a DA Form 2976 by return mail.

DIRECTOR OF ARMY RESEARCH Col Robert E. Kimball was briefed on capabilities of the Harry Diamond Laboratories and work in progress at the Washington, D.C., installation during a recent staff visit. Pictured (l. to r.) are Lt Col Milton S. Hochmuth, HDL commander; Col D. A. Kellogg, Army Materiel Command; Col Kimball and Nathan Kaplan, chief of the Power Supply Branch of the HDL Components Laboratory.

Resor Announces Selection Of AMC Laboratories Director

(Continued from page 1)

administrator for most of his career, Dr. Thomas most recently was Chief Scientist and Director of Research for Northrop Space Laboratories at Hawthorne, Calif.

From 1960 to 1962, Dr. Thomas served as director of engineering with Honeywell, Inc., Minneapolis, Minn. In 1962 he became general manager of Lear-Siegler Research Laboratories. Additional industrial experience was gained with E. I. Du Pont de Nemours Central Laboratories, Baird Associates, and Sylvania Division of General Telephone and Electronics Corp.

In the scientific educational field, Dr. Thomas served as department chairman and associate professor of physics and chemistry at Knox College, Galesburg, Ill. He later lectured and taught on a part-time basis at Harvard, Boston and Northeastern Universities in Boston, Mass., and at the University of Southern California, Los Angeles.

Graduated from Oklahoma A&M with a BS degree in electrical engineering, he earned AB and AM degrees from Harvard University and a PhD degree from Rutgers.

R&D Achievement Award Nominees

Nominations of candidates for consideration for the 1966 Research and Development Achievement Awards must be submitted to the Review and Analysis Directorate, Office of the Chief of Research and Development, not later than March 31. Criteria and qualification requirements for submission of nomination are explained in Army Regulation 672-304.

Army Slates National JSHS at ECOM, May 5-7

(Continued from page 1)

will be quartered in an Asbury Park, N.J., hotel.

During the afternoon, participants will tour various facilities of ECOM including the Satellite Communications Center, the Hexagon and the television studios.

Dr. Henry Margenau of Yale University will be principal speaker at the evening banquet to be followed by a dance in Fort Monmouth's Gibbs Hall.

Princeton University will be host for the second day's program with the welcoming remarks by Dean J. Douglas Brown.

The keynote humanities address will be by Dr. James Hadley Billington, professor of history.

Dr. Thomas Ripley Carver, professor of physics, will deliver the keynote scientific address.

Faculty members of Princeton will lead post-address "precepts," or small discussion groups, as the University's academicians are wont to call the sessions. (The precept was instigated by Woodrow Wilson during his presidency at Princeton as a group session conducted by a top-ranking professor. Precepts often were held in the professor's home. They stressed informality and an easy atmosphere as the mode for stimulating advancement in learning and scholarly interests.)

During the afternoon on the Princeton campus, student groups will be given "the Orange Key Campus Tour" and they will visit several of the major university laboratories. Definite on the agenda are the plasma physics and hydrogen fusion laboratories and the nuclear accelerator facility.

Brooklyn Institute to Hold Symposium on Networks

A "Symposium on Generalized Networks," 16th in the series of annual international symposia sponsored by the Microwave Research Institute of the Polytechnic Institute of Brooklyn, will be held in New York City, Apr. 12–14, 1966.

The symposium will be held in cooperation with the Institute of Electrical and Electronics Engineers, the Optical Society of America and the Society for Industrial and Applied Mathematics. Cosponsors include the U.S. Army Research Office, Air Force Office of Scientific Research and the Office of Naval Research.

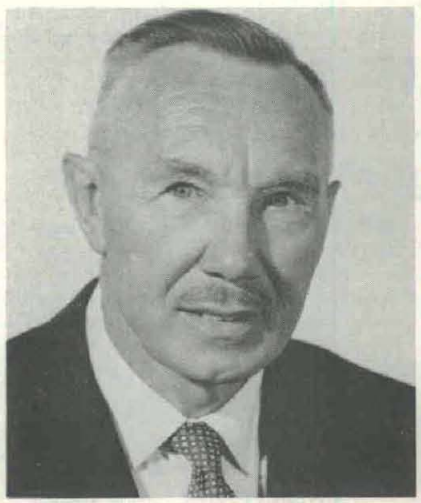
Topics to be considered include, network theory of distributed structures; network representations in electromagnetic theory; optical systems as networks; translation of physical laws into constraints on network realizability; networks as thermodynamic systems; network formalism in quantum mechanical systems; new attacks on classical network problems; network representations of biological systems.

Proceedings of the Symposium on Generalized Networks will be published as Volume XVI in the MRI Symposia Series and will be available at a reduced rate to members of the participating societies.

Picatinny Engineers Cut Costs

Nine months of research effort to simplify a cartridge case responsible for round failures resulted in a foolproof modification and $1,085,900 cost savings by engineers at Picatinny Arsenal, Dover, N.J.

Simplification of the complex case assembly, a component of the 40mm grenade launcher for helicopters, and a hardware design change raised mass production efficiency and reduced inspections.



Dr. Henry Margenau

Dr. Henry Eyring

Medical R&D Command Leader Becomes General

Brig Gen Colin F. Vorder Bruegge, promoted recently to that rank, is continuing as head of the Army Medical R&D Command, a post he assumed in February 1965, and is also special assistant for R&D to Surgeon General Leonard D. Heaton.

General Vorder Bruegge has served as deputy commander of the R&D Command since 1959 with the exception of one year (1963–64) when he was a student at the Industrial College of the Armed Forces. He was chief of the Research Division in 1959 and from 1956–59 was also deputy commander of the U.S. Army Medical Unit at Fort Detrick, Md.

Brig Gen C. F. Vorder Bruegge

He has served as assistant director of the Armed Forces Institute of Pathology (1948–50) and as special assistant to the director for organization and planning and technical adviser and Institute representative for the planning group for the new Institute Building (1950–55).

General Vorder Bruegge is a Diplomate of the American Board of Pathology, a member of the Tennessee Chapter of the Alpha Omega Honor Medical Society and the American Association of the Advancement of Science, a Fellow of the American Society of Clinical Pathologists and the College of American Pathologists, and has been awarded the Legion of Merit with First Oak Leaf Cluster.

Economists Forecast Record R&D Funding

Funding for U.S. research and development in 1966 is expected to reach a record $23 billion.

As forecast by economists at Battelle Memorial Institute, Columbus, Ohio, the estimate represents the smallest relative annual gain for R&D outlays in the past decade. The 1965 total has been estimated at about $22.2 billion.

The 1966 estimate is: Federal Government, $15.8 billion; industry, $6.7 billion; colleges and universities, $340 million; other nonprofit institutions, $235 million.

The estimate is that Government and industry each will spend about $400 million more this year than in 1965. Colleges and universities are expected to raise expenditures by about $25 million (7.9 percent) and other nonprofit institutions about $20 million (9.3 percent).

The Federal increase of $400 million was termed "moderate" by the Battelle economists since it represents only a 2.6 percent gain over the $15.4 billion in 1965. The figure reflects a reduction in the rate of obligational authority and of expenditures by the Department of Defense and the National Aeronautics and Space Administration. The forecasters do not expect this cutback to deter continued growth of the economy.

The shifting nature of Government programs is expected to result in a somewhat greater emphasis on basic research and wider geographic distribution of R&D endeavor.

Industry investment in research and development is foreseen by the economists as continuing to grow. Few if any industries, they stated, have reached the point of diminishing returns on R&D investment.

The present cash flow position (net profits retained plus depreciation) suggests the rate of industry spending for R&D will increase about 6 percent this year. Total industry performance of R&D, however, is expected to grow at a slower rate in 1966 due to reduction of Federal financing.

Nonprofit institutions show a long-term trend of rising rates of expenditure from their own funds. The rate of growth in academic spending was greater in the pre-Sputnik era than it has been since 1958, largely because of the rise in Federal financing of academic research.

In view of the shift in Government research programs, particularly those relating to health, education and welfare, the prediction is that academic performance of R&D will continue to derive an increasing share of support from the Federal Government.

Dr. Lawrence Ames, Microbiologist, Dies

Dr. Lawrence M. Ames, 65, noted microbiologist, consultant for the National Academy of Sciences and retired Army Research Office scientist, died after a heart attack early this month in Alexandria, Va.

The author of "A Monograph of the Chaetomiaceae," published in December 1961 as the first complete, authoritative work in this field in 40 years, joined ARO in 1958 and retired from Federal Service in 1962.

Dr. Ames, born in Waverly, Wash., received his baccalaureate and master's degrees from Michigan State University and his doctorate in biology from Harvard University. He began his Civil Service career with the U.S. Department of Agriculture in 1933.

He was recognized widely as a mycologist and for his fungi deterioration research. His interest in chaetomiaceae, a special group of cellulose-destroying fungi, began in 1927 and was broadened in 1956 by research in the U.S. and Europe under a Secretary of the Army Research and Study Fellowship. Dr. Ames' monograph has become a valuable research tool for laboratories throughout the United States and abroad; it reports on more than 100 species of chaetomiaceae.

Since Civil Service retirement, Dr. Ames served on the consulting staff of the National Academy of Sciences (National Research Council, Washington, D.C.) and was a research professor at American University, Washington, D.C.

He was president of the Washington Microbiological Society and past president of the RESA chapter of the Scientific Research Society of America at Fort Belvoir, Va. He was also a member of the American Institute of Biological Sciences, the Mycological Society of America, the Washington Academy of Sciences, the British Mycological Society, the Washington Microbiological Society and the Washington Botanical Society.

Dr. Lawrence M. Ames

Edgewood Facility Honors Memory of Nuclear Leader

The Army Nuclear Defense Laboratory's Tandem Van de Graaff accelerator facility being constructed at Edgewood (Md.) Arsenal will be named after Lt Col Ralph J. Truex, who died in 1962.

Lt Col Truex worked for many years in the field of nuclear research, including assignments with the 144th Special Weapons Unit at Sandia Base, N. Mex., and as chief, Nuclear and Special Components, R&D Division, Office of the Chief of Ordnance, Washington, D.C.

The Ralph J. Truex Accelerator Laboratory will be capable of generating up to 15,000,000 volts (15 MeV) when operating at maximum capacity. It reportedly will extend the energy range for the neutron cross section measurement program and charged particle investigation.

The new structure is part of the multi-million dollar building program at Edgewood connected with the new accelerator. Operation of the accelerator and its supporting equipment will be the responsibility of the Engineering Division of the Nuclear Defense Laboratory.

2243rd Reserve R&D Unit Activated at Fort Belvoir

The 2243rd Reserve Research and Development Unit (Reinforced Training) was recently activated at the U.S. Army Mobility Equipment Center's Engineer R&D Laboratories (ERDL), Fort Belvoir, Va.

Commanded by Lt Col Adolph H. Humphreys, who in civilian life is chief of the Laboratories' Combat Research Division, the new unit consists largely of ERDL's former Mobilization Designation Detachment No. 39.

The unit is designed to retain, in a Reserve capacity, highly trained scientific and engineering talent, in keeping with a policy of "strength in depth" for the Army research and development program.

Kwajalein Prepares for Expanding Role in Testing of Nike-X

Magnitude of the Army Nike-X antimissile missile development program, funded at nearly $400 million this fiscal year, points to the expanding role of Kwajalein Test Site, isolated in the Pacific Ocean, as the newest of the U.S. national missile ranges.

Placed under Department of the Army control July 1, 1964, Kwajalein is the primary test site for the Nike-X—a role it had for Nike Zeus from January 1959 until the system was phased into Nike-X in 1963.

When responsibility for operation of the test site was transferred from the Navy to the U.S. Army Materiel Command, Kwajalein Test Site was designated a national range, destined to grow substantially in importance. The advanced Research Projects Agency is another major user of its facilities with Project Press (Pacific Range Electromagnetic Signature Studies).

Except for its remoteness, its ideal isolation for missile testing purposes, Kwajalein has little to offer in the way of natural attractions—aside from the combination of sand, sun and surf—that might interest anyone not required to work there. Located some 2,000 miles southwest of Hawaii, it has a land area of 700 acres, with average elevation four feet above high tide.

The U.S. Weather Bureau, which furnishes certain technical support to the military operations, reports that the temperature average is 83 degrees, average humidity 82 percent, and average rainfall 101 inches annually. Rainfall, caught in basins, is the main source of fresh water, except for that distilled from sea water.

Despite these meteorological factors, Kwajalein Island is fast on its way to becoming a very valuable piece of real estate, insofar as U.S. investment in facilities for missile testing is concerned. Today the island accommodates a community of more than 3,600 persons, including some 500 families, and is expected to have a population of about 5,000 in FY 1967.

Geographically, Kwajalein happened to be more fortunate insofar as becoming a name in the news is concerned. The U.S. Army found that its location fulfilled some exacting requirements, including its distance from an intercontinental ballistic missile launching site.

Since an important part of the Nike Zeus tests involved intercept of U.S. ICBM target vehicles, the test site had to be within range of a launching area for these missiles. Kwajalein offered the necessary basic support facilities, and was the required distance down-range from Vandenberg Air Force Base, Calif., where the Air Force launches its ballistic missiles.

AERIAL VIEW of Zeus Acquisition Radar area at Kwajalein Island.

Consequently, in January 1959, Kwajalein was selected as the primary test site for the Nike Zeus system. Until then the island had been operated by the Navy as a base for air-sea rescue operations, for servicing transient ships and aircraft, and for logistic support of the Atomic Energy Commission tests at Eniwetok and Bikini from 1946 to 1958.

Construction of the Nike Zeus facilities began in August 1959 under the supervision of the Pacific Island Division, U.S. Army Corps of Engineers in Honolulu, Hawaii. By 1962 support facilities had been constructed, along with the Zeus Acquisition Radar, the Discrimination Radar, two Target Track Radars, the Missile Track Radar, Battery Control Building, Zeus launch cells, and related communication and instrumentation accommodations.

All of this buzz of development activity increased the U.S. population of Kwajalein Island to 1,300 by November 1959, when it achieved status a a part of the U.S. Navy Pacific Missile Range. Construction of ARPA's Project Press facilities began in November 1960 on Roi Namur Island, 50 miles north of Kwajalein, and Press joined Niki Zeus as a user of Kwajalein range.

Project Press technical facilities, including the mammoth TRADEX radar and its related equipment, along with support facilities, were completed by 1962. About two years later, Kwajalein Atoll, which comprises nine islands (only Kwajalein, Roi Namur, Ennylabegan and Gugeegue are U.S. populated), was established as the center for Department of Defense full-scale re-entry measurements and system test programs.

The Department of the Army now operates Kwajalein Test Site (KTS) through General Frank S. Besson, Jr., as CG of the U.S. Army Materiel Command. The Nike-X project manager at Redstone (Ala.) Arsenal, Headquarters of the Army Missile Command, functions as the KTS commander and controls it through his National Range and Test Operations Division.

Nike–X and Project Press personnel are the only range users with large amounts of equipment and personnel on Kwajalein Atoll. The other projects are primarily Air Force and Navy ICBM/SLBM re-entry measurement programs and the Terminal Radiation Program (TRAP). KTS support of the latter groups is predominantly in communications, control, and generation of data (such as meteorological, telemetry, trajectory and impact scoring data).

Civilian contractors are used extensively at KTS in providing to range users both logistic and technical support. Logistic support functions performed by approximately 1,100 persons include: aircraft, marine and vehicular operation and maintenance; repair, utility operations; fire protection and prevention, security and law enforcement; medical and dental services; and operation of the commissary, schools, churches and recreational facilities.

Technical range support is provided by the contractor and by the U.S.

Weather Bureau. The contractor currently employs about 160 persons on photo-optic coverage, operation of four M–45 surveillance cameras, 18 fixed sequential cameras, two LA–24 telescopes, three Askania cinetheodolites, and a complete photographic processing laboratory.

Electronic instrumentation services include operation and maintenance of two G–15 digital computers, an AN/MPS–19 surveillance radar, an FIC system, a range timing system, and the telemetry system; also, operation and maintenance of the facility control center, the message and crytographic center, radio transmitter and receiver sites, and the submarine cable and L-carrier system which connects the various Islands of Kwajalein Atoll.

Fifteen U.S. Weather Bureau personnel provide services which include hourly and synoptic meteorological observations, forecasts, aircraft preflight weather briefings, severe weather warnings, twice-daily rawinsonde soundings, and routine tidal observations. They also participate in the seismic sea wave warning system as requested by the U.S. Coast and Geodetic Survey.

Kwajalein Test Site usage will increase in FY 1966 when the Advanced Research Projects Agency begins installation of its new ALTAIR radar and PLATOS 42-inch telescope for re-entry measurements on Roi Namur. KTS importance will increase as full-scale tests of the Nike-X system and other national important ballistic missile re-entry measurement experiments are included in operations.

Nike-X Sprint Passes First Underground Launching

Needle-nosed Sprint, the Army's fastest accelerating guided missile, recently was launched successfully from an underground cell in maneuverability tests at White Sands (N. Mex.) Missile Range.

The 27-foot antimissile missile is part of the Nike-X system and a companioin to the planned Zeus missile component of the Army's highest-funded development project. It was ejected into guided flight from a cylindrical steel launching cell buried upright in the earth.

SPRINT, the Army's newest antimissile missile, is shown here during a test flight from an underground launch cell. Fired from a near vertical position, the missile is guided by ground-based radars and computers.

Sprint was started aloft by a gas-driven "pop-up" piston and the first-stage motor ignited after the missile was in the air. The underground cell-launching technique is conceived for operational use.

Both solid-propellant motors of Sprint were fired during the test and the missile was guided by ground-based radars and computers. It was not fired at an actual target.

Following second-stage burnout, Sprint was deliberately destroyed as part of the test plan which included safety procedures.

Col Ivey O. Drewry, Nike-X project manager, said that major objectives of the test flight were met. The test marks a major milestone in development of Sprint as part of the complex Nike-X system which will be capable of controlling a number of Sprint and Zeus interceptor missiles simultaneously.

The slender, cone-shaped Sprint was heated to incandescence by air friction during the few seconds of extreme velocity flight but special materials enable it to withstand the intense heat.

Sprint is being developed to intercept attacking intercontinental and submarine-launched ballistics missiles once they have penetrated the earth's atmosphere. The long-range Zeus would be capable of intercepting attacking missiles in space before they come within the range of the high-velocity Sprint.

This is the first time the pop-up technique of launching a missile has been used by the Army. The missile rests on a piston in the buried cylinder and is ejected upward when a solid propellant is ignited beneath the piston.

Not far from the Sprint's test-launch site is another major component of the Nike-X system, the huge MAR (Multifunction Array Radar). The MAR at White Sands is the pilot model of the Nike-X radar being developed to perform target acquisition, discrimination, tracking and missile tracking.

Another part of the Nike-X system is the MSR (Missile Site Radar) being developed to issue guidance instructions to interceptor missiles.

Poor Health Ends Dr. Zahl's 35-Year Federal Career

Acting upon advice of his physician, Dr. Harold A. Zahl, Director of Research at the Army Electronics Command Laboratories, Fort Monmouth, N.J., ended almost 35 years of Federal Civil Service by resigning in January.

In a letter to Assistant Secretary of the Army (R&D) Willis M. Hawkins, Dr. Zahl said he will be available for any assistance his long career as a pioneer in Army electronics may qualify him to give on request.

Recognized for research in electronics, acoustics, infrared detection and development of what is known as the VT–108 tube, which was a breakthrough of vast importance to the electronics industry, Dr. Zahl is among the Army's most honored scientists.

Among honors he has received was the public service award of the Federal Business Association of New York in 1964, the Department of the Army Exceptional Civilian Service in 1963, and the Institute of Electronics and Electrical Engineers Harry Diamond Memorial Award in 1954.

In 1948, Dr. Zahl was the first scientist promoted to top career status under Public Law 313 as a result of accomplishments during a Civil Service career. Associates agree that his impact upon Army science has been profound.

Dr. Harold A. Zahl

XV–5A Flight Testing Continues

The U.S. Army Aviation Materiel Laboratories, Fort Eustis, Va., awarded a $1,326,000 contract to Ryan Aeronautical Co. for extension of flight testing of XV-5A Lift Fan V/STOL research aircraft, incorporation of research modifications and personnel familiarization training.

Electronics Command Developing Accurate Mobile Meteorological Data System

Accurate data, high-speed automation and mobility for modern combat forces are combined in a meteorological information system being developed by the Army Electronics Command, Fort Monmouth N.J.

Known as the Meteorological Data Sounding System, the prototype unit is vehicular-mounted for rapid transport where needed to provide fighting forces with the weather facts that may mean the difference between success or failure of an operation.

The MDSS is fully automated to provide sounding data for missile firings, conventional artillery, tactical planning, nuclear fallout prediction and weather forecasts more quickly than any other atmospheric probing system now in use.

Wind speed and direction will be obtained by radar tracking of the airborne apparatus. Data will include temperature, humidity and atmospheric density.

Capability of providing fresh, highly accurate reports on atmospheric conditions throughout the various levels would, it was stated, be a major factor in enabling mobile artillery batteries to make improved first round hits by correcting for atmospheric influence on projectile and missile trajectory.

Projected for general field use in the 1970 period, the system will use newly designed ballon or rocket radiosondes to feed information to the compact ground equipment. Computers then will convert, transcribe and transmit the meteorological data to combat units in easily usable form.

DESIGNED FOR FIELD USE in the 1970s period, the automated meteorological sounding system being developed under direction of the U.S. Army Electronics Command uses computer methods to produce reports on atmospheric conditions. The retractable antenna automatically tracks balloons or rocket-borne radiosondes to altitudes of 20 miles or more.

OPERATORS of sounding equipment monitor data and printout from radiosonde atmospheric probes carried aloft by balloons or small rockets.

In explaining the merits of the projected system, researchers said that it will provide the faster and more precise detection, measurement and productive capabilities that will be required to support tactical needs as envisioned in the time frame of the 1970s.

Test models of the system have been delivered for evaluation to the Electronics Command and the Army Test and Evaluation Command, Aberdeen, Md., by the contractor, the Republic Aviation Corp. of Fairchilds Hiller Corp.

The entire sounding system, which can be trucked or airlifted over rough terrain, can be put into operation or made ready for moving to a new location in less than 30 minutes. Mobility and compactness of the system is achieved by maximum use of solid-state circuitry.

One of the advanced features of the meteorological data sounding system is a parabolic antenna that can be raised mechanically through a roof hatch into operating position. Without interference, the antenna acquires radar ranging and the sounding data beamed by the radiosondes' transmitters.

An advanced feature of the sounding system is the capability of reacquiring ranging echoes should intervening rainfall cause loss of signals from the radiosonde target. Direction-sensitive radio equipment keeps the radar automatically pointed toward the radiosonde carrier, allowing automatic signal pickup as soon as the target signals are stronger than the echoes from the rain barrier.

The new system is projected to supersede the present Rawinsonde system which the Army began using in the early 1950s.

22 Generals 'Salute' 47-Year Civil Service Retiree

Twenty-two generals—18 of them in person—were among some 500 persons who recently paid tribute to William E. Carter, 67, when he retired after 47 years 7 months of Federal service with the U.S. Army.

A luncheon, and afternoon and evening receptions hosted by Maj Gen David P. Gibbs, Army Chief of Communciations-Electronics, in whose office as well as that of the Army's Chief Signal Officer Carter served, reflected unprecedented honor for a civilian employee.

Acting Army Chief of Staff General Creighton W. Abrams presented the retirement certificate. General Gibbs awarded Carter a second Meritorious Civilian Service Award at the afternoon reception at Fort Myer, Va.

Carter also received a Certificate of Achievement, a special plaque from the Armed Forces Communications-Electronics Association and two embossed leather books autographed by military and civilian friends scattered worldwide.

Joining the former Army Signal Corps in May 1918 as a messenger, he advanced to chief messenger at the start of World War II, supervising 104 employees. In recent years, because of his advancing age, he has served as mail clerk.

Carter has the distinction of being the only civilian employee who has known 16 of the 20 Army Chief Signal Officers since the founding of the Signal Corps in 1860. Four retired Chief Signal Officers, unable to attend the retirement activities, sent personal messages.

William E. Carter

Not Quite That Simple, Friend

AMC Patent Adviser Disputes Fort Huachuca Story

Oversimplification of the process of obtaining a patent, as indicated by a recent article in this publication, is claimed by an expert on the complexities involved. He takes exception to the account from Fort Huachuca, Ariz., on how easy it was for Curtis L. Wilson to make 20 applications in a year with only one rejection.

Robert T. Gibson, an adviser in the Patent Law Division, Office of the General Counsel, Headquarters U.S. Army Materiel Command, Washington, D.C., contends that getting a patent is not nearly as simple as was reported in the October 1965 edition.

"The article stated," he writes, "that to obtain a patent it is only necessary to present to the Patent Office a workable creative idea, and the Patent Office will do the rest."

"The article went on to state that one does not have to be a lawyer to comply with the patent filing procedures, nor an engineer to draw the plans, and that an uncomplicated, even handwritten description of the invention and its function, plus a simple sketch is sufficient; also, that the legal assistance offices can provide the forms and handle the actual patent submission."

A patent application, Gibson emphasizes, is "one of the most difficult and complicated legal documents that can be prepared"—as many courts have stated in their opinions.

The patent attorney or agent operates in two distinct and highly complicated disciplines, he explains, one in technology, and the other in law. One does not have to be a lawyer to file a patent application for a client before the U.S. Patent Office, but he must comply with certain qualifications as set forth by the U.S. Patent Office.

The same qualifications apply to lawyers as well as non-lawyers. A qualified lawyer is called a patent attorney, and a qualified non-lawyer is a patent agent. Currently, the qualifications Gibson cited as necessary for registration before the U.S. Patent Office are:

(1) He must have been employed as a Patent Examiner in the Patent Office for a period of at least four (4) years; or

(2) He must show that he or she is of good moral character and reputation and further show that he is qualified to render service, advice and assistance in the prosecution of their patent applications.

To show the latter, one must pass a one-day, 6-hour exam administered throughout the U.S. by the Civil Service Commission. This exam covers many aspects of the patent laws as well as claim preparation and analysis. To pass the exam, it is almost essential that one have had some prior technical training or background.

The legal portion of the exam covers such subjects as statutory bars, restrictive requirements, double patenting, interference proceedings, utility, novelty and invention requirements, disclaimers, reissue patents, joint inventorship problems, affidavits under Rules 131 and 132 of the Rules of Practice, and many other subjects.

"When a patent attorney or patent agent prepares and submits a patent application to the U.S. Patent Office for a client," Gibson explains, "his job is only half over. He must rebut the prior art arguments cited by the Patent Office *not only to show that the inventor has an invention over the prior art, but also to show that his client deserves the broadest claim within reason to protect the invention.*"

A Claim is the written structural details of an article, or the step-by-step description of a process setting forth the metes and bounds of the invention so as to distinguish over the prior art.

More precisely, the claim defines the scope of one's invention, and is notice to all who wish to practice the invention that they must obtain a license from the patent owner to make, use or sell the item which is so defined in the patented claim.

A very limited and specific claim that only defines what is called a "picture image" of an article is almost worthless to an inventor who wishes to exploit his invention, Gibson points out, "because anyone can make a few minor changes in the article or process which would take it outside the scope of the claim."

The job of the Patent Office Examiners in the public interest is to cite the best prior art to show that the invention may not be worthy of a patent. It is the job of the patent attorney or agent to show that his client defines a new and useful invention over the prior art, and should be granted the broadest reasonable claim to protect this invention.

An inventor can file his patent application on his own behalf in the Patent Office without meeting the qualifications for patent agent or attorney as outlined above. However, he does so at the risk of losing any possible rights to his invention by not knowing all of the pitfalls which can befall him in the prosecution of an application.

Submission to the Patent Office of a handwritten description of the invention and its function, with a simple sketch, will not meet the requirements of the Patent Office. Requirements can be found in Rules 51–95 of the Patent Office Rules of Practice, and any patent attorney will be happy to exhibit his copy.

All Government employees should use patent adviser services, Gibson states. If there is no patent adviser or attorney located at your installation, your local legal office can direct you to the one who has the responsibility for your agency.

ASAP Loses Member Emeritus as K. T. Keller Dies at 80

Kaufman T. Keller, Member Emeritus of the Army Scientific Advisory Panel, one of its 10 original members, and a pioneer whose feats made him one of the giants of the American automobile industry, died Jan. 21 at age 80.

Known affectionately to colleagues as "K. T.," he came to Detroit "as a greasy mechanic" (his own term) in 1910. He rose to positions of responsibility in the Chevrolet Division, General Motors, and was vice president and general manager of GM of Canada from 1924–1926.

In 1926 he joined Chrysler and became president of the Corporation in 1935. Elected chairman of the Board of Chrysler in 1950, he continued his active participation in the automotive industry.

Mr. Keller was appointed to the Army Scientific Advisory Panel when it was established by Secretary of the Army Pace in 1951; a Member Emeritus status came in 1960. Appointed as a senior consultant in 1965, he remained active in the Panel's work until his death.

Kaufman T. Keller

ECOM Unveils $2 Million Simulator for Electronics Testing

Assistant Secretary of the Army (R&D) Willis M. Hawkins has unveiled and "flown" a revolutionary Army Electronics Command facility which simulates in-flight performance of aircraft electronic systems.

The $2 million large-scale man-machine simulator at Fort Monmouth, N.J., is known as the Tactical Avionics Systems Simulator.

Consisting primarily of a huge computer system and two maneuverable cockpits, the simulator is the only Army device capable of evaluating proposed aviation electronics (avionics) during the design stage of new Army aircraft. It also will be used to resolve advanced electronics systems for existing aircraft.

Secretary Hawkins was escorted through the new facility by Brig Gen William B. Latta, ECOM commander, and was briefed on the complexities of the simulator. Some 500 guests and ECOM employees watched Mr. Hawkins unlock the device.

Already an experienced pilot, Mr. Hawkins was awarded a "student pilot certificate" by Lt Col L. G. Callahan, Jr., director of ECOM's Avionics Laboratory, qualifying him to "fly" the avionics device, at the unveiling ceremony.

Although Mr. Hawkins did not formally address the gathering, he reviewed the specific areas with which the Army R&D Program is concerned —the working environment, new responsibilities and current requirements—and stated:

"We are still being driven relentlessly by the accelerating momentum of our scientific output. Not a day goes by that we don't see some new idea or have some development come to fruition. This is the foundation of our present successful military posture."

Mr. Hawkins cautioned that it should never be forgotten that the war in Viet Nam and problems of maintaining U.S. Forces elsewhere are "infinitesimal" to those which would be faced if present scientific momentum was lost and the Nation became a participant in a struggle requiring all national resources to survive.

William Kenneally of ECOM's Avionics Laboratory was in immediate charge of installation and heads programing and operation of the facility. He gave a comprehensive briefing for General Latta, Brig Gen Wesley C. Franklin, deputy commanding general (operations), and the technical staff of ECOM.

"HEART" OF recently unveiled Tactical Avionics Systems Simulator at Army Electronics Command, Fort Monmouth, N.J., is this large-scale digital-analog computer, capable of duplicating all operational phases of Army tactical aircraft and the electronic systems. It provides a "real world" response to pilots' and gunners' control inputs and produces systems design and evaluation data.

"Focal point" of the equipment, Kenneally said, is the "hybrid" computer—the active combination of a general purpose digital computer, parallel digital logic and general purpose analog computers into an integrated total system.

A "very powerful system" results, he said, when the digital and analog machines are integrated into a single class, or hybrid, which tends to place emphasis on the strong points and to minimize the weak points of each type of machine.

The major initial project in which the simulator system is being used is to evaluate the design of the electronic systems of a high-speed, weapons-carrying compound helicopter known as the Advanced Aerial Fire Support System (AAFSS). This system is being developed to provide escort protection to flights of troop-carrying helicopters in combat operations.

"It provides in an accurate manner an unlimited representation of an aircraft and its electronic systems. It brings the real world into the laboratory," Kenneally said.

In the cockpit, for example, the pilot uses actual controls and instruments. As he "flies" the aircraft the control input activates the specially programed computer, translating the flight into realistic terms. It feeds the information to the cockpit instruments, to a cockpit motion system, and to a control-loading system which imposes forces on the pilot's controls identical to those he would feel during actual flight.

The pilot can simulate takeoff, can climb to any altitude, use navigation aids, fly at variable speeds, move in formation with other aircraft, go through maneuvers and take evasive action to avoid enemy fire. The cockpit is thrown into the actual motions of yaw, pitch and roll.

Function of the gunner, whose main purpose is to employ the aircraft as a weapons platform that can move swiftly in any direction, are analyzed as fully as the pilot's role.

ALREADY A PILOT, Assistant Secretary of the Army (R&D) Willis M. Hawkins receives a "student pilot certificate" to "fly" the new flight simulator at Fort Monmouth, N.J. Presenting the certificate to Mr. Hawkins, shown seated in one of two of the Tactical Avionics Systems Simulator's maneuverable cockpits, is Lt Col L. G. Callahan, Jr., director of the Army Electronics Command's Avionics Lab.

The system also measures the effects that firing of different kinds of weapons have on the aerodynamic stability of an aircraft. By evaluating the design of flight control, it minimizes the problems presented when the aircraft attitude is changed sharply by a weapon's recoil.

The major elements or subsystems are being installed in stages. Two large maps and closed-circuit television for both the pilot and gunner are soon to be added. Other refinements to the system are scheduled.

When the ground picture system is added, the gunner as well as the pilot can view the moving televised display of terrain on the cockpit windscreen. A simulated gunsight enables the gunner to call for precise flight patterns or maneuvers to acquire, track and fire on targets. Hits and misses are registered.

Kenneally reminded his audience that mission simulators are not new and that the Army, the other Military Services and the National Aeronautics and Space Agency (NASA) use as routine various mission simulators in crew orientation, familiarization and training.

"The system is unique," he said, "in that it is designed to provide for advanced system design rather than crew training for an existing system. More specifically, its mission is to provide for the analysis and synthesis of advanced Army avionic systems operating in a simulated tactical environment."

STRATCOM Announces 8 New Assignments

Personnel changes announced by the U.S. Army Strategic Communications Command (STRATCOM) recently made Brig Gen Walter B. Bess the commanding general of STRATCOM-Europe.

All strategic signal facilities of the U.S. Army Europe are now under his control. The expanded system includes 20 recently added units, 3,700 additional personnel and the Army's portion of the Joint European Microwave System.

A 1936 West Point graduate, the general also has been named deputy chief of staff for Communications Electronics, USAREUR. He wears the Legion of Merit, the Bronze Star, and the Philippine Presidential Citation.

Col Lawrence R. Klar, former chief of the Defense Communications Agency's (DCA) Objectives Division, is the new head of the STRATCOM Equipment Applications Directorate.

Col J. G. Moak recently vacated that post to assume duties as STRATCOM chief of staff. In the interim, R. G. Surina has been serving as the acting head of the Directorate, one of six major headquarters offices at STRATCOM.

Col Klar is a graduate of both the Command and General Staff College and the U.S. Military Academy. Prior to joining DCA, he had served three years in Europe, the last as commander of the First Signal Group at Orleans, France.

During World War II, he participated in four battle campaigns in the Pacific Theater, including New Guinea and the Philippines.

Other officers appointed to key STRATCOM assignments include Lt Col John M. Reid, new assistant secretary of the General Staff; Lt Col Ernest J. Baker, deputy director of Plans and Operations, and Maj Richard Garties, assistant Staff Judge Advocate.

Brig Gen Walter B. Bess

Lt Col Arthur M. Gravlin is the new chief of the Systems Control Office, Engineering Directorate, and Lt Col W. W. Nelson has been designated deputy chief of STRATCOM's ET-A (European Tropo-Army) Project Control Office.

Col Lawrence R. Klar

McNamara Orders Study Of All Military Hospitals

Recommendations for improvement of design and management of military hospitals, outpatient clinics and hospital management training programs are expected to result from a study ordered by Secretary of Defense Robert S. McNamara.

The comprehensive study is being conducted by the Department of Defense, assisted by outside consultants, with the U.S. Army Medical Research and Development Command as executive agent.

Secretary McNamara established a Hospital Management Evaluation Committee to oversee preparation of the study plan, progress of the effort and to analyze consultants' reports.

Headed by Thomas D. Morris, Assistant Secretary of Defense (Manpower), the committee includes Dr. Shirley C. Fisk, Deputy Assistant Secretary of Defense (Health and Medical); Lt Gen Leonard D. Heaton, Surgeon General of the Army; Vice Adm R. W. Brown, Surgeon General of the Navy; and Lt Gen R. L. Bohannon; Air Force Surgeon General.

Col Jack C. Carmichael, Assistant for Medical Facilities Planning (Health and Medical) is executive secretary. Pierre Palmer, Bureau of the Budget, has been designated as contact point for that agency.

The Military Departments now operate more than 250 hospitals and 450 dispensaries which have a capital investment of more than $1 billion and employ about 170,000 personnel.

The annual operating costs of these facilities and related medical services will exceed $1 billion in Fiscal Year 1966. Secretary McNamara emphasized that it is essential these facilities are managed effectively in order to provide the best medical service at the lowest possible cost.

The committee has the responsibility of preparing a final report for transmittal to the Secretary of Defense in November 1966. This report will be a comprehensive plan of action and will outline for the Secretary both long-range objectives to improve the overall management of the medical services and specific recommendations where results in a given area can be accomplished in a shorter period of time.

The following contractors have agreed to perform preliminary studies: McDonnell Aircraft Corp., Electronic Equipment Division, St. Louis, Mo.; Daniel, Mann, Johnson and Mendenhall; Space-General Corp.; Bolt, Beranek and Newman, Inc., all in Los Angeles, Calif.

Lt Col J. R. Walsh, Jr.

Lt Col D. R. Markwell

Lt Col T. E. Marriott

Lt Col J. E. Houseworth, III

OCRD Announces 9 New Officer Assignments

Four of nine new staff and action officers who reported recently to the Office of the Chief of Research and Development (OCRD) are assigned to the U.S. Army Research Office (USARO), Arlington, Va.

LT COL JOHN R. WALSH, Jr., is assistant for management and ADP operations, Scientific and Technical Information Division, USARO. Previously he was a bridge executive officer and assistant chief of staff, G–2, 25th Infantry Division in Hawaii (1962-65) and a test officer with the Armor Board (1959-62).

He served in Europe during World War II and in Japan following the war. Subsequently he served: at Fort Carson, Colo.; as aide-de-camp to the CG, U.S. Army Alaska; as a test officer with the Infantry Board; and as an operations and intelligence adviser to the Military Assistance Advisory Group, China.

Col Walsh has attended the Universities of Georgia, Kentucky and Hawaii and has completed the Infantry School, OCS Armor School advanced course, and the Command and General Staff College. His decorations include the Bronze Star with two OLCs and the Army Commendation Medal.

LT COL DICK R. MARKWELL, a staff officer in the Chemistry and Materials Branch, Physical Sciences Division, USARO, previously served as a plans officer with the International Military Assistance Office, U.S. Army Military Assistance Command, Viet Nam.

Other assignments have included: battalion executive officer, 81st Armor, 1st Armored Division, Fort Hood, Tex.; special weapons liaison officer, Allied Forces Central Europe; troop commander with the 2nd Armored Cavalry, Germany; and troop commander and regimental staff officer, 6th Armored Cavalry, Fort Knox, Ky.

His education includes BS and MS degrees from the University of Wichita and a PhD from the University of Wisconsin in inorganic and electrochemistry. He wears the Army Commendation Medal with OLC, Army Commendation Ribbon with Medal Pendant, and the Joint Services Commendation Medal.

LT COL THOMAS E. MARRIOTT, a staff officer in the Physics and Engineering Branch, Physical Sciences Division, USARO, is a 1945 graduate of the U.S. Military Academy. He has an MSEE degree in communication engineering from the Georgia Institute of Technology and has completed the Command and General Staff College.

Previous assignments have been: battalion CO, 44th Artillery, Fort Sill, Okla., 1963-65; staff officer, G–3 Section, U.S. Army Pacific, Hawaii, 1962-63; executive officer, 1st Battalion, 8th Artillery, Hawaii, 1961-62; communications officer, 25th Artillery Division, Hawaii, 1960-61; and electronic engineer with the U.S. Army Air Defense Board, 1955-59. He has won the Army Commendation Medal.

Lt COL J. EDWARD HOUSEWORTH, III, combat surveillance-target acquisition project officer, Physics and Engineering Branch, Physical Sciences Division, USARO, is a 1964 graduate of the U.S. Military Academy. He attended Duke University, received an MSEE degree from the University of Pennsylvania, and has completed the Command and General Staff College.

Past assignments include: senior adviser to Viet Namese Regional Forces, Viet Nam, 1964-65; U.S. Army Combat Developments Command liaison officer to the U.S. Army Electronics Command, Fort Monmouth, N.J., 1962-64; U.S. Continental Army Command liaison officer to the U.S. Army Signal R&D Laboratory, Fort Monmouth, 1960-62; and artillery adviser, Military Assistance Advisory Group, Taiwan, 1958-60.

He has been decorated with the Bronze Star Medal, Air Medal and Viet Namese Honor Medal.

Lt Col J. A. Stuart, Jr.

Lt Col R. S. Douthitt

Lt Col M. E. Lewis, III

Lt Col Briggs H. Jones

1st Lt L. C. Drozeski, Jr.

LT COL JAMES A. STUART, Jr., staff officer, Long Range Plans Branch, Plans Division, OCRD, is a 1945 graduate of the U.S. Military Academy with an MS from Virginia Polytechnic Institute in aerospace engineering. He has completed the Command and General Staff College and the Naval War College.

In 1964-65 he served as deputy assistant chief of staff for civil affairs at the Headquarters of United Nations Command/U.S. Forces Korea, and was director of engineering, Army Aerospace Depot Maintenance Center, Corpus Christi, Tex., 1961-63.

LT COL ROBERT S. DOUTHITT, a staff officer, Special Warfare Division, OCRD, has served as chief, Training Division, Directorate of Training, Military Assistance Command, Viet Nam, 1964-65; commander, Operational Detachment C, 5th Special Forces Group, Fort Bragg, N.C., 1963-64. Two earlier Special Forces operational assignments were at Fort Bragg.

He is a 1964 graduate of the U.S. Military Academy and has completed the Command and General Staff College, Special Forces Officers Course at the Special Warfare School and the Army Supply Management Course, Army Logistical Management Center. He wears the Army Commendation Medal with OLC.

LT COL MOSE E. LEWIS, III, action officer, Programs Branch, Programs and Budget Division, OCRD, previously commanded the 1st Battalion, 77th Artillery, 1st Cavalry Division, 1964-65; was chief of the section for cost effectiveness evaluation, Tactical Air Mobility Division, Combat Developments Command, 1963-64; a member of the Howze Board, 1962; and budget officer and assistant comptroller, U.S. Army Aviation Center, Fort Rucker, Ala., 1960-62.

He has a BA degree in business administration from Stanford University, and MBA degree from Syracuse University, and has completed the Command and General Staff College regular course. His decorations include the Distinguished Flying Cross with OLC, Air Medal with 10 OLCs, Bronze Star Medal and the Army Commendation Medal.

LT COL BRIGGS H. JONES, staff officer, Combat Arms Branch, Combat Materiel Division, OCRD, previously has served as executive officer with the 1st Reconnaissance Squadron, 11th Armored Cavalry, Fort George G. Meade, Md., 1964-65; with the Headquarters, Eighth U.S. Army, Korea, 1963-64; and as project officer for M60 and M48A3 tanks, U.S. Army Armor Board, 1959-62.

He graduated from the U.S. Military Academy in 1950, after attending the University of Mississippi and Amherst College, has an MS degree in mechanical engineering from the University of Michigan, and has completed the Command and General Staff College.

FIRST LT LEO C. DROZESKI, Jr., adjutant and administrative officer at the U.S. Army Personnel Research Office, OCRD, previously served as adjutant at the Humphreys District Command Korea, 1964-65. He holds a BBA degree in mechanical engineering and business administration from the University of Notre Dame and an MBA in industrial management from the University of Pennsylvania. He also has completed the Adjutant General officer basic course.

Kendrick Commands Walter Reed Army Medical Center

Thirty-one years of service as an Army physician provide the background of experience Maj Gen Douglas B. Kendrick, Jr., carries into his new duties as commander of the Walter Reed Army Medical Center in Washington, D.C.

In September 1965, General Kendrick returned from a tour as Surgeon, U.S. Army Europe, and served as special assistant to The Surgeon General until he succeeded Maj Gen Henry S. Murphey, who retired from active military service Nov. 30.

As CG of the WRAMC, General Kendrick is responsible for one of the largest medical centers in the world, involving an average of 1,500 patients and some 5,500 military and civilian personnel.

The WRAMC furnishes administrative and logistical support to the tri-service Armed Forces Institute of Pathology, Walter Reed Army Institute of Research, Army Institute of Dental Research, the newly established Walter Reed Army Institute of Nursing, the Army Biomechanical Research Laboratory and the Army Medical Service Historical Unit.

General Kendrick gained his first working knowledge of Walter Reed Army Medical Center in 1937, just three years after he completed his internship at St. Joseph's Hospital and his residency in surgery at Grady Memorial Hospital, Atlanta, Ga. He earned a BS degree in 1928 from Emory University in Atlanta, and has two years of postgraduate work in surgery at the Mayo Foundation and the University of Vienna.

In 1944, following service at Walter Reed as chief of the Blood Research Division and later as special assistant to The Surgeon General on blood transfusions, he was assigned to the 10th Army in Okinawa. The following year he was named physician to General Douglas MacArthur in Japan and retained that post until 1948.

Other key assignments include: chairman, Armed Forces Blood Group (1950–1952); commander, U.S. Army Hospital, U.S. Military Academy (1952–55); executive officer and later chief surgical consultant to The Army Surgeon General (1955–58).

Maj Gen D. B. Kendrick, Jr.

Critical Review Slated On Retrieval of Data

Arrangements for the Third National Colloquium on Information Retrieval, May 12–13 at the University of Pennsylvania, are being made by chairman George Schecter, scientific and technical information project director at Frankford Arsenal, Philadelphia, Pa.

Leading scientists from every phase of the information dissemination problem, representative of Federal agencies, industry and the academic scientific community, are expected to participate in the general sessions.

The theme is "Information Retrieval—A Critical Review." Papers have been invited from prospective participants in the following areas:

- Presently operating information retrieval systems and how they compare with other ways of solving the problem, based on time, cost, hardware-software trade-offs or techniques.
- Information retrieval systems being planned and justification for the new techniques, including such aspects as hardware components, software techniques, system design, user interface, proposed standards.

Pioneer Detrick Researcher Retires at 68

One of the original group of scientists that played important roles in the growth of research at Fort Detrick retired from Federal Civil Service Dec. 30 at the age of 68.

Dr. Harold W. Batchelor was assigned to Camp Detrick as an officer in the U.S. Army Sanitary Corps, Medical Department, in May 1943, one month after the post was activated.

Dr. Batchelor's first accomplishment was the organization of what was then the Biology Section of Munitions Branch, now the Technical Evaluation Division.

He is credited with originating the Cotton Aerosol sampler, proposing the construction of a test tank large enough to test full-scale biological munitions under controlled environmental conditions, procuring the first biological simulant used in research at Detrick, and conducting the first field sampling of aerosols.

The idea of the test tanks finally evolved into the present "Eight Ball," the million-liter stainless steel test sphere.

An early project that has remained of primary interest to Dr. Batchelor was his first requisition for a quantity of books to establish a technical library. It now has a listing of 50,000 books, 25,000 periodicals, and over 40,000 technical documents.

In the fall of 1943, he was one of the first three officers sent to Horn Island, Miss., to organize and equip an installation for the field study of toxic agents. He was in charge of the testing laboratory and serviced tests of candidate munitions, including the first U.S. tests of toxic agents using animal exposure and aerosol sampling.

From May to October 1946, he formulated and conducted the biological weapons experimental part of the first two atomic bomb tests of the Cross Roads Project at Bikini.

In 1948 he supervised the construction of Building 527, the Eight Ball building, and conducted the first stimulant tests upon completion. He then was placed in charge of formulating operating requirements for a series of proposed Munitions Division buildings.

From September 1953 to November 1957, he organized and directed the Surveillance Branch. He was the first to send simulant biological agents aloft in German V–2 rockets, a Corporal missile, and balloons to study effects of the higher atmosphere on simulant agents.

In 1960 he wrote the scope of a contract for a mechanical information retrieval system, and labor developed what is know as the COMEINDORS

Dr. Harold W. Batchelor

manual. This was the experimental prototype of a mechanized information retrieval system that was merged into the present Fort Detrick mechanized information retrieval system.

In later years, he assisted in conducting an all-Army survey which was later merged into the Army-wide scientific and technical project. His latest efforts have been devoted to research in information science.

A native of Victoria, Kans., he received a BS degree at Kansas State College (1922) and PhD at the University of Wisconsin (1938). He taught two years each at the University of Idaho and University of Wisconsin, and for 16 years was an assistant professor at Ohio State University.

Dr. Batchelor is the author or coauthor of a long list of technical papers and publications, and a member of a number of scientific societies and organizations.

Logistics Management Center Adds 2 Courses

Two new courses have been added to the curriculum of the U.S. Army Logistics Management Center at Fort Lee, Va., bringing the total to 20 courses, half of which are Defense or joint.

The new courses are a 2-week Research and Development Management Orientation Course, and a 2-week Senior Logistics Management Seminar.

The R&D course is an orientation for personnel newly assigned to the Army's Research and Development Program. Classes will be conducted Feb. 28-Mar. 11, and June 13–24.

The management seminar is an orientation course for senior Headquarters, U.S. Army Materiel Command personnel. The first class will be conducted Apr. 18–29.

Other courses in the Center's curriculum are:

Army Logistics Management Course (12 weeks), Army Project Manager Course (3 weeks), Maintenance Management Course (6 weeks), Installation Logistics Management Course (1 week), Associate Army Logistics Management Course (2 weeks), International Logistics Management Course (3 weeks), Supply Management Course for Auditors (2 weeks), and Management Seminar (1 week).

Defense Specification Management Course (3 weeks), Defense Logistics Instructor Development (2 weeks), Defense Depot Operations Management Course (6 weeks), Defense Inventory Management Course (6 weeks), Defense Advanced Inventory Management Course (5 weeks), Defense Advanced Disposal Management Course (4 weeks), Defense Disposal Executive Development Seminar (2 weeks), Defense Procurement Management Course (5 weeks), Defense Advanced Procurement Management Course (3 weeks), and the Defense Quality Control Management Course (2 weeks).

The Army Logistics Management Center is a major field activity of the Army Materiel Command. Col J. P. Alexander, Jr., is Center commandant.

NEW UNIT CREST of 11th Signal Group is presented to Maj Gen R. J. Meyer, commander of the Army's Strategic Communications Command (left) by Lt Col (now Col) Charles J. Dominique, unit CO, during recent STRATCOM Commanders Conference in Washington, D.C. The crest represents a signal beacon and symbolizes an ancient heritage for one of the most modern communications units. Based at Fort Lewis, Wash., the 11th has an airmobile capability to move anywhere in the world to link up with the Defense Communications System. It is the only Army unit of its kind.

Human Resources Research Office 1966 Work Program Lists 16 New Projects

Sixteen new projects are listed in the Fiscal Year 1966 work program of the Human Resources Research Office (HumRRO), Alexandria, Va., an Army contract agency of George Washington University.

The new projects include six research tasks, eight exploratory studies and two basic research programs. Work is now being performed at the seven HumRRO research divisions.

The FY 66 work program in its entirety comprises 31 tasks, 14 exploratory studies and five basic research programs. In addition, 11 percent of the FY 66 effort has been allocated for anticipated Army requests for technical advisory services.

Agreed upon by HumRRO and the Army Chief of Research and Development, the work program describes HumRRO's planned activities for a particular year.

The six new research tasks, full-scale research projects designed to produce specific information or products aimed directly at solving Army problems, are as follows:

ENDURE—determination of endurance of tank crews using combat equipment with a 48-hour capability and discovering ways to extend their endurance.

NIGHTSIGHTS—identification of critical human factors problems in the use of the new passive night-vision devices and development of effective training techniques.

SIMULATE—analysis of existing concepts of training simulation and miniaturization to determine their adequacy for Army needs and development of any necessary new concepts and techniques.

STAR—development of concepts and training materials on aircraft recognition training for personnel manning all forward area air defense weapons.

STEP—research in consonance with a proposed Army Special Training and Enlistment Program (STEP) for marginal personnel. No work will be performed until the Army decides to continue or cancel the STEP program.

TECHPROBE—development of a course of instruction for the UH–1 helicopter mechanic that may serve as a model for development or revision of similar courses.

An exploratory study (ES) is an effort to evaluate the feasibility of engaging in a major research activity on a particular Army problem. About 45 percent of HumRRO exploratory studies have led to inauguration of tasks. The eight new exploratory studies in the FY 66 work program include:

ES–41—determination of the feasibility of qualitatively evaluating human factors for use in measuring potential combat effectiveness.

ES–42—conduct of a series of small-scale experiments to explore techniques for effectively organizing written instruction to promote maximum learning.

ES–43—determination of the scope of and most profitable areas for research toward development of more effective training systems for all aspects of military training, including new equipment training and various types of technical training.

ES–44—initiation of research in the areas of visual surveillance, localization, aircraft recognition and range estimation for the Army's forward area air defense weapons personnel.

ES–45—examination of the command and control functions of man during the preengagement and engagement of cycles of the Nike X missile system to determine the need for training research that will maximize man-machine effectiveness.

ES–46 — determination of what problems exist in the teaching of technical skills in the military organizations of selected developing nations, and the feasibility of studying the relationship between military training and the role of the military in modernizing those countries.

ES–47—examination of the performance requirements associated with advising commanders and other officials concerned with the psychological aspects of operations overseas.

ES–48—study of means of improving the collection, analysis and utilization of information obtained from personnel experienced in stability operations.

HumRRO basic research programs are concerned with the psychology of the learning process. Although they are not directly aimed at solving specific Army problems, the knowledge gained through the programs has special application to HumRRO's efforts to help improve Army training. The two new basic research programs are:

BR–12—study of the manner in which individuals make compound probability estimates as a critical element of the military decision process and, ultimately, how individuals can best be trained to make such estimates.

BR–13—study of the problem of long-term retention as a function of training content, training methods and training conditions.

ECOM Promotes Electronics Experts

Peter B. Pichetto and Robert B. Martin have been appointed special assistants to Maj Gen Richard J. Meyer, commanding general of the U. S. Army Strategic Communications Command (STRATCOM).

Associated with military electronics activity since 1940, Pichetto is a graduate of the University of Calfornia (Berkeley) and was formerly with the Office of the Chief Signal Officer in the Pentagon. He has served as chief engineer of STRATCOM since its formation.

Martin is a Navy veteran of World War II who began his Federal service in 1942 at the Navy Research Laboratory as a specialist in radar transmitter development.

A University of Wisconsin graduate, he was chief engineer at radio station WGMS (formerly WQQW) in Washington, D.C., and served briefly with the Bureau of Standards before joining the Office of Civil Defense (OCD) in 1951. He left OCD as director of Communications Electronics to join STRATCOM last September.

Robert B. Martin

Peter B. Pichetto

Army Awards $728 Million in Contracts

U.S. Army contracts totaling over $728 million for research, development, test and production were let in recent weeks, with the largest aggregation going to the Nike-X antimissile missile system prime contractor.

Western Electric received two contracts totaling $99,925,169, which included a $92,814,791 modification to the present multimillion dollar agreement for Nike-X research and development. Subcontractors throughout the country will share in the funds. The firm also will be paid $7,110,378 for FY 1966 engineering services on the Nike Hercules missile system.

Philco Corp. received four contracts totaling $83,656,126 for engineering services and production of the Shillelagh missle system and Shillelagh industrial engineering support.

General Motors' nine contracts, aggregating $79,028,718, will provide the Army with school/ambulance conversion buses, automobile sedans, diesel engines, 8-cylinder engines for the self-propelled 8-inch howitzer, the self-propelled 175mm gun and recovery vehicle, and stake and platform trucks. Phase III of the US-FRG Main Battle Tank Development Program also is to be continued.

Olin Mathieson Chemical Corp. also was awarded nine contracts totaling $33,641,414 for various ordnance items and cartridges.

Kaiser Aluminum and Chemical Sales Corp. will produce MX–19 aluminum honeycomb core airplane landing mats under a $25,084,498 contract. Day and Zimmerman, Inc., received a $22,486,212 modification to an existing contract for ordnance items.

Bendix Corp. agreed to produce ordnance items and guidance and control components for the Parshing missile under a pair of contracts valued at $19,918,092.

Hercules Powder Co. won two contracts totaling $19,240,284 to produce propellants and conduct operations and maintenance activities at the Sunflower Army Ammunition Plant, Lawrence, Kans.

Seven contracts to Raytheon Co. aggregating $18,997,064 are for mortar fuzes and for Hawk missile system ground support equipment, field service documentation, industrial engineering services, maintenance and modification of special tooling and test equipment, and self-propelled modification features.

Remington Arms Co., Inc., was awarded three contracts totaling $18,616,260 for miscellaneous ammunition and ordnance items. Hughes Aircraft Co. and the Aircraft Division of Hughes Tool Co. received a pair of contracts valued at $15,534,166 for TH–55A (primary trainer) helicopters and research and development on the TOW missile system.

Under two contracts totaling $14,585,576, Harvey Aluminum Sales, Inc., will produce ammunition, fuzes and fuze spare parts. Three contracts to General Electric Co. valued at $14,584,836 are for 20mm guns and gun pods, M5 sub-systems, repair parts for the UH–1B helicopter, and various ordnance items.

Firestone Tire and Rubber Co. was issued five recent contracts totaling $13,515,177 to supply tires for various kinds of trucks and rubber track shoe assemblies for the M60 tank and the M113 personnel carrier.

U.S. Rubber Co. received a $13,364,503 contract modification for explosives and for reactivation and support of Joliet Army Ammunition Plant, Joliet, Ill. Bell Helicopter Co. has contracted to supply UH–1 helicopter rotary wing blades and tail boom assemblies for $12,734,203.

Collins Radio Co. was issued a $9,045,290 contract for a long-line microwave system for the Republic of Korea Army and a long-line microwave system for the Korean Ministry of Communications.

International Harvester Co. received four contracts totaling $8,798,376 for various types of trucks and school buses. General Dynamics Corp. will perform FY 1966 engineering services on the Redeye missile system under an $8,096,310 agreement.

Colt's Inc. gained a pair of contracts valued at $7,605,550 for repair parts for M16 and XM16E1 5.56mm rifles and for new 5.56mm rifles. Motorola Inc., received a $7,515,677 initial increment to a fixed price contract for mortar fuzes and Menominee Engineering Corp., Norway, Mich., won two contracts totaling $7,470,179 for components for the M–4 military floating bridge.

Sperry Rand Corp. was awarded a $6,996,989 modification for ordnance items and Westrex Communications Division of Litton Systems, Inc., will

MICROWAVE SYSTEM is contracted for the Republic of Korea by the U.S. Army Electronics Command, Fort Monmouth, N.J. The $9,045,000 complete communications network is provided by the U.S. Department of State's Agency for International Development (AID) and by the U.S. Army through its assistance program for Korea. The multimillion-dollar network will carry telephone, telegraph and television systems throughout Korea, serving both the Republic's Ministry of Communications and the Korean Army. Shown signing the contract at Fort Monmouth are W. W. Roothouse, executive vice president of the Collins Radio Co., Dallas, Tex., contractor, and Irving Liberman, ECOM contract officer. Standing: Hung-Ki Kim, Korean Government; Brig Gen W. B. Latta, ECOM commander, Albert A. Nicolay, U.S. Department of State.

get $6,926,247 to produce radio transmitters and receiving equipment.

TRW, Inc., was awarded a $6,500,000 contract for design, development and fabrication of test vehicles and to conduct a flight test program.

Honeywell, Inc., was granted three contracts totaling $6,232,570 for research and development work on classified ammunition, production of M551 fuze metal parts and ordnance items.

Lesser contracts include: FMC Corp., $5,746,693, for rubber track shoe assemblies for M113 vehicles and ordnance items; Magnavox Co., $5,641,432, gun direction computers; Electronic Assistance Corp., $5,223,276, radio receivers (R–390/URR);

Standard Products Co., $5,105,050, for rubber track shoe assemblies for M113 vehicles; R. G. LeTourneau, Inc.. $4,778,160, ordnance items; Chamberlain Corp., $3,856,694, ordnance items; Sylvania Electric Products, Inc., $5,352,300, electron tubes; Hol-Gar Manufacturing Co., $3,667510, generator sets;

I. D. Precision Components Corp., $3,534,014, ordnance items; Mason and Hanger, Silas Mason Co., Inc., $3,404,400, ordnance items; Martin, Zachry Constructors, $3,394,665, for construction of Nike-Zeus, Nike-X and PRESS facilities at Kwajalein Atoll, Marshall Islands, Pacific;

Pace Corp., $3,302,776, aerial photoflash cartridges; Laboratory for Electronics Inc., $3,194,000, airborne receivers for UH–1 and CH–47 helicopters; AVCO Corp., $3,178,365, for a research program under ARPA's Project Defender and an increment to another contract; Norris Thermador Corp., $3,127,215. 105mm tracer projectiles and ordnance items;

AiResearch Manufacturing Co., division of Garrett Corp., $2,820,999 for gas turbine generator sets and for research and development on Project MUST (Medical Unit Self-contained. Transportable); Eagle Engineering Manufacturing Co., $2,792,808, air-cooled generator sets; Acronetics Division of General Time Corp., $2,752,000, bomb fuzes;

Jackes-Evans Manufacturing Co., $2,550,266 from Frankford Arsenal. Philadelphia Pa.; Douglas Aircraft Co., $2,450,000, classified research project for ARPA; Supreme Products Corp., $2,481,169, ordnance items;

Ford Motor Co., $2,377,004 carryall, cargo and panel trucks; General Instrument Corp., $2,367,052, ordnance items; Bell and Howell Co., $2,127,130, modification for ordnance items; Wagner Electric Co., $2,125,240, for 4.2-inch mortar projectile parts; Kennedy Van Saun Corp., $1,999,280. for 4.2-inch mortar projectile parts;

Bell Aerosystems Co., $11,997,060, for exploratory development of an individual lift device system; Radiation, Inc., $1.993,427 modification for satellite communications terminals MARK IV; LTV Michigan Division of LTV Aerospace Corp., $1,957,656, industrial services and documentation for the Lance missile; Kaiser Jeep Corp., $1,957,148, for 2½-ton trucks; Action Manufacturing Co., $1,883,600, for ordnance items; REDM, $1,870,000, for ordnance; SCM Corp., $1,858,097, teletypewriter sets;

Canadian Commercial Corp., Ottawa, Ontario, Canada, $1,858,066, for ordnance items; Wilkinson Manufacturing, $1,842,800, ordnance items; Lehigh, Inc., $1,833,991, ordnance items; Columbus Milpar, $1,800,300, ordnance items; Bell Aerospace Corp., Hydraulic Manufacturing Co., $1,745,048, cylinder assemblies for tail rotors for UH–1 aircraft;

Amron Corp., $1,708,454, for 40mm cartridge cases; Mohawk Rubber Co., $1,653,200, for 2½-ton truck tires; Mansfield Tire and Rubber Co., $1,608,887, for tires for ¾-ton trucks and trailers; Airport Machining Corp., $1,508,650, for ordnance items; Varo Inc., 1,461,950, for production of periscopes and preproduction evaluation of technical data; Johnson Furnace Co., $1,438,019 for ¼-ton trailers and trailer chassis; Martin Marietta Corp., $1,422,203 for special support equipment, spare parts and data to support radio transmitter sets;

Harrington and Richardson, Inc., $1,345,733, for 7.62mm gun barrels and two sets of final inspection equipment; Belock Instrument Corp., $1,345,408, for depot maintenance equipment for the Hawk misile;

Associated Spring Corp., $1,318,475, for 20mm link cartridge belts; University of Michigan, $1,320,000; General Time Corp., $1,315,426, increment to previous contract; Raven Industries, Inc., $1,295,000, ordnance items; Bulova Watch Co., $1,282,088, for M423 fuze metal parts;

Hamilton Watch Co., $1,241,813, increment to larger contract; Parsons Manufacturing and Stamping Co., $1,226,890, ordnance items; American Fabricated Products Co., $1,214,329, ordnance items; Mine Safety Appliance Co., $1,200,807, items for chemical agent detector kits, refill kits and clips;

Williamson Co., $1,192,129, modifications to aircraft engine shipping containers; Switlik Parachute Co., $1,128,419, personnel parachutes; General Tire and Rubber Co., $1,112,788, ordnance items; Telecomputing Services, Inc., $1,104,852, for data reduction services; Newal, Inc., $1,104,640, ordnance items;

Continental Motors Corp., $1,039,113, for tank engine assemblies; Universal Match Corp., $1,038,440, for ordnance items; Raymond Engineering Laboratories, $1,002,131, for M414 fuze parts.

Fielding of New XM–158 Expected Early in 1966

Successfully fired more than 500 times in tests at Redstone Arsenal, Ala., the new XM–158 lightweight 2.75-inch rocket launcher for Army helicopters is expected to be operational in the field early this year.

Developed in-house by the Army Missile Command (MICOM), the XM–158 is designed to replace current launching pods which have limited reusability. It is a versatile system with a 7-tube reusable pod which can be used with a variety of other helicopter armaments.

MICOM reports that the XM–158 will give using units an increased capability with much less logistic support requirements.

Work on the system was performed by the Ground Support Equipment Laboratory of MICOM's R&D Directorate and the overall development program was completed two months ahead of schedule.

Among advantages cited for the XM–158 over systems in use are light weight, fast assembly and economy.

XV-158 LAUNCHER, mounted below the M6 machinegun system, will be used on helicopters to fire the 2.75-inch rocket. Consisting of a 7-tube reusable pod, the system can be used with a variety of aircraft armaments.

Aberdeen C&CL Plays Vital Role in Reliability of Materiel

Products of research and development that assure top performance and durability of critical military materiel are the continuing objective of the U.S. Army Chemical and Coating Laboratory, Aberdeen Proving Ground, Md.

Designated as the primary Army activity for R&D work on organic coatings, cleaning and paint-stripping compounds and automotive chemicals, the C&CL is commanded by Col Charles D. Y. Ostrom, Jr., formerly commander of the U.S. Army Research Office–Europe in Frankfurt, Germany.

Little glamor is associated with the work of C&CL researchers, nor do they reap the satisfaction derived from a dramatic development of military materiel of vast significance.

Reliability is to them one of the most important words in the English language; their prime business is materials that enable materiel to function as it should when needed, despite the rigors of environmental extremes and resulting deterioration.

The Chemical and Coating Laboratory produces paints, protective coatings, hydraulic fluids and numerous other items to prevent deterioration that, as one scientist commented, "are probably the least acclaimed and most often taken-for-granted group in the entire complex of U.S. defense supply lines."

For example, during the Korean War the C&CL developed a quick-drying protective paint that is proving valuable now for shipment of materiel—particularly ammunition which must be shipped quickly after production—to the environmental conditions of Viet Nam.

ONE OF THE PIONEER METHODS developed at USAC&CL in seeking new techniques for analyzing organic coatings is infrared spectroscopy.

**Col Charles D. Y. Ostrom, Jr.
USAC&CL Commanding Officer.**

In monitoring and coordinating the total research program of the Army Materiel Command in protective coatings and lubricants, the C&CL may be required to expedite development of priority items occasioned by emergency needs.

Organic coatings and chemicals developed to meet specific military requirements often must achieve industrial performance but, unlike many items for general consumer use, also must have "shelf goods" length of life. This is particularly true of materials formulated at the C&CL.

A large percentage of these compounds serve the primary purpose of protecting an entire item or some component in the defense stockpile from the deterioration that time alone can produce. Other materials must combat the weathering effects of the elements.

Even automotive chemicals, such as hydraulic fluid and antifreeze, may have to withstand unpredictably long periods of storage or extreme storage hardships and still meet the highest standards of performance.

The forerunner of the C&CL, located at Fort Holabird, Baltimore, Md., was moved to Aberdeen Proving Ground in 1943 as part of the Development and Proof Services. Under the 1962 Department of the Army reorganization, it was designated an independent laboratory with the mission of supporting the entire Army Materiel Command complex.

The C&CL operates under the direction of the Chief, Research Division, R&D Directorate of Headquarters AMC. It provides technical assistance to Headquarters, AMC and major subordinate commands and activities as requested, and participates in the standardization and industrial preparedness programs within assigned fields.

Among the more significant developments listed in C&CL reports is an electricity-conductive coating in use by the Army and Navy in such techniques as electrical firing by remote control, recording practice targets, and numerous connections in missiles and other complex weapons systems.

Scientists at the C&CL discovered that weather balloons can be coated with the conductive substance to protect them from static electricity. Until his C&CL development, usual materiel coatings resisted electricity.

An outside coating for ground vehicles and aircraft that is resistant to the strong solvency of hydraulic fluids which may be spilled or leak onto the finish is another C&CL development. Conventional finishes were destroyed by hydraulic fluids, exposing the metal of tanks and aircraft to destructive effects of humidity, rain and smog.

A paint suitable for the outside finish of ammunition shells, and also resistant to corrosion caused by the various chemicals in explosive charges, was developed in 1963. It has proved a major timesaver in shell assembly for troops in Viet Nam.

The same coating eliminates the previous necessity of applying a special interior asphalt and an additional exterior paint spray with special ammunition pigments.

One type of coating formulated by the C&CL can withstand temperatures as high as 1200° F., a characteristic valuable for gasoline-fired personnel heaters in vehicles and on superheated steam pipes in generating plants. This coating has been adopted

EVALUATION of hydraulic brake fluids is obtained through use of this controlled temperature cabinet. Range is from −67° F. to +200° F.

Government-wide as a standard specification.

Claimed as a breakthrough in missile coatings developed by the C&CL is a new olive-drab, solar-reflecting paint which was described in the November 1965 issue of the *Army R&D Newsmagazine*, page 4. The heat-reflecting characteristics of the paint prevents serious overheating of missile components and also provides on-the-ground camouflage, which was difficult with the paint previously used.

C&CL scientists currently are exploiting coatings of various colors that may be developed to give reflectance and heat absorption, as well, to meet certain situations.

C&CL work with preservation and packaging requirements has produced a strippable, translucent film that completely covers small items and spare parts. This material serves as a protective coating against air and dust and can withstand temperatures ranging from −65° F. to +165° F. Nomenclature of the coated item can be read through the material. It is available in hot-melt and cold-dip compounds.

Another strippable film developed by the laboratory is a gel lacquer for protecting optical lenses at low temperatures and from scratches. The coating also is fungus resistant, important because the glues and other mounting materials used with lenses often develop fungi in optical systems under certain climatic conditions. With this protection, delicate optics reach the field in perfect condition.

Conversion coatings. These coatings differ from paints and varnishes in that they are chemical treatments of metal to produce specific interactions with the base metals. A conversion coating not only protects but insulates

"EXPOSURE FARM" at Aberdeen PG proves durability of C&CL-developed coatings. Similar panels are used for tropic exposure in Panama, C.Z.

Dr. Charles F. Pickett
Technical Director, USAC&CL

and creates a surface more receptive to organic coatings, which include most paints.

The need for these special "converters" is increasing as weight- and speed-oriented weaponry requires more aluminum, magnesium and "exotic" alloys.

Guidelines on suitable conversion coatings for both ferrous and nonferrous metals have been provided by the C&CL. Still eluding the laboratory's scientists and other researchers, however, is a conversion coating compatible with all metals.

Paint removers. The problem of keeping surfaces clear is magnified many times during industrial construction when new items must first be painted and then repainted in major rebuild operations. In the C&CL role with military materiel, this calls for a cleaner that will perform efficiently on a variety of metal surfaces.

As scientists compound increasingly tough paints and coatings, even tougher cleaners and strippers must be developed. Wider use of nonferrrous metals adds to the problem; a too-strong paint remover may work through softer metal. Thus, C&CL scientists are constantly working to reflect the latest state-of-the art in all types of cleaners and strippers.

Results of the C&CL in this field have somewhat removed its generally unheralded status. Requests for laboratory studies come to the laboratory from developmental scientists, governments and industry all over the world.

C&CL analytical specialists. Internationally known also are the scientists whose special purview is the development of new techniques for analyzing chemicals and coatings.

Modern techniques are essential in controlling procurement of the large variety of protective materials needed to support the laboratory's mission. Among the claimed pioneer achievements are infrared and ultraviolet spectrophotometric and gas chromotographic techniques for analyzing organic coatings.

The C&CL team has established methods for quantitative identification and analysis of such organic materials as vegetable and animal oils, epoxy and nitrogenous resins, and many modifying resins. Listed among developments in analytical identification are 10 dicarboxylic acids and 12 polyhydric alcohols.

Hydraulic brake fluid and antifreeze. Military requirements for these essential compounds for a mobile Army are, of necessity, higher and more varied in standards than for similar civilian products.

Brake fluid, for example, normally is put to use soon after a civilian vehicle is serviced. In contrast, a military car, truck or tank may be in storage or transit for months. Lacking certain chemical balance, stagnant fluid may react with surrounding metal and rubber, causing malfunction of the brake system by the time it is needed.

Climatic conditions under which military vehicles of all types must frequently operate place requirements on the C&CL to produce fluids that will withstand extremes of heat and cold. As early as 1947, the laboratory compounded the first available arctic-grade brake fluid. It has been used in military exercises in Alaska and in U.S. expeditions to the Arctic and Antarctic.

Similarly, antifreezes must meet military needs and be compatible with commercial compounds as well to make local purchases possible. The laboratory's R&D efforts in brake

(Continued on page 20)

USAC&CL RESEARCHER employs a programed temperature gas chromatograph at Aberdeen to study rate of thermal degradation of high polymers.

Aberdeen C&CL Plays Vital Materiel Reliability Role

(*Continued from page* 20)

fluids and antifreezes have made an impact on industry, encouraging further work on suitable compounds.

C&CL research has also led to an arctic-grade coolant that stays fluid at temperatures as low as —67° F.

Added to the mission of C&CL in mid-1964, but admittedly still in the preliminary phase, is research in fuel and lubricants. Laboratory work so far has been confined primarily to multicylinder engine-oil evaluations, combustion studies relating to cetane improvers, and low-temperature cranking studies.

Other efforts in this area have been directed to developing refined analytical techniques for determining dilution in engine oils under subzero operating conditions. Investigation into basic fuel constituents and the individual and combined effects on the formation of deposits in combustion chambers is also progressing.

Research being done on contracts awarded by the C&CL includes work on liquid hydrocarbons, combustion, physical characteristics, compression-ignition combustion phenomena, and ignition - delay additives. Current studies in lubricants include the foaming characteristics of gear lubricants, the mechanism of varnish formation and the molecular structure influence on dispersancy.

The Army Engine Oil and Gear Lubrication Reviewing Committees are chaired by representatives of the C&CL's fuel and lubricants group. These advisory groups of specialists from various segments of the equipment manufacturing industry provide valuable technical asistance.

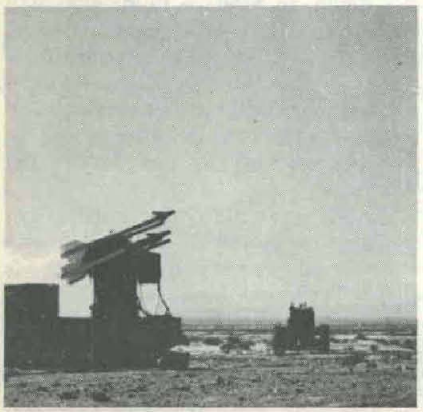
Review of the results of a variety of performance tests required to qualify military engine oils and gear lubricants and recommend whether the materials involved meet established requirements is among the functions of these groups.

C&CL staff members also are in close liaison with such technical organizations as the Coordinating Research Council, Society of Automotive Engineers and the American Society for Testing and Materials.

A qualified products list established and maintained by the C&CL assists using agencies in the field to obtain precisely the performance they require in a finish, coating, cleaner, automotive chemical, engine oil or multipurpose gear lubricant. Many of the C&CL specifications bear the label "Federal" instead of "Army."

Dr. Charles F. Pickett has been technical director of C-CL and its forerunner for the past 20 years. Col Ostrom came to Aberdeen Proving Ground in 1963 and has commanded the Army Ballistics Research and Human Engineering Laboratories in addition to the C&CL.

Sequence Camera Records Chaparral Missile Launch



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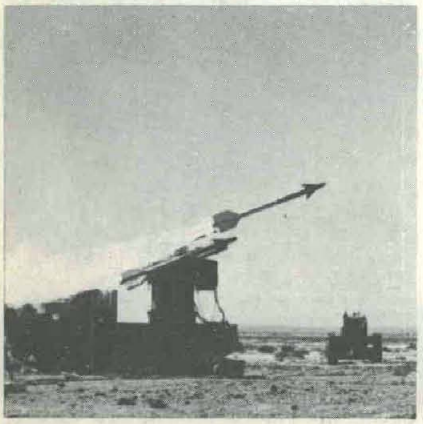
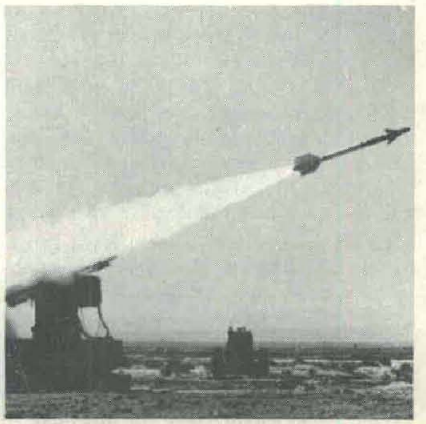


. . . launch



. . . headed for home

FIRST LAUNCH PHOTOS of Army Missile Command's Chaparral guided missile system produced this striking sequence as the infrared heat-seeking Sidewinder (IC) leaves an Army M-548 self-propelled vehicle. Surface-to-air Chaparral system units may also be mounted on trailers or semi-mobile emplacements. The Navy-developed supersonic air - to - air Sidewinder, adapted for this new role, is launched from a modified M45 machinegun mount which cradles four ready-to-fire antiaircraft missiles that "home" on target heat. The Chaparral system is designed to protect frontline areas from low- to medium-altitude aircraft. Testing is shown at Naval Ordnance Test Station, China Lake, Calif.

Picatinny Testing Places Premium on 'Hand Talk'

Wind tunnel personnel at Picatinny Arsenal, N.J., are either using or learning to use "hand talk," and practically everyone working in the Arsenal's noisy test areas must have an annual audio checkup.

Foam rubber ear muffs or ear plugs are required of workers and visitors alike in high-sound-level areas. The muffs, worn only for 10 to 15-second test periods, form a tight seal about the ears making it almost impossible to hear the human voice. Hand signals are used to communicate.

Picatinny's medical department now conducts an "audiometric program" requiring an annual check on all personnel exposed to more than 90 decibels. That means a lot of people, because an artillery round of 105mm produces in excess of 100 decibels. Wind tunnel aerodynamic tests have hit sound levels of 120 decibels.

Ammunition testers in the technical services laboratory have it a bit easier. Tiny silicone rubber protectors are worn inside the ears nearly all of the work day. These devices allow hearing—even a whisper—yet provide absolute protection against sudden sound concussion since they operate like a sound control valve.

Picatinny's safety department still takes no chances: when a new or untried item is to be tested, commercial sound-level meters check the decibels before personnel are exposed.

SATCOM Reorganization Accompanied by Key Personnel Realignment

Restructuring of the U.S. Army Satellite Communications (SATCOM) Agency, in line with its mission in the Defense Communications Satellite Program (DCSP), resulted in recent key personnel changes.

Col Mitchel Goldenthal, SATCOM commander, announced appointment of George F. Senn as director of the Engineering Directorate, and Robert F. Smith as director of the Mission Support Directorate (formerly the Materiel Department).

A charter member of the SATCOM Agency and a satellite communications pioneer, Senn succeeded Col Robert E. Warren, now deputy commander of the Agency.

Along with Samuel P. Brown, technical director, Senn holds one of the Agency's two super-grade PL–313 ratings. Out of some 7,600 Army Electronics Command civilian employees at Fort Monmouth, N.J., only 15 hold this rating.

Before joining SATCOM, Senn held key positions at Fort Monmouth's U.S. Army Electronics Laboratories. He was project manager for Project Score which developed the world's first active communications satellite, and served as project director for the Courier satellite, the successor to Score.

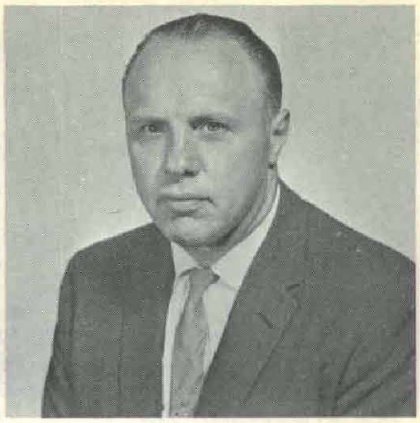
A senior member of the Institute of Radio Engineers (IRE), and the coauthor of various publications on satellite communications, he served as deputy director of the SATCOM Agency Ground System Department.

After receiving a BS degree in electrical engineering from Drexel Institute, he did graduate work at the University of Pennsylvania and Rutgers. He began his Civil Service career in 1937 after holding positions with Philco, RCA, and GE.

Peter Maresca remains as deputy director of the Engineering Directorate. Chiefs of its new divisions are: Systems Engineering, Dominic LaBanca; Tactical, Vincent Chewey; IDCSP (Initial Defense Communication Satellite Program), George Silverman; ADCSP (Advanced Defense Communication Satellite Program), George T. Brazee; and Exploratory Development, Cmdr Joseph F. DeBold, USN.

ROBERT SMITH served previously as Materiel deputy and acting director. He entered Civilian Service as deputy project manager of Nike Zeus at White Sands Missile Range, N. Mex., after duty as a guided missile officer (1950–58) in the U.S. Army Signal Corps and Ordnance Corps. He holds a BS degree in electrical engineering from Colorado State University.

Robert E. Smith



George F. Senn

Joseph Vincelli, formerly assigned to the Agency's Plans Office, was appointed deputy of the Mission Support Directorate. He served as a pilot in the U.S. Navy during World War II and in 1949 received an Academy of Aeronautics diploma in aircraft design and construction. In 1960, he graduated from Monmouth College with a BS in physics.

He was retained as an instructor of airplane design until 1951 when he entered Government service. He was an aeronautical development engineer at the Naval Air Station in Lakehurst, N.J., until he joined the SATCOM Agency.

The Mission Support Directorate now consists of a Maintenance and Training Division under Aubrey Smith, Procurement Services Division headed by Samuel Codomo, and Site Engineering Division under Lt Col Clarence A. Klaver.

New deputy director of the Operations Control and Evaluation Directorate (formerly the Ground System Department) is William Tobias. He has served as communications test director for Project SYNCOM and has coauthored various papers on SYNCOM communications tests.

Col Eugene B. Datres, who was director of the old Ground System Department, continues as director of the new Operations, Control and Evaluation Directorate. New Division heads are William Deckert, Evaluation; Wilbur Lafaye, Control; and Murray Miller, Operations.

The Satellite Communications Test Operations Center (SCTOC) under Maj William W. Weihmiller is now a part of the Operations Division of the OCE Directorate.

The former Plans Office has been absorbed into the Programs Directorate, under Col Robert H. Scales as director and Richard deSante as deputy. It consists of a Programs Analysis Division under Anthony Orefice, Budget and Management Division headed by Herbert C. Mason and Plans and Reports Division under Lt Col Thomas H. Taylor.

Samuel P. Brown is still the SATCOM technical director; Alan Gross and Rollin G. Keyes remain as assistant technical directors. The Administrative Services Office consists of Lt Col Herbert F. Hartzell, director; Allan F. Raymond, chief, Administrative Division; and William H. Reese, chief of Graphic Arts.

Nike-X Missile Veteran Guides Purdue University Jet Propulsion Center Work

Dr. Bruce A. Reese, a former technical director of the U.S. Army Nike-X missile defense project at Redstone Arsenal, Ala., has been named director of Purdue University's Jet Propulsion Center.

Since he left Redstone late in 1963 to resume regular professorial duties at Purdue, he has continued as a Nike-X consultant. He joined the Nike Zeus antimissile missile project in 1961 after serving as professor of mechanical engineering at Purdue for 15 years.

Dr. Reese is credited with an important role in development of the advanced Nike-X system, as a project director and, in the past two years. as a technical adviser. He has also served as a consultant to the Department of Defense Advanced Research Projects Agency and the U.S. Air Force.

He was educated at Brigham Young, New Mexico and Purdue Universities.

MADE IN SWITZERLAND, these phototheodolite tracking cameras, operated by two soldiers for each unit, are the most accurate in the world. Under cognizance of the U.S. Army Air Defense Board headquarters at Fort Bliss, Tex., the telescopic motion picture cameras provide important research and development information.

Precision Movie Cameras Pinpoint Air Defense Data

Precision telescopic motion picture cameras at five locations on the Dona Ana Range at Fort Bliss, Tex., are helping the Army Air Defense Board to provide pinpoint R&D data for missile development.

Similar tracking of air defense weaponry, including conventional firepower, is conducted in arctic and tropical climes to test weapon systems under adverse conditions.

The cameras—known as phototheodolites—can track a target drone or ground fired missile with an accuracy of 1/1000 of one degree in lateral and vertical movement. Photos are made at a rate of 30 per second. Data by two or more cameras can locate a missile precisely anytime.

Even the accuracy of rapid-firing machineguns or the newest air defense artillery can be determined by measuring miss-distance between the target and tracer ammunition.

Data recorded by the phototheodolites disclose the full-flight characteristics of missiles, a vital requirement of reliability testing by the Air Defense Board.

During a missile or gun test an officer at the master control console coordinates operation of the five Fort Bliss cameras with the test officer down range. Fourteen well-trained cameramen and technicians keep the electrically driven phototheodolite array on target and synchronized.

OCE Assigns Woman to Direct Lunar Soil Study

Distaff capability in geology has been selected by the U.S. Army Corps of Engineers to head research aimed at simulating on earth the soil conditions of the moon, in preparation for planned lunar landings.

Miss Alice S. Allen, a geologist with the Corps of Engineers Extraterrestrial Research Agency (EXTERRA), has been given that assignment. Selected recently, she is supervising research on lunar surface composition based on knowledge from space probes and earth-based studies.

Objective of the EXTERRA lunar engineering studies for the Army and the National Aeronautics and Space Administration (NASA) is to recreate important lunar surface properties such as soil density, light reflectivity, thermal and electrical conductivity.

Using these simulated conditions, scientists will be able to make Project Apollo studies related to such moon explorer requirements as walking, digging and movement of surface loads. This, it is believed, will lead to solution of engineering problems in providing shelter, power, water supply, construction materials, equipment and perhaps the necessary hand tools.

Miss Allen is a Federal Civil Service career employee who worked with the U.S. Geological Survey for 28 years before she joined the research staff of the Army Corps of Engineers. She is a Fellow of the Geological Society of America and was educated at Mount Holyoke College, the University of Wisconsin and Northwestern University.

Miss Alice S. Allen

Missile Vet Leads MICOM R&D Directorate

Command of the Army Missile Command Research and Development Directorate, comprised of eight laboratories, three divisions and the Redstone (Ala.) Arsenal Scientific and Technical Information Center, was assumed recently by Lt Col Robert M. Pearce. It is the second largest of the command's four directorates. Previously chief of the Directorate's Future Missile Systems Division, he succeeds Col Stanton W. Josephson, recently reassigned to Viet Nam.

Following duty with the Office, Chief of Research and Development in the Missiles and Space Division, Washington, D.C., from August 1958 to June 1961, he served in Korea as commander of the 1st Missile Battalion, 42nd Artillery. Then he was liaison officer for the U.S. Army Combat Developments Command until named project manager for the Shillelagh system in 1964.

His first tour with Redstone Arsenal was in 1956 when he was assigned as chief of the Project Office, Control Office, Army Ballistic Missile Agency, following a tour in Europe and a short assignment with a Field Artillery Battalion at Fort Knox, Ky.

In his new assignment, Lt Col Pearce will direct the R&D program aimed at improving Army missile systems as well as developing new missiles and related hardware.

Lt Col R. M. Pearce

Research at the R&D Directorate is carried out in a wide variety of fields ranging from inertial guidance and control to propulsion engineering and from development of ground support equipment for missile systems to development of new radar and missile systems.

The new director is a 1944 graduate from the U.S. Military Academy and has an MS degree in aeronautical engineering from New York University. He has completed the Army Command and General Staff College regular course and the Nuclear Weapons Employment Course (1957) at Fort Leavenworth, Kans.

He also studied guided missiles aerodynamics at the New York University Graduate School in the late 1940's and later served with the Armed Forces Special Weapons Command at Sandia Base, N. Mex., where he worked on the development of atomic weapons.

Retiring 'Bud' Waite Basks in Enviable Eclat

Scarcely a man living, it might be Amory H. (Bud) Waite's boast if modesty did not forbid, has found a Federal Civil Service career more varied, fascinating, adventuresome and rewarding than his in working with his fellow men.

When the veteran of 24 years of Department of the Army service at Fort Monmouth, N.J., retired recently, he was able to look forward to the comfort of "that old rocking chair" with no small measure of satisfaction in reviewing his experiences and achievements.

Enviable recognition came to him as a polar explorer, inventor, electronics engineer, lecturer, author, participant in 14 nuclear bomb tests, and as a member of various joint Federal agency scientific expeditions. Included in his polar experience are 11 Antarctic expeditions and participation in 12 Arctic research programs over a period of 31 years.

In February 1962, in recognition of his achievements as an electronics engineer, including invention of an accurate polar altimeter for icecap aviators which he later described in visits to numerous European countries, he was awarded the Veteran Wireless Association's Marconi Gold Medal. In December 1962, he was elected a Fellow of Britain's Royal Geographic Society.

Prominence came to him early in his career when he was a radioman in a group of three men who rescued the late Admiral Richard Byrd from his advanced Antarctic base in 1934. The trio went 72 hours in 70° below zero weather to rescue the famous explorer.

Born in Boston, Waite joined the U.S. Navy in 1919 and served four years as a radioman. Later he was a marine electrician for the Bethlehem Shipbuilding Co. in Quincy, Mass., and for two Boston firms as well as for the U.S. Shipping Board. While with the Board, he went on a year-long Pacific Ocean cruise on an all-electric drive cargo vessel, the "MS Triumph."

Besides the Byrd expedition, his notable Antarctic trips included "Operation Highjump" in 1947 and a Navy expedition in 1954. He introduced VHF radio relay in England just before D–Day in World War II and then served in France, where he was awarded the Bronze Star for his assistance in the establishment of radio communications during the Normandy invasion. Numerous other awards and honors have recognized his achievements.

Amory H. (Bud) Waite

Upon return to the United States, he was sentto the Far East, where he repeated his VHF pioneering and installed several hundred miles of Japanese radio link circuit.

Radiobiology Expert Heads Medical R&D Command Unit

Lt Col Eugene F. Chandler, MC, former chief of radiology at Martin Army Hospital, Fort Benning, Ga., is the new chief, Special Activities Branch, Nuclear Energy Division, Army Medical R&D Command.

He succeeds Lt Col Wallace R. LeBourdais, MC, who has been assigned to the student detachment, U.S. Army Element of the Industrial College for the Armed Forces, Fort McNair, Washington, D.C.

Col Chandler has studied radiobiology at Reed College, Portland, Ore., and at Oak Ridge (Tenn.) Nuclear Institute. He entered the Army in 1949 after receiving an MD degree from the University of Colorado Medical School, Denver. He was a resident physician in pathology and later in radiobiology and nuclear medicine at Letterman General Hospital, The Presidio, Calif.

Col Chandler was laboratory officer for the 110th Station Hospital in Salzburg, Austria, 1950–51 after his internship in Presbyterian Hospital in Denver. He has been radiobiology Chief at Mercy Army Hospital, Okinawa; U.S. Army Hospital, Fort Ord, Calif.; and Madigan General Hospital, Tacoma, Wash.

INSIGNIA ADJUSTING by Brig Gen W. B. Latta (left), CG, U.S. Army Electronics Command, Fort Monmouth, N.J., and Col Frank Milner, CO, U.S. Army Engineer Research and Development Laboratories (USA ERDL), Fort Belvoir, Va., signifies the recent transfer of responsibility for the Army's night-vision program. Direction of night-vision research, formerly the responsibility of USAERDL under the U.S. Army Mobility Command, has been shifted to the U.S. Army Electronics Command. Under direct supervision of the Combat Surveillance, Night-Vision and Target-Acquisition Laboratories at Fort Monmouth, the Electronics Command Night-Vision Laboratory, with its 200 scientists and engineers, will continue to function as a tenant at USAERDL.

AVCOM Develops Mobile Stands For Field Testing of Turbines

Mobile turbine engine test stands for field use are a recent development of the Army Aviation Materiel Command, St. Louis, Mo.

The stand consists basically of two Fruehauf trailers with engine mounts, control room, hoisting crane, fuel tanks, a water tower, generators, and other auxiliary test equipment.

The stands were designed originally to test T–53 and T–55 turbine engines. A modification kit enables testing of the T–62, T–63 and T–64 series, and the JFTD–12—all turbine engines now in Army inventory and any developed in the foreseeable future.

The portable water tower provides for the "water brake"—the means for absorbing power developed by the engine under test.

A broadening of the mobile test stand concept is embodied in what the Army calls a "Floating Maintenance Facility." The craft is a modified Seaplane Tender, completely equipped as a heavy repair shop. It includes repair and testing capabilities for both turbine and reciprocating engines.

Electronics Agency Tests New Low-Frequency Antenna

Initial tests on a new low-frequency antenna have been completed by the Electronics Research and Development Activity (ERDA), Army Electronic Proving Ground, Fort Huachuca, Ariz.

The low-profile hydraulically operated antenna cuts field installation time from two days with eight soldiers for available antennas to two hours with six soldiers for the smaller new mobile unit.

The antenna uses the patented "Directly Driven Resonant Radiator" technique (antenna connected directly to the transmitter system). It has a maximum height of about 38 feet as compared with 125 feet required by the antenna it may replace.

The prototype model is mounted on an M36–C combat truck, a 2½-ton long-bed vehicle, which also carries the hydraulic system and grounding net. The receiving part of the antenna (top load) consists of three main sections, totaling about 30 square feet. Two sections fold inward for transporting on ordinary roads.

Three hydraulic lifts move the top load—more than a ton of Litz wire coiled like a clock spring—to the 38-foot level. The lifts can be operated simultaneously or independently to enable the erecting team to equalize the antenna's plane with the earth.

Transported also on the truck bed are two spools of 100 square feet of copper netting which completes the antenna circuit.

The hydraulic system has been satisfactorily tested, and evaluation of the Directly Driven Resonant Radiator application to the low-frequency transmitter is in progress.

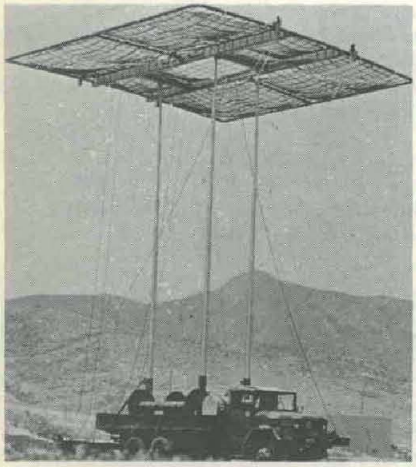
The Army uses low-frequency antennas primarily for long-range communication and navigation. The antenna being developed has the same pattern as a vertical monopole—omnidirectional in the horizontal and figure-of-eight in the vertical plane.

Gain of the 100-kilocycle antenna is about 1.5 decibels below a good quarter-wave monopole. Height wavelength is approximately .01 to .02 diameter wavelength is .06 to .08

Input impedence of the antenna can be adjusted to any normally encountered value without the use of matching network, because of the direct connection of the transmission line to the antenna.

When tests have been completed, the new communications equipment will be transferred to the Army Electronics Command, Fort Momouth, N.J., for further development.

The prototype was built by Northrop, Ventura, Calif., at a contract cost of $300,000.



FULLY EXTENDED and ready for use, the hydraulically operated low frequency antenna can be erected in two hours by six men. The three hydraulic lifters push the 1-ton load to about 38 feet. Wires dropping straight down at the rear of the unit are transmission lines. Diagonal lines steady the antenna in winds up to 75 knots.

Agencies Join DoD in Updating Plastics Handbook

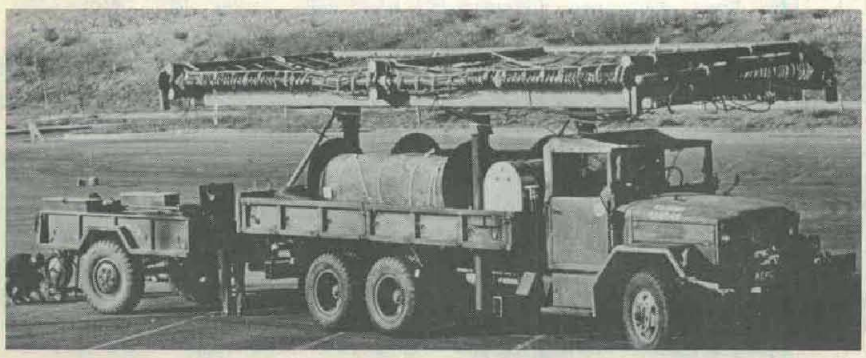
Private industry and Federal civilian agencies have joined the Department of Defense to update Military Handbook 17, "Reinforced Plastics for Flight Vehicles," an estimated 3-year project.

First published in 1959, with only minor editorial revisions since, the handbook is the only authoritative defense-wide document on materials properties and design criteria of reinforced plastics for aircraft, missiles and other flight vehicles.

The Defense Department's Information Evaluation Center (PLASTEC) at Picatinny Arsenal, N.J., is responsilbe for revision of the handbook. Work is assigned to Roswell Winans, Allan Shibley and Harry Pebly of the Arsenal's plastics and packaging laboratory.

Mechanical properties obtainable from reinforced plastics have increased through research since the handbook, used extensively as a specification guide for many defense contracts, was published.

Approximately 85 persons attended the recent initial session of the Services—Industry Advisory Group, representing Army, Navy, Air Force, NASA, Forest Products Laboratory, Federal Aviation Agency and major national aerospace companies and suppliers of resins and reinforcements.



REVOLUTIONARY new low-frequency antenna folds in for hauling over roads. The trailer carries the system's transmitting and receiving equipment

Army QM Corps Historians Publish Last Book of Series

Quartermaster operations in the Mediterranean and European theaters during World War II are described in a new official history by William F. Ross and Charles F. Romanus.

"The Quartermaster Corps: Operations in the War Against Germany," is the fourth and final volume on World War II Quartermaster activities and is the 62nd book in the series, *U.S. Army in World War II.*

Ross is a historian with the Defense Supply Agency and Romanus, coauthor of three previously published Army volumes on the China-Burma-India theater, is chief, General Reference Branch, Office of the Chief of Military History, Department of the Army.

The new volume has 798 pages, maps, charts, tables, photographs and an index. It can be purchased for $8.50 through the Superintendent of Documents, U.S. Government Printing Office, Washington, D. C. 20402.

Picatinny Static Testing Yields Valuable Ballistic Data

Without moving an inch, rockets capable of zooming 50 miles across the sky are being tested at the Army Picatinny Arsenal, Dover, N.J.

Static testing is the first phase of ballistic test firings for evaluating rocket design, performance and reliability. To many persons, static testing is simply the firing of an item of ammunition bolted to a stand. Actually the process is so sophisticated that several days may be required to set up the equipment to test a single item.

In actual free-flight tests, the rocket is completely unrestrained; but for static testing it is physically attached to a special stand for ballistic measurements. Forces developed by the rocket are transmitted through a force-sensing element, which "sees" the thrust, into a restraining wall capable of sustaining forces up to 1,000,000 pounds.

Technicians may obtain as many as 40 types of information from one test item. Some of the vital data that must be obtained so that a future rocket will fly a true trajectory include thrust, vibration, velocity, stress, combustion pressure, acceleration, blast pressure, temperature and stress versus time.

Technicians at the solid-rocket test range can create many of the conditions present at an actual firing, such as climates below freezing or extremely high temperature.

Two operational elements, the propulsion test and data acquisition units, make up the test range. A highly specialized test-engineering staff provides direct support for all operations, including the design and development of special-purpose test equipment and overall testing program coordination.

Established in 1948, the Picatinny test range has been the site of propulsion test and evaluation of such ordnance items as Honest John, Shillelagh, Davy Crockett, the 2.5" Bazooka and Pershing.

The first atomic shell was tested for feasibility at this range, as well as other nuclear items, the escape capsule rocket, boosted heavy artillery projectiles and rockets for helicopter armament.

MICOM Engineer Building Better Gyroscopes

With seven patents for improved missile gyroscopes to his credit and seven more applications pending, a space-minded Army engineer is gaining recognition among the "creative geniuses" of the Army Missile Command, Redstone Arsenal, Ala.

Since joining the Inertial Guidance and Control Laboratory at MICOM in March 1956, James V. Johnston's constant goal has been to devise better gyroscopes to keep missiles headed toward preprogrammed targets. He terms his work "attempts to build a better mousetrap."

Graduated from Vanderbilt University after Army aviation service in World War II, he has "rolled up his sleeves" at the drawing board and at missile guidance platforms to prove his ideas.

One invention took more than 1,000 tests to satisfy Johnston that his idea was sound. Another experimental gyro model required the inventor to take three trips to Alaska, checking his improved gyroscope at various latitudes. He tested it enroute from Alabama to Washington State to southern Alaska.

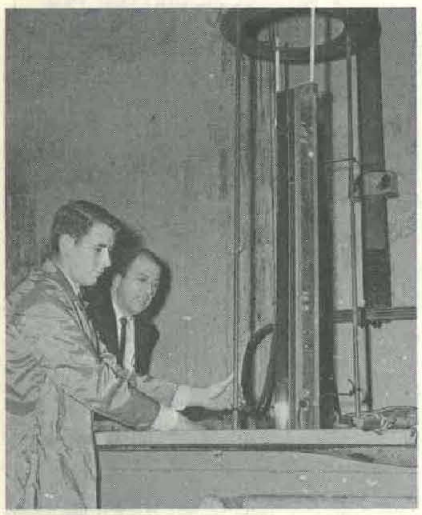
At Point Barrow, Alaska, his gyro performed as all good gyros do there —it didn't know what to do, because at the true North Pole a good gyro is stable. His was.

Inventor Johnston's patents are mostly subtle changes. They won't put him in the class with Edison or Bell, but each nod from the Patent Office means another step toward more perfect control of guided missiles, because of a better gyro—a "better mousetrap."

"BETTER MOUSETRAP" inventor James V. Johnston of the Army Missile Command tests one of his gyros. This model took him all the way to the North Pole before he could determine whether his idea would work.

Watervliet Device Aids Gun Tube Replating

Nickel coating to reclaim field-corroded gun tubes has been made economically practical at Watervliet (N.Y.) Arsenal with development of a rubber and lucite wiper that eliminates cathodic gases.



WATERVLIET ARSENAL chemist Robert Cullinan (left) and physicist Peter V. Greco demonstrate wiping device which prevents pitting corrosion of gun tubes by removing injurious gases while a protective nickel coating is being deposited to recondition the field-worn tube surfaces.

Removal of the plating gases during deposition of the less expensive substitute for chrome has solved the problem of nickel pitting when large tubes are reclaimed and thick deposits of the metal are required.

As simple as the automobile windshield wiper, the in-house designed device was developed by physicist Peter V. Greco and chemist Robert Cullinan. Removal of the pitting gases is achieved by rotating either the wiper or the tube.

In developing techniques to be used in reprocessing field-pitted gun barrels, the Watervliet scientists learned that normal methods of eliminating plating gases were ineffectual. Neither agitation of the plating solution nor the use of organic additives completely prevented pitting of the fresh metal coating.

Now that the deleterious gases can be removed from the cathode with the wiping device, organic additives have been deleted from the plating solution and it is given continuous carbon treatment to remove organic contaminants.

HDL Develops Fast Automatic Fuze Tester

Harry Diamond Laboratories (HDL) engineers in Washington, D.C., have designed and developed an automatic fuze tester capable of accurately testing 80 fuzes per hour, more than double the output of two manually operated testers.

Designed by Anton Soler, electronic engineer, and David H. Watson, chief of the Test Equipment Section at HDL, the device will be used for acceptance testing of production line fuzes. In replacing manually operated equipment, it will provide more accurate test information and a greatly lessened degradation effect on fuze performance, the HDL announcement stated.

The multipurpose tester, scheduled to go into production use shortly consists primarily of two groups of equipment in a 2-bay console. The basic equipment serves for all fuzes to be tested. The second group contains adaption panels to perform specific functions. It consists of an RF unloading chamber and transducer elements that convert electrical parameters of the fuze into appropriate voltage analogs for measurement, comparison, and read-out or print-out.

The basic tester is not capable of testing any particular fuze without addition of the transducer and load chamber to adapt it to the particular fuze to be tested. It consists of a master scanner or programer, a digital voltage measurement and limit comparator system, and a control display panel.

Included in this unit are regulated power supplies, buffer and serializer decks adapt the digital voltmeter outputs to suitable drive signals for IBM 526 Summary Card Punch or Friden tape punch.

HARRY DIAMOND Laboratories engineers Anton Soler (left) and David H. Watson check out a fuze in new automatic test system they designed.

The master scanner is a stepping switch programer having a 20-test capability. This unit sequentially connects the digital voltmeter and comparator circuits to the transducer outputs. The actual number of tests and test sequence is preset in the control display deck.

The digital voltmeter is a Nonlinear Systems Model 4206 with relay closure outputs. Voltage comparison to go/no go limits is accomplished through a companion H.L.S. Model 54 Digital Comparator in conjunction with a Sealectro Co. diode matrix plug-in board. Limits for each test on each fuze can be preset through the diode matrix board.

An operator control and display panel interrelates the scanner and voltage measurement system to the fuze transducer. It provides operator control of automatic or manual testing and print or no print, as desired, of data output. In the automatic mode, test sequences are automatically advanced after depressing the test start switch.

As each test is performed, a light corresponding to that test position will be lighted. If the fuze fails in that test, the light will remain on throughout the remainder of the test cycle. Thus, when all tests are completed, an operator can ascertain which tests failed.

The control panel contains go/no go lights that signify overall acceptance or rejection of the fuze tested. Operation of the appropriate switch will deenergize the lights and program the equipment to repeat the test sequence on the same or different fuze.

Special transducers adapt the fuze test parameters to suitable d.c. voltage analogs which the digital voltmeter can measure. If necessary, the equipment may provide a simulated target approach signal. The d.c. analog of this audio voltage required to cause fuze firing is provided to the basic console for measurement and comparison.

Special circuits are incorporated into each transducer as required by fuze specifications. Measurements of pulse repetition frequencies, noise levels, etc., are handled separately as required by the fuze purchase description.

Prototype models of the automatic fuze tester were developed by HDL engineers in conjunction with the Sperry-Piedmont Corp.

3 MSTS Ships 'Relay' Nike Hercules Missile System Across Atlantic

Seagoing "garages" of the Military Sea Transportation Service (MSTS) are moving high priority Army Nike Hercules missile system equipment to and from Europe in a fast roll-on, roll-off 3-ship relay.

Assigned for Army use under the MSTS "shipper services" are the U.S. Naval ships *Comet* and *Taurus*, and the *SS Transglobe* of the Hudson Waterway Co., New York. All are the LSV (Landing Ship, Vehicle) type, each capable of carrying at least 100 semitrailers and more than 50 automobiles. The Transglobe is leased to the MSTS.

Army missilemen have dubbed the RO/RO vessels "go-go" ships because of the roll-on, roll-off capability of moving ready-loaded vans and trucks for stateside missile equipment overhaul or Western Europe delivery.

Nike Hercules systems—the primary high-altitude air defense guardians in the U.S. and Europe—are rebuilt at stateside depots when 24-hour-a-day duty begins to take its toll. The overhaul instead of replacement saves the Federal Government about $1 million per system, Redstone Arsenal reports.

One unit in Europe being serviced by RO/RO ships is the 32nd Artillery Brigade, with headquarters at Kaiserlautern, Germany. When the Nike Hercules Project Office recalls equipment for maintenance, the 32nd hauls its trailers to Bremerhaven, drives them aboard the RO/RO vessel and they arrive in the U.S. in less than 30 days. Before a missile battery is dismantled for maintenance another battery is set up to replace it.

LOADED with Nike Hercules equipment, an Army trailer drives off one of three RO/RO ships designed to increase speed and efficiency with which high priority Army goods can be de- high priority goods can be delivered.

CRDL Veteran Biochemist Wins SARS Fellowship

Further evidence that the Secretary of the Army Research and Study (SARS) Fellowship Program can benefit gifted, well-seasoned researchers as well as bright newcomers is furnished by Joseph Fleisher, an Army biochemist for over 23 years.

All of those years have been devoted to service with the Army Chemical Research and Development Laboratories (CRDL) at Edgewood Arsenal, Md., where he is known for his work in the Physiology Division, Directorate of Medical Research, on organophosphorus poisoning.

The SARS Fellowship enabled Fleisher to depart recently for a year of study and research at Cornell University under the direction of Dr. Richard O'Brien, head of neurochemical and pharmacology research. Dr. O'Brien is one of the Nation's foremost authorities on insecticides and pesticides, particularly organophosphorus compounds.

SARS Fellowships are awarded to Army employees to encourage research and educational development for future use of creative talents of Civil Service career employees whose outstanding capabilities have been demonstrated by results of their work.

Dr. Van M. Sim, Deputy Director for Medical Research at CRDL, said the award to Fleisher is part of the Army's continuing program to encourage self-improvement of personnel and to develop talents needed to fill present and future executive positions in the research program.

Fleisher holds a bachelor's degree from Brooklyn College and master's degrees in public health and biochemistry from the Universities of Michigan and Maryland, respectively.

Author of about 30 scientific publications in biochemistry and pharmacology, he is a former instructor and head of the Chemistry Department at Harford Junior College, Bel Air, Md. He is a member of the American Chemical Society, the Society for Pharmacology and Experimental Therapeutics, the Research and Engineering Society of America, and is listed in *American Men of Science*.

Abstracts for AGED Meet Must Be Submitted Mar. 1

March 1 is the deadline for submission of abstracts of papers to be considered for presentation at the 9th Hydrogen Thyratron and Modulator Symposium, May 10-11-12.

Contributors should forward 200-word abstracts to Sol Schneider, co-chairman of the symposium, Electronic Components Laboratory, U.S. Army Electronics Command, Fort Monmouth, N.J. 07703. Inquiries regarding attendance should be directed to cochairman George Taylor, same address.

Sponsored by the Electronics Command and the Advisory Group on Electron Devices (AGED), the unclassified symposium will be held at Fort Monmouth.

Papers are solicited on hydrogen thyratron tube design and characteristics, modulator design practices and problems, novel modulator circuits, pulse coding techniques, hard tube modulators, magnetic modulators, magnetic assists, auxiliary tubes such as drivers, clippers and rectifiers, and solid-state devices performing similar functions.

Foreign nationals wishing to attend must submit immediately a request through their military attache to the Office of the Assistant Chief of Staff for Intelligence, Department of the Army, Washington, D.C., ATTN: Foreign Liaison Office.

HumRRO Top Officials Brief ASA Hawkins, DAR Kimball

Assistant Secretary of the Army (R&D) Willis M. Hawkins and Director of Army Research Col Robert E. Kimball recently attended a 2-hour orientation briefing at the Alexandria headquarters of the Human Resources Research Office (HumRRO), Army contract agency of George Washington University.

Although Mr. Hawkins had twice visited HumRRO Division No. 2 at Fort Knox, Ky., it was his first trip to the headquarters. His assistant for research, Col K. C. Emerson, and Col H. B. Gallinger, chief, and J. L. Barber, Human Factors and Operations Research Division, U.S. Army Research Office, accompanied Mr. Hawkins and Col Kimball.

MICOM Designates Sergeant Weapon System Manager

Maj William A. Cole has been named acting project manager of the Sergeant weapon system, surface-to-surface ballistic missile, at the U.S. Army Missile Command (MICOM), Redstone Arsenal, Ala.

Maj W. A. Cole

He succeeds Col J. Mort Loomis, Jr., project manager for the past three years, who retired Dec. 31. Maj Cole, a 1953 graduate of the U.S. Military Academy, has served in various positions on the Sergeant project since he joined MICOM in 1963.

MICOM also recently announced that two Sergeant missiles have been fired successfully from a sea-level site at Tyndall Air Force Base, Fla., in a proficiency test under simulated combat conditions.

The missiles impacted in the off-shore bomb range of Eglin Air Force Base, marking the first time a major ballistic missile has been launched from the coast of the Gulf of Mexico.

Bingham Gets Senior Standardization Job in Canada

Col Robert H. Bingham is the new Senior Standardization Representative, U.S. Army Standardization Group-Canada. Col William H. Hard held that office until reassigned recently to the 82nd Airborne Division.

Backed by more than 10 years of R&D experience, Col Bingham was until recently the chief of the U.S. Army Materiel Command's Test and Evaluation Branch, Directorate of R&D, Washington, D.C.

His R&D assignments include three years with SHAPE in the Scientific Advisory Office; two years with the Office, Deputy Director of Research and Engineering; and two tours in the Office, Chief of Research and Development.

Commissioned in Artillery after graduating in 1941 from Yale as a mathematics major, Col Bingham served during World War II with the 9th Infantry Division in North Africa, Sicily and Europe. During the Korean War, he served with the 3rd Infantry Division.

He holds the Silver Star with Oak Leaf Cluster, and the Bronze Star with V-device and OLC.

Col R. H. Bingham

Aberdeen Tests New MBT Suspension System

Results of tests of an experimental friction hydropneumatic suspension system reported by Development and Proof Services (D&PS), Aberdeen Proving Ground, Md., are assisting in joint design of a suspension system for the MBT–70 main battle tank.

The tank is under joint development by the U.S. Department of Defense and the German Defense Ministry. Findings of tests of the experimental American-designed system are viewed as a potential solution to some of the tank commanders' long-time mobility problems related to rough terrain, hull pitch and drag, and suspension "bottoming."

Some of the means by which research seeks to overcome the problems are: Sufficient additional wheel travel necessary to reduce suspension bottoming, the cause of violent pitching of the vehicle; increased ground clearance, which reduces hull drag and enables maintenance of higher average speeds when traveling through deep mud; and lower spring rate, designed to reduce hull-pitch and bounce-accelerations for smoother ride characteristics.

The objectives of the system are high-vertical-wheel travel and low-spring rate for achieving high vehicle speeds over rough terrain, improved track and road wheels, variable ground clearance for improved mud mobility, minimum size and weight, and a high degree of reliability.

The friction hydropneumatic suspension system, in which the variable spring rate of a gas-oil spring is used, consists of wheels individually sprung by means of compact suspension units. Each suspension unit contains a hydraulic rotary actuator connected through a damping valve to a variable-volume, gas-charged accumulator.

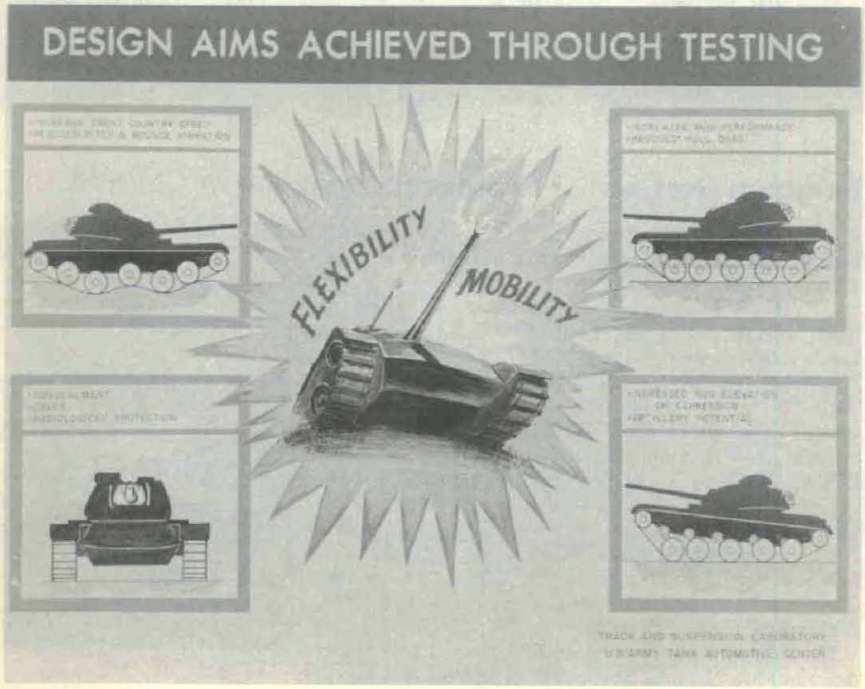
Front and rear suspension units contain hydraulically actuated multiple-disc friction brakes to provide for bumpstop and lockout. Suspension units are arranged in a three-point suspension by three hydraulic circuits connected to a common manifold. This arrangement permits the operator to vary the attitude of the vehicle by raising or lowering any portion of the vehicle independently.

The position of the road wheel arms relative to the hull is provided in the height-control system by a selector lever for each hydraulic circuit. The operator can vary the ground clearance or the altitude of the vehicle by means of the rotary leveling valves through this linkage. The operator may also engage friction-disc brakes to back the suspension in any selected position.

A pressure-compensated variable-displacement piston pump, driven mechanically by the vehicle power plant, provides the hydraulic pressure required to operate the system. Capable of delivering 28.5 gallons per minute at full flow, the pump operates continuously while the vehicle power plant is in operation but delivers oil only when required by the control system to raise the vehicle or to replace fluid lost through internal leakage.

Deficiencies uncovered while being tested at D&PS included problems in internal seals and hydraulic lines. After careful study, pressure transducers, accelerometers and vibration pickups were installed to record test data at D&PS. Further testing of the system will be performed in Alaska.

Organized in 1945, D&PS has the mission of engineering testing of Army materiel, from rifles to artillery to trucks. In a facility with firing ranges, test courses, instrumentation and refined data gathering techniques, the Development and Proof Services scientific and engineering staff subjects armament and Government equipment to grueling, exacting trials.



AGARD Panel Hears 13 Papers During 5-Day Program in Rome

The 27th Flight Mechanics Panel of NATO's Advisory Group for Aerospace Research and Development (AGARD) heard 13 papers during a 5-day technical-business program in Rome, Italy.

Updating of the current AGARD report on V/STOL (vertical short takeoff, landing) aircraft handling was assigned to Seth B. Anderson of the NASA-Ames Research Center, Moffett Field, Calif.

Scheduled for submission at the panel's May meeting in Paris, the revised report draft is expected to provide an invaluable pool of V/STOL data from all NATO nations developing the aircraft concept.

AGARD scientists and engineers regard the V/STOL report as an important publication in advancing NATO's fundamental principle of international cooperation through exchange of technical information.

William S. Aiken, Jr., of the National Aeronautics and Space Agency (NASA) aeronautical research office, Washington, D.C., served as panel chairman at the Rome meeting. U.S. Army R&D panel members attending were John Beebe, Army Materiel Command and J. C. Kidwell and William Anderson of the Army Aviation Test Activity, Edwards AFB, Calif.

Some 20 members and observers from U.S. military and civilian aeronautical organizations were among the 100 persons representing the NATO countries at the meeting.

ARPA Reports on 'Longshot' Nuclear Sounding Test

Preliminary results of Project Longshot—a recent nuclear detonation detection experiment conducted by the Advanced Research Projects Agency (ARPA)—indicated earlier arrival of seismic waves at recording stations than predicted.

A pronounced seismic velocity anomaly in the crust and mantle of the Amchitka Island area, the test region, was explained by ARPA officials as the reason for the early arrival time of the seismic waves. Amchitka is located in the Aleutian chain off the coast of Alaska.

An 80-kiloton nuclear device, buried at a depth of 2,300 feet, was detonated during the Longshot experiment. Previously alerted stations in 25 countries worldwide recorded the seismic waves. Successful results have been reported from more than 200 stations.

ARPA sponsored the experiment as part of its continuing program of research on nuclear test detection. Further results of Longshot are expected to prove out suspected travel time anomalies of seismic waves that travel out from the complex Aleutian arc structure as an aid in event location research.

In addition, the experiment is expected to provide data of use in research on the discrimination of earthquakes from nuclear events. In this regard, ARPA reported that all 525 channels of its Large Aperture Seismic Array (LASA) installation at Billings, Mont., recorded the Longshot event but the great bulk of this data will not be available for several months.

The recently dedicated LASA, first of the very large aperture array facilities to be completed, is linked to the ARPA-VELA Uniform Project of seismic disturbance detection. LASA operates in a "process of elimination" fashion, more reliably determining which events might be nuclear blasts through highly accurate detection and identification of earthquakes.

ARPA officials indicated that if the theory regarding the early arrival times of the seismic waves is proven, it could lead to revisions in current curves of energy loss for seismic wave propagation to long ranges.

Representative stations recording the Longshot event are as follows: Cold Bay, Alaska; Baker Lake, Canada; Thule, Greenland; Tonopah, Nev.; LASA Center, Mont.; Goldstone, Calif.; Iron Mountain, Mich.; Sodankyla, Finland; Port Moresby, New Guinea; Honiara, Solomon Islands; Vista Hermosa, Mexico; Quetta, Pakistan; Kaspareske Hory, Czechoslovakia; Strasbourg, France; Bangui, Africa; Windhoik, South Africa; Caracas, Venezuela.

$16 Million Awarded for Avionics

A $16,100,000 contract for helicopter avionics was awarded recently to the Sylvania Electronics System, Williamsville, N.Y., by the U.S. Army Electronics Command at Fort Monmouth, N.J.

The contract calls for a 51-month delivery of 1,825 lightweight avionics packages designed to provide all phases of air-ground and air-to-air communications for the Light Observation Helicopter (LOH) being developed for the Army by Hughes Tool Co., Culver City calif.

Dear Sir:

What is the follow-on, or shirttail, as we say in the trade, to the pantless professor story in your November issue?

a. Pique is a ribbed cotton fabric, and I thought that the pajamas were silk.

b. Did the professor ever get his pajamas back?

c. I assume that as printed matter they were sent to the Defense Documentation Center. Would his chances of recovery have improved if he had filled out a DD Form 1473 and assigned the proper key-words?

Sincerely,
HAROLD WOOSTER
Director, Information Sciences
Office of Aerospace Research

P.S. Dare I say that the search for the missing bottoms could be called fundamental research?

CRREL Physicist Begins Sabbatical With College Group

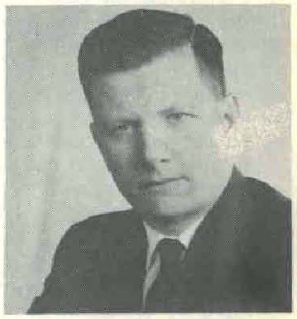
Granted a year's leave of absence from the U.S. Army Cold Regions Research and Engineering Laboratory (USA CRREL), Hanover, N.H., Dr. Paul R. Camp has joined the Commission of College Physics.

Composed chiefly of college and university faculty members, the group is seeking to strengthen the physics curricula in the Nation's colleges and universities; also, to develop teaching methods emphasizing new ideas in physics.

Sponsors of the Commission's work are the National Science Foundation, American Physical Society, and American Association of Physics Teachers. Commission headquarters are at the University of Michigan.

Dr. Camp graduated from Wesleyan University with a BA degree in 1941, earned an MS degree at Harvard in 1946, and received a PhD at Pennsylvania State University in 1951. Prior to joining USA CRREL in 1961, he was an associate professor of physics at Brooklyn Polytechnic Institute.

Formerly he served with the Radio Corporation of America, working in solid-state physics and surface properties of germanium. Until he joined the Commission, he was engaged in physical properties of ice research at USA CRREL.



Dr Paul R. Camp

Lt Col Hill Takes Over as Weapons Command R&D Director

Lt Col James A. Hill

NEW R&D DIRECTOR for the Army Weapons Command (AWC), Rock Island, Ill., is Lt Col James A. Hill, deputy commander of Rock Island Arsenal for the past 27 months, Maj Gen Roland B. Anderson, AWC commander, has announced. He served four years with the Military Assistance Advisory Group (MAAG) in Norway before assignment to Rock Island in 1963. Earlier, he served a tour of duty in the R&D Division of the Chief of Ordnance in Washington, D.C. Col Hill holds a BS degree from the University of Alabama and is a 1958 graduate of the Army Command and General Staff College, Ft. Leavenworth.

Microminiaturization Advances Solving Army BTE Problems

By Maj Eugene L. Naegele

Microminiaturization technology — also termed microelectronics, molecular electronics and integrated circuitry—is being applied to the development of Battery Terminal Equipment (BTE), designated AN/GSA–77, as a new component of air defense control and coordination.

The BTE is designed to tie the Nike Hercules and Hawk air defense weapons systems into the Birdie AN/GSG–5 (V), Missile Monitor AN/MSQ–18, and AN/TSQ–51 control coordination systems—in response to a 1964 Qualitative Materiel Requirement.

Being developed under supervision of the Air Defense Fire Distribution Systems Office of the U.S. Army Materiel Command, the AN/GSA–77 will replace both the Fire Unit Integration Facility (FUIF) and Coder-Decoder Group (CDG) now performing the tie-in function.

Weight, size, excessive power, air conditioning and maintenance requirements of the FUIF and CDG proved uncorrectable state-of-the-art deficiencies until recent technological advances in integrated circuitry.

The FUIF is installed in a separate building on Nike Hercules sites in the United States, and the CDG, which is truck-mounted, is used for overseas employment of Nike Hercules and Hawk. Both require a ⅜-ton air conditioning unit to control equipment operating stability.

Figures 1 and 2 show two proposals for the new BTE, which will be mounted inside the Nike Hercules Director Station and Hawk Battery Control Center. The BTE thus eliminates the requirement for a separate building or truck at each Nike Hercules and Hawk battery. Moreover, it does not require air conditioning equipment.

Evaluation of responses to the request for proposals on the new BTE resulted in selection of two contractors, Litton Industries and Martin-Marietta Corp., because of their different approaches using the same technology. One configuration uses plug-in flat packs mounted on large circuit boards. The other configuration uses smaller cards on which 8 to 10 integrated circuit packs are soldered.

Figures 3-5 show the analog and digital circuits being used by the two contractors. Both configurations enable consideration of a "throw-away" maintenance concept. Such a concept might allow substantial reduction in the number and training level of personnel required for maintenance.

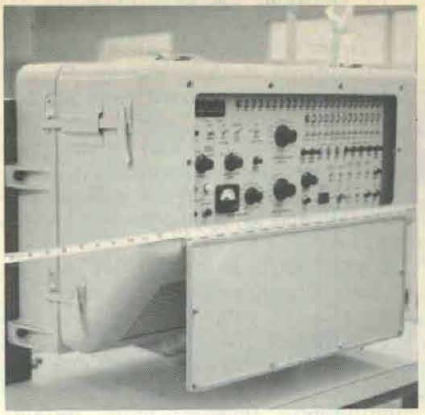


Figure 1
Martin BTE Configuration

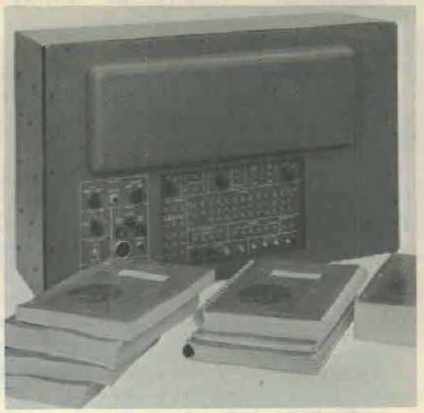


Figure 2
Litton BTE Configuration

Four preproduction models from each of the two contractors are being competitively evaluated in a combined Engineer/Service Test that started in January 1966. The test will determine, in addition to overall suitability of the equipments, which packaging concept is most advantageous to the Army in this application.

Weight, size and power requirements for the AN/GSA–77 are among the major advantages which will directly benefit Artillery personnel. A full order of magnitude reduction in weight and power requirements and two orders of magnitude in size will be achieved.

Table I compares the BTE characteristics in these areas to those of the equipment being replaced.

TABLE I,

Weight, Power and Size Comparison

	FUIF	*CDG*	*BTE*
Weight (lbs)	5300	4000	150
Power (watts)	7000	1700	250
Size (cu ft)	700	400	3

The reliability, maintainability and self-test features of the new integrated circuit technology will result is substantial cost savings to the Army and may result in a new maintenance philosophy for electronic equipment. The descriptive term used today to describe reliability is "operational availability of the system."

Operational availability is calculated from the factors mean time between failures (MTBF), mean time to repair (MTTR), and mean logistical time (MLT). MTBF and MTTR are self-explanatory. MLT describes the mean time required to obtain a replacement item from the spare parts supply system after a failure has been determined and before repair can commence.

The expression for operational availability is

$$Ao = \frac{MTBF}{MTBF + MTTR + MLT}$$

Operational availability is then the fraction of total time during which an item of equipment may be put to use. If failures are random it is also an expression of the probability that a system will be operational at any given instant of time, and is thus a useful expression. Analysis of the factors which determine operational availability indicates where effort may be most productively applied to increase operational availability.

Valid data is not available for a quantitative comparison; however, a qualitative result using experience with similar systems indicates an improvement over the systems being re-

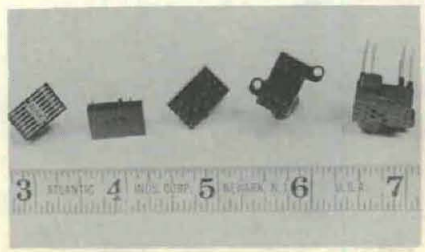


Figure 3
Martin Plug-in Digital Circuits

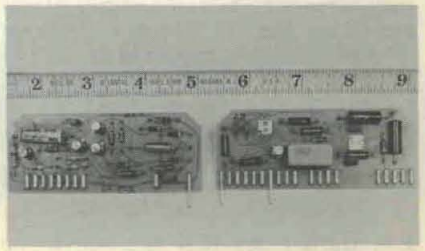


Figure 4
Martin Analog Circuits

placed on the order of 10 to one in MTBF of the new BTE.

The calculated MTBF is in excess of 2,500 hours. Digital integrated circuitry itself is capable of still higher values, but the necessity for a certain amount of analog circuitry results in approximately a 40 percent reduction.

Translating MTBF of the new BTE into operational time, on a basis of 16 hours per day, there will be an average of better than five months between failures.

The MTTR will be reduced to a very low value through use of fault isolation techniques which have been in use in digital computers for many years. When the BTE is in operation, the automatic test circuitry performs a complete functional check every few minutes.

An audible and visual alarm informs operating personnel that a malfunction has occurred. Activation of built-in test equipment results in isolation of the malfunction to a single card and identification of the faulty circuit on the card. The result is a return to operation within minutes by replacement of the faulty component.

MLT is reduced to a minimum by stocking a full set of spare components right in the case which contains the BTE. Additional cards and flat packs may also be stocked at the battery. Cost analyses and results of the Engineer/Service Test will be used to determine the number and type of parts to be stocked.

The high reliability and small size of the components indicate that a year's supply of spares can be stocked at the battery. With the large MTBF and spares within the battery, MLT may be reduced to a negligible value. Using the required values of 2,500 hours for MTBF and 20 minutes for MTTR, the resulting operational availability will be higher than 99.98 percent.

Industry has today the capability of providing the Services wth electronic equipment incorporating integrated circuit technology and more fully utilizing digital processes. Figure 7 shows a squad radio set being developed by the Army Electronics Command. Figure 8 pictures a molecular electronics version of a television set built by Westinghouse. Many more examples could be given if space permitted.

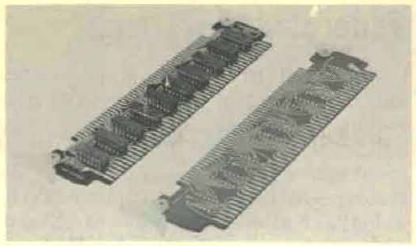


Figure 5
Litton Digital Circuit Cards

Figure 6
Litton Analog Circuit Cards

Figure 7
U.S. Army Squad Radio Set

Figure 8
Molecular Electronics TV

A review of technical society journals and general scientific periodicals indicates availability of a wide variety of manufacturing techniques and packaging. Investigations to date offer no conclusive evidence that any one of these techniques is the panacea to all Military Services requirements.

Indeed, these investigations indicate that a decision on microminiaturization is almost a unique matter with each functional system. In almost every case a complex trade-off analysis is required to balance various factors of time and total life cycle cost.

Among these factors are research and development costs, procurement costs, logistics and training costs, design cycle and delivery times, and the impact of possible future system changes required by standardization or revision of mission and employment doctrine.

All of these factors indicate that the Services must conduct study and

(*Continued on page 32*)

Maj Eugene L. Naegele joined the Office, Chief of Research and Development in July 1965 and was assigned as a research and development coordinator to the Air Defense and Missiles Division, Directorate of Missiles and Space.

His projects include Army air defense control and coordination systems, radars, simulators/evaluators and Nike Hercules. Previous military assignments include enlisted service in the European theater in World War II; instructor duty at The Infantry School and The Air Defense School; Nike Hercules training battery commander; Eighth U.S. Army G3 Section; assistant S3, Eighth U.S. Army Provisional Air Defense Command; and assistant S3, 56th Artillery Brigade (AD).

While in the Eighth U.S. Army G3 Section, Maj Naegele was general staff coordinator for Korea Nike Hercules site construction, organization, missile range, and logistical support. He received the Army Commendation Medal.

A graduate of the Guided Missile Staff Officer, the Artillery Officers' Advanced, and the Commandand General Staff College courses, he has a BS degree in physics from Case Institute of Technology (1946) and MS degree in electrical engineering from the University of Arizona (1965). He is a member of the IEEE.

Maj Eugene L. Naegele

Business Press Seeks Better Federal Agency Link

How some 600 editors representative of publications with an "actual readership in excess of 16 million" can more effectively serve in disseminating Federal Government technical and other information was discussed recently in Washington, D.C.

The occasion was the first annual Government-Business Press Editors Washington Conference at the Statler-Hilton Hotel. Editors of Federal agency publications and Government leaders concerned with improving dissemination of scientific and technical information were guests. Co-sponsors were the American Business Press and the American Society of Business Press Editors.

Indicative of the sincere interest members of the sponsoring organizations have in achieving a more mutually satisfactory working arrangement with Federal agency information dissemination representatives was the tenor of discussion and the manner in which guests were entertained. Planning for the meeting covered a span of about 2½ years.

Glenn T. Seaborg, chairman of the Atomic Energy Commission, joined with Secretary of Commerce John T. Connor and Breene M. Kerr, assistant administrator for technical utilization, National Aeronautics and Space Administration, as principal speakers. Dr. Donald A. Schon, director, Institute for Applied Technology, National Bureau of Standards, also gave a featured address.

Secretary Connor read a message from President Lyndon B. Johnson on the importance of improving dissemination of scientific and technical information produced by the Federal research and development activities, currently approaching annual funding of about $20 billion.

James G. Morton, Special Assistant Secretary of Commerce for Public Affairs, and Dr. Allen Gray, editor of *Metal Progress*, moderated two panel discussions on "The Business Press" and "The Technical Press." Panelists included editors of several major publications and top officials of a number of Federal agencies.

Microminiaturized BTE Heralds New Equipment

(*Continued from page 31*)

evaluation of the complete environment of complex systems prior to establishing detailed requirements. In most cases for complex systems, this requires contractor assistance and close coordination between developing and using agencies.

Every indication, however, is that the Army can now look forward with assurance to previously inconceivable operational availability of combat equipment, larger proportions of personnel available for direct combat duties, and accomplishment of the mission with improved cost effectiveness.

The degree of improvement appears to be limited only by our imagination in determining application and support concepts. No major technical or industry bars to the new era are apparent if we can determine just what we want done and how we want to do it.

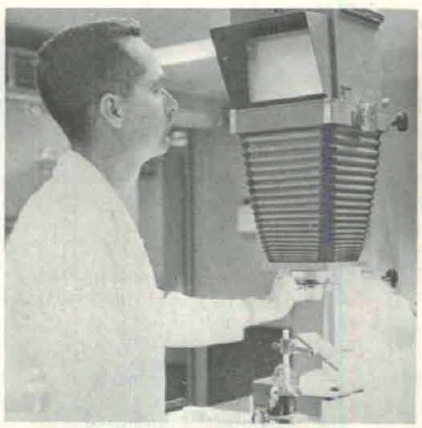
ACKNOWLEDGEMENT. The author acknowledges the helpful information and illustrations received from the U.S. Army Materiel Command, Hughes Aircraft Co., Litton Industries, Martin-Marietta Corp., and Westinghouse Electric Corp.

WSMR Studying Microbial Missile Deterioration

Microorganisms that contaminate man's food, causing illness, also can prove deadly to military materiel—by, for example, building living bridges that may short-circuit electrical systems of multimillion-dollar missiles.

Scientifically combatting these "menace to missiles" ever-present microorganisms is the Microbiology Laboratory of the Environmental-Instrumentation Branch at White Sands Missile Range, N. Mex. It is believed the only Department of the Army laboratory devoted solely to fighting missile biodeterioration caused by exposure to hostile environments of land, air and water and varying climatic conditions.

In four years, more than 250 species of microorganisms known to be degrading to missile components and materials have been isolated from missile systems—from nosecones to boosters, inside and out.



"BUG PORTRAIT" is taken in the Microbiology Laboratory at White Sands (N. Mex.) Missile Range by Oscar Calderon, laboratory chief. This laboratory concentrates solely on determining the effects of microorganisms on materials used in missiles. Culture photographs help analyses.

Through study of bacteria, fungi and streptomycetes, microbiologists have learned that these organisms feed upon a great variety of organic materials used in missile systems. Diets include cellulose, canvas, leather and sometimes silicon rubber, fuels, paints and propellants. Excretion of microorganisms also can produce corrosive products.

Rapidity of degradation of materials by microorganisms is controlled largely by temperature, humidity and environment. Laboratory testing allows microbiologists to control the temperature and humidity to some extent. More thorough analysis requires that the test item be subjected to a variety of actual environmental conditions.

The WSMR laboratory assists in drawing up specifications that will help curb the microorganism problem by selection of better materials, providing environmental protection, and establishing higher quality assurance standards for missile systems.

Infrared spectrographs are used to identify new types of organic acids never before found. Microbiologists also use X-ray diffraction and spectrophotometers to identify corrosive compounds given off by the organisms.

Intense interest in this field also is reflected by a meeting held last November at the U.S. Army Natick (Mass.) Laboratories. More than 50 representatives of Department of Defense agencies met for the 14th research conference on "Prevention of Microbiological Deterioration of Military Materiel."

Three days of round-table discussions delved into basic research, petroleum products deterioration, materials failures and protection, testing and analytical procedures, and environmental studies relating to the preservation of military supplies and equipment from microbial damage.

Kudos

Nine Department of the Army employees recently earned Meritorious Civilian Service Awards for outstanding contributions to Army R&D.

Four of the recipients work at Picatinny Arsenal, Dover, N.J., where Commanding Officer Col H. H. Wishart made awards. Wilfred Hosking, director, Industrial Services Directorate, Louis Marino, chief, Shell Division, Commodity Management Office, Ralph Pollara, acting chief, Nuclear Engineering Directorate, and George Jackman, chief, Nuclear Engineering Directorate. They were cited for:

"Highly meritorious technical and administrative qualities in strengthening the defense capabilities of the United States in the entire spectrum of munitions manufacturing."

Two members of the Life Sciences Division, U.S. Army Research Office, Arlington, Va., Dr. Carl Lamanna and Dr. Allen L. Forbes, and Dr. Leo Alpert of the Environmental Sciences Division, received Meritorious Civilian Service Awards from Lt Gen William W. Dick, Jr., Chief of Research and Development.

Dr. Lamanna is deputy chief and scientific adviser of the division and Dr. Forbes is a medical officer in the Scientific Analysis Branch.

Dr. Lamanna was cited for his "outstanding (administrative) abilities and distinguished scientific leadership . . . his imaginative analyses of scientific issues and his keen discernment of solutions to administrative problems" in direction of Army life sciences research.

Dr. Forbes was honored for his "outstanding scientific leadership" and "imaginative guidance in planning and initiating the acceleration of research" in such life science areas as food and nutrition, environmental medicine and medical physiology.

Dr. Alpert was cited for distinguishing himself while serving as chief scientist and chief, Research Division, U.S. Army Tropic Test Center, Panama, C.Z. from 1963-65.

Especially singled out in the citation were his conception and implementation of the Environmental Data Base for Regional Studies in the Humid Tropics, fulfilling a vital military requirement, through his "bold concept of this program, his vast scientific knowledge and complete devotion to duty."

Two Springfield (Mass.) Armory employees, Lyman E. Pevey, Jr., and Richard W. Colburn, received the Army's second highest civilian decoration from the Armory CO, Col Arthur H. Sweeney, Jr.

Safety Director Pevey has received a number of National Safety Council awards. He led the Armory safety program during the past fiscal year to the best civilian employee accident-free rate and lowest per capita cost in the Army Weapons Command.

Colburn is chief of the Manufacturing Development Unit of the Armory Operations Division. He was cited for his "ingenuity, initiative, leadership and technical competence," resulting in Springfield Armory's production shops being equipped with the "latest in electronic, tape-controlled, electrochemical and electro-discharge equipment for metal removal operations."

Deputy Director of Defense Research and Engineering Dr. Finn J. Larsen and Brig Gen Alvin E. Cowan, Director of Development, Office of the Chief of Research and Development, presented the Meritorious Civilian Award to John L. Baer.

A chemical engineer at the U.S. Army Limited War Laboratory, Aberdeen Proving Ground, Md., Baer was decorated for suggesting high hardness steel be used in place of standard steel armor plate in armoring the Viet Namese Railway System. The suggestion resulted in an estimated $206,000 saving.

COST REDUCTION AWARD of $750, the largest sum ever granted for a suggestion at the U.S. Army Natick (Mass.) Laboratories, is presented by Col C. T. Riordan, deputy commmander, to Robert B. Luksich. A subsistence quality control specialist, Luksich suggested a reform expected to save $20,000 annually in preparing military food specifications at Natick Lab.

LEGION OF MERIT is bestowed on Maj Gen James W. Sutherland by Maj Gen Selwyn D. Smith (right), U.S. Army Materiel Command chief of staff. General Sutherland served as CG of the U.S. Army Test and Evaluation Command, Aberdeen Proving Ground, Md., from August 1963 to December 1965. He received the award at a farewell dinner on the eve of his departure for a new assignment to Europe, where he has assumed command of the 4th Armored Division.

Five personnel of Picatinny Arsenal Dover, N.J., received the Army Research and Development Achievement Award. Picatinny CO Col H. H. Wishart made the presentation and Maj Gen F. A. Hansen, CG, U.S. Army Munitions Command, offered his congratulations to:

Elise McAbee, materials engineer, and Mitchell Chmura, Feltman Research Laboratory; Ferdinand Scerbo, chief, Ammunition Section, Nuclear Engineering Directorate; Carmine J. Spinelli and Bartholomew Stang, chiefs of development engineering, Nuclear Engineering Directorate.

Lt Gen William W.. Dick, Jr., Chief of Research and Development, presents Meritorious Civilian Service Award to two U.S. Army Research Office personnnel, Dr. Leo Alpert (center) and Dr. Carl Lamanna, who previously has received the Exceptional Civilian Service Award from the Army.

Radio Frequency Crowding Presents Problem to Huachuca Test Unit

By Maj Gen Benjamin H. Pochyla

The "population explosion" in the radio frequency spectrum is the concern of the Electromagnetic Environmental Test Facility (EMETF), established in March 1960 at the U.S. Army Electronic Proving Ground, Fort Huachuca, Ariz.

The EMETF provides a facility in which the numerous items of Army communications-electronics equipment (radios, radars, navigation aids, etc.) are tested to assure that they will be electromagnetically compatible and will not interfere wih each other to an intolerable extent on a battlefield.

Congestion is one of the chief causes of incompatibility. Consider the potential congestion problem of a field army. In a square roughly 100 miles on a side, an army would have about 110,000 transceivers, transmitters, and receivers. Serious interference to the receivers on a battlefield could result in the loss of command control, with disastrous results.

Mere numbers of equipments do not really reflect the magnitude and complexity of the interference problem. First- and second-order effects must be considered. First-order effects are caused by two or more transmitters operating on or near the same frequency, resulting in so-called cochannel and adjacent channel interference. These effects are usually inevitable in a congested situation.

Second-order effects are caused by transmitters radiating unwanted signals, receivers responding to signals other than those for which they are tuned, and complex interactions between equipments. Generally, they are unavoidable by-products of modern techniques and are usually most noticeable in equipments that are within a mile or so of each other. Reduction of these effects is often costly.

In solving the Army's interference problem, several questions have to be answered. Just how bad would the interference be on a present-day battlefield? What can be done to existing equipment to reduce the interference? Remembering the principles of cost effectiveness, how stringent do design standards have to be for new equipment? How effective are new methods of frequency assignment? Will newly developed equipment be compatible?

To help answer these questions, the EMETF evaluates the performance of communications-electronics (C-E) equipments, systems, and concepts in simulated tactical electromagnetic environments. Simulation is necessary, since real-life tactical environments are not generally available. Even if they were, electromagnetic compatibility testing in them would be difficult to control and costly.

Simulation here means imitation. Both physical and mathematical simulation are employed in the EMETF. Physical simulation involves the use of actual equipment to create environments. Mathematical simulation in the EMETF involves the use of a computer and programs containing the equations that describe an electromagnetic environment and its effect upon equipment under test.

An engineer could manually solve the various equations and thus simulate an environment. Even with his slide rule, however, he would take much too long to solve most problems. Thus, a high-speed computer is used to perform the calculations.

Mathematical simulation of complex physical situations must be validated. When equations are used to represent these situations, the constant possibility is that the equations do not accurately represent phenomena involved.

Validation consists of comparing the results of mathematical simulation with the results of carefully controlled physical experiments and refining the mathematical simulation until it adequately represents reality.

Although the initial approach to EMETF testing involved both physical and mathematical simulation of electromagnetic environments, physical simulation was stressed at the outset. The feasibility of mathematically simulating a huge complex environment had not been proven.

Originally, physical simulation was accomplished in a large field facility on the Southern Arizona desert. Actual items of Army C-E equipment

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Maj Gen Benjamin H. Pochyla has been commanding general of the U.S. Army Electronics Proving Ground, Fort Huachuca, Ariz., since September 1963. Other assignments since World War II include: commander, 516th Signal Group, U.S. Army Europe; chief of the Combat and Developments Division and later the chief of Programs and Operations, Office of the Chief Signal Officer; U.S. Army War College faculty; CG of the Signal Training Center, Fort Gordon, Ga.

Prior to assignment as USAEPG deputy CG in May 1963, he was deputy director of Communications-Electronics for the Joint Chiefs of Staff, Washington, D.C.

Graduated from Texas A&M College in 1929 and commissioned a second lieutenant in the Cavalry Reserve, he was employed as an industrial engineer with the Southwestern Bell Telephone Co. until World War II. Then he served initially in the Operations Division of the War Department General Staff and, later, as the deputy chief Signal officer on General MacArthur's staff in the Pacific.

He is a graduate of the Command and General Staff School (1941), Armed Forces Staff College (1948), Army War College (1952), and the Command Management School (1955).

Maj Gen B. H. Pochyla

SCIENTIFIC CALENDAR

National Conference on Space Maintenance and Extra-Vehicular Activities, sponsored by the USAF and The Martin Co., Orlando, Fla. Mar. 1-3.

Plasmadynamics Conference, sponsored by AIAA, Monterey, Calif., Mar. 2-4.

Scintillation and Semiconductor Counter Symposium, Washington, D.C., Mar. 2-4.

5th Electric Propulsion Conference, sponsored by AIAA, San Diego, Calif., Mar. 7-9.

11th Annual Gas Turbine Conference, sponsored by ASME, Zurich, Switzerland, Mar. 13-17.

Annual Scientific Meeting of the Society of Toxicology, Williamsburg, Va., Mar. 14-16.

4th International Aerospace Instrumentation Symposium, sponsored by The College of Aeronautics and the Instrument Society of America, Cranfield, England, Mar. 21-24.

Institute of Electronic and Electrical Engineers International Convention, N.Y.C., Mar. 21-25.

National Defense Seminar, Carbondale, Ill., Mar. 21-Apr. 1.

Meeting of the American Chemical Association, Pittsburgh, Pa., Mar. 22-31.

1966 U.S. Army Operations Research Symposium, sponsored by ARO-D, Fort Monmouth, N.J., Mar. 23-25.

Symposium on Functional Analysis, sponsored by ARO-D, Irvine, Calif., Mar. 28-Apr. 1.

2nd International Symposium on Aerobiology, sponsored by AMC and the Illinois Institute of Technical Research Institute, Chicago, Ill., Mar. 29-31.

6th Conference on Applied Meteorology, sponsored by AMS and AIAA, Los Angeles, Calif., Mar. 29-31.

Low Speed Aerodynamics Problems Associated with Helicopters and V/STOL Aircraft, sponsored by AMC and the Cornell Aeronautical Laboratory, Buffalo, N.Y., Mar. 30-Apr. 1.

7th Symposium on Engineering Aspects of Magnetohydrodynamics, sponsored by ASME, IEEE and AIAA, Princeton, N.J., Mar. 30-Apr. 1.

Conference on Analysis and Synthesis of Networks, sponsored by IEEE, Stuttgart, Germany, Mar. 31-Apr. 1.

National Topical Meeting on Large-Scale Production and Application of Radioisotopes, sponsored by the American Nuclear Society, Augusta, Ga., Mar. (date undetermined).

were carefully located to create realistic environments at selected sites.

Due to the enormity of the project, the field facility was developed in phases. Experience gained in one phase was applied to succeeding phases. Original plans called for developing the field facility to a level where Army size environments could be simulated.

By early 1962, the field facility had been developed to the level at which testing could be accomplished in a partial electromagnetic environment for a corps. At two representative test sites, the simulated environment looked like that which would be created by much of the communications and some of the forward-area radar equipment of a corps.

Automatic equipment was developed for controlling tests and for detecting interference. The Corps area was roughly 40 miles wide and 60 miles deep. The capability for mathematical simulation of environments was being developed concurrently with that of the field facility. The goal of mathematical simulation was to extend the findings of the field facility to any part of the world and to any tactical configuration.

A turning point in the EMETF course stemmed from field testing in the partial electromagnetic environment for a corps. Based upon the results, it was determined that more emphasis could be put on mathematical simulation.

Field tests clearly indicated that the major interference contribution of transmitters several miles or more away from a receiver is cochannel or first-order. Because the mathematical simulator, properly validated, could satisfactorily represent these transmitters, they were no longer needed in the field facility with the exception of a relatively few used for variation.

Consequently, the field facility was considerably reduced in geographical size, at a considerable saving in money, and a new concept of EMETF testing was initiated. Under this concept, mathematical simulation is used for performing the majority of compatibility evaluation testing. Simulation is validated by controlled physical experiments in the field and in the shop.

In addition to validating the mathematical simulation of antennas and radio frequency propagation conditions, the field facility is important for evaluating second-order interference effects and for evaluating interference situations involving equipment which cannot feasibly be mathematically simulated.

In another portion of the EMETF, the instrumentation workshop, closed-system validation of mathematical simulation is carried out. Direct connection of transmitters, receivers, and interference detection devices in a closed-system configuration allows controlled testing of those factors not involving the antennas or the propagation path. Shop facilities also are used in determining the relationship of interference and intelligibility.

Much work remains to be done in the EMETF before it reaches its full potential for electromagnetic compatibility testing. Some of the existing simulation techniques require further refinement; other techniques are still being developed. However, the EMETF is providing useful results.

For example, one of the tests that has been performed is the evaluation for the U.S. Army Combat Developments Command Communications Electronics Agency of a new idea for utilization of the radio frequency spectrum. This type of test illustrates the capability of the EMETF to evaluate new concepts before they are tried in real life. Obviously, this type of evaluation can result in the savings of much money.

Other tests have evaluated the single-sideband mode of voice transmission. In several tests, electromagnetic compatibility of new equipment was compared with that being replaced. Two different types of tactical position-fixing equipments have been tested. Interference difficulties were experienced with both. One has been redesigned and is now back at the EMETF for further testing.

The EMETF has supported electronic countermeasures vulnerability testing for six types of equipment.

In another test, the electromagnetic environment in which an Army missile would have to operate was evaluated. Excessively high levels of energy can cause malfunction or premature detonation of a missile.

New items of equipment can be tested at the EMETF for electromagnetic compatibility at any point in their R&D cycles. Even before equipment is available, anticipated characteristics can be used in mathematical simulation tests. Testing at various stages during development helps to insure that the equipment will not have major compatibility problems when it goes into production.

Filter/Separator Standardized

A 15 GPM filter/separator, smallest of a family being developed by the U.S. Army Materiel Command R&D Laboratories, Fort Belvoir, Va., has been type classified by the Army.

Approved for military procurement as the need arises, the 15 GPM unit removes water and fine solid particles from fuel at combat airfields and fuel tank farms. Other sizes include 50, 350 and 600 GPM, which are in various stages of development and testing.

Made of aluminum and weighing only 45 pounds, the 115 GPM filter/separator is a hand-carried unit that decontaminates fuel pumped into light aircraft directly from 55-gallon storage drums.

Col Stone Departs as Dugway CO to Head MUCOM R&E

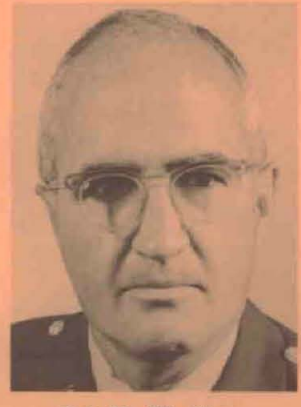
After serving 12 months as commander of Dugway (Utah) Proving Ground, Col William W. Stone started 1966 as director, Research and Engineering Directorate, Headquarters Army Munitions Command.

Remembered in the Office of the Chief of Research and Development as the first executive to the Director of Army Research (1958-59), Col Stone is a career officer in the Army Chemical Corps. He entered military service in 1940 as an Army Air Corps cadet.

During World War II he served in Panama, the Philippines and as a staff officer on the Manhattan Project. Tours at Eniwetok and Bikini Islands in the Pacific preceded a 1952-55 assignment to Dugway Proving Ground. In 1959-60 he attended the Army War College, Carlisle, Pa.

Then he served as senior chemical adviser to the First Republic of Korea Army from August 1960 to August 1961, earning the Army Commendation Medal for outstanding performance of duty. He also has been awarded the Legion of Merit.

Col Stone was commissioned in the Army Air Corps following graduation in 1941 from the California Institute of Technology with a master's degree in meteorology. He is a member of Tau Beta Pi, honorary engineering society.



Col W. W. Stone

Col Rall Leaves GIMRADA Command for DIA

Col Lloyd L. Rall, CO of the Army Engineers Geodesy, Intelligence and Mapping R&D Agency (GIMRADA) for the past 18 months, on Jan. 10 became deputy assistant director of the Defense Intelligence Agency for Mapping, Charting and Geodesy.

Col Hamilton W. Fish, former DoD special program management officer in the Office of the Chief of Engineers, is the new GIMRADA commander at Fort Belvoir, Va.

During Col Rall's tenure, the geodetic satellite program has gained momentum as part of the sequential collation of range (SECOR) system for accurately locating widely spaced positions on earth. The SECOR system is an aid to mapping and continuously adds to scientific knowledge of the earth's size and shape.

Other developments in progress at GIMRADA include a new 60-degree Pendulum Astrolabe to observe the position of celestial bodies, a digital mapping compilation system, an automatic device for checking aerial photographs and a 5-color electrostatic printing machine.

Col Rall was deputy director of topography in the OCE before joining GIMRADA in mid-1964. A graduate of the University of Wisconsin, he was commissioned in the Corps of Engineers' Reserve in 1940 and served overseas during World War II and in Japan for two years following the war.

Commissioned in the Regular Army in 1947, he was assigned to the Office of the Joint Chiefs of Staff. Later he served as CE representative on the Army Equipment Policy Panel. His career includes service as professor of military science and tactics at the Missouri School of Mines and Metallurgy.

COL FISH, a graduate of the U.S. Military Academy, was commissioned in the Army Corps of Engineers in 1937. In World War II he served as engineer of an Infantry division in the Pacific theater. Later he commanded a construction group in support of the U.S. Occupation Forces in Japan.

He was a member of the Engineer Inspector General's staff in Washington, D.C., (1952 to 1954) and for the following two years, was commanding officer of a construction group at Fort Knox, Ky.

From 1956 to 1959 he was deputy then District Engineer in Okinawa in charge of military construction there and at Taiwan. Later he was engineer, then deputy chief of staff (administration) for the XVIII Airborne Corps, Fort Bragg, N.C., and served for a year in Korea.

Col Hamilton W. Fish

Col Lloyd L. Rall

A registered engineer in North Carolina, he is a member of several national engineering societies.

Army, AF, NASA Join in Developing Propulsive Wing

Research and testing of the propulsive wing, regarded by aircraft experts as a potentially significant advance in V/STOL flight, is being sponsored by the Army, Air Force and the National Aeronautics and Space Administration (NASA) under a joint development agreement.

A 12-month program with initial funding of $500,000 is planned to determine the feasibility of using turbofans in a ducted wing to provide lift and horizontal flight for V/STOL (Vertical, Short-Takeoff and Landing) aircraft.

Management of the program is assigned to the U.S. Air Force Research and Technology Division at Wright-Patterson AFB, Ohio, supported by the Army Aviation Materiel Laboratories, Fort Eustis, Va., and NASA's Langley (Va.) Research Center.

A wind-tunnel model of the new wing concept will be designed and built for testing at the Langley Research Center by Ling-Temco-Vought, Inc. (LTV). The LTV aeronautics division will also furnish test support and data analysis for transition and cruise mode testing in the low-speed and transonic wind tunnels at Langley.

Previous V/STOL concepts which have been investigated include the tilt wing, tilt-propulsion duct, tilt rotors, lift fans in wings and various combinations of these.

Early in 1965, the Army accepted two research V/STOL lift-fan aircraft, the XV-5A. This is one of several V/STOL research efforts being studied by the Army Aviation Materiel Laboratories, formerly the Army Transportation Research Command laboratories, Fort Eustis, Va. Flight tests are still under way at the Army Aviation Test Activity, Edwards AFB, Calif.

The propulsive wing uses high-by-pass-ratio turbofans buried in a ducted wing. The high mass-rate flow through the wing can be deflected downward for vertical flight or aft for horizontal flight. Turbofan engines can provide adequate thrust for lift-off and can perform efficiently at high cruising speeds.

Because of the integration between the airframe, propulsion and control systems, the propulsive wing allows for reduction in structural weight and an increase in useful load. It is a decided departure from conventional aircraft design propulsion systems enclosed by the airframe.

Conceived by LTV in 1958 as the ADAM (Air Deflection and Modulation), the propulsive wing V/STOL idea has undergone improvements by the originator. Last year a wind-tunnel test program of the wing was conducted for the Army Research Office, Durham, N.C.

The new tests are expected to provide more realistic simulation of external and internal flow reactions by supplementing previously obtained information with power-model data.

(*Editor's Note:* A comprehensive review of Army V/STOL aircraft by the chief of the Air Mobility Division, OCRD, was published in the September 1965 issue of *Army R&D Newsmagazine*, page 24.