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CERL Reviews Gains In Total System Plan On First Anniversary

Dedicated to the objective of applying the systems approach to research and development in the total construction process, the U.S. Army Construction Engineering Research Laboratory recently marked its first anniversary by reporting achievements.

Established in growing facilities at the University of Illinois at Urbana, CERL was founded to improve both military and civilian construction techniques. Col Edwin S. Townsley is director and Dr. L. Shaffer is deputy director and chief of engineering development.

The systems approach advocated by the Building Research Advisory Board-National Academy of Sciences Committee instrumental in the establishment of CERL aims at identifying and solving problems as a whole, before individual parts are "set in concrete."

To achieve this goal, CERL brings diverse groups together to understand construction problems and needs. The concept is to eliminate "blind spots"

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Blue Ribbon Defense Panel Report Considered For Potential Impact on Research, Development

Blue Ribbon Defense Panel findings and recommendations in a 237-page report to President Nixon distributed to federal agencies in July—with 4 of 14 appendices published since and others indefinitely scheduled—potentially could impact profoundly on R&D.

How many recommendations will be adopted regarding weapons systems management, materiel acquisition, research and development policies and procedures, and general organization of the defense establishment is still open to conjecture. In the minds of many, whatever degree of implementation takes place likely will be effected over an extensive period.

Defense agencies have their top experts in all of the areas potentially

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International Food Congress Recognizes Role of NLABS

SOS/70 (Science of Survival), theme of the recent 5-day Third International Congress of Food Science and Technology in Washington, D.C., served incidentally to recognize the importance of the role of the U.S. Army Natick (Mass.) Laboratories in food preservation and packaging research and development.

Assigned responsibility as the coordinating agency for the Department of Defense Food Program, based upon long-established expertise in advancing the state-of-the-art in technology, the NLABS were represented by an exhibit in the educational category and several technical papers.

Magnitude of the congress was evidenced by participation of distinguished food technologists from most

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ASAP Slates Fall Meeting As MASSTER Orientation

Ground Warfare Panel members of the President's Science Advisory Committee will join with the Army Scientific Advisory Panel (ASAP) and defense research and development leaders for the ASAP fall meeting and an orientation on Project MASSTER, Oct. 5–6.

Lt Gen Beverly E. Powell, director of Project MASSTER and CG of Fort Hood, Tex., will be host to the meeting. Army Materiel Command CG General F. J. Chesarek, Assistant Secretary of the Army (R&D), Robert L. Johnson, Chief of R&D, Lt Gen A. W. Betts, and Combat Developments Command CG Lt Gen George I. Forsythe are expected to be participants.

Representatives of the Office of Defense Research and Engineering, the Assistant Chief of Staff for Force De-

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Norton Nominated for 3 Stars as New ACSFOR

Deputy Director of Project MASSTER Maj Gen John Norton has been nominated for 3-star rank when he takes over as Assistant Chief of Staff for Force Development, HQ DA, succeeding Lt Gen Frederick C. Weyand.

Secretary of Defense Melvin R. Laird announced General Norton's new assignment Sept. 11, but no definite date for assumption of his new duties was given. The promotion to 3-star rank has U.S. Senate approval.

General Weyand, nominated for 4-star rank, is scheduled to report as deputy commander of the U.S. Military Assistance Command Vietnam, succeeding General William B. Rosson, effective Nov. 1.

General Norton moved to the Project MASSTER assignment at Fort Hood, Tex., III Corps headquarters, in October 1969 after serving as CG of the U.S. Army Aviation Systems

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Maj Gen John Norton

Lt Gen F. C. Weyand

Maj Gen G. P. Seneff

Featured in This Issue . . .

Army R&D Newsmagazine

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Purpose: To improve informal communication among all segments of the Army scientific community and other Government R&D agencies; to further understanding of Army R&D progress, problem areas and program planning; to stimulate more closely integrated and coordinated effort among Army R&D activities; to express views of leaders, as pertinent to their responsibilities, and to keep personnel informed on matters germane to their welfare and pride of service.

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Chief of R&D Details Objectives for Army Aircraft

Army Chief of Research and Development Lt Gen Austin W. Betts, in a July 28 address to the Army Aviation Association of America in Los Angeles, Calif., detailed R&D objectives for Army aircraft within the limitations of envisioned budgetary constraints. His address follows.

* * *

Some years back, when Willie Sutton, the notorious bank bandit, was captured, he was asked why he robbed banks. "Because," he said with complete candor, "that's where the money is!"

Tonight, I am going to talk to you in complete candor, to tell you where we plan to "bank" our limited aviation R&D money. I do not mean to imply any similarity in operations between Willie Sutton and the aircraft industry.

Rather, it is my intent to lay before you the scope of the Army's aviation research and development program, as I see it for the next few years, thereby hopefully relieving industry from premature or false starts toward assumed Army aviation needs.

It is no news to this audience that the Army believes the development of the helicopter has had about the same revolutionary effect on battlefield tactics as did the development of the stirrup and the bridle centuries ago. Our battlefield successes of Vietnam, and the hard fact of reality is that we have been winning, are due in large measure to the mobility and flexibility provided our ground forces by the helicopter.

One may say, yes, the helicopter has proved its worth in Vietnam, but that is a unique situation where you have been operating under complete aerial supremacy—in the absence of a really sophisticated air defense system. Still your losses are over a thousand aircraft downed. What happens when. . . .?

We are well aware of this, but every study and war game exercise that I have seen indicates that the airmobile concept will be equally valid against a more sophisticated enemy, albeit some of our tactics may require modification.

What this says, then, is that the Army believes, in any military operation in the foreseeable future, it will rely to a major extent on aerial vehicles for tactical mobility, no matter the enemy—no matter the intensity.

The problem, then, is to maintain in the years ahead the tactical advantage that we believe we now have in this field—in the face of rising Soviet technological progress on one hand, and a shrinking United States defense R&D budget on the other. Quite a task!

It is sort of like my story of the young man who kept running to his boss and saying, "Sir, I have a problem." To get him started thinking positively, his employer told him sternly, "Young man, we don't speak of 'problems' around here; we have opportunities." A week later the young man was back: "Sir," he said, "I have an insurmountable opportunity!"

The technology of our current aerial vehicles is now basically over a decade old. I need only to remind you of the technological progress in the field of TV sets to stress the technological progress that has been made in the past 10 to 15 years—in all fields.

Some of the new aviation technology lends itself to incorporation into existing aircraft, a process generally referred to as upgrading or product improvement. Other technology requires a completely new system design if full advantage is to be made of the advances.

Ideally, we would like to replace system for system, wherever the cost effectiveness shows the new system to be superior. As we all know, this is not always possible for several reasons—available dollars being the principal one.

In the past, this has not presented the problem, though, that it does today, since technological advances did not come with great rapidity and racing with obsolescence was not a daily trial. . . . Missile systems we fielded in the late 50s and early 60s have already become technological antiques that we have been forced to relegate to the scrap smelter or to museums.

Today, obsolescence poses an increasingly difficult problem. In the air-mobility area, we are essentially at a cross-over point. We are now coming to the time when all of our first-generation air-mobile systems should, from a technological point, be undergoing replacement during the next 5 to 10 years.

The air-mobility systems we need, and need the soonest, are the gunship to replace the "interim" Cobra, an assault-lift aircraft to replace the aging

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Blue Ribbon Panel Report Considered for Potential Impact on R&D

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affected hard at work preparing their own detailed evaluations, analyses and comments on the report. Wide differences of opinion are expected.

Many major problem areas reviewed in the report, prepared during a year of intensive high-level effort under the guidance of Gilbert W. Fitzhugh as chairman, have been long recognized by the defense agencies. Other focal points of attack have been more recent in surfacing to the degree that concerted, aggressive remedial action has been of priority importance.

In effect, the report presents to the President a comprehensive review of the prevailing situation in the Defense Department, as viewed by the panel, along with highly critical observations and some broad-sweeping proposals for massive change.

Obtainable through the Superintendent of Documents, U.S. Government Printing Office, cost $2.25, the report provides interesting reading for anyone concerned in problems of managing the vast resources of the Department of Defense, functioning of the Joint Chiefs of Staff and, particularly, the conduct of research and development and procurement of military materiel.

Chapter headings and the space devoted to each are: organization, pages 21–61; management of materiel resources, 62–110; management and procedures, 114–134; management of personnel resources, 135–144; other management considerations, 145–179; conflicts of interest, 180–196.

Individual views of dissenting panel members range from pages 198 to 210 and the consolidated recommendations from 211 to 237. An Executive Summary states major points of the panel's findings and recommendations in less than nine pages.

Pages 10 to 20 are devoted to the background and introduction of the report, termed "the first broad-scale study of the Department of Defense in many years—in fact since the two Commissions on Organization of the Executive Department of Government chaired by former President Hoover."

An explanation important to the defense agencies concerned with preparation of comments and recommendations or suggestions regarding the report appears on page 20, as follows:

"Selected staff reports have been identified as Appendices to this Report. The Panel's recommendations are in no case based exclusively on these staff reports, as its studies were broader and more extensive than the staff reports alone.

"Some of the appended staff reports contain detailed facts and evaluations bearing on specific recommendations of the Panel while others address subjects, draw conclusions and suggest changes in areas which the Panel as a whole did not choose to address.

"In some such instances, there was a question as to whether the studies

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Blue Ribbon Defense Panel Members

Membership of the Blue Ribbon Defense Panel, chaired by Gilbert W. Fitzhugh, chairman of the board, Metropolitan Life Insurance Co., included:

Dr. Martha E. Peterson, president, Barnard College, Columbia University; Mrs. Leona P. Thurman, attorney; William Blackie, chairman of the board, Caterpillar Tractor Co.; George Champion, president, Economic Development Council of New York City; William P. Clements Jr., chairman of the board, SEDCO, Inc.; John M. Fluke, president, John Fluke Manufacturing, Inc.;

Dr. Marvin L. Goldberger, professor of physics, Princeton University; Robert C. Jackson, chairman, Teledyne Ryan Aeronautical; Lane Kirkland, secretary-treasurer, AFL-CIO; Hobert D. Lewis, president, Readers Digest Association, Inc.;

Wilfred J. McNeil, director-adviser, Fairchild-Hiller Corp., and president, Tax Foundation; Dr. Ruben F. Mettler, president, TRW, Inc.; Lewis F. Powell Jr., attorney; Dr. George J. Stigler, professor of American Institutions, University of Chicago; Claude Young, Office, Commissioner of Professional Football.

Dr. Peterson resigned from the Panel because of the pressure of her duties at Barnard College and Dr. Goldberger resigned because of illness.

ASAP Slates Fall Meeting As MASSTER Orientation

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velopment, Assistant Chief of Staff for Intelligence and other Army R&D agencies, along with senior consultants of ASAP, are expected to raise total attendance to approximately 75.

Dr. John D. Baldeschweiler, professor of chemistry at Stanford University and a member of the ASAP, is chairman of the PSAC Ground Warfare Panel, which also includes some ASAP members.

Presiding as chairman for the first time will be Lawrence H. O'Neill, president of Riverside Research Institute and a former professor of electrical engineering at Columbia University. Secretary of the Army Stanley R. Resor approved his appointment effective Aug. 1 as successor to Dr. Harold M. Agnew, ASAP chairman since January 1966.

Appointed director of the Los Alamos Scientific Laboratory effective Sept. 1, Dr. Agnew has been a member of the ASAP since 1964 and was vice chairman under Dr. Finn J. Larsen. He will continue as a member.

Lt Col James R. Fuller succeeded Lt Col Edward E. Roderick as executive secretary of ASAP when Roderick was reassigned to Fort Hood recently to command a tank battalion of the First Armored Division. Col Fuller has served as assistant secretary since 1968.

Norton Nominated for 3 Stars as New ACSFOR

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Command, St. Louis, Mo., since May 1967.

Maj Gen George P. Seneff, a member of the growing family of former staff officers in the Office of the Chief of Research and Development, HQ DA, who have advanced from field grades to 2-, 3- or 4-star rank, has been assigned to succeed General Norton as deputy director of Project MASSTER.

General Seneff served in OCRD from June 1956 to August 1959, as a staff officer until promoted to chief of the Analysis and Evaluation Division in August 1956, and from July 1958 as chief, Air Mobility Division.

Following graduation from the National War College, he was assigned for three years in Paris, France, as U.S. Army member of the Mutual Weapons Development Program, Office of the Secretary of Defense.

Two years as commander of the 11th Air Assault Aviation Group at Fort Benning, Ga., were followed by duty as director, Army Aviation, Assistant Chief of Staff for Force Development, HQ DA, until February 1966.

After two months as an aviation officer, U.S. Army Vietnam, he became CG of the 1st Aviation Brigade for a year and a half, leaving to become CG of the 3d Infantry Division. Since March 1969, he has been J–3, HQ U.S. Army Strike Command.

CERL Reviews R&D Achievements on First Anniversary

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that blur the view problem by owners, engineers and builders.

CERL has applied this approach successfully to problems of rigid airfield pavements, troop construction in theaters of operation, military family housing and the Safeguard Antiballistic Missile System.

Dr. E. L. Murphree is credited with developing the systems approach to rigid airfield pavements. He assembled a working team representing 28 organizations/agencies dependent upon airfield pavements. All three of the Military Departments, along with the Department of Defense, aircraft manufacturers, pavement maintenance crews and pilots of the huge new Boeing 747 aircraft were represented.

Talking papers were prepared by experts in user needs, pavement design, construction, airport operations, maintenance, and systems analysis as a basis of communication during a 2½-day conference at CERL.

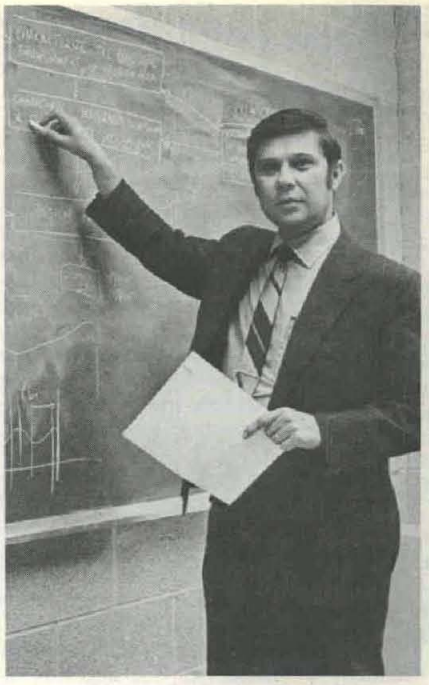
Identified during the meeting were the need for and basis of an entirely new approach to pavement design and behavior for the era of the C5A 747, the next generation jumbo-jet aircraft. Discussion fostered two subsequent meetings on the same theme sponsored by non-Defense agencies.

Application of the systems approach to troop construction has resulted in a project sponsored by the Joint Services Emergency Contingency Board of the Joint Chiefs of Staff. The first output will be a catalogue of modular buildings which the Army, Navy, Air Force and Marines have available for construction in theaters of operation.

In military housing, in cooperation with the Department of Housing and Urban Development (HUD), Project Breakthrough is seeking to provide a basis for a research and development study of industrialized building of units.

Safeguard ABM System research and development, coordinated with the Huntsville (Ala.) Nuclear Division (HND) of the Army Corps of Engineers, has led to a preliminary design of a biaxial shake table to test prototype hardware items as heavy as 15,000 pounds; also, refinement of a construction scheduled procedure accountable for weather conditions on-site.

Dr. Shaffer said first-year operations of CERL have established that the systems approach to research and development in construction can lead to improvement in military and civilian construction techniques. Resulting products are less costly, available on a more timely basis, and in performance more sensitive to the many users dependent on them.



Dr. E. L. Murphree

CERL's ongoing R&D activities include development of materials for permanent construction; development of improved design, management and construction techniques; design of military housing systems; sociotechnological-economic forecasting for military construction; and development of engineer functional component systems.

Additional efforts involve hardened facility systems; improved utility systems; development of computer-aided techniques for design and construction management; development of improved structural systems; and improved pavement design methods.

Recruitment of the skilled, highly specialized staff required by CERL is approximately two-thirds completed within the authorization for Phase I, which provides for 115 civilians and two military personnel.

Budgetary constraints in harmony with the national administration's economy efforts to dampen inflationary trends have complicated the phased construction schedule for CERL's specially designed facilities at the University of Illinois.

Two new buildings are providing laboratory resources adequate for current requirements. Construction of an administration building has been deferred indefinitely. Phase III calls for two "mirror image" buildings plus machine shops facing current labs.

STRICT Seen as New Approach to MOS Tests

Situation-Test-Requirement-Item-Cluster-Technique (STRICT), termed a new approach to Military Occupational Specialty (MOS) tests, was reported in a paper presented recently by an Army education specialist.

Dr. John J. Holden, assigned to the U.S. Army Ordnance Center and School at Aberdeen (Md.) Proving Ground, presented the paper at an MOS Test Development Conference at the U.S. Army Quartermaster School, Fort Lee, Va. It is titled "The Development of Military Occupational Skill Performance Items for MOS Evaluation Tests."

STRICT was developed as a replacement for test questions which do not separate performers from nonperformers, with the objective of writing questions in the language of the job.

Dr. Holden demonstrated the difficulties encountered when using a single multiple-choice type item in the construction of MOS evaluation tests.

Even a properly constructed multiple-choice item is limited to the coverage of only one topic, task, or element of knowledge, he said in pointing out advantages of developing a cluster of items around a situation-requirement.

Each cluster, he contends, should consist of a "situation" paragraph and a group of several multiple-choice items. The student is given an MOS duty or task-related problem with information, conditions, or data and the necessary illustration that must be analyzed or evaluated in answering the pertinent test items which follow. Each test item is referenced to the "situation" and is answerable independently of other items in the "cluster."

The STRICT approach offers advantages inherent in open-book tests and overcomes limitations of single multiple-choice type items. It is proposed as an ideal technique for evaluation of managerial, supervisory, administrative, and clerical skills or tasks.

Dr. Holden, who has earned degrees from Ithaca College and Rutgers University and has a doctorate from the University of Southern Mississippi, recommends further study and refinement of the Situation-Test-Requirement-Item-Cluster-Technique to develop it for possible implementation.

International Food Congress Recognizes NLABS' Role

(Continued from page 1)

of the major countries. Some 435 technical papers were presented, with 85 more chosen for inclusion in the published proceedings. Two plenary sessions and two "structured" discussion groups involved an impressive array of the world's experts.

Sponsored jointly by the International Committee for Food Science and Technology in conjunction with the U.S. Departments of Agriculture and of Health, Education and Welfare, the congress was supported by some 119 U.S. or U.S. elements of major industrial organizations or foundations. The host was the Institute of Food Technologists.

Presentations were translated simultaneously in five languages. Participants used color-coded hearing sets —blue for English, brown for French, red for German, yellow for Russian and green for Spanish.

For the first time since the congress was initiated, commercial organizations were permitted to display their products or services. The educational exhibit category was featured by displays prepared by the U.S. Department of Agriculture's Research Service to represent all parts of the United States.

In addition to the NLABS' exhibit, the U.S. Army Medical R&D Command and the U.S. Agency for International Development Office of Nutrition offered exhibits. Educational displays also were shown by International Food Service of England, the League for International Food Education (LIFE), National Center for Fish Protein Concentrate of the U.S. Department of Interior's Bureau of Commercial Fisheries, the U.S. Committee for UNICEF, and the University of Manitoba.

Opening plenary session speakers and their topics were: Executive Board SOS/70 chairman R. L. Hall, welcoming remarks; Dr. George W. Irving Jr., administrator, U.S. Department of Agriculture Research Services, "The Challenge of the 70s: Produce and Conserve"; Dr. Gunnar Myrdal, professor of international economy, Sweden, "Political, Social and Economic Aspects of the Food Production Problem"; and The Right Honorable The Lord Ritchie Calder, Scotland, "Famine at the Feast."

Dr. Philip Handler, president, U.S. National Academy of Sciences, presented the featured W. O. Atwater Memorial Lecture. Chancellor-Emeritus E. M. Hrak of the University of California at Davis gave introductory remarks at the closing plenary session. Other closing speakers and their topics:

Dr. Fred Sai, director, Medical Services, Ministry of Health, Ghana, "Role of Food Science in Developing Africa"; The Honorable K. P. Mathrani, food secretary, Government of India, "Nutrition and Public Planning"; Dr. Ross A. Chapman, director-general, Food and Drug Directorate, Department of National Health and Welfare, Canada, "The 70s—Challenge and Change for Food Science."

Countries represented by members on the International Committee of Food Science and Technology which sponsored the congress included Australia, Canada, Czechoslovakia, Denmark, Finland, France, Federal Republic of Germany, Hungary, India, Israel, Japan, Korea, Mexico, The Netherlands, New Zealand, Philippines, Poland, South Africa, Spain, Sweden, Switzerland, Thailand, United Kingdom, U.S.S.R., and United States. The United Nations Food and Agricultural Organization also was represented.

One of the features of the congress was a display of more than 100 books and periodicals, representative of numerous nations, on problems of providing, processing and preserving food, along with new sources of food envisioned through an accentuated research and development effort. The exhibit was highlighted by a "Meet the Author" program to provide an opportunity for interviews.

Numerous recommendations adopted by the congress will be included in publication of the proceedings. Many will be offered for consideration by the United States Congress.

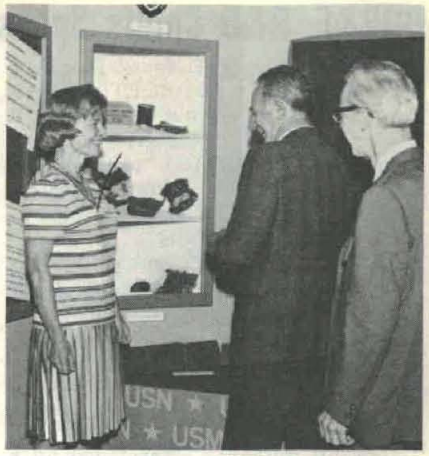
NATICK LABORATORIES' technical paper authors and subjects are: H. A. Hollender, Mary V. Klicka (recipient in July 1970 of a Department of Defense Distinguished Civilian Service Award for her "significant contributions to the feeding of combat soldiers and astronauts"), G. Legris and M. C. Smith, "Space Food Technology: A Review" and

Z. Markus and G. Silverman, "Enterotoxin a Biosynthesis"; E. Wierbicki, A. Anellis, J. J. Killoran, E. L. Johnson, M. H. Thomas and E. S. Josephson, "High Dose Radiation Processing of Meat, Poultry and Seafood Products"; R. S. Kahan and J. J. Howker, "Retention of Fresh Chicken Quality in Refrigerated Poultry Using Radiation and Other Techniques"; and

S. J. Bishov, A. S. Henick and J. W. Giffee, "Headspace Oxygen and Stability in Freeze-Dried Foods"; H. Gorfien, A. R. Rahman and D. E. Westcott, "Extension of Shelf-life of Fresh Produce in Controlled Atmospheres"; J. G. Kapsalis, J. E. Walker Jr. and M. Wolf, "A Physicochemical Approach to the Study of the Textural Properties of Low and Intermediate Moisture Foods"; and

H. R. Moskowitz and J. Secrist, "Sensory Evaluation and Optimization of Flavor Attributes"; A. R. Rahman, S. Bishov and D. E. Westcott, "Reversible Compression of Dehydrated Foods"; M. H. Thomas and E. Wierbicki, "Effect of Irradiation Dose and Temperature on Thiamine Content of Ham."

FORT DETRICK, Md., laboratories, U.S. Army, were represented at the congress by a paper presented by E. J. Schantz, "Chemical and Physical Properties of Some Purified Staphylococcal Enterotoxins."



NATICK LABORATORIES ration design specialist Mary V. Klicka discusses panel of DoD Food Program exhibit with Dr. J. M. McIntire, general manager, Carnation Co., Van Nuys, Calif., and Dr. Byron H. Webb, chief, Dairy Products Lab, U.S. Department of Agriculture, Washington, D.C. The exhibit was presented at the Third International Congress of Food Science and Technology in Washington, D.C.

WECOM CG Presents LOM To Retiring WECOM CofS

U.S. Army Weapons Command CG, Maj Gen H. A. Rasmussen, presented the Legion of Merit to Col Robert W. Schafer when he retired recently as WECOM chief of staff to terminate more than 29 years of active duty.

Col Schafer has accepted a position as assistant city manager of Kettering, Ohio. He has BS and MS degrees from Ohio State University and in 1965 was awarded an MS degree from George Washington University.

DDR&E, R&D Chiefs Sponsor TACRAC Program

The Director of Defense Research and Engineering (DDR&E) and tri-Service R&D chiefs are sponsoring a Tactical Warfare Research Advisory Committee (TACRAC) program in which key personnel from industry, government, and the U.S. Armed Forces are participating.

The first scheduled event is a classified (Secret) symposium on Land Warfare Nov. 16–18 at Fort Benning, Ga. If the approach proves useful, TACRAC II, III and IV programs in areas such as Air Interdiction, Ocean Control, and Combat Support may be arranged.

Over-all guidance is provided by a steering committee chaired by Charles A. Fowler, Deputy Director of Defense Research and Engineering for Tactical Warfare Programs. Members are Lt Gen A. W. Betts, Army; Rear Adm E. A. Ruckner, Navy; Lt Gen Otto J. Glasser, Air Force; and Maj Gen Louis Metzger, Marine Corps.

A tri-Service TACRAC management group headed by General Charles Bonesteel (USA, Ret.) is supported by the Advanced Research Projects Agency, the Institute of Defense Analysis and the Research Analysis Corp. Col Robert E. Lazzell, chief of the Plans Division, Office of the Chief of R&D, is the Army member.

Objectives of TACRAC are:

- To develop within the scientific and engineering communities a greater understanding of the challenging complexities of modern tactical warfare.
- To define and vivify specific problem areas considered by the Services to be among the most crucial in terms of finding technological contributions to their solution.
- To offer the opportunity to stimulate innovative approaches to solving, through a mission-oriented approach, the most critical problems.
- To provide a methodological framework encouraging the cross-fertilization of ideas and the cross-application of new developments and concepts among the various mission areas of tactical warfare RDT&E.

The general session of the TACRAC I Symposium will provide an overview of some of the challenges of tactical warfare RDT&E, stressing the operational and technical nature of problems in land combat. Deputy Secretary of Defense, David Packard, will be the dinner speaker.

Session II will include discussions and presentations on Mine and Booby Trap Countermeasures by representatives from several agencies. Lt Col Robert D. Cicchinelli, Surveillance, Target Acquisition, Night Observation (STANO) Systems Office, Office of the Chief of Staff, U.S. Army, will present "Operational Environment."

"Accurate Delivery of Firepower" is the theme of Session III. Maj Gen B. E. Huffman, senior Army member of the Weapons Systems Evaluation Group (WSEG), will discuss "Operational Aspects and Considerations, Surface-to-Surface." Dr. Joseph Sperrazza, director of the Army Materiel Systems Analysis Agency, will discuss "Technology Overview."

During Session IV dealing with Close Air Support, Col Robert L. McDaniel, ODDR&E, will speak on "Ground Force View."

Session V will feature discussions on "Location of Hostile Indirect Fire Weapons." Maj Gen William B. Fulton, STANO Systems manager, Office of the Chief of Staff, Army, will give the introduction.

Preceding the final session, a discussion on land warfare will involve as panel members Army Chief Scientist Dr. Marvin E. Lasser, OCRD; Victor L. Friedrich, Assistant for Electronics to the Assistant Secretary of the Army (R&D); Clyde V. Hardin, Assistant for Southeast Asia Matters to the ASA(R&D); and David C. Hardison, Combat Developments Command Scientific Adviser.

AMC Solicits New Concepts for Small Arms

Interest in development of new weapons systems concepts for military application is being promoted in the Small Arms Incentives Program by the Army Materiel Command.

Proposals for new systems considered to have suitable potential may be eligible for financial support in the form of development or study contracts. AMC's Small Arms Systems Agency at Aberdeen Proving Ground, Md., administers the program for the Advanced Research Projects Agency.

The program seeks to stimulate development of weapons to be used by the individual soldier, on light combat vehicles, or as secondary armament for armored vehicles. Included are pistols, submachineguns, grenade launchers and machineguns.

Suggestions are solicited in the following areas: ammunition and ammunition packaging; production techniques; cartridge cases; projectiles; terminal effects; fuzing; target detection and target acquisition (i.e., surveillance radar, infrared/ultra-violet detection, optics, and sighting devices); weapons and weapon mechanisms; mounts; material finishes; explosives and pyrotechnics; manufacturing supplies, including metals, plastics and similar materials.

The program is designed to promote interest in weapons systems development among inventors, gunsmiths, machinists, hobbyists, and small shop owners, as well as industrial, educational, research and nonprofit institutions and government agencies.

Proposals should contain enough information for evaluation on the basis of whether the concept is technically sound, offers an attractive probability of success and has potential military value. Proposals recommended for further consideration will be evaluated for study or development contractual support.

Proposals should be submitted to the commanding officer, U.S. Army Small Arms Systems Agency, Aberdeen Proving Ground, Md. 21005.

Davis Assigned as Director, Commander of ECOM Lab

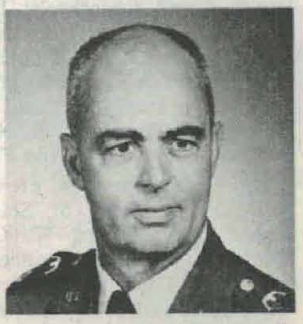
Lt Col James H. Davis is the new director and commanding officer of the Combat Surveillance, Target Acquisition and Systems Integration Laboratory, HQ U.S. Army Electronics Command (ECOM), Fort Monmouth, N.J.

The laboratory has been under the direction of Herbert Goldwag since June when Lt Col George R. Davis was assigned to Vietnam. Goldwag is now serving as technical director of the laboratory.

Col James Davis was assigned to ECOM following a tour of duty with the Targeting Division of the J–2 Intelligence Directorate, HQ European Command, Stuttgart.

Other major assignments have included the Targeting Office, Defense Intelligence Agency in Washington, D.C.; artillery adviser to the 1st Turkish Army in Istanbul; and a tour in the Department of Target Acquisition, Fort Sill, Okla. He was assigned to Korea in 1951.

Col Davis earned a BS degree in electrical engineering from the University of Kansas in 1950 and a master's degree in meteorology from the University of Texas in 1958. He completed the Artillery School at Fort Sill and remained on the staff and faculty until 1956. He also is a graduate of the Command and General Staff College.



Lt Col James H. Davis

Budgetary Cutbacks Contribute to OCRD Realignments

Organizational realignments within the Office of the Chief of Research and Development, HQ DA, attributable mainly to personnel authorization losses and budgetary cutbacks, have effected recent reassignments of personnel and functions.

Increased emphasis on improved management of in-house laboratories is reflected in assignment of Col Robert B. Bennett to a new position as principal assistant for laboratory actions to Director of Army Research Brig Gen George M. Snead Jr.

Assisted by Lt Col Harry Collins and Maj Edward E. Chick in a newly established Laboratory Review Office (LRO) in the Pentagon, Col Bennett is responsible to General Snead and to Deputy and Scientific Director Dr. Richard A. Weiss for all matters pertaining to laboratory systems.

Functions of the office include coordination and preparation of General Staff actions related to Army laboratory systems; also, assisting in supervision of staff actions for Army laboratories to ensure planning, program coordination and review and analysis of laboratory reports.

Objective of the LRO is to assure a "reasonable balance of research, development, testing and evaluation effort among U.S. Army in-house laboratories, industry and universities." This includes assessment of over-all quality of the laboratories' products and accomplishments.

Retirement of Brig Gen Kenneth F. Dawalt as Deputy Chief of Research and Development (International Programs) was accompanied by abolishment of this position and reassignment of functions to Director of Plans and Programs Brig Gen George Sammet Jr.

The OCRD memorandum effecting this change requires General Sammet to incorporate in his duties such functions as "are feasible to absorb"; also, to develop a plan for assignment of other functions to the International Office and to other elements—"with necessary trips and attendance at international conferences to be shared by various general officers of OCRD."

Under the guidance of Col James E. Wirrick, a veteran of OCRD assigned to the International Office staff since October 1969, this office is now an element of the Directorate of Plans and Programs. Col Wirrick succeeded Col T. C. Rohan following his recent retirement.

Director of Developments Brig Gen John W. Barnes has been assigned additional responsibility as Deputy Chief of Research and Development for Southeast Asia; also, as Army member, Office of the Secretary of Defense PROVOST Steering Committee, and vice director of Plans and Programs.

Abolishment of the Office of the Executive for Administration, replaced by an Office of the Chief of Administration headed by Col Clinton B. Haden with Jack R. Merrits as deputy, led to changes affecting veteran employes.

CWO Joseph Garner, associated with the OCRD administrative office since 1961 except for a tour of duty in Vietnam, is now chief of the Administration Branch. Another long-time employe, Mrs. Kathleen R. Durkin, was appointed chief of the Military Personnel Branch. Mrs. Nora Comer, also a veteran, is chief of the Management Services Branch.

With the discontinuance of the long-established OCRD Technical and Industrial Liaison Office and transfer of its functions to the Office of the Chief of Administration, TILO Chief Col R. A. Smith was reassigned as chief of staff of STRATCOM Agency in Hawaii.

Walter Willis, assigned to the R&D Office of the Office of the Chief of Staff in 1952 and to the TILO since June 1956, was appointed chief, Technical and Industrial Liaison Branch, Office of the Chief of Administration.

L. VanLoan Naisawald, with OCRD since March 1960, became chief of the new Special Programs and Support Branch.

Loss of two military and one civilian manpower spaces in authorized strength of the Nuclear, Chemical and Biological Division, accompanied by a review of essential functions to be accomplished, resulted in transfer of these functions to several OCRD divisions.

The Communications-Electronics and Space Division gained responsibility for RADIAC instrument development. The Physical and Engineering Sciences Division added the Army Nuclear Power Program and the nuclear reactor safety responsibility, along with special nuclear materials reports.

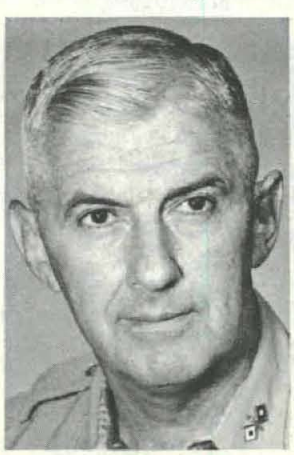
Life Sciences Division is now charged with medical nuclear materials effects research and health physics; also, biological research projects and general biological investigations formerly performed by the NCB Division. The director of Army Ballistic Missile Defense assumed the added duty of space nuclear clearance activities.

No additional personnel spaces are allocated to the divisions charged with the additional functions, except that the Director of Army Research may adjust personnel authorizations within his resources.

Grady Takes Control of CEEIA Engineering Directorate

Assignment of Col John H. Grady as head of the Communications Engineering Directorate, Communications Electronics Engineering Installation Agency (CEEIA), U.S. Army Strategic Communications Command, Fort Huachuca, Ariz., was announced Sept. 9 by Brig Gen Harry E. Tabor, deputy commander of STRATCOM and CG of CEEIA.

Col Grady, who succeeds Col George E. Rippey, served at Fort Huachuca as a combat developments action officer from 1956 to 1958. His most recent assignment was deputy director for communications systems, Office of the Assistant Chief of Staff (Communications-Electronics), HQ DA. His earlier assignments in the communications-electronics field include service with the Joint Chiefs of Staff and the Office of the Chief Signal Officer, HQ DA.



Col John H. Grady

He has served with HQ Eighth U.S. Army in Korea, in Vietnam with the 39th Signal Battalion, and the U.S. Army-Vietnam.

Col Grady has a BS degree in military engineering from the U.S. Military Academy (1946), a master's degree in communications engineering from the University of Illinois (1953), and is a graduate of the Army Command and General Staff College and infantry and signal schools.

Among the awards and decoration he holds are the Legion of Merit, Bronze Star Medal, the Joint Services Commendation Medal and the Army Commendation Medal.

Bureau of Commercial Fisheries Records Fish Locations With Night-Vision Devices

Night-vision devices loaned to the Bureau of Commercial Fisheries at Pascagoula, Miss., are being used to determine potential application for rapid location and identification of fish in open-sea areas.

Developed by the Army to increase combat effectiveness of U.S. troops under cover of darkness, the new image intensifier devices have also been loaned to other government agencies and universities for research projects. For example, they are being used to study habits of vampire bats and coconut crabs at night (see July–August 1970 issue, p. 27).

Kirby L. Drennan of the Bureau of Commercial Fisheries reports, in a recent technical paper, on use of the night-vision devices, which amplify the dim glow of stars or faint skyglow to provide a clear image to the observer.

In Florida, Spanish mackerel fishery yields an annual catch of 7 to 8 million pounds and is carried on chiefly with gill nets and haul seines at night, he states.

Night-vision devices were used as one approach to locating and identifying these fish by detecting the bioluminescence or "fire" caused by the movement of rapidly swimming fish. The image intensifiers can amplify this bioluminescence 40,000 times through the use of a 3-stage intensifier tube.

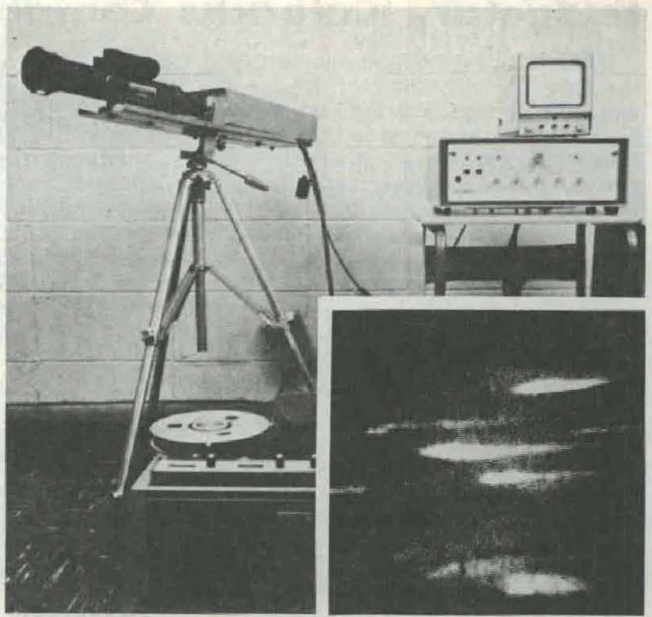
A Plumbicon Television-Image Intensifier System was used to observe individual fish, schools of fish, scuba divers, and objects towed at subsurface depths in water containing both high and low concentrations of luminescing organisms.

Observations were made from surface vessels, a stationary oceanographic platform, and from fixed- and rotary-wing aircraft.

In studies conducted off the west coast of Florida, imagery of schools of herring was obtained at night from altitudes of 500 to 5,000 feet. Results indicate that low-level light sensors can be used effectively in locating and possibly identifying fish stocks in the open sea.

Remote sensing systems expected to evolve from these studies and other research made possible through night-vision advancements are envisioned as having both day and night-sensing capabilities in locating fish at sea, and for numerous other civilian use applications.

Recording of migration data and the ability to predict movements and concentrations of various species of fish will enable the fishery industry to anticipate and predict where larger catches can be taken. This will result in a significant reduction in search time and operating costs per unit of catch.



STARLIGHT SCOPE, coupled to Plumbicon Television System, is used to observe fish, scuba divers and objects at subsurface depths. Inset shows bioluminescent fish outline.

ECOM Names Donnelly Warfare Lab Chief

Commanding officer and director of the U.S. Army Electronics Command's (ECOM) Electronic Warfare Laboratory at Fort Monmouth, N.J., is the new title of Col James D. Donnelly, a staff officer in 1967–68 with the Office of the Chief of Research and Development, HQ DA.

Col Donnelly has been product manager for teletypewriters at HQ U.S. Army Electronics Command, Fort Monmouth. N.J., since March 1969, when he returned from Vietnam.

From 1964 until 1967, he commanded the 1st Signal Battalion in Stuttgart and was later assistant chief of staff for communications-electronics for the U.S. Army in Berlin.

Col Donnelly has served with the Research and Development Directorate, U.S. Army Missile Command, Redstone Arsenal, Ala.; the Office of the Chief Signal Officer, Washington, D.C.; and in Korea with the Military Assistance Group.

He has a BS degree in mathematics and physics from Georgetown University and has done graduate work in engineering administration at George Washington University. He attended the Command and General Staff College in 1961.

His awards and citations include the Bronze Star, Legion of Merit and the Army Commendation Medal.

Col James D. Donnelly

Betts, Klingenhagen Slated To Speak at APBI, Oct. 15

Lt Gen Austin W. Betts, Army Chief of Research and Development, and Maj Gen John L. Klingenhagen, commanding general of the U.S. Army Aviation Systems Command (AVSCOM), will speak at an Army Aviation Advanced Planning Briefing for Industry (APBI) Oct. 15.

"Challenge of the decade of the 1970s" will be the theme of the briefing cosponsored by the Army Aviation Association of America (AAAA) and the AVSCOM, St. Louis, Mo. The briefing will be held in the State Department's West Auditorium, 22d Street and Virginia Avenue, N.W., Washington, D.C.

APBI will coincide with the regular annual meeting of the AAAA, Oct. 15–16, at the Shoreham Hotel, Washington, so that industry personnel present for the meeting will be able to attend the briefing.

Further information and registrations may be obtained by writing AAAA, 1 Crestwood Drive, Westport, Conn. 06880. The $30 registration fee includes attendance at both the briefing and the AAAA annual meeting, other than the President's Reception and the Honors Luncheon.

Major Army RDT&E, Procurement Contracts Exceed $334 Million

Continued R&D of the Safeguard Antiballistic Missile System accounted for $92,210,276 of $334,481,040 in Army RDT&E and procurement contracts, each exceeding $1 million, issued from July 1 to Sept. 1.

Bell Helicopter Co. was awarded two contracts totaling $39,731,386 for OH–58A helicopters and repair of UH–1 series of crash-damaged aircraft. Federal Cartridge Corp. received a $32,213,651 order for production of small arms ammunition at a government-owned facility.

M113 vehicle procurement is involved in a $30,288,194 contract with the FMC Corp. Page Aircraft Maintenance, Inc., was issued a $27,500,519 contract for maintenance of aircraft at Fort Rucker and Fort Stewart.

Three contracts totaling $13,555,939 with Raytheon Co. are for advanced development of the SAM–D missile system and for engineering services for the Hawk missile. Lockheed Electronics Co., was issued an $8,119,606 order for scientific engineering, technical and support services for continued operation, maintenance and future development of the electromagnetic environmental test facility at Fort Huachuca, Ariz.

Thiokol Chemical Corp. is receiving $8,096,400 for loading, assembling and packing of illuminating cartridges. Dynalectron Corp. is providing maintenance support, modifications and repair of rotary- and fixed-wing crash-damaged aircraft for $8,029,657.

Electro Space Corp. is receiving $8,014,454 for AN/PRC–77 radio sets and RT–841/PRC–77 receiver-transmitters. Lear Siegler, Inc., will be paid $7,434,147 for maintenance support, modifications and repair of crash-damaged aircraft.

Litton Systems, Inc., will receive $6,428,000 for development, manufacture and test of prototypes of the Air Defense Guided Missile System, AN/TSQ–73. RCA Corp. gained three contracts totaling $4,171,583 for 40mm intensifier assemblies and for two mobile MPS–36 radars.

Parachute signals are being furnished under two contracts with Pace Corp. totaling $4,037,680. Lockheed Aircraft Corp. is receiving $3,225,765 for maintenance support, modifications, maintenance and repair of crash-damaged aircraft.

Novo Corp. is performing container services for Oakland (Calif.) Army Base under a $3,039,741 contract. Marathon Battery Co. will receive $2,967,300 for dry batteries and associated test equipment and Varo, Inc., $2,766,003 for image-intensifier assemblies.

LTV Corp. was awarded $2,623,000 to retrofit Lance missile ground support equipment; Union Carbide Corp., $2,442,731 for batteries; Ronal Industries, Inc., Port Chester, N.Y., $2,348,988 for winterizing 1¼-ton trucks; Olin Corp., $2,113,398 for illuminating projectiles.

Honeywell, Inc., is receiving $2,026,048 for production of PDM551 fuze parts, and Ford Motor Co., $2,020,510 for engineering support services for the M151, M718 and M825 series of vehicles.

Contracts under $2 million. Global Associates, $1,858,363 for logistic support at Kwajalein Missile Range; General Research Corp., $1,833,500 for data processing system analysis for the Advanced Ballistic Missile Defense Agency; and

URS Systems Corp., $1,797,586 for technical services and data processing operations; Engineered Devices, Inc., $1,778,400 for fire trucks; Philco-Ford Corp., $1,750,000 to upgrade two satellite communications stations at Camp Roberts, Calif., and Fort Dix, N.J.; and

Kisco Co., Inc., $1,509,136 for 105mm cartridge cases; Human Resources Research Organization, $1,500,000 for research and studies in support of the Army Human Resources Research Program; and

General Motors Corp., $1,411,330 for storage batteries; IBM Corp., $1,274,249 for preliminary ballistic missile defense software development for an IBM data processing system; Hughes Tool Co., $1,260,000 to repair crash-damaged aircraft; and

Chandler-Evans, $1,092,000 to overhaul fuel controls on UH–1 helicopter engines; Owens-Illinois, Inc., $1,011,500 for cinetheodolites and support equipment to record moving target positions; and Xerox Corp., $1,000,000 for classified services.

ECOM Announces Knight Assigned as DCO

Deputy commander of the U.S. Army Electronics Command is the new assignment of Col (Brig Gen designate) Albion W. Knight Jr., as announced Sept. 9 by HQ ECOM, Fort Monmouth, N.J.

The successor to Brig Gen Harold A. Kissinger, recently reassigned to Vietnam, was graduated from the United States Military Academy in 1945 and commissioned in the Signal Corps. Col Knight served the past year in the Office of the Secretary of Defense as a military assistant.

Assigned to the U.S. Atomic Energy Commission staff in Germantown, Md., he served in 1968–69 as assistant director, Division of Military Application, responsible for research and development matters.

After graduating from the Industrial College of the Armed Forces in 1963, he served on the faculty in Washington, D.C., an additional year.

An assignment to the Office of the Assistant Chief of Staff for Force Development followed from July 1964 to July 1968 as chief, Nuclear Division, and alternate Army member of the Military Liaison Committee to the U.S. Atomic Energy Commission.

After graduating from the Army Command and General Staff College in 1959, he was assigned to the Office of the Deputy Chief of Staff for Military Operations in Washington until July 1962. He earlier served in the Office of Special Weapons Development, Continental Army Command, at Fort Bliss, Tex., and with the Armed Forces Special Weapons Project at Sandia Base, N. Mex., over an 8-year period—interrupted by attendance at the Advanced Officers Course at the Fort Monmouth Signal School and a year in Korea.

Col Knight has an MS degree in communications engineering (1950) from the University of Illinois.

Col Albion W. Knight Jr.

Brig Gen Graves Succeeds Watkin As North Central Division Engineer

Brig Gen Ernest Graves Jr., deputy director of Military Construction, Office of the Chief of Engineers, will become Division Engineer for the North Central Division of the Army Corps of Engineers, Chicago, Ill., on Dec. 1. He will succeed Brig Gen William W. Watkins Jr., who recently was assigned to duty in Vietnam.

CDCEC Adapts Laser to Evaluate Combat Maneuvers

Laser beams are simulating live rounds of ammunition for realistic evaluation of combat maneuvers at the U.S. Army Combat Developments Command Experimentation Command (CDCEC), Fort Ord, Calif.

The heart of the Direct Fire Simulator System (DFS) is a laser transmitter attached to the barrel of an M–16 rifle, machinegun, or any direct-fire weapon.

Worn by an individual rifleman (see photo below), the DFS is powered by a battery pack and has eight laser beam detectors. A hip-pack contains the logic circuitry. Combined with a Range Measuring System (RMS–2) and a Central Computer, the DFS provides the CDCEC with a realistic means of evaluating combat maneuvers.

When a soldier squeezes the trigger of his weapon, the transmitter sends out a harmless laser beam of light the same distance a live round would travel. If a "hit" is scored, the light beam is picked up by one of eight detectors the opposing soldier is wearing. Four of these special sensors are located on his helmet, two on his chest and two on the lower part of his body.

The detector converts the code carired by the laser beam into coded current pulses and, by using the RMS–2 transmitter carried by the soldier, relays information to a central computer system. In a fraction of a second, the computer decides who did the shooting, who was "hit" and whether or not there was a "kill."

RIFLEMAN holds M16 with Direct Fire Simulator System attachment that fires a laser beam to simulate live rounds of ammunition. He also wears special sensors on his helmet, chest and knees to transmit "hit" or "kill" information to a central computer during realistic evaluation of combat maneuvers at CDCEC Ford Ord, Calif.

The computer tells the soldier he is "hit" by setting off a buzzer in his helmet. It also trips a switch in his equipment that puts his laser transmitter out of operation. The casualty is time recorded simultaneously on computer printout, providing precise information on how the simulated battle is progressing. Field commanders can judge immediately the effectiveness of the tactics being used.

Before the CDCEC put the DFS into use, the transmitters were tested for abnormal conditions that could result in energy density levels in excess of the limit established by the Office of the Surgeon General. Results showed that the DFS laser could not emit radiations in excess of safety standards based on detailed studies of eye safety hazards.

Fifteen members of CDCEC's Experimentation Battalion are participating in tests to compare simulated fire of the DFS with live fire of the M–16 at Fort Ord. Further tests will be made at CDCEC's Hunter Liggett Military Reservation to check performance of the DFS under simulated combat situations.

WRGH Designated Army Organ Transplant Center

Designation of Walter Reed General Hospital in Washington, D.C., as the U.S. Army's first "Organ Transplantation Center" was announced Sept. 1 by the Army Surgeon General.

Patients for kidney transplants will be received from seven Army hospitals termed "Regional Dialysis Centers." They are Walter Reed, William Beaumont in El Paso, Tex., Letterman in San Francisco, Calif., Tripler in Honolulu, Hawaii, Brooke in San Antonio, Tex., Fitzsimons in Denver, Colo., and Madigan in Tacoma, Wash.

Jancy Cothran received the first kidney transplant in an operation performed Aug. 10 by Walter Reed surgeons and was released from the hospital Aug. 31. She is the daughter of retired Air Force Col and Mrs. B. A. Cothran of Columbia, S.C., currently residing in Laurel, Md.

The donor was Jancy's 23-year-old brother, Army 2d Lt Benjamin A. Cothran Jr.

The Office of the Surgeon General said the broad transplant policy of the new center at Walter Reed will allow for other organs to be transplanted in the future when more is known about the tendency of the body to reject foreign tissue.

Proximity of Walter Reed Army Institute of Research and the Armed Forces Institute of Pathology, likewise at the Walter Reed Army Medical Center, accounted for selection of Walter Reed General Hospital for the Organ Transplantation Center.

Army medics are now using modern techniques, including dialysis, to save lives of soldiers who are suffering renal failure. A later transplant would enable them to lead a more normal life. Under the transplant plan, renal patients will be sustained at one of the dialysis centers for transfer to the Walter Reed center if a transplant is indicated.

Kidneys will be obtained from a living related volunteer—brother, sister or parent—requiring consent of the patient also before surgery. Volunteer donors must be over 21, healthy and emotionally stable. Use of cadaver donors is planned in the future.

Organ recipients will be active duty or retired members of the military, their dependents or dependents of deceased members.

Donors will receive related medical treatment without charge, including examination, hospitalization, transportation to and from the hospital and follow-up treatment related to the donation. Subsistence charges will also be waived. The donor will be discharged from further care when he has fully recovered from the surgery.

Active duty military members will be accepted as donors only when other properly matched donors are not available.

If a satisfactory kidney cannot be found for a potential recipient, who is active duty military, he will be separated from the military and transferred to a Veterans Administration or civilian hospital for further treatment. In the case of a dependent or retiree, the patient will be placed on home dialysis or returned to a Regional Dialysis Center.

The Army Organ Transplantation Center works with civilian centers; future plans include an even closer affiliation through computerized cadaver-organ-patient matching to enable a more effective use of organs.

USACSC Sets Commanders Conference

Lt Gen William E. Depuy, Assistant Vice Chief of Staff, U.S. Army, will be the featured speaker at the U.S. Army Computer Systems Command's (USACSC) Third Commander's Conference at Fort Belvoir, Va., Oct. 15-16. The agenda includes presentations and discussions by key command headquarters staff personnel and visiting commanders from the U.S., Europe and the Pacific.

Picatinny Installs New Large-Scale Computing System

Three years of planning, testing and evaluating the most powerful equipment available in the computer industry have culminated in installation of a large-scale computing system at Picatinny Arsenal, Dover, N.J.

The "heart" of the system is the Control Data Corp. 6500 computer, the first of its kind to link three different types of remote terminals to meet multiple requirements of the scientific and engineering community participating in arsenal activities.

To insure that the equipment selected would satisfy operational objectives, a new and more rigorous method of evaluation was developed jointly by the Data Processing Systems Office of Picatinny Arsenal and the Computer Systems Support and Evaluation Command, HQ Department of the Army.

Based on comprehensive data, a model was constructed which was statistically matched to the arsenal's computer workload mix. The model contained 48 different computer programs consisting of over 30,000 Formula Translator (FORTRAN) cards. Each interested vendor was required to convert these programs to his computing system and then demonstrate actual execution of the model.

Effort required to accomplish the conversion and the amount of time each manufacturer's equipment took to run the programs were measured by a team of experts from Picatinny and HQ Department of the Army. Purpose: To insure that the conversion effort was practical, that the manufacturer's "software" functioned well and that the equipment could handle the estimated workload.

Three remote terminals of the CDC 6500 provide capabilities ranging from an electronic desk calculator through the most extensive large-scale analytical programs. Picatinny experts believe it offers one of the most modern on-line interactive graphics systems serving the Department of the Army.

Through teletypes connected via phone lines to the computer, geographically dispersed users can compose new programs or draw upon existing ones stored in the computer's files at the central site. In both cases, answers can be requested and received immediately.

For problems which are too large and require more extensive output than is practical with the teletype, five batch-processing terminals have been located in the arsenal's larger engineering areas.

Each terminal provides a card reader and a line printer as extensions of facilities at the computer center. Telephone links make it unnecessary to travel to the center except when using the largest of the arsenal's computer programs with extensive printed output.

Batch terminals also have a TV-like screen or scope in which the terminal user can receive a snapshot of the operator's console at the central computer facility. He can tell whether jobs he has submitted are being processed or are awaiting action. The remote terminals also are being used to serve outside customers.

Personnel in Picatinny's Data Processing Systems Office, at HQ Munitions Command and at Frankford (Pa.) Arsenal are providing for the arsenal's scientific and engineering computing requirements.

Power and versatility of the Picatinny computer center system constitute a major resource in the over-all Army Materiel Command complex to serve current requirements and to develop new techniques in computer-aided design expected to have a major impact on future materiel research and development.

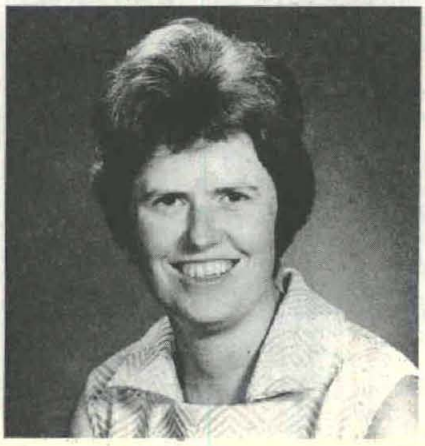
Data Processing Systems Office Chief David L. Grobstein checks out new computer recently installed to link three Picatinny Arsenal terminals.

Mezzo-Soprano Avionics Engineer Represents ECOM in Vietnam With R&D Liaison Team

A red-haired, amateur mezzo-soprano entertainer who is also an avionics engineer is serving three months in Vietnam as the Avionics Laboratory representative on the U.S. Army Electronics Command's Research and Development Liaison Team.

Mary Purvis, since 1960 an ECOM engineer at Fort Monmouth, N.J., will be part of a 4-member team which rotates its membership to insure that each ECOM laboratory has a professional scientist in the field.

Two years ago Mary took flying lessons in a flight training program sponsored by the Avionics Laboratory to help scientists in the lab better understand the research and development challenges encountered by an avionics engineer. (See *Army R&D Newsmagazine*, March 1968, p. 22.)



Mary Purvis

In Vietnam she will check on field problems relating to research and development, as contrasted with the regular maintenance problems handled by field representatives of ECOM's Maintenance Engineering Directorate.

R&D field liaison representatives are interested in design of equipment which the ECOM labs can develop in support of field forces, the improvement of existing equipment, and solving problems involved with avionics equipment in Army aircraft.

During her three months overseas, Mary will wear WAC uniform fatigues. She is scheduled to return to Fort Monmouth in late October.

A graduate of Newark College of Engineering with a BSEE degree, Mary lives with her parents, Mr. and Mrs. Donald Purvis, in a house which Mary designed.

As a trained mezzo-soprano, Mary has appeared in several amateur stage productions. She works with young people at St. Dorothea's Church, Eatontown, singing with a guitar group at the folk mass. Mary took some music to Vietnam with her in case there is an opportunity to participate in a similar program.

MECHANICAL FAILURES PREVENTION GROUP, representing more than 100 scientists and engineers from industry and federal agencies who met recently at the U.S. Army Tank-Automotive Command (TACOM), Warren, Mich., includes (from left) Daniel F. Anconda, TACOM conference coordinator; Dr. B. Sternlicht, MTI Corp., meeting chairman; Cmdr C. R. Oberg, Office of Naval Research (ONR), program director; Brig Gen Alvin C. Isaacs, deputy CG of TACOM; Lt Cmdr S. W. Doroff, ONR; Lt Cmdr S. J. Gordon, ONR; Dr. William Sawyer.

Diesel Engine Info Exchanged at TACOM Meeting

Identification and Prevention of Mechanical Failures in Internal Combustion Engine Systems was discussed at a recent 2-day meeting at HQ U.S. Army Tank-Automotive Command, Warren, Mich.

More than 100 industrial and federal scientists and engineers exchanged information and views, including employes of the Department of Transportation, Department of Commerce, Atomic Energy Commission, National Aeronautics and Space Administration, and Department of Defense.

USATACOM deputy CG Brig Gen Alvin C. Isaacs welcomed the group, formed in 1967 and sponsored by the Office of Naval Research to apply technological expertise to prevent, control and predict failures.

Cited during the discussion was a recent report that faulty lubrication leading to mechanical failures is costing American industry an estimated $10 billion annually. Numerous other causes of failure leading to loss of life, serious injury or property loss were reviewed.

Presentations included: Failures of Diesel Engines in Naval Shipboard Service, W. Anderson and R. A. Coulombe, U.S. Navy; A Fleet Maintenance Officer Looks at Engine Failures, Lt Cmdr Robert Kronberger, Long Beach (Calif.) Naval Shipyard; Problems of Small Military Engine Generator Sets, J. H. Horton, U.S. Army Mobility Equipment Command;

Field Failure Data from the Army Equipment Reporting System, Earnest Rickard, U.S. Army Maintenance Board, Fort Knox, Ky.; Failure Experience with Fleet of Modern Automobiles, D. L. Powel, Auto Research Laboratories, Inc.; and

Failure Classification as an Aid for Failure Prevention in Diesel Engines, A. A. Schmudde, Caterpillar Tractor Co.; Use and Misuse of Lubricating Oil Analysis to Prevent Engine Failures, Robert Bates, D. A. Lubricant Co., Inc.; and

External Indicators of Internal Failures, George Staton, U.S. Army Frankford Arsenal; Vehicle Diagnostics in the Service Environment, John St. John, Service Research Center; Advanced Support Concepts of Internal Failures, R. J. Brachman, Frankford Arsenal.

Chairman of the meeting was Lt Cmdr Stanley W. Doroff, Office of Naval Research, assisted by Dr. William T. Sawyer of Chesapeake College as executive secretary. Presiding was Dr. B. Sternlicht of MTI Corp. Cmdr C. R. Oberg of ONR was the program director.

Col Mitman Takes Command of Ft. Detrick

Col Floyd B. Mitman Jr. took command of Fort Detrick, Md., and the U.S. Army Biological Defense Research Center Aug. 17 after returning from an assignment in Thailand as chief of staff, HQ U.S. Army Support.

Lt Col Selvyn French, who had served as interim commander, returned to his former duties as head of the Installation and Services Directorate.

Col Mitman has served as director of the Advanced Research Projects Agency Office for the Middle East, Africa South of the Sahara and Southern Asia area in Beirut, Lebanon. He also has held R&D assignments at Deseret Test Center, Fort Douglas, Utah, and the Pentagon, Washington, D.C.

In 1952 he was special assistant to the Deputy Secretary of Defense for Special Security Programs, subsequent to an assignment as executive officer to the Chief Chemical Officer. During World War II, his military career took him to North Africa, Sicily, Italy and France.

He has a BS degree in chemistry from Indiana University (1939) and an MS degree in organic chemistry from Pennsylvania State College (1941). He graduated from the Command and General Staff College in 1955 and the Army War College in 1965.

Col Mitman's decorations include the Legion of Merit with Oak Leaf Cluster, Bronze Star Medal, Army Commendation Medal and the Purple Heart.

Col Floyd B. Mitman Jr.

Brig Gen Rebh Assumes Duties In New Dual CE Assignment

Effective Oct. 1, recently promoted Brig Gen George A. Rebh assumed new duties as deputy director, Military Construction and assistant to the Chief of Engineers for National Aeronautics and Space Administration Support.

Assigned to the Plans Division, Office of the Assistant Chief of Staff for Force Development, HQ DA, upon his return from Vietnam earlier this year, General Rebh served in 1967–68 as deputy division engineer in the Huntsville (Ala.) Engineer Division.

He assisted in the organization of this division, which is responsible for construction of the Sentinel Antiballistic Missile System sites.

In World War II he served in the European Theater of Operations, participating in five campaigns. After VE day, he was assigned to Washington, D.C., as a staff member on the Manhattan Project.

In 1946, he was awarded a Rhodes Scholarship which enabled him to earn BS and MS degrees at Oxford University in England. Commissioned in the Army Corps of Engineers upon graduation from the U.S. Military Academy in 1943, he is a graduate of the Army Command and General Staff College and the Industrial College of the Armed Forces.

AFIP Malaria Research Proves Antibody Reactions To Parasite Infections May Cause Kidney Disease

Research at the Armed Forces Institute of Pathology (AFIP) in Washington, D.C., has provided recent conclusive evidence that the antibody reaction to malarial parasite infection can lead to renal deposits of immune complexes which may cause serious kidney disease.

The nephritis which may develop as a result of the malarial infection may prove a more serious threat to the health of the patient than the malaria itself, according to a number of recent reports on investigations.

Dr. Peter A. Ward, chief of the AFIP Immunobiology Branch, won an Army Research and Development Achievement Award in 1969 for experimentation which demonstrated, using a precise method for detection, that antigen-antibody activity complexes formed in the response to the malarial parasite is associated with deposits in the renal glomeruli. The deposits can lead to functional and structural aberrations recognized clinically as the nephritis or nephrosis of malaria.

The high incidence of malarial infection among U.S. and allied forces in Southeast Asia and the emergence of drug-resistant forms of malaria accentuate the need for further research in its renal complications.

In research on the immune complexes supported by Department of the Army funds, splenectomized rhesus monkeys were injected with *Plasmodium cynomolgi*, a cause of simian malaria.

Half of the monkeys in the experimental group were immunized prior to infection to elevate the antibody levels and thus increase the amount of circulating immune complexes. All the monkeys were unilaterally nephrectomized, on the theory of doubling the amount of immune complexes to which a single kidney would be subjected.

Kidneys were found by immunofluorescence to contain immune complexes and were subjected to experimental procedures to elute the antigen-antibody complexes from tissues. Further experiments are in progress to determine the nature of the antigen-antibody complexes.

Deposits of antigen-antibodies also have been found in experiments with renal biopsy material from East African humans who developed glomerular disease after malarial infection.

Dr. Ward said it is necessary that the pathogenesis of the renal lesion caused by the immune deposits be understood in dealing with the nephritis which develops ensuant to malaria.

Continuing studies in the AFIP Immunobiology Laboratories under Dr. Ward's direction are attempting to determine more precisely the nature of the immune complexes deposited in the kidneys during malarial infection.

Researchers are seeking evidence of the complexes in the blood, on the theory that the antigen-antibody complexes are formed elsewhere in the body and carried through the circulatory system to the kidneys.

Dr. Ward suggested destroying the malaria vectors as the most effective way of combatting malaria and the ensuing nephritis. Also, if a patient with malaria is diagnosed early, prompt treatment may prevent the renal complication from developing.

Dr. Peter A. Ward

Located at Walter Reed Army Medical Center, Washington, D.C., the AFIP is a joint service agency commissioned to maintain consultation services for pathologic tissue, conduct pathological research and provide instruction in advanced pathology.

Dr. Ward has been at the AFIP since August of 1965. He spent two years there as a captain in the Army Medical Corps and remained as chief of the Immunobiology Branch after separation from the Army.

Graduated from the University of Michigan with a BS degree in biology, Dr. Ward has a medical doctorate from the University of Michigan Medical School. From 1963 to 1965 he studied experimental immunopathology at the Scripps Clinic and Research Foundation in La Jolla, Calif.

Lt Col Ammerman Assigned as APG Executive Officer

Lt Col Howard E. Ammerman, new executive officer at Aberdeen (Md.) Proving Ground, is a veteran of 28 years Army service. He was previously assistant operations officer, Army Ordnance Center and School at Aberdeen.

From 1967 to 1969 he was chief of Ordnance Unit G–4, Army Section, Joint U.S. Military Mission for Aid to Turkey.

Assigned to Springfield Armory in 1965 as chief of the Research and Engineering Division, he subsequently served as deputy commander for Plans and Administration. In 1963 he was 71st Ammo Dump Materiel officer and Ordnance Ammunition Battalion commander in the Far East, following assignments at Redstone Arsenal, Ala., and in Washington, D.C.

Col Ammerman entered the Army in 1942 as an ROTC commissioned officer. From 1946 to 1949 he served in the Far East Command as a member of the 1st Cavalry Division Artillery and subsequently was assigned to G–3, General Headquarters. He transferred to Ordnance in 1953.

He has a BS degree from the University of Maryland and has completed courses at the Command and General Staff College and the Industrial College of the Armed Forces (extension).

Lt Col H. E. Ammerman

AVSCOM Systems Director Earns MIT Master's Degree

Lt Col George T. Neu has been named Systems Engineering director of the U.S. Army Aviation Systems Command (AVSCOM), after receiving an MA degree from MIT.

A 1954 graduate from the U.S. Military Academy, Col Neu is a qualified Army parachutist and Senior aviator.

He has served as commanding officer and executive officer of the 4th Armored Division in Germany and with Army Aviation in France. Col Neu has been an instructor of aircraft maintenance doctrine and organizations and has also taught nuclear weapons effects, capabilities and employment.

Before graduate study at MIT, he was assigned to the Aviation Materiel Management Center in Vietnam.

Col Neu has been awarded the Bronze Star, the Air Medal with Oak Leaf Cluster and the Army Commendation Medal.

Maj Gen Horner Assigned as AMC Chief of Staff

Maj Gen Charles T. Horner Jr. assumed responsibilities of chief of staff, U.S. Army Materiel Command, in August after completing an assignment as commanding general, 2d Logistical Command in Okinawa.

General Horner also has headed the 2d Logistical Command at headquarters, Fort Lee, Va., served as chief of staff, I Corps (Group) in Korea, and was executive officer, Programs Division, Supreme Headquarters Allied Powers Europe.

Other key assignments have included assistant commander, 5th Infantry Division, Fort Carson, Colo.; commander, 1st Infantry Brigade, Infantry Center, Fort Benning, Ga.; chief, Combat Developments Office, Infantry School, Fort Benning; and chief of staff, Military Assistance Advisory Group, Vietnam.

General Horner, who started his career as an enlisted man in 1934, has served as U.S. Army Infantry representative with the United Kingdom War Office and School of Infantry, London, England; and in the Research and Development Division, Office of the Assistant Chief of Staff, G4, HQ Department of the Army, Washington, D.C.

He served during World War II in eight major campaigns in the North African and European theaters, including the amphibious assaults on Oran, Sicily and Normandy. As an Infantry battalion commander, he participated in the assault landing at Gela in Sicily and at Omaha Beach in Normandy.

Graduated from the University of Pennsylvania with a bachelor's degree, he has completed the executive management course at the University of Pittsburgh, and is also a graduate from the U.S. Army War College.

Maj Gen Charles T. Horner Jr.

General Horner has been awarded the Distinguished Service Cross, the Distinguished Service Medal, the Silver Star with Oak Leaf Cluster (OLC), the Bronze Star with "V" device and three OLCs, and the Combat Infantryman's Badge and numerous foreign decorations.

Watervliet Scientists File Applications for 2 Patents

An application for a patent on development of a lightweight composite material and a patent award on a "Split Ring Valve for Bore Evacuator" were announced recently by Watervliet (N.Y.) Arsenal.

Dr. Guiliano D'Andrea filed application for a patent on his fifth invention, a composite material equal to steel in heat conductivity but weighing only one-quarter as much. It consists of geometrically identical copper or aluminum fibers uniformly distributed throughout an epoxy resin matrix containing titanium powder.

Intended as a post-saving substitute for the pads, customarily made of wood and other conventional materials, used in the boring of large-caliber gun tubes, the material has proved experimentally that it can be cast or molded economically to shape with excellent dimensional stability.

Dr. D'Andrea has been issued patents for development of a constant-pressure lubricator for a 20mm gun system, a breech actuator mechanism, a laterally sliding breechlock for loading large-caliber guns, and a metallic obturator for sealing a high-pressure gun.

The patent for the Split Ring Valve for Bore Evacuator was issued to Walter H. Austin, chief, Component Development Section, and Donald F. Trudeau, a mechanical engineering technician.

Designed to replace various check valve arrangements in Army artillery, the evacuator device has improved function experimentally and provided easier maintenance of the bore evacuator in installations at the arsenal.

Powell Goes to TECOM as Deputy CG, CofS

Brig Gen Edwin L. Powell Jr. reported for duty early in August as the new deputy CG and chief of staff, HQ U.S. Army Test and Evaluation Command at Aberdeen (Md.) Proving Ground.

Maj Gen Frank M. Izenour, CG of the TECOM, welcomed General Powell at formal ceremonies as successor to Brig Gen Michael Paulick, who retired from active duty in July after serving as deputy CG since 1968.

From April 1969 until he departed for his new duties, General Powell was assistant commander of the Americal Division in Vietnam, following three years as deputy and then director of Army Aviation, HQ DA.

After a tour of duty at the Army Infantry Center at Fort Benning, Ga., where he participated in the Army's examination of new air mobility concepts, General Powell was assigned in 1965 as military assistant to the Secretary General for Scientific Affairs, North Atlantic Treaty Organization.

Brig Gen Edwin L. Powell Jr.

Key assignments have included service with the Army Aviation Board, the Army and Engineer Board, in Iran with the U.S. Army Engineer District (Gulf), with the Office of the Chief of Research and Development at HQ DA, and in the Office of the Secretary of Defense.

During World War II, he served in North Africa and Europe with the 16th Armored Engineer Battalion and with HQ 1st Armored Division.

Graduated from the United States Military Academy in 1941 with a commission in the Corps of Engineers, he received a master's degree in civil engineering from the University of California in 1948. He also is a graduate from the Air War College, Army Command and General Staff College, Army Aviation School, and the Army Primary Helicopter School.

The 50-year-old general's decorations include the Silver Star, Legion of Merit with OLC, Distinguished Flying Cross, Bronze Star Medal, Air Medal with "V" device and 17 OLCs, and the Purple Heart.

CE Releases Shore Protection Book

The Army Corps of Engineers has released a 25-page booklet "Shore Protection Program," explaining the Federal program for shore protection of the oceans and Great Lakes from erosion. It also defines methods available to State and local governments for Federal assistance from the Corps.

Copies are available from the Corps of Engineers division or district office, or from the Director, U.S. Army Coastal Engineering Research Center, 5201 Little Falls Road, NW, Washington, D.C.

TOPOCOM Applies ADP Techniques to Geographic Information Responsibilities

Establishing a data bank of worldwide geographic information is the challenge U.S. Army Engineer Topographic Laboratories are attempting to meet by applying ADP techniques to military geographic information.

Located at Fort Belvoir, Va., ETL is in the advanced development stage of designing an integrated military geographic information system. ETL is a part of Army Topographic Command, Chief of Engineers.

The proposed system is being designed to meet the worldwide requirements for geographic information of Army elements stationed within the CONUS (continental United States), and the regional requirements for the operational area of a field Army.

A worldwide geographic information system can be viewed as applying a grid to the globe, with topographic information to be filled in about the area of earth represented by each grid. Approximately 20 percent of the earth's geographic information has been gathered, researchers estimate.

Eight warehouses in the Washington, D.C., area contain printed information about the earth's surface gathered by the military.

The system proposed by ETL would store much of this geographic information micrographically and electronically and would complete the process of filling in information about each of the global grids. The voluminous amount of data currently stored by conventional printing methods would be reduced, and the electronically stored information would be more readily available.

Marvin Gast, chief, Geographic Applications Branch, Geographic Sciences Division, ETL, said:

"A major advantage of the data bank concept is the elimination of depots, with their mountains of obsolete hard copy products. Printing would be done only when somebody needed the product, and the product he would get would be current."

Information would be available in varied, flexible means, such as hard copy, computer printouts, or the answer to a phone call—information tailored to meet the needs of the requester. An automated system would apply analytical models to the raw geographic data to provide the requester with information needed.

As an interdependent topographic system within the Department of Defense, the data bank would be based on standardization of data elements, computer software and procedures.

Termed an "Integrated Topographic System," it would combine functions currently performed separately by topographic mapping units and terrain intelligence units. Gast said the integrated system must contain all types of military geographic information, including maps, geodetic data and terrain studies.

Ease of access for a particular data element would be governed by the frequency with which the element is requested and the speed of response required by requesters.

For the integrated concept to be operative, each associated organization would have to feed data according to an agreed division of labor.

Creating such a data bank of geographic information is being considered as a total concept in which collecting, reducing and processing are treated as one function.

"There is no reason," Gast explained, "why the great amount of research and development effort that will be expended by the Army to design the data base of geographic information and write the machine-independent computer programs to operate the system cannot be considered to have a dual purpose.

"The Army's worldwide design could be adapted for civilian use at the national level, covering the entire United States, and the field Army design could be adapted for use at state or regional levels. The information required by Civil Affairs elements to establish a workable military government is the same as that required by local and regional planning agencies."

Approximately $6 million of research and development funds will have to be invested by the Army before the debugged computer programs will be available to civilian agencies. Gast said no special effort would be required to make the programs usable by a civilian agency.

Dr. Kenneth R. Kothe, chief, Geographic Sciences Division, ETL, described the topographic data system as one which would contain wide information for decision making about terrain and man-made features.

The base of geographic data to be stored in the system includes such elements of the natural environment as surface configuration, drainage characteristics, soils, rock types, coasts, vegetation, climatology and surface and ground water.

Included also would be elements of the cultural environment such as highways, railroads, inland waterways, airfields, electric power, petroleum and gas, solid fuels, urban areas and ports.

The system would contain information on labor force and skills, economic factors such as construction and mineral resources, construction and transportation organizations and storage facilities, and such political factors as boundaries and territorial waters. This data would be used to support military and civilian missions.

ECOM Scientist Gets 3 Patents

Three patents were granted recently to William B. Glendenning, research scientist in the Integrated Electronics Division of the Electronic Components Laboratory, U.S. Army Electronics Command (ECOM), Fort Monmouth, N.J.

His new inventions are "Method of Measuring the Thickness of a Diffused Surface Layer," "Corrosion Vapor Etching Process," and "Removing Surface Defects from Semiconductor Junctions." The first invention is designed to facilitate process control of integrated circuits; the other two increase production of solid-state devices and integrated circuits.

Col Vogt Assigned as Deputy CO STRATCOM Pacific

The U.S. Army Strategic Communications Command (STRATCOM) has assigned Col Blain O. Vogt as deputy commander of STRATCOM Pacific.

He succeeds Brig Gen Wilburn C. Weaver, reassigned to Southeast Asia as deputy commander, 1st Signal Brigade.

Col Blain O. Vogt

Col Vogt served until recently with the Office of the Secretary of Defense in Washington, D.C., as an Army member for the Military Studies and Liaison Division, Weapons Systems Evaluation Group. STRATCOM assignments have included commander of the Communications Systems Agency at Fort Monmouth, N.J., and the 160th Signal Group, 1st Signal Brigade, in the Republic of Vietnam.

He has served in the Office of the Chief Signal Officer, HQ DA; General Headquarters, Far East Command; the Joint Chiefs of Staff, NATO; and the Military Assistance Advisory Group, Federal Republic of Germany.

He has BS and MA degrees from the University of Maryland and is a graduate of the Command and General Staff College, and the Industrial College of the Armed Forces.

AVLABS Offer Courses Under Project Transition

Under a Department of Defense program, Project Transition, the U.S. Army Aviation Materiel Laboratories, Fort Eustis, Va., are offering a 240-hour, 6-week course to help military personnel nearing a return to civilian life to prepare for good-paying jobs.

Trainees work right alongside veteran specialists. No classes are held and trainees learn by doing. One to three persons are assigned to an instructor to receive detailed information on his work as he goes about his normal duties. As students learn, they assume a portion of the work under the instructor's guidance.

Volunteers for the training may learn such crafts as machinist, tool and gauge maker, welder, sheet metal worker, modeler and woodworker.

Depth of the training depends on experience, if any, aptitude and interest in the subject. Advancement in the trade is limited only by ability.

For example, instruction is given in such advanced work as laying out and making various metal parts to tolerances of .0002 based on reading and interpretation of complex blueprints.

To qualify for the training, all a man needs is an earnest desire to learn the trade and the determination to stick with the program until completed, said Curtis M. Mull, program supervisor.

Mull is chief of AVLABS Experimental Fabrication Branch, Engineering and Technical Services Division. Herman P. Simon, who introduced the program at AVLABS nearly two years ago, is division chief.

Applicants for training are first interviewed by Mull and his staff and told what will be expected. They tour facilities and ask questions about areas of interest.

Previous experience is not necessary to qualify. Many civilians-to-be use this training opportunity to brush up on past or related experience they may have acquired in or out of military service.

Successful trainees receive a letter of congratulations from Mull at the conclusion of the course. The letter outlines the various types of equipment and machinery the man has learned to operate and proves an effective door opener to employment.

PROJECT TRANSITION trainee Sgt Tom Brown (left) learns how to set up a milling machine for precision operation, under the watchful guidance of John B. Clayton, an experienced model maker with the U.S. Army Aviation Materiel Laboratories, Fort Eustis, Va.

ILR Designated Principal Army Logistics R&D Agency

Designation of the Institute of Logistics Research (ILR), Army Logistics Management Center (ALMC), Fort Lee, Va., as the principal organization for conducting logistics research and developing logistics methodology through the Army Materiel Command was announced Sept. 3.

The logistics research effort is designed to insure optimum utilization of resources through improved techniques in the accomplishment of the AMC mission.

Assignment of ILR tasks, designation of objectives, and the establishment of priorities will be accomplished only by or through HQ AMC directorates. Other administrative matters pertaining to the ILR will be the responsibility of the commandant, Army Logistics Management Center.

In effect, the institute will act as AMC's "Think Tank" across the full spectrum of Army logistics.

The institute will develop the Army Logistics Management Center study programs; provide technical reviews of study proposals and on-going studies; and evaluate completed logistics related studies from Army sources as well as from the other military services, Defense Supply Agency, and General Services Administration.

Lt Gen Henry A. Miley Jr., AMC deputy CG, has directed that operational control of the ILR Logistics Studies Office (LSO), Inventory Research Office (IRO), and Procurement Research Office (PRO) be placed under the control of related elements of HQ AMC.

The LSO and the IRO will be placed under the director, Plans and Analysis, and the PRO under the Directorate of Requirements and Procurement. The LSO and PRO are elements of the institute at the ALMC. The IRO is located at Frankford Arsenal in Philadelphia.

General Miley said the current state-of-the-art developments in automatic data processing have provided the AMC with visibility of the complete cycle of procurement, wholesale supply and distribution, "allowing us to measure the effect on retail supply.

"I have directed that certain elements of the Army Logistics Management Center be placed under the operational control of related elements of HQ AMC to take advantage of this increased visibility and provide timely responses in support of command-level decisions.

"These changes have been designed to provide a more timely response to the appropriate functional elements of this headquarters. They must, however, be implemented so that the instructional mission of the Army Logistics Management Center will continue to reflect the latest developments in doctrine and techniques."

AVLABS Award Contracts For Helicopter Blade Design

Two 7-month study contracts to develop advanced designs for helicopter main rotor blades were awarded in mid-September by the U.S. Army Aviation Materiel Laboratories (AVLABS), Fort Eustis, Va.

Col John R. Adie, AVLABS commanding officer, said the studies are intended to help solve the problem of main rotor blades which generate high maintenance costs due to a high rate of externally-caused damage coupled with poor repairability characteristics.

An $89,836 contract, Repairable Main Rotor Blade Advanced Design Study, was awarded to Kaman Aerospace Corp. to analyze and evaluate various design concepts for rotor blades from the standpoints of costs, maintainability and reliability.

A $96,548 contract, Sectionalized Main Rotor Blade Advanced Design Study, was awarded to the Vertol Division of the Boeing Co. to develop the best design for a sectionalized main rotor blade, in which damaged sections can be easily and quickly replaced under operational conditions.

Late General Ware Memorialized

Keith L. Ware Annual Awards for Excellence in Newspapers, Magazines, Radio and Television is the recent redesignation of what formerly were the Annual Army Newspaper, Magazine, Radio and Television Program Awards.

The contest, which ends Dec. 31 each year, now honors the memory of the late Maj Gen Keith L. Ware, Medal of Honor recipient and former Army Chief of Information, who lost his life in Vietnam in 1968 while commanding the 1st Infantry Division.

Army Tests LWL-Developed Tapelights in Vietnam

Electroluminescent tapelights, designed for use at remote area airfields, landing zones and drop zones, have recently been evaluated with favorable results in Vietnam.

Developed by the U.S. Army Land Warfare Laboratory (LWL) at Aberdeen (Md.) Proving Ground, the new lightweight lighting system is based on stimulated light emission from a material. Electrical energy is converted primarily into light without first having to be converted into heat.

In the past three years, the LWL developed three lighting systems for use in remote areas—the Landing Zone Director's Signal System, which was recently type classified for limited production; a Front Line Trace Marker; and an Airfield Lighting Set.

The plastic tapelight lamp used in all three systems is 1.75 inches wide and comes in any length up to 150 feet. It operates on batteries as well as on conventional a.c. power sources available to Army field units.

The lights are available in white, green, yellow and blue. Other colors can be attained by applying photoluminescent overlays. Green is the primary lamp color used in all three systems, since it is the brightest and most easily seen at night.

The flat configuration and unidirectional emission of the tapelight make it possible for the user to limit the exposure of light to minimize detection by enemy ground forces.

The Loading Zone Director's Signal System, consisting of two electroluminescent signal paddles and a signal apron (see photo), was developed to enable the control officer to direct aircraft in their landing approach.

The paddles are flashlight cases that use two "D" cells and contain an electronic inverter into which a 12-inch electroluminescent tapelight is plugged. The signal apron also has two 12-inch tapelights set in plastic pockets in a "T" configuration.

The Front Line Trace Marker is made of two juxtaposed tapelights and a powerpack and carrying case. It provides a night signaling device that enables ground troops to indicate their defensive perimeters, assault lines or combat fire and maneuver formation to aircraft pilots.

Tapelights are encased in a panel that uses a rot-resistant material as backing and a clear plastic covering on top to enable effective light transmission. It has an operation time to half brightness of 300 hours.

The airfield lighting system was designed to mark boundaries, taxiways, helipads and obstructions in remote areas. The tapelight is 20 inches long and 2¼ inches wide and is encapsulated in fiberglass. Various colors are used to define runways, taxiways and obstructions. A collapsible Lexan fixture has been developed to permit either flat or an inverted "V" installation.

Other components include a battery pack, flasher units and a set of strobe timers that can be used to produce a sustained sequencing strobe effect to mark the approach end of a runway.

The airfield lighting system will withstand rotor downwash effects of up to 120 mph. It has a slant range visibility of two to three miles at 1,500–2,000 feet elevation on a dark, clear night.

Landing Zone Director's Signal System is one of three electroluminescent tapelight lighting systems developed by the U.S. Army Land Warfare Laboratory for use at remote area airfields.

Vietnam Veterans Dominate COAC

Combat veterans from tours of duty in Vietnam comprised the majority of 37 students in the 36-week Chemical Officer Advanced Course which started Sept. 11 at the Chemical Center and School, Fort McClellan, Ala.

Natick Appoints Dr. Byrne Chief of ORSA Office

Dr. Robert J. Byrne, who recently obtained a PhD degree in industrial engineering from the University of Massachusetts, has been appointed chief of the Operations Research and Systems Analysis Office, U.S. Army Natick (Mass.) Laboratories.

Dr. Robert J. Byrne

As head of the newly established office, he directs studies for over-all cost reduction and improved performance of future military systems involving Natick's research, development and engineering efforts in support of the combat soldier.

Dr. Byrne received his BS degree in civil engineering at the University of Massachusetts (1951) and MS degree in engineering management at Northeastern (Boston) University (1967).

He has been a staff member of Natick Laboratories since 1954 and was associated with the U.S. Geological Survey, Department of the Interior, for three years.

ECOM Appoints New Comptroller, Director of Programs

Appointment of Robert C. Lowery as the U.S. Army Electronics Command's (ECOM) comptroller and director of programs follows 14 years service as deputy comptroller and director of programs for the U.S. Army Missile Command (MICOM), Redstone Arsenal, Ala.

Drafted into the Army while he was a student at Wooster (Ohio) College, he finished active service with the rank of major and is now a colonel in the Reserves. He was graduated cum laude from Ohio State University in 1948 with a bachelor's degree in business administration and earned a master's degree the same year.

During the Korean War he worked for the government on a loan basis from Crucible Steel Co. of America as a management engineer in the Pittsburgh Ordnance District. However, he remained in federal service and transferred to Redstone Arsenal in 1956.

Lowery is a past president of the Federal Government Accountants' Association, and a 1968 Industrial College of the Armed Forces graduate.

Robert C. Lowery

USAARL Expands Research to Meet Needs Generated by Role of Helicopters

Investigations concerned with medical operational problems have expanded substantially at the U.S. Army Aeromedical Research Laboratory to meet requirements generated by the critical role of helicopters in Southeast Asia as all-purpose mobility vehicles.

Located at Fort Rucker, Ala., as a part of the Army Aviation Center, the USAARL is a Class II Activity of the Army Medical Research and Development Command, and was established as a small unit in 1962.

The USAARL conducts studies on current and anticipated medical problems of fundamental or immediate nature relevant to Army aviation and airborne operations. Research involves physical standards, medical aspects of personnel selection, training, performance and retention, and human factors related to equipment.

Collocation enables USAARL scientists to work with personnel of such additional Fort Rucker organizations as the Army Combat Developments Command Aviation Agency, the Army Board for Aviation Accident Research, the Army Aviation Test Board, Army Aviation Human Research Unit, and the Army Aviation School.

Collectively, these organizations form the U.S. Army Aviation Center team. Working in close coordination, they consider problems of broad application, isolate key issues and identify matters of vital concern to Army aviation.

Cooperative interaction increases each organization's awareness of the other's involvement. In providing for an exchange of ideas and development of new scientific approaches, this interaction brings to light many areas where research is necessary.

Specifically, this teamwork enables the USAARL to conceive and conduct a research program highly responsive to Army aviation's operational problems and requirements.

Liaison with research laboratories of other U.S. military, governmental and civilian agencies endeavors to avoid unnecessary duplication of research effort.

Complementary missions of USAARL and the Naval Aerospace Medical Research Laboratory (NAMRL) at Pensacola, Fla., have stimulated a mutually beneficial association. This has been formalized by a Joint Army/Navy Flight Medical Research Panel that reviews and recommends research projects of mutual interest.

ORGANIZATION. The USAARL is a mission oriented research unit organized into seven divisions: Headquarters, Biophysics, Aviation Psychology, Aviation Medicine, Bioengineering and Evaluation, Technical and Logistical Services, and Administrative Services.

RESEARCH. Directed primarily to solution of immediate operational problems, the USAARL program also is based solidly in fundamental research projects influenced by long-range requirements. The program is developed through in-flight observations, studies of field problems reported by other aviation agencies, and technical evaluation of aircraft and personnel equipment.

USAARL administrators strive to achieve the balanced research program necessary to marshal and maintain the academic, scientific and technical skills essential to adequate support of Army aviation.

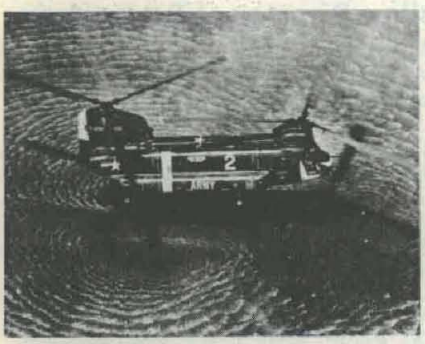
Investigations range from the more immediate problems associated with the helicopter and airplane cockpit environment to long-term fundamental studies. Problem areas include hearing loss, color vision and other factors that affect the safety, well-being and efficiency of the aircrewmen.

BIOPHYSICS. Directed by Robert T. Camp Jr., the Biophysics Division is concerned with investigating noise spectra in and around Army aircraft. Functions include evaluating and proposing design of various hearing protective devices, improving communications equipment, increasing aircraft conspicuity, evaluating and improving cockpit illumination, and evaluating and improving weapons flash-suppression systems.

AVIATION PSYCHOLOGY. Directed by Capt Mark A. Hofmann, MSC, the Aviation Psychology Division is interested in operational measures of aviator in-flight performance. Studies include the effect of fatigue on visual search activity, photic flicker and cortical responses in Army aviators, operational measures of pilot performance during autorotations, and identification of causes of pilot vertigo/disorientation accidents.

AVIATION MEDICINE. The Aviation Medicine Research Division, directed by Lt Col William P. Schane, MC, represents disciplines such as cardiology, neurology, respiratory physiology, aviation medicine, veterinary medicine and biochemistry.

Research projects cover determination of fatigue by biochemical analysis of body fluids, techniques of providing rapid recovery from fatigue, and evaluating cockpit environmental



USAARL researchers are concerned with work capabilities of man in the downwash environment created by horizontal and vertical components of VTOL aircraft. A new method can compute velocity of downwash if rotor diameter and gross weight are known.

BIOPHYSICS Division Chief Robert T. Camp Jr. fits a research subject with a flight helmet in preparation for sound attenuation tests at the U.S. Army Aeromedical Research Laboratory.

HELICOPTER POST-CRASH fire environment parameters of survivability have been established by USAARL researchers, using metered fuel spills over helicopter hulks and instrumented anthropometric dummies and anesthetized laboratory animals to collect data.

control devices in the extremes of climatic conditions; also, sampling and analyzing toxic gases that result from ordnance propellants and determining their effects on aircrewmen, and Army aeromedical support problems.

BIOENGINEERING. The Bioengineering and Evaluation Division is directed by Lt Col Stanley C. Knapp Jr., MC. Researchers are concerned with problems related to man/machine interface and interaction.

Efforts include biodynamic evaluation of aircrew protective headgear, clothing and body armor, physiological actions and reactions to impact acceleration.

Other activities involve crash injury economics; evaluating, and recommending modifications to design of in-flight helicopter escape systems; long-range troop transport and parachute medicine; and determining the hazards to and useful work capability of man in the VTOL downwash environment.

Projects and areas of interest enumerated within each research division are by no means all-inclusive—only a representative sampling.

A major undertaking this summer is an engineering and service evaluation of standard air delivery equipment (personnel and cargo) at high-drop-zone elevation. This project is being conducted at the request and with the cooperation of agencies of the U.S. Army Test and Evaluation Command (USATECOM).

Results will determine the adequacy of system reliability and the evaluation of current safety standards. Additionally, the project presents an excellent opportunity to collect performance and physiological data on a relatively large sampling of airborne troops in high-altitude operations.

Among highlights of the past year's research efforts have been assisting in the type classification of the Sound Protective Helmet SPH–4, and determining parameters limiting survivability during aircraft post-crash fires.

The SPH–4 helmet represents a prolonged endeavor of researchers at USAARL, reinforced by Aviation Center personnel, to provide an improved hearing protective device combined with a crashworthy and comfortable helmet for aircrewmen.

Prototypes of the SPH–4 were evaluated by USAARL, leading to design modifications. Test results, from the standpoint of sound attenuation and crashworthiness, proved satisfactory; type classification was completed in December 1969.

The Bioengineering Division of NAMRL was closely allied to this design modification effort, providing valuable assistance in impact test and evaluation.

Speculation about survivability of aircraft post-crash fires has persisted virtually since the inception of aviation. A literature review, however, revealed only a limited and incomplete documentation of time/temperature data for burning helicopters.

USAARL researchers created a reproducible fire with metered fuel spills over helicopter hulks. Using instrumented anthropometric dummies and anesthetized laboratory animals to collect data, they established helicopter post-crash fire environment parameters of survivability.

Earlier speculations that crewmen could survive a post-crash fire for up to two minutes proved far too liberal. Time/temperature and physiological data recorded during these experiments have proven conclusively that intolerable conditions exist within 30 seconds after ignition.

This research has defined more precisely the requirements for development of improved aircrewmen's protective clothing. Results have stimulated further research in aircraft fire prevention by the military and also the civilian aircraft industry.

In addition to active research projects, numerous consultations have been provided to Army agencies on aviation medicine problem cases. Evaluations and recommendations have been made concerning the medical aspects of equipment, protection of aircrew members, and special devices for combat employment.

Many USAARL staff members serve on various advisory committees such as the National Academy of Sciences-National Research Council Vision Committee and the Committee on Hearing and Bioacoustics, and the Department of Defense Aircrew Station Standardization Panel. They also serve on the Aerospace Medical Panel, committees of the NATO Advisory Group for Aerospace Research and Development, and the planning and advisory groups of numerous professional and scientific associations.

FUTURE PROGRAM. Future research problem areas in which USAARL is certain to be involved will be derived from the medical and physiological aspects of the man-aviation system relationship. Aviation and airborne personnel are exposed not only to enemy action, but also to the additional hazards of altitude, terrain avoidance, extremes of photopic and scotopic visibility, hazardous sound pressure levels, heat, cold, toxic materials and vibration.

Improper control or response to these operational factors always has the latent potential of trauma from a crash landing or ejection from the aircraft.

USAARL leaders stress alertness in research response to the requirement for continuous medical evaluation and review of personnel, personal protective equipment, survival methods, physiological training, emergency warning systems, cockpit and aircrew station design, and heating and ventilating systems.

Future USAARL efforts in many interrelated programs will apply results obtained from a responsive operational aviation medicine R&D program, aimed at providing information to protect and conserve the fighting strength of Army aviation personnel.

Taylor's View on Innovation

"It is rare for an innovation to become popular solely because its utility is demonstrated. In fact, if one thinks of the last 60 years in psychology, fad and faith seem to have been more important than validity. Any major innovation is likely to take on the character of a social movement in which small cohesive groups with novel perspectives influence the social scene. This was true of psychoanalysts, of Darwinism, and of Newtonian world views. . . . Innovation is a sociological and psychological phenomenon. It is important therefore to analyze the way in which social inventions come to be adopted, apart from and irrespective of, their presumed scientific merit.
James B. Taylor
Journal of Applied Behavioral Science

Lt Col Thompson Directs EOD Center at Picatinny Arsenal

Lt Col Earl F. Thompson Jr. is the new director of the Explosive Ordnance Disposal Center at Picatinny Arsenal, Dover, N.J., succeeding Lt Col Thomas J. Girkout Jr., retired after 25 years of military service.

Col Thompson came from an assignment as plans and programs officer with the Military Assistance Advisory Group in Taiwan.

From 1966 to 1968, he was transportation officer at Fort Bragg, N.C., and earlier served as division ammunition officer with the 7th Infantry Division in Korea. He has an AB degree in social sciences from the University of Syracuse.

Lt Col Earl F. Thompson Jr.

MASSTER Responds to AMC, CDC Needs for Army of the Future

One of the U.S. Army's top priority research, development, test and evaluation (RDT&E) activities is Project MASSTER, designed to provide a capability to deal with the myriad of materiel items, systems and concepts proposed for the Army of the future.

MASSTER denotes Mobile Army Sensor System, Test, Evaluation and Review. Headquartered at Fort Hood, Tex., the project is under Lt Gen Beverly E. Powell as commanding general with Maj Gen John Norton as deputy director.

Basically, Project MASSTER responds in two directions—to the Army Materiel Command for the testing of materiel and to the Army Combat Developments Command for testing doctrine and concepts for employing materiel.

Emphasis currently is on surveillance, target acquisition and night observation (STANO) systems and components. Project MASSTER responsibilities as envisioned for the Army of the future will include other materiel.

Activities to date have been concentrated on Army-developed or sponsored materiel and ideas. Due to the great potential resources of industry and its significant contributions to Army R&D projects, special procedures are established for testing of materiel and operational concepts developed by nongovernmental sources.

This article addresses the general concept of how the Army processes an unsolicited request for test of STANO-related materiel, who can approve or disapprove, how the requester knows where his proposal stands, and what the requester can do to expedite the process of testing.

General categories of STANO items include night-vision devices; surveillance aircraft; personnel detectors; equipment detectors; radars; ground sensors; photographic equipment; optical equipment; aural equipment; electronic surveillance equipment; information transmission, identification and positioning devices and systems; test, measurement and diagnostic equipment.

The request from a nongovernmental source for test of materiel by Project MASSTER goes to the Army Materiel Command (AMC) where the Unsolicited Proposals Office assigns a control number and determines if a Memorandum of Understanding (paragraph 304b, AR 27–60) is in hand.

If a Memorandum of Understanding between the requester and the U.S. Government is required and not in hand, the request is put aside and held in suspense until the memorandum has been obtained from the requester. When the memorandum is in hand, AMC initiates a technical evaluation of the proposal. At the same time a copy of the request is forwarded to the Combat Developments Command (CDC). The AMC technical evaluation considers the following:

- *Completeness of the request.* It should contain, as a minimum, a detailed technical description of the materiel, its capabilities and military potential, restrictions under which technical data and any proprietary rights represented in the materiel will be released to the Army, a summary of any previous government tests/evaluations, and a proposed test plan.
- *Military potential.* STANO-related materiel proposed to be tested must have potential military utility. The request should include performance characteristics and configuration for its probable use environment. The materiel need not satisfy an existing QMR (Qualitative Materiel Requirement) or SDR (Small Development Requirement) but should be oriented toward the satisfaction of a military materiel requirement or objective.
- *Development status.* STANO-related materiel proposed for test must have been developed and fabricated to a point whereby testing at the proposed time would accomplish a useful result for the Army.
- *Facility requirements* for test and evaluation, which must be compatible with the test capabilities of Project MASSTER.

Simultaneously with the AMC technical evaluation, CDC will review the request package. The CDC review determines if the materiel proposed for test meets a military requirement. If it does, and no approved requirements document exists, CDC must initiate action to develop an appropriate document or determine if the materiel proposed for test should undergo functional and organizational experimentation and/or field exercise tests at Project MASSTER.

If directed to test, Project MASSTER will contact the requester to obtain a Test and Bailment Agreement for testing conditions. It specifies security requirements and stipulates specific rights and liabilities concerning administration, logistics, operation, test data usage, equipment damage, personal injury, schedules and costs.

As a condition for Army agreement to test, this document stipulates that the requester agrees to:

WSMR Nominates Employe for Outstanding Woman Award

Listing in the 1970 edition of *Outstanding Young Women of America* and nomination for New Mexico's Outstanding Young Woman of the Year Award have recognized the achievements of a 12-year employe of the White Sands (N. Mex.) Missile Range.

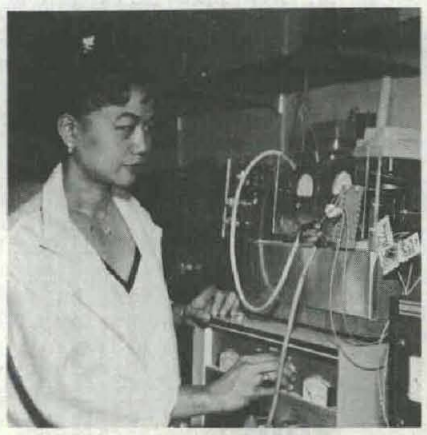
Mrs. Paul (Joy) Arthur, chief of the Systems Development Section, Missile Electronic Warfare Technical Area, is an electrical engineer who has something more in common with her husband than is normal. He is also an electrical engineer and is likewise a veteran employe of WSMR.

After attending the University of the Philippines, the petite and photogenic Mrs. Arthur, a native of Manila, enrolled at Purdue University and earned a bachelor's degree. In 1966, she was awarded a master's degree by New Mexico State University.

When she resigned from a position with Westinghouse Research Laboratories, she started her U.S. Government service career at WSMR. After working four years in designing and developing special equipment for the Measurements Divison, she transferred in 1962 to the Missile Electronic Warfare Technical Area.

Mrs. Arthur is a member of the Institute of Electrical and Electronics Engineers (IEEE), the Association of Old Crows (an organization of electonics specialists), and the Society of Women Engineers.

With a 10-year-old son to spur her interest, she has been a prime counselor for several years for the Junior Engineer and Scientists Summer Institute, sponsored by local universities in the WSMR area.



Mrs. Paul (Joy) Arthur

• Deliver the required test materiel, in the proper quantities, at a prescribed time, to the designated test site. (Costs associated with delivery and testing of the materiel will have to be negotiated on a case-by-case basis; normally, delivery costs will be borne by the nongovernment source.)

• Perform receiving inspection of the materiel at the test site and make certain it is in operating condition.

• Provide written operation procedures and operator training, if required.

• Provide necessary and timely maintenance, maintenance documentation, and maintenance support, to include all parts and labor, for materiel furnished.

• Remove the test materiel from the test site at the completion of the test operation or upon demand by the government.

• A disclaimer of government liability for loss or damage to persons or property.

Within 25 days of test completion, AMC will convene a review body consisting of representatives from AMC (the developer), CDC (representing the user), CONARC (the trainer), and the Logistics Doctrine, Systems, and Readiness Agency (representing the logistician). This board meets in an in-process review in accordance with provisions of AR 705–5.

The responsibility of this group is to evaluate test results, Project MASSTER recommendations, and the requirement against which the materiel was tested and make a recommendation to HQ, Department of the Army concerning the future of the tested materiel.

The group also will recommend where in the Army's materiel life cycle (AR 11–25) the materiel should be placed or recommend that no further consideration be given.

The range of recommendations to continue with the materiel go from entry into advanced or engineering development (AR 750–5) to acceptance as standard Army materiel (AR 71–6). HQ Department of the Army will consider the review recommendations and make the final determination.

Procedures here described were designed to provide for a normal flow toward acceptance of the request for testing. More effort is required to deny the request than to allow it to go through the process, except when the requester fails to provide sufficient information.

Positive controls have been established to insure that requests are processed speedily and not lost in the "administrative mill."

Immediately upon receipt of a request, a sequential control number is assigned which serves to identify the request until it is dropped from accountability. The decision to drop from accountability must be fully documented.

A quarterly report showing the status of all requests is provided to the STANSM (STANO system manager) with information copies to other HQ DA staff elements, members of the review board and the director of Project MASSTER.

Army procedures require communications with the requester. The Materiel Command gives notice that the request will be evaluated or held in suspense until a Memorandum of Understanding has been signed and delivered to AMC.

AMC will provide the requester with results of the AMC technical evaluation and combat developments review, advising him that the evaluation is terminated or that testing will be conducted at Project MASSTER.

In the latter case, the requester will be informed that test guidance is being provided to Project MASSTER through the STANSM, HQ DA; also, that the director of Project MASSTER will contact him for execution of the Testing and Bailment Agreement.

When HQ DA has provided the AMC with a decision on the future of the tested materiel, AMC must notify all concerned, including the requester, of the decision.

Discussion here has been concerned with AMC and CDC handling of requests. Similar procedures are in effect for the Army Security Agency (ASA). The basic difference is that ASA is responsible for both development and user representation. Therefore, the exchange of information between these two elements is an internal function of the ASA.

Each step of these time-consuming procedures has been a candidate for elimination and has survived a critical examination, considering interests of the government and the requester.

Positive controls prevent inadvertent rejection of a request, insure economy of resources to prevent expending effort where there is no military requirement (or to cover ground previously covered) and allow testing to be worked into the Project MASSTER schedule.

Several steps can be taken by the requester to expedite consideration of his request and testing of the materiel. First, of course, he must submit a complete package, as here described. Second, he can insure that the request gets to the proper place:

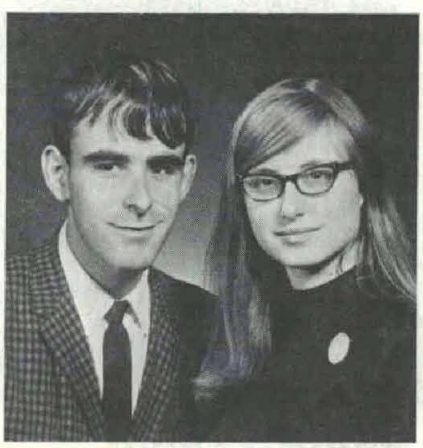
For Non-ASA Items
Commanding General
U.S. Army Materiel Command
ATTN: AMCRD-PS-P
Room 2739, Building T-7
Washington, D.C. 20315
Phone: OX 7-5883 or OX 7-6075

For ASA Items
Commanding General
U.S. Army Security Agency
ATTN: IARD-T
Room 2020, Building A
Arlington Hall Station, Va. 22212
Phone: OX 2-5165

Third, he can include the required Memorandum of Understanding (paragraph 3–4b, AR 27–60). Fourth, he can provide a minimum of five copies of the entire package to AMC. (Two of these will stay in AMC, two will go to CDC, and one will go to Project MASSTER.)

ECOM Employes Exemplify Youthful Achievement

YOUTHFUL ACHIEVEMENT in Army R&D is exemplified by these U.S. Army Electronics Command employes. Mr. and Mrs. Geoffrey R. Akers recently were awarded master's degrees while continuing their ECOM employment at Fort Monmouth, N.J. Geoffrey specialized in engineering mathematics at Columbia University and Donna in English at New York University. Geoffrey earned his BS degree with honors from the University of Maine and is now working toward a second MS in nuclear physics, with his eyes on a PhD. Donna, a magna cum laude graduate and a member of Sigma Pi Sigma and Phi Kappa Phi, is a budget analyst in R&D Technical Support Activity.

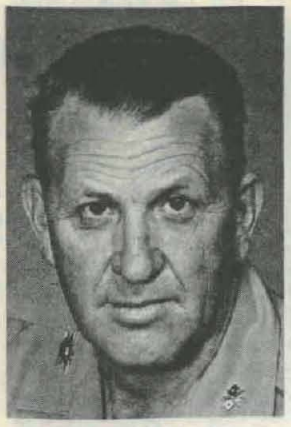


Contracts Totaling $362,569 Call for Power Conditioners

Contracts totaling $362,569 for 15-kilowatt power conditioners were awarded recently by the U.S. Army Mobility Equipment R&D Center (MERDC), Fort Belvoir, Va., with $233,212 going to the General Electric Co.

Power conditioners are designed to convert conventional electrical power into precise power, to provide "no-break" power by permitting operating off DC batteries, and to act as frequency converters.

General Electric Co. will provide a breadboard Unit, one prototype and four advanced development models. Westinghouse Electric Corp. will get $63,845 and Western Gear Corp. of Semtrol Electronics $65,512 for breadboard units.



Col George W. Adair

Col Joseph P. Coe Jr.

Col George B. Jordan

STRATCOM Fills 3 Key Positions at Fort Huachuca

The U.S. Army Strategic Communications Command (STRATCOM) recently announced assignments of Col George W. Adair, Col Joseph P. Coe Jr. and Col George B. Jordan to fill key positions at Fort Huachuca, Ariz.

Col Adair was named deputy commander of the newly created STRATCOM Communications Electronics Engineering Installation Agency (CEEIA), following a tour of duty as executive officer, Communications-Electronics Division, SHAPE headquarters, Europe.

Enlisted in the Army Reserves in 1933 and commissioned an Infantry officer three years later, Col Adair served with the 2d Signal Battalion in the Normandy invasion and subsequent campaigns in Northern France, Ardennes, Rhineland and Central Europe.

In 1942 he became a signal officer and served as plans officer, Southeast Signal School; chief, Communications-Engineering, Sixth Army; signal officer, Joint Military Advisory Group-Turkey; and deputy inspector general, Office of Chief Signal Officer.

A graduate of the Command and General Staff College, the colonel earned a BAA degree in social science from George Washington University. Among his awards and decorations are the Bronze Star Medal, Meritorious Unit Citation, Legion of Merit and the Armed Forces Reserve Medal.

COL COE was assigned to the Office of the Deputy Chief of Staff-Plans and Operations, HQ Army Strategic Communications Command, following an assignment as director of Communications-Electronics, U.S. Continental Army Command, Fort Monroe, Va. He served at Fort Huachuca with the Electronic Warfare Department, U.S. Army Electronic Proving Ground, from 1956 to 1960.

Col Coe began his Army career as an enlisted man in 1939. He survived two death marches when he was taken prisoner by the Japanese after the fall of Bataan and Corregidor in 1942. After two years as a prisoner of war, he escaped and joined an American-Philippino guerrilla unit.

In 1944 he was given a battlefield commission as a second lieutenant in the Signal Corps. Key assignments have included duty with I Corps, Eighth U.S. Army during the Korean War; I Field Force, Republic of Vietnam; Office of the Chief Signal Officer, HQ Department of the Army; and Supreme Headquarters, Allied Powers, Europe.

Among his citations are the Purple Heart, two awards of the Bronze Star Medal and the Legion of Merit, and three awards of the Army Commendation Medal.

Col Coe is a graduate of the Army War College, the Command and General Staff College, and has attended the Advanced Signal Officer Course at Fort Monmouth, N.J.

COL JORDAN now heads the Telecommunications Automation Directorate (TAD), STRATCOM Communications Electronics Engineering Installation Agency. From 1966 to 1968, he was at Fort Huachuca as chief of the Automatic Data Field Systems Agency.

Col Jordan served as chief, International Civil Affairs and Psychological Operations, U.S. Army-Pacific, prior to his current assignment.

Major assignments since 1941, when he entered the Army as a commissioned officer, include senior military adviser to the Republic of Vietnam Army; international relations officer, Inter-American Defense Board; and director of the Franconia District in West Germany.

Col Jordan earned the Combat Infantryman Badge while serving in the China-Burma-India Theater (1941–45) and following Japan's surrender was named chief of the Agriculture Department for the U.S. Military Government of the Ryukyu Islands.

He is the author of several articles on communist guerrilla theory and tactics which appeared in *Military Review*. He has a master's degree in international relations from George Washington University and was graduated from the University of Arizona with a BS degree in agriculture. His military education includes the Army War College, Command and General Staff College, Advanced Infantry Officer Course, and several Army-sponsored courses on management and data processing.

Col Morris Heads TECOM TSA Directorate at Aberdeen PG

Col George T. Morris, the new head of the U.S. Army Test and Evaluation Command's Test Systems Analysis Directorate, Aberdeen Proving Ground, Md., was assigned after serving 18 months with the Joint Continental Defense Systems Integration Planning Staff in Arlington, Va.

He succeeds Col Vitaly Kovalevsky, who resumed his duties as director of Infantry Materiel Testing.

A 1950 graduate of the U.S. Military Academy, Col Morris was awarded a master's degree in electrical engineering by the University of Oklahoma (1959) and graduated from the Army Command and General Staff College (1963). He attended a one-year course in defense economics at the Institute for Defense Analysis in Washington, and has attended numerous service schools.

Col George T. Morris

Beginning in 1963, he served three years with the Nuclear Activities Branch of the Operations Division of Supreme HQ Allied Powers Europe. During the Korean War, he took part in three major campaigns, and returned in 1967 as CO, 2d Battalion, 71st Artillery.

He completed a tour of duty at Virginia Polytechnic Institute as assistant professor of military science and tactics, and was assigned to the Army Artillery and Missile School in connection with electronic research activities.

AVLABS Receive Bell Award for Advanced Helicopter R&D During 1969

Presentation of the Grover E. Bell Award to the U.S. Army Aviation Materiel Laboratories, Fort Eustis, Va., for R&D during 1969 leading to advanced helicopter development was based on these accomplishments:

1500 SHP Demonstrator Engine Program—Two versions of 1500 SHP Advanced Demonstrator Engines were developed through design, fabrication, component tests, gas generator tests, and initiation of engine testing. These engines reflect significant advancements over current designs, not only in performance, but also in operational, maintenance and reliability characteristics. Engine weight reductions of 40 percent, coupled with specific fuel consumption improvements of 20 to 30 percent over the range of operating powers, can provide significant improvements in advanced aircraft, such as a 50 percent increase in payload or range capability for a utility type helicopter.

High Performance Helicopter—AVLABS R&D Programs, designed to evaluate rotor behavior, employed the UH–1 compound helicopter. A maximum level flight speed of 274.4 knots was attained which is the highest speed ever achieved by a rotorcraft.

High advanced ratio operations and blade tip Mach numbers above Mach 1 have been accomplished. Such programs have contributed significantly to advance rotor technology and have proved the feasibility on which to base future rotary wing requirements and design criteria.

Utility Tactical Transport Aircraft System—During this period AVLABS completed preliminary design studies and several studies of the *Heavy Lift Helicopter* based on computer programs developed within the Preliminary Design Division. An improved preliminary design computer program, which will provide the determination of size, performance, and other characteristics of rotary wing and VTOL aircraft, has been developed under a supporting contract.

Tactical Aircraft Guidance System (TAGS)—The Department of the Army approved an advanced concept for flight control and navigation of aircraft as a joint U.S.-Canadian Development Sharing Project. The project is being implemented between AVLABS and the Department of Industry, Trade and Commerce of Canada.

This concept is expected to have a significant impact, particularly on vertical takeoff and landing aircraft of the future in the areas of increased capability to operate in marginal and restricted visibility conditions; reduced pilot factor accidents; increased survivability; and reduced training requirements for pilots.

Crashworthy Fuel System—New design concepts and criteria for the reduction and/or elimination of aircraft post crash fires were established. A system was designed, fabricated, installed on a UH–1, and dynamically crash tested.

Based on the results of this research program, a Department of the Army program was approved, and action is currently under way for the installation of such a crashworthy fuel system on UH–1D/H helicopters. Similar crashworthy fuel systems will be installed on other operational Army aircraft.

This modification will offer the potential of significantly reducing the number of personnel injuries and fatalities resulting from aircraft fire. Additionally, new crash survival design concepts and criteria have been established.

Data are being incorporated into requirement documents and specifications for application to future Army aircraft systems. Results of this program are being widely utilized by other Department of Defense agencies and members of industry for the establishment of design requirements.

Another unique system is the *Parawing*, a radio-controlled parachute-like device, now undergoing development, designed to air drop silently a 500-pound payload from altitudes of 500 to 30,000 feet to besieged forces.

New materials, advance designs of aircraft and aircraft systems including components—all come under the AVLABS spotlight of research and advanced development to add to the development of better Army aircraft.

R&D LEADING TO ADVANCED HELICOPTERS was recognized by the American Helicopter Association with the presentation to the U.S. Army Aviation Materiel Laboratories, Fort Eustis, Va., of the Grover E. Bell Award, shown here by AVLABS Commander Col John R. Adie and Larry M. Hewin, technical director. Present for the ceremony were Army Chief of Staff General William C. Westmoreland, Army Materiel Command CG General F. J. Chesarek, Assistant Secretary of Defense (I&L) Barry J. Shillito, Assistant Secretary of the Army (R&D) Robert L. Johnson, Secretary of the Air Force Dr. Robert C. Seamans Jr. and numerous dignitaries representative of the DoD and industry.

Army Security Agency Raises Hovey to Deputy CofS for R&D

Promotion of Herbert S. Hovey Jr. to the highest positon ever achieved by a U.S. Army Security Agency civilian employe was announced in mid-September when he became deputy chief of staff for R&D.

Maj Gen Charles J. Denholm, CG of the USASA, announced appointment of Hovey as the only civilian to achieve deputy chief of staff status with the agency. Deputy chiefs of staff for other activities are full colonels.

Hovey was promoted to Grade GS–16 as acting DCS (Research and Development) when the position was converted from an officer to a civilian slot, as announced in the July–August edition of this publication.

In 1964 he was among 23 winners of the annual R&D Achievement awards presented by the U.S. Army Chief of Research and Development, in recognition of outstanding basic research by in-house laboratory personnel. He received the Department of the Army Meritorious Civilian Service Award in 1962.

Journal Acclaims Two OCRD-Sponsored Publications

Two comprehensive publications, *Deserts of the World* and *Arid Lands in Perspective*, sponsored by the Environmental Sciences Division, Office of the Chief of Research and Development, HQ DA, are reviewed in the June 1970 edition of the *Geographical Journal*.

This periodical of the Royal Geographical Society of London, England, acclaims both of the books, saying that "editors of the University of Arizona Press are to be warmly congratulated for their imaginative conceptions and for their attractive and thoroughly competent productions."

Deserts of the World, an appraisal of research into their physical and biological environments, is a 788-page document priced at $15 and edited by William G. McGinnies, Bram J. Goldman and Patricia Paylore. The first two also edited *Arid Lands in Perspective*, a 421-page book at $18.

Both books, on which research began in 1964, were prepared under contract with the Army Research Office, Washington, D.C. The Earth Sciences Laboratory, U.S. Army Natick (Mass.) Laboratories supervised the contract.

The *Geographical Journal* comments, in part, that "To collate and evaluate contemporary knowledge and research on desert environments is a formidable task, but it is one of considerable potential value because so much of the relevant information is scattered and inaccessible."

Deserts of the World includes sections on weather and climate (Reitan and Green), geomorphology and surface hydrology (Lustig), groundwater hydrology (Simpson), surface materials (Dregne), vegetation (McGinnies), fauna (Lowe), and desert coastal zones (Schreiber).

The Journal says: "Supported on a sound bibliographic base, each section provides a critical appraisal of literature and current research, reviews the availability and reliability of information, mourns the persistent lack of data, and designates significant trends and unresolved problems. . . .

"Every research worker concerned with the study of desert environments should have access to a copy of this compendium: it is a basic reference book and a valuable baseline from which much future work may proceed. Perhaps in future years the Office of Arid Land Studies will prepare similar volumes on semi-arid lands, and on the activities of man in deserts."

Relative to *Arid Lands in Perspective*, The Journal acclaims this document, prepared under the auspices of the Advisory Committee for Arid Lands Research at the University of Arizona and the Committee on Arid Lands of the American Association for the Advancement of Science, as a "well-edited work," saying:

"Batisse contemplates the diversity of arid-land problems; Christian and Parry review progress in the study of Australian arid lands; McGinnies identifies knowledge gaps and research needs. For the natural scientist, Neal surveys the physical and environmental characteristics of playas, Lustig advocates some possibilities of quantitative landform analysis, Flach and Smith apply to deserts the tongue-buckling USDA soil classification (7th Approximation), and Warren provides an extensive bibliography on dunes and associated phenomena.

"A detailed study of a century's vegetation change in the U.S. and Australia (Heathcote), and a proposal for an international programme of rangeland improvement (Peterson) will interest those concerned with land resources and their appraisal. Coastal deserts are represented by a review of their future (Meigs), a description of the central Namib Desert (Logan), and a report on imaginative experiments in Sonora for coastal desert environmental control (Hodges).

"In addition, there is a well-informed account of cold deserts (Cameron), a contention that weather-induced ecological change has been important in creating North-African and Near-Eastern deserts (Raikes), a proposal for the adoption of a water-supply hierarchy in arid lands (Okun), and a guide to bibliographic sources for desert research (Paylore). Smith and Padfield consider the relations between land, water and social institutions, and Lee analyses human responses to arid environment. . . ."

A similarly commendatory review of *Deserts of the World* and of *Arid Lands in Perspective* was published in SCIENCE magazine, Volume 167, a publication of the American Association for the Advancement of Science.

Gibson Appointed R&E Consultant to CINCPAC

Robert G. Gibson has been appointed research and engineering consultant to Admiral John S. McCain Jr., Commander-in-Chief, Pacific (CINCPAC).

A 1942 graduate of the U.S. Naval Academy, Gibson received a master's degree in engineering from Rensselaer Polytechnic Institute in 1947. His career includes R&D tours at China Lake research facilities, the Office of Naval Research, Washington, D.C., and combat experience in World War II and in Korea.

Robert G. Gibson

With Lockheed Missiles and Space Co. (1953–65), his assignments ranged from operations research in antisubmarine warfare and airborne early warning to Polaris program manager, including fleet introduction and field support.

After serving as assistant director for Tactical Ordnance and Missile Systems with the Director of Defense Research and Engineering (DDR&E), he returned to Lockheed as director of Long Range Planning until he assumed his new duties.

MICOM Assigns Gober as Acting Director of S&M

Lt Col Floyd C. Gober is newly assigned as acting director of Supply and Maintenance at the U.S. Army Missile Command (MICOM), succeeding Lt Col Frank Creighton who recently retired from active Army service.

Col Gober was formerly chief of the International Logistics Office at MICOM. His service includes tours of duty in Germany, Korea, Thailand and Vietnam in addition to stateside duty in Indiana, Texas, South Carolina and Alabama. He was assigned to the Aviation Section for his first tour at Redstone Arsenal, Ala., in 1959.

He entered the Army with the Alabama National Guard in January 1951 and was commissioned five months later. Graduated from Flight School in 1953, he is a fixed- and rotary-wing rated pilot with more than 5,000 flying hours. He is a graduate of the University of Nebraska.

Lt Col Floyd C. Gober

3 Atomic Energy Program Officers Among 81 Selected for Promotion to BG

Enrollees in the U.S. Army Atomic Energy Officer Specialist Program might be suspect of having "stars in their eyes," based upon results of the recent Brigadier General Selection Board. Of 81 colonels chosen, three are in the AE program.

Announcement of the appointment of Col (Brig Gen designate) Albion W. Knight Jr. as the deputy CG of the Army Electronics Command is carried with his biographical sketch on page 9. Other AE program selectees are Col Charles D. Daniel Jr. and Col Winfield S. Scott, both graduates from the U.S. Military Academy.

Col Daniel was reassigned recently from chief, Nuclear, Chemical-Biological Division to Director of Missiles and Space, Office of the Chief of Research and Development HQ DA. He is responsible for exercising Department of the Army General Staff monitorship of the Army R&D program in the areas of Air Defense and Missiles; Communications, Electronics and Space; and Nuclear and Chemical Warfare and Biological Defense.

Col Daniel coordinates with appropriate offices of the Air Force, Navy, Department of Defense and other federal agencies in review of project plans, and prepares policy guidance to assure achievement of objectives.

Upon graduation from Tulane University with an MS degree in physics, under the Army Advanced Education Program, he was selected for further study and obtained his doctorate in 1968. He is also a graduate from the Field Artillery basic and advanced courses, the Army Command and General Staff College (including the prefix -5 course) and Industrial College of the Armed Forces.

Col Daniel was commissioned in the Field Artillery. He commanded a battery in the 3d Infantry Division during the Korean War and 2d Battalion, 33d Artillery, 1st Infantry Division in 1966–67 in Vietnam, where he also served briefly as acting commander, 1st Infantry Division Artillery.

He has served as chief, Nuclear Branch, HQ Defense Atomic Support Agency; S–3 of the 3d Battalion, 21st Artillery (HJ) in Germany; National Guard adviser with the 38th Field Artillery Group in Kentucky; tactical officer, Officer Candidate School, Fort Sill, Okla.; executive officer and commander, 64th Field Artillery Battalion, 25th Infantry Division; and aide-de-camp to the CG of the 25th Infantry Division Artillery.

Military honors awarded to Col Daniel include the Silver Star, Legion of Merit, Distinguished Flying Cross, Bronze Star (with 4 OLCs), Air Medal with 16 OLCs, Joint Service Commendation Medal, and Republic of Vietnam Cross of Gallantry with two Silver Stars.

Col Charles D. Daniel Jr.

Col Winfield S. Scott

COL W. S. SCOTT graduated from the USMA and was commissioned in the Field Artillery in 1944, 22 years after he was born in Providence, R.I.

In 1949 he was awarded a master's degree in science from Northwestern University and in 1964 a master's in business administration from George Washington University. He also has completed the management program for executives, Graduate School of Business, University of Pittsburgh.

His military career began in 1940 when he enlisted in the 103d Field Artillery Regiment, Rhode Island National Guard, from which he was discharged to enter the USMA. During World War II, he served as an artillery forward observer in Italy.

After the cessation of hostilities, he enrolled in Northwestern University, earning an MS degree in electrical engineering in 1948.

He is a graduate from the Artillery Officer's Advanced Course, special weapons courses (after transferring to the Ordnance Corps in 1952), and Industrial College of the Armed Forces.

Assigned to Vietnam in July 1964 with the Military Assistance Command, he was ordnance officer and senior adviser to the Chief of Ordnance, Republic of Vietnam Armed Forces. An assignment to the Plans Division, Logistics Directorate, Joint Chiefs of Staff in the Pentagon, followed until June 1968.

Col Scott is assigned to Picatinny Arsenal, Dover, N.J., as project manager of the 2.75-inch rocket system, with direct authority and responsibilities characteristic of 42 PMs in the Army Materiel Command.

Army Converts Trash Into Cash By Recycling at Fort Carson

Conversion of trash into cash through recycling of waste material into useful products, by way of ecological studies linked to the national effort to alleviate pollution, is receiving increased attention.

An example of effort at an Army installation is the work of Sp4 Edward H. Leek, adviser to the Directorate of Facilities and Engineering for Ecology at Fort Carson, Colo. Daily cost of hauling away two trash dumpsters of cardboard was eliminated by an arrangement with a paper company, which picks up the cardboard, pays $4 a ton for it, and has converted some of it into roofing shingles which have found their way back to the post.

Sp4 Leek also is awaiting approval of plans to recycle motor oil, aluminum cans and newspapers.

$9 Million Saved on Upgrading ROK Wideband Network

Estimated savings of $9 million are being realized during the process of upgrading the wideband communications network serving U.S. military and government agencies in the Republic of Korea.

Maj Gen Hugh F. Foster Jr., CG of the U.S. Army Strategic Communications Command (STRATCOM) 1st Signal Brigade, Republic of Vietnam, initiated the program while he was commanding STRATCOM-Pacific.

Transistorized equipment, made surplus by communications advances in Southeast Asia, is being used to replace 9-year-old gear in Korea.

General Foster said that in addition to giving the existing network greater quality, reliability and flexibility, the replacement will raise the capacity of the system from 240 to 360 channels.

The over-all mission of upgrading the Korean wideband network has been assigned to STRATCOM, the Army's worldwide communications command at Fort Huachuca, Ariz.

While STRATCOM modifies the network to meet defense communications system (DCS) standards, the U.S. Air Force will upgrade Korean Air Force communications and link them with the KWN. Spanning some 240 miles, the KWN is composed of landlines, tactical VHF radio, and military and commercial microwave/tropospheric-scatter radio systems.

Col Robert B. Bennett

Col Carl M. Zilian

Col Donald R. Keith

Col Douglas W. Poage Jr.

OCRD Announces 24 Officer Assignments

Recent returnees from combat duty in Vietnam are predominant among 24 officers assigned recently to the Office of the Chief of Research and Development, HQ DA.

Col Robert B. Bennett returned to OCRD as principal assistant for laboratory actions to the Director of Army Research, following a tour of duty as commander of the U.S. Army R&D Group (Europe).

Col Bennett has served continuously with OCRD since July 1959, except for a year in Korea as chief, Plans Division, Quartermaster Section, HQ Eighth Army. After serving with the U.S. Army Standardization Group in Canada (1954–57), he was assigned as chief, War Plans Division, Office of the Quartermaster General, until 1959.

Graduated from Mount Union (Ohio) College with an AB degree in education and social sciences, he continued graduate study at Ohio State University and in 1948 earned an MBA degree in research management from New York University.

Col Bennett's training includes courses at the Army Command and General Staff College (C&GSC), Industrial College of the Armed Forces (ICAF), Army Special Warfare School, Radiological Defense Course. He completed Civil Service Commission course in research management.

With the U.S. Army Research Office (USARO), OCRD, he has served as chief, Studies and Analyses Division and chief of the former Human Factors and Operations Research and the Social Science Research Divisions (1965–67). He was chief, Medical and Biological Sciences Branch, Life Sciences Div. (1964–65).

While assigned to USARO, he served as the OCRD representative to the Technical Career Structure Army (TECSTAR) Committee (1965–66), and then chaired the OCRD reorganization committee.

Col Carl M. Zilian is the new chief, Combat Materiel Division. He recently served as brigade commander and chief of staff with the 7th Infantry Division in Korea.

From 1962 to 1965, he was an action officer with the Combat Materiel Division, OCRD, and in 1966–67 was a battalion commander at the Army Infantry Center, Fort Benning, Ga. He was a division chief, Evaluation Directorate, U.S. Army Combat Developments Command (CDC) at Fort Belvoir, Va. (1968–69).

He has a BS degree in military studies from the University of Maryland (1966) and completed the U.S. Army War College (1968). Among awards and decorations, he holds the Silver Star (SS), Legion of Merit (LOM) with Oak Leak Cluster (OLC), and the Combat Infantryman Badge (Second Award).

Col Donald R. Keith is the new OCRD executive officer, following assignments as commander of the 5th Battalion, 73d Artillery and the 36th Field Artillery Group in Germany.

He served with OCRD as a staff officer with the Combat Materiel Division (1963–64), and then was assigned as assistant secretary of the General Staff, Office, Chief of Staff, U.S. Army.

A 1949 graduate of the U.S. Military Academy (USMA), he earned an MA degree in science education from Columbia University in 1958. He has completed courses in the C&GSC, the Armed Forces Staff College (AFSC) and the Industrial College of the

(*Continued on page 27*)

CofS Presents DSM to DCRD (IP) Upon Retirement

Army Chief of Staff General William C. Westmoreland presented the Distinguished Service Medal to Brig Gen Kenneth F. Dawalt when he retired recently as Deputy Chief of Research and Development for International Programs, HQ DA, ending 34 years of active military service.

General Westmoreland expressed his personal and professional esteem for General Dawalt, starting when whey were teammates on the basketball team at the United States Military Academy from which they graduated in 1936. He commented that they had since continued close personal and service associations in military assignments around the world.

General Dawalt served in positions of major responsibility in Europe, Japan and Korea but termed his final assignment with the Office of the Chief of Research and Development as a fitting capstone to his career. In this assignment he was responsible for promoting cooperative R&D ventures and exchanges of technological information among Free World nations in materiel standardization efforts.

Listed in Volume 36 of *Who's Who in America*, General Dawalt distinguished himself in various key assignments, winning the Silver Star, Legion of Merit with OLC and Army Commendation Medal with OLC, among other decorations.

CHIEF OF STAFF Gen William C. Westmoreland awards Distinguished Service Medal to Brig Gen Kenneth F. Dawalt at retirement ceremony in the Pentagon. At right is Mrs. Dawalt.

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Armed Forces (ICAF).

His military awards include the LOM and the Army Commendation Medal (ARCOM) with OLC.

Col Lauris M. Eek Jr. is assigned as deputy chief, OCRD Combat Materiel Division, following a tour of duty as CO of the 1st Brigade, 2d Infantry Division in Korea.

From July 1967 to July 1969, he served as G–3, 1st Armored Division, then as CO of the 2d Battalion, 13th Armor (13th Horse), 1st Armored Division, Fort Hood, Tex. He was chief of the Armor and Combat Vehicle Test Divison, Arctic Test Center, Fort Greely, Alaska, from July 1964 to July 1966.

A 1950 USMA graduate, he has an MS degree in mechanical engineering from the University of Michigan (1964) and is a graduate of the C&GSC and the Army War College.

He has received the LOM, Bronze Star Medal (BSM) with OLC, and the ARCOM.

Col Douglas W. Poage Jr. is the new commanding officer of the Army Manpower Resources Research and Development Center (USAMRRDC).

Graduated from the USMA in 1950, he received an MS degree in electronics from Georgia Institute of Technology in 1960 and completed the C&GSC in 1965.

Col Poage was chief, Programs and Plans Branch, U.S. Army Combat Developments Command, Fort Belvoir, Va. (1968–70), Infantry battalion commander in Vietnam (1967–68), and chief (1961–65) of the Guided Missile System Staff Officers' course, Fort Bliss, Tex.

He has been awarded the LOM, BSM, ARCOM with OLC, and Vietnamese Cross of Gallantry.

Lt Col John H. Cain is assigned to the U.S. Army R&D Information Systems Office (ISO) after serving two years as deputy CO of the U.S. Army Mobility Equipment R&D Center (MERDC), Fort Belvoir, Va., followed by a tour of duty in Vietnam.

Graduated from Wentworth Institute in 1949, he received a BS degree in business administration from Long Island University in 1965. Majoring in automatic data processing systems, he earned an MBA degree from George Washington University in 1969 and completed the C&GSC course in 1964.

During 1965–66 he served in Korea as executive officer, Infantry Division, Support Command, following an assignment as liaison officer, U.S. Army Engineer Division, Mediterranean.

He also served as instructor, U.S. Army Engineer School (1951–52, 1957–59) and as a combat engineer in Europe and Korea. He has been awarded the BSM with OLC, ARCOM with OLC, and the Purple Heart.

Lt Col Robert E. Ingalls has been assigned to the Programs Branch, Programs and Budget Division, OCRD, following graduation from the ICAF. Col Ingalls has a BS degree from the University of Rhode Island and an MS degree from Ohio State University, both in industrial engineering, and is a graduate of the C&GSC.

He has served as chief of the Manpower and Organization Branch, Office of the Joint Chiefs of Staff, HQ DA; battalion commander, 1st Infantry Division, Vietnam; staff officer, Management Office, Office of the Deputy Chief of Staff for Logistics, DA; and staff officer, Officer Personnel Directorate (OPD), Office of Personnel Operations (OPO), DA.

He has been awarded the LOM, BSM with two OLC, Air Medal (AM) with three OLC, Joint Services Commendation Medal (JSCM) and ARCOM with three OLC.

Lt Col Anthony P. Simkus, new OCRD military adviser to the Research Analysis Corp., recently received an MBA degree in operations research and management science from Tulane University.

He has a bachelor of general education degree in business management from the University of Omaha and is a graduate of the C&GSC.

Col Simkus has served as chief, Operations and Training Branch, U.S. Army Chemical Corps School, Fort McClellan, Ala., and chief of both the Test and Evaluation Division and the Research and Development Division, Explosive Ordnance Disposal Center, Picatinny Arsenal, Dover, N.J. He was a Chemical Corps staff officer with the 7th Corps, Stuttgart, Germany, and escort officer, operations officer, and executive officer, Technical Escort Unit, Edgewood Arsenal, Md.

His awards include the BSM, National Defense Service Medal (NDSM), Korean Service Medal, United Nations Service Medal, Parachutist Badge, ARCOM with two OLC, Vietnam Service Medal (in three campaigns) and two Presidential Unit Citations (Army and Marine Corps).

Lt Col Charles B. McLean Jr. is a new staff officer in the Combat Arms Branch, Combat Materiel Division.

A 1951 graduate of the USMA, he has a master's degree in mechanical engineering from the University of Michigan and has completed the U.S. Army Artillery Advanced Course.

Col McLean was until recently assistant chief of staff, Retrograde and Disposal, U.S. Army Support Command, Vietnam, and has served as R&D coordinator, HQ U.S. Army Materiel Command (AMC). In two assignments with the U.S. Army Tank-Automotive Command (TACOM), he was liaison officer with the M113 tank coproduction project, La Spezia, Italy, and project engineer with the Research and Engineering Directorate, Warren, Mich.

Col McLean's awards include the LOM, BSM, AM, ARCOM and the Order of Cavaliere from Italy.

Lt Col Charles E. Sell commanded the 2d Engineer Battalion, 2d Infantry Division, Korea, prior to reassignment with the Programs Branch, Programs and Budget Division.

A 1952 graduate of the USMA, he has a 1957 MS degree in civil engineering from Iowa State College and has completed the C&GSC.

An assignment as instructor and associate professor at the USMA (1966–69) followed a tour of duty as an engineer planning officer, Base Development Division, Military Assistance Command, Vietnam (MACV). From 1961 to 1964, he was project engineer for the New York Opera-

(*Continued on page 28*)

Col Harris Succeeds Orman as WECOM Deputy CO

Col James F. Harris Jr.

Col James F. Harris Jr. has reported for duty at HQ U.S. Army Weapons Command (WECOM), Rock Island, Ill., to succeed Col Leonard M. Orman as deputy commander. Col Orman retired from the Army in July after more than 30 years service.

Col Harris served until recently as deputy chief of staff for logistics at the Army Air Defense Command, Ent Air Force Base, Colo.

Graduated from the University of Nebraska in 1939 with a BS degree in mechanical engineering, he has an MBA degree from George Washington University and has completed courses at the Command and General Staff College and the Industrial College of the Armed Forces.

Maj Gen H. A. Rasmussen, commanding general of WECOM, announced the assignment of Col Harris as deputy.

OCRD Announces 24 Officer Assignments

(*Continued from page 27*)

tions Office, Atomic Energy Commission (AEC).

Lt Col Sell has been awarded the BSM and the ARCOM.

Lt Col Robert M. Moulthrop earned a master's degree in aerospace operations and management from the University of Southern California immediately prior to assignment as the United States member of the Primary Standardization Office, International Office, OCRD.

Graduated with a BS degree in agriculture from Auburn University (1952), he has completed the C&GSC course, Armor Advanced Course, and Army Aviation Flight Training.

From July 1969 to July 1970, he commanded a basic combat training battalion at Fort Knox, Ky. At Fort Rucker, Ala., he was commander of a student battalion; assistant operations officer, Department of Maintenance Training; and chief of a cargo-observation helicopter division.

His decorations include the BSM, Vietnamese Honor Medal (1st Class), ARCOM with OLC, Combat Infantryman Badge (CIB), and the Senior Army Aviation Badge.

Lt Col Edward S. Parchinski is a new staff officer in the OCRD High Altitude Systems Branch, Air Defense and Missiles Division, following graduation from the C&GSC. He has a BS degree in mathematics from Fordham University, New York City.

He has served as operations officer, J–3, Joint Task Force–8, and military analyst, Joint Task Force–2, Sandia Base, Albuquerque, New Mex. In Vietnam he was division artillery adviser, 9th RVN Division.

He was a Hercules missile project officer, CDC Air Defense Agency, Fort Bliss, Tex., and HQ Battery CO, 69th Artillery Group, Wurzburg.

His awards include the BSM, AM, JSCOM, NDSM, Armed Forces Expeditionary Medal, Vietnam Service Medal (VSM) and the Cross of Gallantry with Silver Star.

Lt Col Jerry Max Bunyard is the new Army member of the Department of Defense Army Munitions Requirements and Development Committee.

In Vietnam, Lt Col Bunyard served (1969–70) as deputy commander for administration, 1st Aviation Brigade; chief of staff, 1st Aviation Brigade; and 2d Battalion commander, 20th Artillery, 1st Cavalry Division.

From 1966 to 1969, he was executive for Army Aviation, Officer Personnel Directorate, Office of Personnel Operations, HQ DA, Washington, D.C., following a tour in Vietnam as aviation officer, 1st Infantry Division, Artillery.

Graduated with a BS degree in animal husbandry from Oklahoma A&M in 1954, he completed the C&GSC in 1965. He has been awarded the LOM, Distinguished Flying Cross (DFC), BSM with two OLC, Meritorious Service Medal (MSM), AM with OLC, and the ARCOM.

Lt Col H. C. Finger, new chief of the Electronics Branch, Communications-Electronics and Space Division, OCRD, has an MSEE degree from the University of Missouri and is a graduate of the C&GSC.

Until recently he served as S–2, II Field Force Vietnam, Artillery. He has been operations officer of the Communications Electronics Department and chief instructor of the Electronics Division, Communications Electronics Department, U.S. Army Field Artillery School, Fort Sill, Okla.

Col Finger has been awarded the BSM with two OLC, the AM with "V" device and two OLC and the ARCOM with OLC.

Lt Col Francis G. Thomas Jr. was assigned recently to the Discrimination Technology Division, U.S. Army Advanced Ballistic Missile Defense Agency (ABMDA), following a tour of duty as executive officer of an Advanced Research Projects Agency (ARPA) field unit in Vietnam.

From October 1967 to June 1969, he was chief of the Range Operations Office at the Kwajalein Missile Range in the Pacific, following an assignment as chief of the Nike-X Field Office, Whippany, N.J.

He has a BSEE degree from Virginia Polytechnic Institute, an MBA degree from Babson Institute at Wellesley, Mass., and graduated from the C&GSC in 1966. His decorations and awards include the BSM, JSCM, and the ARCOM.

Lt Col Terrence D. Sarent, a new staff officer in the Electronics Branch, Communications-Electronics and Space Division, OCRD, is a recent graduate from the C&GSC. He has a BS degree from Tulane University and an MS degree from Georgia Institute of Technology, both in electrical engineering.

He has served as chief, Electronics Branch, U.S. Army Research and Development Group (Europe), Frankfurt, Germany (1968–69) and executive officer, 97th Signal Battalion, Mannheim, Germany (1967–68), signal adviser, Military Assistance Command Vietnam (1964–65) and signal officer, 8th Logistical Command, Leghorn, Italy (1960–63).

His awards include the BSM, NDSM, Vietnam Service Medal (VSM), Vietnamese Campaign Medal

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TECOM Announces Assignment of Logistics Director

Assignment of Col John B. Hammond as the new director of logistics at HQ U.S. Army Test and Evaluation Command, Aberdeen (Md.) Proving Ground, was announced Aug. 31.

The deputy director, Gerald W. Hayes, has been acting director since Mar. 1.

Col Hammond assumed his new duties upon completion of studies at the Industrial College of the Armed Forces in Washington, D.C.

He enlisted in the Navy at 17, was assigned in the Pacific theater during World War II, and was commissioned in the Infantry in 1949. He served with the 25th Infantry Division in the Far East as a platoon leader during the Korean War. In three major campaigns in 1950–51, he twice won the Silver Star and also the Purple Heart.

Col Hammond has served with Infantry units in the United States, Europe and Korea as well as a 3-year tour of duty with the University of New Hampshire ROTC instructor group.

In 1965 he was assigned to the Office of the Army Deputy Chief of Staff for Logistics (DCSLOG) and served until January 1968 when he assumed command of the DCSLOG Data Processing Center at Radford, Va., until August 1969.

Col Hammond has a BA degree in economics from the University of New Hampshire, is a 1964 graduate of the Command and General Staff College, and is an alumnus of the Infantry School and the Army Logistics Management Center as well as the Industrial College of the Armed Forces.

His decorations include the Legion of Merit, Meritorious Service Medal, and the Combat Infantryman Badge.

Col John B. Hammond

(*Continued from page 28*)
(VCM) and the Parachutist Badge.

Maj Donald A. Roberts was a project officer with the Army Combat Developments Command preceding assignment as a staff officer with the STANO Division, OCRD.

He served as a survival pilot commander, operations officer and executive officer with the 245th Survival Aviation Company in Vietnam (1968–69), following two years as an instructor at the Army Aviation School, Fort Rucker, Ala.

During 1964–65, he was in Vietnam as a pilot commander and communications officer with the 61st Aviation Company, subsequent to service as an airfield operations officer with the Artillery Aviation Command, Fort Sill.

Maj Roberts holds the BSM, AM w/30 OLC, and ARCOM w/two OLC.

Maj Robert S. Borer became a staff officer with the STANO Division, OCRD, following completion of a course at the Air Force Command and Staff College.

He served a tour of duty in Vietnam, after an assignment as chief of the Side Looking Aerial Radar (SLAR) Branch, Combat Surveillance School (1966–68).

Maj Borer earned a BS degree in general engineering from Tennessee Technical University (1956) and an MBA from Auburn Univ. (1970).

He has been awarded the DFC, the BSM with OLC, and the AM with OLC.

Maj William T. King is a staff officer in the Human Factors Branch, Behavioral Sciences Division, OCRD, following a tour of duty in Vietnam, where he was battalion executive officer, 3d Battalion, 22d Infantry, 25th Infantry Division and assistant G-3, Capitol Military Asistance Command.

He has been an assistant professor of military science at the University of Puerto Rico, and assistant G–3, III Corps, Fort Hood, Tex.

Maj King graduated from the USMA, has a master of education degree from the University of Puerto Rico, and is a graduate of C&GSC.

His awards include the DFC, BSM with two OLC, the ARCOM with two OLC and the CIB.

Maj George L. Richardson has joined the Research Technology Division, OCRD, as a staff officer following an assignment as executive officer, 1st Battalion, 30th Artillery, 1st Cavalry Division, Vietnam.

He has also served as J–3, staff officer, with the Military Assistance Command, Vietnam.

Maj Richardson served in 1968 as an instructor of mathematics at the USMA, from which he was graduated in 1957. He has an MS degree in mechanical engineering from the University of Southern California and is a graduate of the C&GSC.

Maj Richardson has received the BSM, the AM, the JSCM, ARCOM, VNSM and the Vietnam Honor Medal (VHM) First Class.

Maj Lewis R. Martin has joined the Research Technology Division, OCRD, as a staff officer. A 1969 graduate of the C&GSC, Maj Martin has an MS degree in chemistry from Pennsylvania State University.

In Vietnam until June 1970, he was assistant S–3, 101st Airborne Division Artillery (AMBL), and S–3 of the 2/319th Artillery Battalion, 101st Airborne Division.

Maj Martin has served as an instructor in chemistry at the USMA, a battery commander in the 4th Missile Command, Korea, and in 1962–63 was a student at the U.S. Army Field Artillery and Missile School, Fort Sill.

His awards include the BSM, AM (second award), ARCOM w/OLC.

Maj John W. Moore is newly assigned to OCRD as the Army representative in the Joint Meteorological Satellite Program Office, Office of the Secretary of Defense.

He has a BS degree in geology from Oklahoma State University, an MS degree in meteorology from Texas A&M University, Army advanced education program (1967–69), and is a 1970 graduate of the C&GSC.

Maj Moore served in 1966–67 as a district adviser with the Military Assistance Command, Vietnam (MACV), battery commander, 2d battalion, 30th Artillery, Fort Sill, Okla. (1965–66), and S–4, 52d Artillery Group, Fort Sill. He served as battery officer, 4th Battalion, 6th Artillery, U.S. Army Europe (1960–63).

He has received the BSM, AM with OLC, ARCOM, CIB, Parachutist Badge and VHM First Class.

Maj Roman Rondiak is newly assigned to the Materials Sciences and Technology Branch, Physical and Engineering Sciences Division, following a second tour in Vietnam.

With the 5th Special Forces Group, Airborne, in Vietnam in 1969–70, he was executive officer and commanding officer of five Airborne Mobile Strike battalions. In Vietnam in 1966–67, he was rifle company commander and battalion S–2 of the 1st Brigade, 101st Airborne Divison, 2d Battalion, 327th Infantry.

Maj Rondiak holds a BE degree from Rensselaer Polytechnic Institute and an MS degree in mechanical engineering from New Mexico State University. He has completed the Infantry Advanced Course.

He is a recipient of the BSM with "V" device and two OLC, AM with "V" device and five OLC, the Purple Heart, VSM, VCM, Vietnamese Jump Wings, CIB and Master Parachutist Badge.

Capt Larry D. Bird, Judge Advocate General's Corps, is a new legal adviser to Director of Army Research Brig Gen George M. Snead Jr.

He has a doctor of jurisprudence degree from the University of Nebraska (1967) and a BS degree in business administration from Kansas State University (1964).

Capt Bird has served (1969–70) as legal adviser to the Army Council of Review Boards, Office of the Secretary of the Army, and in 1968–69 as assistant staff judge advocate, HQ, First U.S. Army, Fort Meade, Md.

He is a Distinguished Military Graduate from the ROTC program at Kansas State University and has received the MSM.

Col Van Eaton Reports to ECOM as Inspector General

Col John H. Van Eaton reported recently to the U.S. Army Electronics Command (ECOM), Fort Monmouth, N.J., as the new inspector general.

From 1967 until 1969, he was stationed in Heidelberg, Germany, with the Office of the Deputy Chief of Staff for Operations, U.S. Army Europe and Seventh Army. Until recently he was at Ramstein Air Base as Army liaison officer to the U.S. Air Forces in Europe.

He has a bachelor's degree from the University of Maryland and has completed the Command and General Staff College. After completing the Officers Advanced Course at Fort Benning, Ga., he served on the staff and faculty.

During the Korean War he was with the 9th Infantry Regiment, and was awarded the Bronze Star Medal with "V" Device and the Purple Heart with Oak Leaf Cluster.

Col Eaton began his Army career during World War II as an enlisted man, attended Officers Candidate School at Fort Benning, Ga., and was commissioned in 1945.

Col John H. Van Eaton

Chief of R&D Details Objectives for Army Aircraft

(Continued from page 2)

Huey, and a heavy-lift helicopter to provide the logistic and service support beyond the capabilities of the CH–54 and CH–47. We also see an end to the useful life of the 15-year-old Mohawk.

Yet our shrinking R&D and procurement budget forecasts tell us that, in the foreseeable future, there will be few simultaneous system-for-system replacements. The probability of any two happening concurrently is very remote.

In terms of R&D, I see few new system development programs in the next two to three years. The intended successor to the Chinook—the Light Tactical Transport Aircraft System (LTTAS)—is a casualty of a reduced defense budget. We do not see any ability to undertake this program until about 1975. Our Mohawk replacement, the Manned Aerial Vehicle for Surveillance (MAVS), is even farther in the future.

Even the heavy-lift helicopter (HLH) is out as a full-scale engineering development program, though I will mention in a few minutes some work we plan to do that will have future HLH implications.

We will do very little R&D in the avionics field, relying instead on industry's commercial advancements and adapting these where possible.

Now that I have passed out the bad news, let's look at what's left. I feel somewhat like the Indian Chief who called his tribe together and announced that he had some news to give them—some good and some bad. He would give them the bad news first, and stated that due to their own improvidence, they would have nothing to eat during the forthcoming winter months except buffalo chips. He then said, "Now, for good news—we have plenty buffalo chips!"

On the plus side, then, the advanced aerial fire support system represented by the Cheyenne, is still our No. 1 development priority. Both we and Lockheed have had our problems with the Cheyenne and we are still not sure that the Congress is going to allow us to continue development. In fact, the Senate Armed Services Sub-Committee recommended deletion of the total request of $17.6 million for FY71.

However, the aircraft is flying and its weapons are performing so well that we are now trying very hard to update Congress on the progress we have made and the favorable status of the Cheyenne program.

In the conferences between the Senate and House subcommittees, I am hopeful that we will get most of this money restored. We have tried to convince the Congress that the technical problems that retarded the Cheyenne program, in 1969–70, are now understood and are being solved. In fact, we believe that we have solutions in hand and that they will be verified in flight in the next few months.

The money received for this program would be aimed at certain pacing technological items, such as the problems of subharmonic rotor instabilities and hingeless rotor dynamics in order to fill out the performance envelope.

Wing location effects on compound helicopters is another item of pacing technology that we intend to pursue as part of our helicopter research program, continuing into the structures field. Progress on the gunship is also dependent upon advances in vibration control devices, reduction of weapon recoil and blast effects, development of lightweight composite armor, and assessment of composite materials for ballistic tolerance.

As you all know, the Army has a considerable number of AH–1G Huey Cobras in the inventory. It is reasonable to assume that these aircraft will

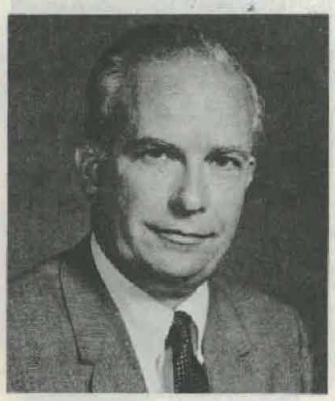
2 Associate Directors Appointed to Frankford R&E

When Dr. Sidney Ross was selected in November 1968 as the first technical director of Frankford (Pa.) Arsenal Research and Engineering, provisions were made to appoint two associate directors.

Action was delayed until recently when Seymour Miller was selected as associate director for engineering and advanced development, and Joseph M. McCaughey was chosen to monitor research and exploratory development functions. They assist and advise the technical director on planning, coordination and executive management of all Frankford Arsenal technical programs.

Miller has been at Frankford 19 of his 21 years in federal service and was commodity manager for small-caliber ammunition until promoted to his new duties. In 1949, as part of a study program sponsored by Drexel Institute of Technology, he worked part-time at the arsenal. After earning his bachelor's degree in mechanical engineering, he became a full-time employe but continued studies for a master's degree.

Seymour Miller



Joseph M. McCaughey

Miller has worked in propellants, packaging, complete munitions round development, and production and system engineering. He was responsible for development of U.S. Army safety standards applied to the European Vehicle Rapid Fire Weapons System (VRFWS) when it was adopted for use by American forces.

McCaughey is now responsible primarily for monitoring projects at Frankford's Pitman-Dunn Laboratories. Since he spent most of his 25 years at the arsenal with the Pitman-Dunn complex, he is considered uniquely qualified for the job. For the last 15 years he has been research adviser to the director of the Metallurgy Laboratory.

Drexel Institute's work study program brought him to the arsenal in 1942. When World War II broke out, he entered the Army and spent 3½ years in the Signal Corps before returning to the arsenal.

McCaughey considers the Liquid Metal Embrittlement Program as the most important research project in which he has been involved. He initiated this research, carried in its early stages solely at Frankford, and wrote the first comprehensive book on the subject in 1960.

More recently he has worked in material studies to establish kinetic energy parameters for controlling penetration of hard targets such as armor plate.

After completing his work on a bachelor's degree in chemical engineering following World War II, McCaughey continued graduate work in mechanical engineering and metallurgy at the University of Pennsylvania.

be around for several years to come. Therefore, we are planning to upgrade the Cobra's effectiveness.

We are planning to install a 30mm automatic gun and to give the Cobra an antitank missile system. But I stress the fact that the upgraded Cobra will still fall far short of the capability we expect to attain with the Cheyenne.

In connection with the upgrading of the Cobra, we are now planning to undertake advanced component work, in FY72, on a program we call SEAS —for Selected Effects Armament Subsystem. We had planned to begin this project in FY71, but it slipped until '72.

SEAS is intended to be an area-type weapon, utilizing a basic motor or propellant with a family of warheads and fuzes, optimized for selected types of targets. Replacing the current 2.75-inch folding-fin aerial rocket, the system would be useable on both the Cobra and the Cheyenne.

I mentioned that we do not plan to start a Heavy-Lift Helicopter operational system development program in the next few years. However, we do plan to begin development of selected critical components for an HLH this year. There are a number of areas that are pacing technology for an HLH program; we must find answers here before we go to a full system development.

The Army Materiel Command, as part of this effort, expects to issue RFPs (Requirements for Production) this year for work on mechanical properties of large gears and gear boxes, pressure jet technology for rotor propulsion, and a cargo hoist system capable of meeting the load-lifting problems of some 23 tons.

Work will be required on stabilization and control problems of large helicopters, since vehicles of this size are a completely new area. Hopefully, we might then be able to start HLH system development by FY74.

The story is somewhat the same for the Utility Tactical Transport Aircraft System (UTTAS), the follow-on to the Huey. Concept formulation work for this aircraft is complete, and the proposed QMR (Qualitative Materiel Requirement) for the system is now in the Department of the Army staff for approval.

However, it is an open question as to which way we will go to satisfy this requirement—a new system or product improve the current one. That decision is due in the next month or so.

In either case, we intend to undertake engineering development of an advanced technology engine starting this year. This 1,500 shaft horsepower engine will have application to our troop lift helicopter no matter which direction we choose to go.

If the decision should be to go the route of a new system, replacement for the Huey will, naturally, be a little later in reaching the inventory. The timing of any such new system will, to an extent, be governed by other technology pacing areas that we do not have the means to fund at this time, though the technology work being done in support of the gunship and other programs may benefit the UTTAS.

For example, the study of wing location is equally as valid for UTTAS as it is for the future gunship. Other technology requirements that we believe may be important ones for UTTAS—but for which we plan only limited funds this year—are such things as coaxial rotors, vibration control devices, and development of energy-absorbent, crushable structural materials.

In summary, what I am saying, in terms of dollars, is that for FY71 we expect to have something less than the $110 million we requested for air mobility. The forecast for the future reflects a little improvement in total dollars, but when we consider inflation and the rising costs of doing R&D, we are not going to be able to do all of the things we believe we should undertake.

At the best, we can see only an increase of about 8 to 10 percent for FY72–73 funding over our request for FY71, and we are not optimistic that we will receive this much. We will continue to consider the attack armed helicopter our No. 1 development priority. Other programs line up behind this one, with no new system starts planned before '73 or '74.

To end on a positive note, I believe the budgets will be adequate, though barely, to support our technological growth in the next few years. Hopefully, we will be able to have a greater number of development options from our component efforts, though system starts will be fewer.

Grabau Added to 1970 Achievement Award Winners

Delay in providing requested additional information prevented announcement of the selection of Warren E. Grabau among a record number of 52 other 1970 R&D Achievement Award winners in the July–August *Research and Development Newsmagazine.*

Approval of the award for the chief of the Terrain Analysis Branch, Mobility and Environmental Division, Army Waterways Experiment Station, Vicksburg, Miss., was announced just after the July–August edition had gone to press.

An 8-member panel of Army judges, representative of the major areas of the scientific disciplines, considered qualifications of the nominees.

Grabau's selection recognized him for development of radically new ideas and concepts for solution of many and very diverse problems, involving interrelations between military activities or items of military equipment and the environment in which they operate.

Rationale underlying these approaches is that the terrain parameters affecting a military activity or operation may be expressed in quantitative terms; also, that these parameters can be coupled with similar ones expressing the activity itself, and formulated as mathematical relations which define the performance of the activity.

Powerful tools are thus available to the military commander or planner, enabling him to plan his operations so as to utilize most effectively the forces at his disposal and to anticipate and overcome problems that could otherwise seriously affect the outcome.

Warren E. Grabau

Two HumRRO Projects Yield 4 Army Technical Reports

Two Human Resources Research Office projects conducted under contract with the Office of the Chief of Research and Development, HQ DA, were completed recently, resulting in publication of four technical reports, two journal articles and a conference paper.

BR–9 on "Learning of Military Skills" produced TR 66–11, *Pursuit Rotor Performance: Effects of Reinforcing the Longer Interval of Continuous Tracking within Each Trial,* by Richard W. Sheldon and John F. Bjorklund; TR 66–22, *Pursuit Rotor Performance: Effects of Reinforcing Successively Longer Intervals of Continuous Tracking over Practice Sessions,* Sheldon and Bjorklund; and TR 68–13, *Supplementary Feedback: An Explanation and Experimental Test,* by Elmo E. Miller, Sheldon and Bjorklund.

BR–18 on "Behavior Management" produced TR 69–17, *Reinforced Management: Approach to Motivating Army Trainees,* by Barrie Cassileth.

Free World R&D Discussed at KIST Conference

In addressing the Seoul International Conference on Electrical and Electronics Engineering, Sept. 2–4, at the Korea Institute for Science and Technology (KIST), the U.S. Government speaker discussed "Free World Research and Development: Its Part in Preparedness, Peace and Progress."

Clyde D. Hardin, Special Assistant for Southeast Asia Matters to the Assistant Secretary of the Army for Research and Development, was one of three featured speakers at the opening session. About 90 technical papers were representative of Korea, the United States, United Kingdom, Canada, Australia, Federal Republic of Germany, Taiwan, Thailand, Israel, India and Iran.

KIST was established by the Korean President Chung Hee Park in February 1966 with the assistance of the U.S. Government, following his visit to discuss the need for an R&D agency with President Lyndon Johnson in May 1965. KIST is founded as an independent, self-perpetuating institution.

Known for his long and close association with U.S. Army research and development activities in Southeast Asia, where he has worked on various special missions, Hardin presented the following message:

* * *

Clyde D. Hardin

As a defense scientist, my previous visits to Korea have been in connection with the U.S. role in its defense partnership with our valiant host country. This gathering today clearly highlights the enduring results of such partnership of free men: solid intellectual and industrial progress in their drive for a better world.

That is the motivation for my choosing the topic of my remarks here today. This topic is at least ambitious, and perhaps even presumptuous: pursuit of knowledge and resulting scientific achievement is *not* a monopoly of the noncommunist world. For this we should be grateful, for knowledge is itself a leavening force in the affairs of man, and works in general toward peace and progress for all nations everywhere.

The pointed reference to the Free World was therefore not intended in a sense of international controversy or competition; but rather in the sense that the Free World has a special responsibility for, and a special opportunity in, the search for scientific knowledge and the self-seeding output of research and development.

The special opportunity is ours for the simple reason that free men have no government shackles on the inquiry of their minds. We have a special responsibility, for the product of this inquiry has major potential for contribution to peace, progress, and the constructive goals of freedom and opportunity which gave it birth.

I have used such words as "defense" here in the same context as "peace" and "progress." This is deliberate, for it is the theme of these remarks that these are inseparable, particularly with regard to research and development, and especially in electronics.

This is not—at least in these days—a universally accepted hypothesis. Some of our students, particularly some of those in my own nation, view the search for solution to military problems to be at counter-purposes with the search for solution to human problems. Those of us who have lived through—and perhaps been victims of—the tyrannies of recent and present history draw a different conclusion, for we have seen a different set of data.

Without security, there can be no peace, no progress, no struggle for humanity's betterment. With it, there can be much. There is no greater testimony to this fact than the great Korean nation, our host today. Twenty years ago this was an impoverished country, but free, and with this freedom was struggling to overcome the liabilities placed upon it by years of previous occupation.

Suddenly, invasion came from the north; rampant killing and destruction followed, creating over a million refugees, and leaving rubble in this very city in which we meet. With the assistance of my country and other Free World members of the United Nations, this threat was turned back.

Today, twenty years later, we find ourselves in a country whose standard of living has been increased an order of magnitude, whose gross national product has gone from a few hundred million to over six billion dollars, whose educational opportunities have changed from one out of three children in elementary school to secondary education for all, and whose universities have increased in student population from 20,000 to nearly 200,000.

We are meeting here in one of the most promising scientific institutions in all of Asia, an institution which is making great strides for human good in food technology, construction materials, transportation, ship building, agriculture—and all the basic sciences of electronics and chemistry and metallurgy and mechanics which gave man knowledge of, and access to, the resources of nature.

Five years ago KIST was just an idea; two years ago most of the buildings had yet to be constructed. But building on the resurgence of security and freedom, its productivity has been so significant that over 50 percent of its research and development is now supported by industry.

Achievements such as this provide visible evidence that peace and progress are dynamically interrelated with security and preparedness; and that research and development is both an input and output function of that relationship.

This injection of ideological overview is perhaps somewhat off the professional mainstream of semiconductor junctions, signal design, large-scale integration, data storage, high-vacuum technology, and the myriad of other exciting concerns of the electronics fraternity who gather here this week to exchange technical ideas and describe the results of our laboratory endeavors.

Yet our presence here and the subject matter of our discussions are in themselves evidence of the impact our science is having on the course of civilization. We stand at a crossroads today in the affairs of men, with the locus of our journey heavily influenced by the technology revolution, a revolution primarily electronic in nature.

The impact has been so great that there are those who would not only separate defense science from nondefense science, but who attack science and technology itself as a machine gone out of control, preempting human values and usurping the future from man and from nature. It may thus be appropriate for us to take a moment to look over our shoulder where we have been, and then scan the horizon for where we are going.

We who are principals in electronic

research and development have a personal responsibility in the fundamental role electronics plays in today's and tomorrow's world. The extent to which it enhances security, peace, and progress is to some extent, at least, determined by our professional contributions to preparedness, our innovations for industrial growth, and our selectivity of effort for the needs of mankind.

First, a very brief glance at where we have been. A survey of the chronology of Free World R&D certainly shows a physical cause-and-effect relationship between defense and nondefense technological achievement that parallels the socio-economic-freedom-security-progress relationship previously discussed.

We in the electronics profession are especially familiar with this interaction. Whether we approach it from the basics of electron physics, or a given hardware technology such as radar or communications, we find the coupling so tight that it is difficult to separate the variables.

Perhaps one measurement of military R&D impact on the human good may be derived from a look at the output of defense laboratories themselves. Even this measure is so inclusive in scope that I would like to take the refuge of illustration by example, using one laboratory with which I happen to be familiar because of personal association.

It was my privilege to serve in the U.S. Army's Harry Diamond Laboratories for many years. This institution is a small fraction of the United States Army research and development operation, and represents a miniscule part of the Free World's R&D achievement. Yet here was developed the world's first integrated circuit, commemorated by the first international Microminiaturization Award and recognition by the U.S. Congress; the science of fluidic amplification, commemorated by the John Scott Award; the high-resolution pulse-tracking radio altimeter techniques used today in commercial aviation; the first microwave switch used in phased-arrays; radar processing techniques involving directional doppler; and a host of other items, from special antennas and microwave sources to heart pumps and weather instrumentation.

These are just some of the benefits to society accomplished as by-products of one small laboratory in the defense scheme of things. Had we taken another Army laboratory—such as the Ballistics Research Laboratory, where the world's first computer, the ENIAC, was born, with guidance and assistance from the University of Pennsylvania—or a defense-related University Center, such as MIT's Lincoln Laboratory, which has contributed so significantly in radar, space exploration, and componentry such as the gallium arsenide laser—the assessment would be similar in worth of impact.

A broader look would reveal that modern communications and navigation, electron optics, data processing and information retrieval, energy cells and nuclear power plants—in fact, most of the electronic world as we know it today—have derived in a major way from defense-oriented research and development.

I do not believe this is an accident. The concerns of defense have to do with such basic needs as safety, communication, transportation, information handling, surveillance, precision position-fixing and delivery systems.

They are directed at operation under environmental constraints of hot and cold, rain and mud, fog, ice, and dark of night.

These goals have many counterparts with the public need to travel more safely, communicate more easily, and automate for greater productivity. Motivation for achievement in defense R&D is not just an economic or disciplinary one, but one of survival itself, enhanced by the drive of patriotism and the concerns of world peace. Such motivations provide resources of inspiration, perseverance, and intellectual challenge that are second to none.

To deter the Armageddon of nuclear war—or to prevent the fall of nations struggling for freedom and self-determination—these are goals that men have died for; they are certainly worth living for, and for the defense scientist have been worth working for, inventing for, and striving for.

But the other side, the public side, of the Free World R&D equation is that which guarantees its positive slope. The rapid extension of military motivated scientific gain to public needs that we referred to by example is natural in a free society, and perhaps is one of its greatest sources of strength.

Nations dedicated to government of, by, and for the people produce institutions with similar affinities. Checks and balances of a free society tend to keep them that way. R&D is such an institution.

In these times of world turbulence, compounded by massive technological impact on human affairs, will tomorrow's new science and engineering remain a creative force in man's climb

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O'Brien Becomes Director of EM Testing at TECOM

Col Robert T. O'Brien is the new director of Electronics Materiel Testing, U.S. Army Test and Evaluation Command, Aberdeen (Md.) Proving Ground. Lt Col Richard A. Humes, acting director since February, has returned to deputy director.

Col O'Brien served a tour of duty with the Office of the Chief of R&D, HQ DA, as chief, Communications Branch, Communications-Electronics Division, before joining the staff of the Director of Defense Research and Engineering in April 1969.

In 1966–67 he was chief of the Welfare Branch, Personnel Services Division, G–1, U.S. Army Vietnam, following two months as commander of the 121st Signal Battalion, 1st Infantry Division.

He has served as chief of Field Operations, Instrumentation Support Group, U.S. Army Combat Developments Command Experimentation Command, Fort Ord, Calif., and operations officer, HQ Signal Office, Supreme Headquarters, Allied Powers, Europe.

A 1949 graduate of the U.S. Military Academy (USMA), Col O'Brien was awarded an MS degree in electrical engineering from Stanford University in 1959. He has completed courses at the Command and General Staff College and the Armed Forces Staff College.

During the Korean War, he took part in five campaigns as a platoon leader with the 7th Infantry Division, returning to the States in January 1951. During the next eight years he served as an OCS training officer at Fort Monmouth, N.J., taught mathematics at the USMA, completed the advanced course for Signal officers at Fort Monmouth and pursued postgraduate studies at Stanford.

His decorations include the Bronze Star Medal with Oak Leaf Cluster, the Meritorious Service Medal and the Army Commendation Medal.

Col Robert T. O'Brien

Free World Research, Development Discussed at KIST Parley

(*Continued from page 33*)

to a better world? It is my conviction that it will. Free World R&D will continue to contribute to man's security, his progress, and his search for peace. The question is only how much.

It is a fair presumption that we here are involved in the answer to that question. We certainly are only part of the determinant; political, diplomatic, economic forces and events will continue to set the stage. But we are a significant part, for we are players on that stage. What then are some of the electronic challenges to Free World scientists and engineers as we face the immediate future?

There are at least three. The first is an individual one, in our relationships with peer groups in the intellectual and academic world, which currently evidence a degree of disassociation with science, as they view an expanding civilization undergoing dramatic social changes, and at the same time interacting with the dizzying pace of technology.

The computer has not dehumanized man, nor has space communication and the transistor radio deprived him of his great literature. Automation has not destroyed talent and skill, but rather created the basis for new skills. We can help our counterparts in the intellectual community to increase the relevance of science to the metamorphosis in society, and to seize the opportunities made possible by new technology for solving social problems.

The second challenge is a professional one of support to the options and opportunities for electronic industries in the emerging nations of the world. What has happened in Japan, and is now happening in Korea, Taiwan and elsewhere, proves that electronic and electrical industry can revitalize the economic base of this area of the world—and in the doing, attack the root causes of poverty on which the imprisoning tentacles of communism feed.

The third challenge is subject-oriented, and perhaps represents my personal view of the principal priorities in new electronic technology. Trade journals, followed by newspaper accounts of Congressional debates, have recently drawn attention to the emphasis given by the Armed Forces of my country to surveillance and display capability: radars, sensors, night vision.

This emphasis has been accelerated by defensive needs experienced in the Southeast Asia conflict. Assassination of village chiefs, attack of cities by rockets, entering homes for confiscation of taxes and the ransacking of rice are nearly all done under cover of night. There is an old Korean proverb that says "The idle get busy in the evening," and so it is with terrorists of all time, whether they be agents of invading armies, or common criminals.

The guardians of civilization—both the soldiers such as those who stand watch on the DMZ north of here, and the civil authorities concerned with protecting the sanctity of our homes and the safety of our streets—need help to take the night away from those who use its cover for coercion and destruction.

Advances in radar, low-light-level television and other image intensification devices, passive infrared imaging, and sensors of all sorts have been significant in recent years. But much is yet to be done, particularly in the areas of materials and production technology for quantity availability, in discriminants for separating and identifying threat situations, and in information processing and display.

If we are to defend nations—or protect cities—with minimum force and minimum interference with society, then we need a maximum of knowledge and information, and objective sorting of that information for wise and timely decisions.

Even in a better world, a world in which the percentage of violence declines, increased population density of staggering proportions is ours to anticipate. Protection of the many from the few will get more difficult, not less. Over and beyond public security considerations, the position-determination and information-handling aspects of new surveillance is mandated by the mobility needs of our burgeoning society, such as traffic control on the ground and in the air. More people and more goods in transit to more locations more swiftly are implicit in a more crowded world.

In the public press, and in Congressional comment, United States interest in integrated surveillance and display/decision technology has been referred to as the "electronic battlefield." This is an apt name, for the intent of current priorities is to develop an instantaneous recognition and response capability which is tangible and real, and operates as a maximally effective tactical deterrent.

The use of sensor-derived, automatically processed information will do much to overcome the manpower nonequivalence that exists between Free World defenses and the mass armament of the communist bloc. The deterrence of superior retaliatory weap-

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Lt Col King Assigned as AMT Director at HQ TECOM

Director of Aviation Materiel Testing at the U.S. Army Test and Evaluation Command, Aberdeen (Md.) Proving Ground became the title of Lt Col David B. King II when he recently succeeded Col Raymond E. Johnson, director since July 1967.

Col King served with the G–4 Section of VII Corps, HQ U.S. Army in Germany from 1967 until mid-March 1969. Ten days later he was in Vietnam with the joint staff, U.S. Military Assistance Command as chief, Aviation Support Branch, Surface Operations Division, J–3.

He commanded the 2d Battalion, 36th Artillery, at Fort Sill, Okla., from September 1965 until he was sent to Europe. During an earlier tour of duty in Vietnam he commanded the 23d Special Warfare Aviation Detachment and, later, the 73d Aviation Company.

Lt Col David B. King II

From 1959 until 1963, Col King was stationed with the Army Aviation Board at Fort Rucker, Ala. During this period, he completed jet qualification and ordnance delivery training with the Navy, flew with the Italian Air Force to bring the Fiat NATO fighter to the United States, and participated in the board's man-machine low-level compatibility studies.

Col King enlisted in the Army Air Corps in 1943 and served in Iceland and Greenland during World War II. Graduated from the U.S. Military Academy in 1950, he later earned a BS degree in aeronautical engineering from Mississippi State University.

A rated Army Aviator since December 1951 and a Master Army Aviator since April 1967, he is qualified in fixed- and rotary-wing aircraft as well as in jet fighters.

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ons perhaps can in part be replaced by the deterrence of superior knowledge. An so another name, which might apply just as well as "electronic battlefield," is "electronic peacekeeper."

In the areas of tension of the world such as the uneasy peace of the demilitarized zones, better surveillance not only increases security from infiltration and attack; it separates major from minor threats, reducing the possibilities of over-reaction and escalatory incidents.

Just the knowledge that tactical intelligence is sufficiently complete and responsive to remove the element of surprise is in itself a peacekeeper of considerable merit.

For Free World defense, internal security, safer and better mobility for a rising population, and for peace itself, a high priority does exist for the electronic elements that extend the senses of man: sensors, data links, information processors, displays. In the Army laboratories, these items and the materials and techniques behind them are receiving a great deal of attention.

This is not enough. It is hoped that interest in these areas will receive similar priority in electronics R&D facilities across the Free World. As surely as we stand here today, such priority will make it a better and a safer world. In deterrence and defense, and in by-products which stimulate progress in all fields, electronic extension of the senses and decision-processes of man will validate the triad of preparedness, peace, and progress.

I hope I have not abused my opportunity before this distinguished audience, for the technical content of my remarks has certainly been minimal. I have yielded to bureaucratic clichés such as "achievement," "public need," and "world turbulence." I have avoided confrontation with the obvious fact that R&D for weapons of defense produces weapons that also can be used for destruction.

I have skirted the equally self-evident data that the "Free World" and the "Communist Bloc" are not spectrally pure delta functions, but rather wideband distributions of a mix of nations, each with national blindspots and governmental imperfections, and each populated with human beings with hopes and dreams and needs. But I am enough of a scientist to believe in statistical evidence, and the recorded data dramatically displays a clear correlation between Free World R&D and man's struggle toward a better life.

Free World R&D continues to beat its swords into plowshares, its targeting radars into air traffic control, its atomic weapons into nuclear power plants, its missiles into space exploration, its satellites into communication systems, its guidance devices into navigation aids.

Weapon products of that R&D are almost exclusively used in the defensive role for the security of man. The Free World has built no Berlin walls, no iron curtains, nor conducted any Bluehouse raids. There are no Laotian, Cambodian or South Vietnamese troops in North Vietnam. But there are tens of thousands of North Vietnamese troops who have attacked and invaded those struggling nations whose use of weapons is in defense of their homelands, not attack of their neighbors.

I confess to a belief that there *is* a cause, that electronic scientists have played a special role in that cause, and face a challenge in its name that is worthy of our best. The creative, imaginative record of KIST, where we gather today, proves to me that that challenge is being and will be met. The significance of this meeting in mainland Asia is in itself a measure of the upward and outward thrust electronics R&D is making to bring the benefit of science to mankind everywhere.

I have just returned from Indochina. While there, I visited again the fledgling Combined Development and Test Center in Vietnam, the dynamic Applied Science Research Corp. of Thailand, and other R&D institutions in Southeast Asia. They are the beginnings from which dreams are being dreamed.

Will there ever be an International Meeting of the Institute of Electrical and Electronics Engineers in Saigon, or Hue, or Ventiane? That is a question that only the future can answer. But twenty years ago were that same question asked about Seoul, who would have answered yes? Such is the stuff of which free men and creativity are made, however, that this has come to pass.

As we share our professional exchanges here, let us remember the conflict once on the streets of this city, and our debt to the men who died to see the peace and progress and opportunity for free intellectual exchange we now enjoy here. This is a professional debt, one owed not only to the past, but to the present—to the men who stand now along the DMZ to the north, and along the Mekong in Southeast Asia. Its payment yields dividends to us all, to our children, and our children's children.

Man should have no fear of discovery, no reluctance that nature's secrets will overwhelm him. His only appropriate concern is to apply those discoveries to the protection of, and assistance to, the race of man. That has been characteristic of Free World search, discovery, and implementation in the electronics field. It is true in Seoul, Korea, in 1970, and must continue to be.

Sounding Board Suggestion Award

SFC Gerald L. Ullom, assigned to the U.S. Army ROTC Instructor Group at St. Bonaventure (N.Y.) University, will receive the first cash award from the Incentive Awards Program for a suggestion sent to the Army Sounding Board for the Individual Soldier. He will receive $400 for a suggestion to reinforce a canvas carrier used to transport the M-18A1 Claymore mine.

MICOM Elevates Wallis to R&E Deputy

Col Vernon V. Wallis became deputy to Dr. John L. McDaniel, head of the Research and Engineering Directorate at Redstone Arsenal, Ala., after serving since December 1969 as chief of the U.S. Army Missile Command Personnel and Training Office.

Col Wallis earned a bachelor's degree in business from Utah State University and a master's degree in mechanical engineering from the University of Arizona.

He has served tours of duty in Germany, Korea and Thailand. Stateside duty has included Fort Polk, La.; Camp Robinson, Ark.; Fort Benning, Ga.; Fort Belvoir, Va.; Fort Bliss, Tex.; and Fort Leavenworth, Kans., where he completed the Command and General Staff College.

Col Wallis received the Purple Heart and the Bronze Star for service during the Korean War. He was awarded his first Legion of Merit while serving with the Combat Developments Command Institute of Nuclear Studies, and a second for exceptional performance of duty at Fort Polk, La.

Col Vernon V. Wallis

Defense International Security Chief Discusses Risk of Further Cuts

Cuts in the Department of Defense budget and personnel strength have gone about as far as they can without risks to the security of the nation, in the opinion of G. Warren Nutter, Assistant Secretary of Defense (International Security Affairs).

In an address to the Western Economic Association annual meeting in Davis, Calif., Aug. 28, he presented a concise statistical analysis of the impact of the budgetary rollback.

He quoted from a recent address by Secretary of Defense Melvin Laird:

" 'My great concern at the present time is the maintenance of the nation's military strength at the level required in today's world. The pressures for deeper immediate cuts are strong. Convinced that deeper cuts would expose the American people to risks which I cannot in conscience recommend that they assume, I shall do my best to persuade the Congress and the people to reject them.' "

Offering "an unbiased account of defense and the economy as seen from the Defense point of view," ASD Nutter stated:

"Let us first take a look at trends in public spending as projected from fiscal 1964, the last year before the military buildup in Southeast Asia, through fiscal 1971. In current prices, spending by government at all levels —federal, state, and local—is expected to increase over this period by $143 billion, or by 82 percent.

"Spending by the Department of Defense, on the other hand, is expected according to the present budget to increase by only $21 billion, or by 41 percent, while nondefense spending increases by the remaining $122 billion, or by 98 percent.

"The contrasting trends are even more striking when measured in constant dollars. In prices of fiscal 1971, spending will have risen by $88 billion for government as a whole, comprising $82 billion for nondefense programs and less than $6 billion for defense. The corresponding percentage increases in real spending are 38.5 percent for government as a whole, 50 percent for nondefense purposes and only 9 percent for defense.

"As a consequence of these trends, nondefense spending will show a rise from 20 percent of GNP to some 24 percent, while defense spending shows a decline from 8.3 percent to 7.0 percent, the lowest percentage since 1951. Similarly, in fiscal 1971 defense will account for less than 35 percent of federal spending, the lowest fraction since 1950. In fiscal 1964, it accounted for 41.8 percent.

"The civilian and military manpower employed by the Department of Defense and defense contractors amounted to about 5.8 million persons at mid-1964. The figure will be higher by less than 700 thousand, or 11 percent, at mid-1971. Over the same period, the labor force will rise by some 14 percent.

"Of course, this relative shift in resources away from defense to other uses has not taken place steadily since fiscal 1964. Quite the contrary. Through fiscal 1968, the relative shift was in the other direction. At the peak of the buildup in Southeast Asia, just before the present Administration came into office, defense spending had risen to 9.5 percent of GNP and 42.5 percent of total federal spending. The trend has been reversed by the sharp military cuts of the last year and a half.

"At first sight, these cuts may not appear to be as large as they have been. In fiscal 1968, defense spending was $78.0 billion. The present budget calls for $71.8 billion in fiscal 1971, a decline by $6.2 billion or 8 percent. But prices and wages paid by the Defense Department have risen by some 15 percent and have therefore eaten up a far larger sum.

"In fiscal 1971 prices, it would have cost $89.4 billion to finance the defense program actually undertaken in fiscal 1968, or $11.4 billion more than the cost in then current prices.

"That is to say, real defense spending measured in fiscal 1971 prices has been cut by $17.6 billion over this period. This is the figure to focus on: a reduction by one-fifth in real defense outlays accomplished so far under the Nixon Administration. This is the magnitude of the shift in resources that is taking place.

"Despite this hefty cut in defense spending, there are some who say that we have not cut enough, that the 'peace dividend' runs many billions of dollars more than the cuts already made. These claims are wrong for two basic reasons.

"First, what we can save by withdrawing troops from Vietnam is considerably less than the full cost of the war. Measured in fiscal 1971 prices, the full cost of our forces came to $30 billion in fiscal 1968. Of that amount, however, some $7 billion represented the cost that would have been incurred for baseline forces if they had been engaged in peacetime activities elsewhere. The incremental cost attributable to Vietnam was $23 billion.

"Second, we have since reduced defense spending in the same real terms by almost $18 billion, leaving only $5 billion to $6 billion of the so-called 'peace dividend' still to be realized.

G. Warren Nutter

"This sum is only about half of the incremental cost of the Vietnam war that will still face us in May 1971, after the withdrawals of 265,500 troops announced so far have been accomplished. That is to say, we will actually have overdrawn the 'peace dividend' by some $5 billion before the end of fiscal 1971, but we can do so only be deferring or reducing other essential programs.

"The cutbacks may stand out more sharply when put in terms of people and things. Our military forces numbered 3.5 million in mid-1968 and will number 2.9 million in mid-1971, a decline of 639 thousand. Those nineteen through twenty-two years old, or about half the total, accounted for 24.7 percent of their age group in 1968 as compared with only 14.5 percent in 1971.

"Civilian employment will show a drop of 142 thousand in the case of the Defense Department and 1.4 million in the case of defense contractors. Total direct employment in defense activities, civilian and military, will therefore decline by some 2.1 million between midyears of 1968 and 1971, creating a substantial problem of transitional unemployment.

"Real purchases of goods and services will fall by 30 percent. Our active fleet will be reduced by more than 200 ships. The average age of ships in the active fleet is now more than 16 years. About half of our Air Force planes are over nine years old. Yet the Air Force has scheduled purchase of only 390 aircraft in fiscal 1971, the smallest number since 1935.

"The problem facing our nation today is to meet a mounting external threat while reducing the resources devoted to defense and expanding those devoted to internal programs. Whatever we do, we must not commit the fatal error of closing our eyes to

the threat shown by actions as well as words.

"The gravity of strategic nuclear developments in both Communist China and the Soviet Union is revealed by a few salient facts:

- "Our estimate of the monster Soviet SS–9 Intercontinental Ballistic Missiles deployed or under construction has increased from 230 a year ago to over 300 today.
- "The number of SS–11 ICBMs also increased substantially.
- "The Soviets continue testing SS–9 multiple re-entry vehicles and an improved SS–11 missile.
- "The Soviets now have some 50 ballistic-missile submarines, including 25 that are nuclear powered. At present construction rates, the Soviet fleet of Y-Class submarines could numerically match or exceed our fleet of Polaris and Poseidon submarines by 1974 or 1975.
- "Communist China has continued to test nuclear weapons in the megaton range and is expected to test its first ICBM within the next year. An operational capability may be achieved by the mid-1970s, and a force of 10 to 25 ICBMs might be operational two or three years later. The launching of a satellite this spring reinforces these judgments.

"In light of these developments, it is important to remember that we have not increased our force level of strategic offensive missile launchers as established around 1965. We have actually decreased the megatonnage in our total strategic offensive force by more than 40 percent since then. In the same period, the Soviet Union has quintupled its number of strategic offensive missile launchers, increasing them from 300 to 1,500, and quadrupled the megatonnage of its strategic offensive force.

"We are confronted with a strong conventional threat as well. The most critical theater is that facing the NATO Central Region, where the Warsaw Pact could, in a relatively short time, assemble a force of about 1.3 million men and associated combat equipment. In Asia, we are all well aware, Communist China and North Korea maintain armed forces that represent a very real threat to neighbors among our staunchest allies.

"Our defense planning and budgeting must also give serious consideration to submarines in the Soviet general purpose forces. The Soviets have about 30 attack and cruise-missile submarines, including about 55 with nuclear power, that could endanger both our own naval forces and the merchant shipping essential to support our European and Asian allies.

"The Soviets are rapidly building up other elements of their naval fleet and expanding its presence throughout the seas of the world. The number of steaming days for Soviet naval units in the Mediterranean has risen from some 750 in 1963 to around 16,000 last year.

"A recent worldwide naval exercise involved about 200 ships whose operations were closely coordinated. Soviet naval units have cruised in the Caribbean each of the last two years. This year, three ships and a nuclear-powered submarine armed with cruise missiles visited a Cuban port.

"In brief, the Soviet Union is embarked on an ambitious program to achieve a global naval capability.

"We estimate that Soviet expenditures on research and development for military and related purposes have been increasing at an annual rate of about 12 to 13 percent during the last few years, while our effort has actually declined when inflation is taken into account.

"Our greater past expenditures have given us a technological lead over the Soviet Union, but recent trends threaten to destroy that lead. Accordingly, the only course we can prudently follow is to advance our own knowledge at a reasonable pace in every area we consider important to our future military strength.

"To ensure our future safety and to avoid the risk of serious technological surprise, we must invest each year a reasonable volume of resources for improving and expanding our technological base. While we cut back on force levels and procurement of weapons in response to budgetary restrictions, we must protect against future threats to national security that would result from inadequate support of basic research efforts.

"Put more broadly, increases in some defense programs are the best way to cut defense spending as a whole. Military assistance and sales are a case in point. These twin instruments assume new importance as we implement the Nixon Doctrine. They are the means for transferring to allied and friendly nations the military equipment and training they need for their own and the common defense.

"In some areas where American forces are now stationed, we can increasingly realize substantial savings by exchanging military assistance for manpower. In others, we can help allies and friends achieve a self-reliance that will make use of American manpower unnecessary in future crises.

"The great danger is that we may be tempted to cut the defense program recklessly simply because it is more easily controlled, year by year, than the rest of the budget. About half of federal spending, or roughly $100 billion in fiscal 1971, is subject to annual control through the appropriation process. Sixty-five percent of the annually controllable sum rests within the defense budget.

"Uncontrollable spending is determined by basic legislation not subject to annual review. In many areas, payments depend on some formula set by law, and funds are automatically disbursed unless Congress revises the basic legislation.

"When spending must be cut quickly, controllable items bear the brunt. Defense therefore becomes a prime target, whether or not reductions make sense as far as national security is concerned. The moral would seem to be that more of the federal budget needs to be brought under annual control so that aggregate spending can be reduced in an orderly fashion when the economic situation calls for such reduction.

"Peace is the prime objective of this Administration. President Nixon has demonstrated his full commitment to that objective through Vietnamization, negotiation, and realignment of national priorities.

"But peace and security require strength. By the end of this fiscal year, the defense effort will have been cut by 20 percent and manpower by 25 percent. We can reduce our defense community only so far without jeopardizing the nation's safety.

"In brief, we have cut defense enough for the present. It is time to look elsewhere for relief from the heavy burden of taxes and for resources better employed in meeting pressing domestic needs. Those whom you have entrusted with responsibility for the nation's security speak with one voice in this message to you."

Coin World Features Medallion Memorializing Army Scientist

Featured on the front page of *Coin World*, "the weekly newspaper of the entire numismatic field," Aug. 26 edition, are two full-size pictures (both sides) of the Paul A. Siple Medallion, presented for the first time at the 1970 U.S. Army Science Conference.

Coin World also carried a feature article reproducing much of the information presented in the combined May–June edition of the *Army Research and Development Newsmagazine* regarding Dr. Siple's illustrious career as an internationally renowned Antarctic explorer—known also for many significant contributions to Army research and development.

Dr. Siple was scientific adviser to the Director of Army Research and had distinguished himself as an Army scientist for a quarter of a century when he died Nov. 25, 1968.

EXCEPTIONAL SERVICE. The Department of the Army's top award for a civilian employe, the Decoration for Exceptional Civilian Service, was presented recently to *William J. Kenneally.*

Maj Gen Walter E. Lotz Jr., CG of the Army Electronics Command (ECOM) and Fort Monmouth, N.J., presented the award. The citation commends Kenneally for service as leader of the Systems Engineering Team in the Airborne Systems Technical Area, Avionics Laboratory, ECOM, over an 18-month period.

Kenneally developed a simulator facility to achieve major advancements in avionic systems analysis and design arts. He began his Civil Service career at Fort Monmouth in 1964.

MERITORIOUS SERVICE. ECOM Deputy for Laboratories Dr. Robert S. Wiseman recently presented the Decoration for Meritorious Civilian Service, second highest civilian award to six Night Vision Laboratory personnel at Fort Belvoir, Va.

Outstanding contributions to the planning and development of new electro-optical night vision equipment that enhances the Army's overall night combat capability earned the award for *Benjamin Goldberg*, director of the laboratory; *Myron W. Klein*, associate director for R&D; *Charles F. Freeman*, director, Advanced Development Technical Area; *John Johnson*, director, Image Intensification and Visionics Technical Areas; *Edward J. Sheehan*, director, Systems Development Technical Area; and *Stanley Segal*, director, Optical Radiation Technical Area.

Jack R. Hildreth, director of the Systems Evaluation Technical Area, received the MCSA for his contributions to the Army's Night Vision Program with Benjamin Goldberg presenting the award at a separate ceremony.

Hildreth is the Night Vision Laboratory representative to the U.S. Army Test and Evaluation Command for all aspects of the engineering and service tests programs. For several years he was U.S. alternate delegate to the NATO Panel on night vision and was the U.S. delegate to a NATO ad hoc committee on testing of night vision devices.

Dr. Eduard A. Gerber received the MCSA upon retirement from federal service as director of the ECOM Electronic Components Laboratory.

The citation accompanying the decoration noted that "The fine record of research and development accomplishments, the consistently high morale of his organization, and the outstanding quality and quantity of scientific publications, patents and inventions, are reflections of the high standards Dr. Gerber has maintained as director of the Electronic Components Laboratory. This exemplary leadership has been the force which has established his laboratory as among the best in the U.S. Army Materiel Command."

Maj Gen Walter E. Lotz Jr., CG of ECOM and Fort Monmouth, presented the award.

Three U.S. Army Missile Command (MICOM) missilemen received the MCSA from Maj Gen Edwin I. Donley, MICOM CG, during ceremonies at Redstone Arsenal, Ala.

Edward Dobbins, Jesse Frampton and Dr. Julian Kobler, all employed by the MICOM Research and Engineering Directorate, were praised for ". . . . outstanding contributions to the evolution of Army weaponry."

The MCSA was presented to *Vivian Buckles* for her performance as chief of the Review and Analysis Division, Army Natick (Mass.) Laboratories.

She was cited for her significant accomplishments in developing and improving systems and techniques for evaluating technical performance in research and engineering programs at the laboratories.

T. Arthur Smith, director of Cost Analysis, and scientific adviser to the Comptroller of the Army, was commended for exemplary and extraordinarily meritorious service in the field of financial management from June 1969 to June 1970.

Comptroller of the Army Lt Gen Frank J. Sackton presented Smith with the MCSA for leading the Army Cost Analysis Program through a major effort of improving the economic and financial projections of the Department of the Army in response to a series of Secretary of Defense and Joint Chiefs of Staff requirements.

LEGION OF MERIT. The nation's second highest noncombat military award was presented to *Col Paul R. Cerar* for achievements as commander of Edgewood (Md.) Arsenal from Sept. 29, 1967, to July 30, 1970.

Maj Gen Erwin W. Graham Jr., U.S. Army Munitions Command CG, presented the award to Col Cerar for displaying "outstanding leadership qualities, sound technical judgment, expert managerial insight, an unparalled understanding of the nature of chemical research and development and superb ability to deal with people."

Col James F. Prewett received the LOM on his retirement from active Army service. Col Cecil W. Hospelhorn, head of the Safeguard Logistics

Chiefs of R&D Honor Secretary for 40 Years Service

Special letters of commendation from 10 Army Chiefs of Research and Development for whom she worked over a 23-year span were presented to Miss Pauline Dorman upon her recent retirement with more than 40 years of federal service.

Lt Gen A. W. Betts, incumbent Chief of R&D, added to his letter of congratulations a Decoration for Meritorious Civilian Service Award with 3 Clusters.

Good wishes came also from former Chiefs of R&D General Anthony C. McAuliffe, Maj Gen Chester G. Helmick, Maj Gen Ward H. Maris, Maj Gen Kenner F. Hertford, General Anthony P. O'Meara, Lt Gen James M. Gavin, Lt Gen Arthur A. Trudeau, General Dwight E. Beach and Lt Gen William W. Dick Jr.

Miss Dorman began her outstanding Civil Service career in 1928 with a temporary appointment in the Bureau of Prohibition of the Treasury Department. Additional temporary appointments with the Navy Department and War Department followed.

She received a permanent appointment in 1930 while serving with the supply Division, G–4, Office of the Chief of Staff, HQ DA.

Miss Dorman's career with Army R&D began in July 1947 when she became confidential secretary to the Deputy Assistant Chief of Staff, G–4, for Research and Development. She has served as secretary to all of the Army's R&D Chiefs since that time.

CHIEF OF R&D Lt Gen A. W. Betts congratulates Miss Pauline Dorman after presenting her with a Decoration for Meritorious Civilian Service Award prior to her retirement with more than 40 years of government service.

Command at Redstone Arsenal, Ala., presented the award.

He was cited for his professional skill and personal drive, credited with being instrumental in establishing patterns for successful logistical support of the Safeguard Antiballistic Missile System.

Col Leonard M. Orman, former director of Research and Engineering and acting deputy commander of the U.S. Army Weapons Command, was awarded the LOM prior to his retirement from the Army after 30 years service. Col Orman was, among numerous key R&D assignments, the first chief of the Defense Research Office, Latin America, in Rio de Janeiro, Brazil.

MERITORIOUS SERVICE MEDAL. Deputy for Laboratories, Dr. Robert B. Dillaway, HQ U.S. Army Materiel Command, presented the MSM to *Col Dean Van Lydegraf* for service as CO of the Atlanta Army Depot from October 1968 to June 1970, when he assumed command of the U.S. Army Natick (Mass.) Laboratories.

Col Van Lydegraf was cited for "distinguishing himself by exceptionally meritorious service . . . because of his sound and proficient approach to the effective performance of supply and maintenance."

Nominated for promotion to brigadier general, he was cited for reorganizing and managing the depot facilities and resources to deal with the greatly increased requirements imposed by Southeast Asia operations.

Col William M. Home, former deputy CO and director of Technical Support at Edgewood Arsenal, Md., and *Maj Ian Sunshine,* chief of the Wound Data and Munitions Effectiveness Team in the arsenal's research laboratories, were awarded the Meritorious Service Medal.

Transferred recently to Fort Sam Houston, Tex., Col Home was cited for his valuable contributions to field test programs, automation of technical information, value engineering and arsenal technical support programs.

Maj Sunshine was lauded for his professional dedication and superior medical skills which forged a "progressive, comprehensive and unrivaled medical research program." The effort included "seven comprehensive medical reports from the Wound Data and Munitions Effectiveness Team in Vietnam."

COMMENDATIONS. U.S. Army Research Office, Office of the Chief of Research and Development, HQ DA, commendations were presented recently by Director of Army Research Brig Gen George M. Snead Jr. as follows:

Office of the Director—Mrs. Cora F. Watson, Certificate of Achievement. *Adjutant's Office*—Miss Nancy S. Carr, Sustained Superior Performance.

Physical and Engineering Sciences Division—Outstanding Performance Ratings to Richard L. Ballard, Fred Frishman and Mrs. Mary F. Fishback; *Research Programs Office*—OPR to Mrs. Lura H. Ferrone; *Studies and Analyses Division*—OPR to Mrs. Glorine Johnson; *Environmental Sciences Division*—OPR to Merrill V. Kreipke; *Life Sciences Division*—OPR to Dr. Eugene M. Sporn.

AFIP Offers Course in Forensic Dentistry

The Armed Forces Institute of Pathology (AFIP) presented a forensic dentistry course, Oct. 5–9, at the AFIP in Washington, D.C., in response to the "urgent, collective requirements of the dental, legal and law enforcement professions."

Director of the Institute Capt Bruce H. Smith, MC, U.S. Navy, said the course—the only type of its kind in the United States and one of the few in the world—is presented to train a "critically needed nucleus of dentists" in principles of identification and dental jurisprudence.

Course director, Lt Col Robert C. Boyers, U.S. Army Dental Corps, listed these areas of faculty concern:

- Each of the three professions must be kept aware of the developments, requirements and special techniques of the other professions.
- The legal and law enforcement professions must be acquainted with the continually expanding role dentists can play in identification and criminal investigation.
- Means of accelerating the development of forensic dentistry must be investigated if the United States is not to continue lagging behind Western nations in this discipline.

The faculty for the course included dentists with experience in forensic odontology, general and oral pathologists, law enforcement officials, lawyers, and an identification expert.

Among lecture subjects were Recent Advances in Identification, Dental Identification in Mass Disasters, The Relationship between Forensic Dentistry and the Federal Bureau of Investigation, Study of Bite Marks, and Professional Liability.

The course included laboratory sessions on identification of human remains by comparison of dental records and a mock trial depicting the dentist's role as an expert witness.

Brig Gen Hinrichs Heads AMC R&P Directorate

Brig Gen Frank A. Hinrichs was promoted recently to that rank and is head of the Directorate of Requirements and Procurement, HQ U.S. Army Materiel Command, Washington, D.C.

In succeeding Maj Gen Felix J. Gerace, who retired recently, General Hinrichs took over responsibility for policy direction of all AMC procurement activities at more than 150 installations and activities throughout the United States; also, logistics materiel management activities, including requirements determination, budgeting and programing.

Prior to assignment to HQ AMC in 1969, General Hinrichs served in the Office of Personnel Operations as chief, Ordnance Branch and later as executive officer, Officer Personnel Directorate.

He earned a bachelor's degree in general engineering from Oklahoma Agricultural and Mechanical College (Oklahoma State Universtiy) in 1941 and was commissioned in the ROTC program in 1940. He earned a master's degree in business administration from George Washington University, while concurrently attending the Industrial College of the Armed Forces.

General Hinrichs has held key Army materiel assignments in the U.S., the Far East and Europe. In 1966 he commanded the 29th General Support Group in Vietnam and later commanded the U.S. Amy Procurement Agency. He also has served as director of Procurement, 1st Logistical Command, Vietnam.

AMC Director of Requirements and Procurement Brig Gen Frank A. Hinrichs receives star designating new rank from Maj Gen Paul A. Feyereisen, AMC Deputy CG for Materiel Acquisition, with an assist from Mrs. Hinrichs.

Cyclic Catalytic Reactions as Amplifiers in Chemical Detection

By Dr. Edward J. Poziomek
Edgewood Arsenal, Md.

National accentuation of concern over pollution of man's environment and possible methods of control points to the potential for application of research findings reported in 1963 by U.S. Army scientists.

Investigation relevant to national defense was reported in the *Microchemical Journal* (Volume 7, pages 78–88, 1963) in connection with the increasing use of toxic chemicals.

The article indicated the need for learning more about catalytic and chain-type reaction mechanisms in order to be able to achieve the detection of toxic chemicals at low concentrations and in simple ways.

Concern at that time was expressed over the increasing use of toxic chemicals by industry, agriculture and consumers of various pesticides.

The *Army Research and Development Newsmagazine* (February 1970, page 34) carried an article on the use of polymer "unzipping" as a promising means for the amplification of a molecular event in chemical detection.

The concept involves using a polymer that is stable under normal environmental conditions, but rapidly depolymerizes by an unzipping mechanism in the presence of the material to be detected. This results in the liberation of many molecules of monomer for each molecule of pollutant.

In this report, I will explain the concept of using catalytic reaction by continuing a description of Army research in the area of chemical amplification as related to microchemical detection.

Cyclic catalytic reactions involve several steps. An ideal situation exists if the chemical to be detected can be used to catalyze a reaction. However, the usual case is that a reagent must be allowed to react with the material to be detected in order to produce the catalyst.

The catalyst is then available to initiate a cyclic reaction. For example, Scheme 1 illustrates a mechanism in which the catalyst reacts with an indicator chemical to give a changed indicator and a modified catalyst. Another chemical regenerates the catalyst, which is then available to begin another cycle. When a number of these cycles occur, a detection signal is obtained because of the many indicator molecules that have changed.

If the reaction product of the initiation step is itself highly colored, the cycling mechanism might still be necessary since at low concentration of the pollutant very little product would form.

Scheme 1 is a simple illustration of the basic idea; other variations are possible. The Army has described in the literature (*Microchemical Journal*, Vol. 14, pp 150–154, 1969) a detection application of cyclic catalytic reactions. It involves detecting the organophosphorus compound isopropyl methylphosphonofluoridate (GB).

Specific technical details concerning the principle can be obtained by examining the journal article. Actually the report is an extension of the idea presented in Scheme 1. It illustrates the use of the detection reaction product (catalyst) not only to initiate a detection signal cycle but also to start an additional cycle to generate more catalyst (Scheme 2).

The latter cycle operates by using the detection reaction product to autocatalytically decompose the detector reagent. The organophosphorus compound was detected at the 0.1 microgram level, using the multicyclic catalytic system in a simple detector tube.

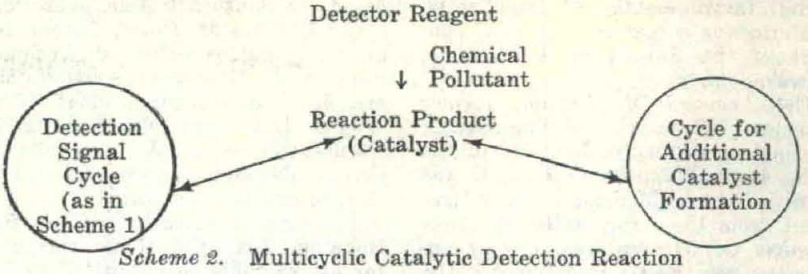
For demonstration purposes, a cyclic catalytic reaction can be illustrated colorfully by using the indicator methyl viologen. This compound is easily reduced by metals such as zinc to give a blue-colored methyl viologen free radical.

In the presence of an oxidizing agent, such as the oxygen in air, the radical is converted back to the original viologen molecule which is available to react with more zinc metal (Scheme 3).

Therefore, dissolving 10 milligrams of methyl viologen in 5 milliliters of water gives a very pale straw-colored solution. Addition of 25 milligrams of zinc metal dust gives an immediate dark blue color (step *1*, Scheme 3).

If the solution is swirled vigorously, or if air is bubbled into the solution, the blue color disappears (step *2*, Scheme 3). That step *1* is still operating can be checked by simply stopping the bubbling of air or the swirling. Eventually all of the zinc will be converted to zinc oxide, a colorless precipitate.

Cyclic reaction catalysis is one of the many research areas the Army has examined for principles applicable toward the development of sensitive detection methods. In the current time of national concern over pollution, these research results may prove helpful to those searching for solutions to chemical detection problems.



Scheme 2. Multicyclic Catalytic Detection Reaction

Methyl Viologen	+	Zinc Metal	→	Methyl Viologen Free Radical (blue)
Methyl Viologen Free Radical (blue)	+	Oxygen (from Air)	→	Methyl Viologen

Scheme 3. Cyclic Catalytic Reaction.

Detector Reagent	+	Chemical Pollutant	→	Reaction Product (Catalyst)	INITIATION STEP
Catalyst	+	Indicator Chemical	→	Changed Indicator + Modified Catalyst	DETECTION SIGNAL CYCLE
Catalyst Modified	+	Regenerating Chemical	→	Catalyst etc.	

Scheme 1. Cyclic Catalytic Detection Reaction

ASTA Dedicates AIDAS at Edwards Air Force Base

Engineering flight testing of Army aircraft was improved in mid-August when an Advanced Instrumentation and Data Analysis System (AIDAS) was dedicated by the U.S. Army Aviation Systems Test Activity at Edwards Air Force Base, Calif.

Expected to reduce drastically the amount of time required in final preparation of test reports, and to improve the accuracy of data obtained, AIDAS was inaugurated at a ceremony at which Brig Gen John P. Traylor, deputy CG of the Aviation Systems Command, cut the ribbon.

Using a third-generation computer for data reduction, AIDAS is manufactured by Electro-Mechanical Research Corp. of Sarasota, Fla., and was designed to supplant a smaller system.

Data aides and engineering technicians formerly had to transcribe plot-by-plot readings of oscillograph sheets or in quantifying data obtained from numerous sequenced photographs of the test aircraft's instrument panel. Data was card-punched for computer in-put.

Flying characteristics data can be collected now within the aircraft on magnetic tape and fed directly into the computer upon landing. Two airborne systems are included presently within the AIDAS purchase. They can be expanded or compressed for customization in any type aircraft and can record digital or FM data.

Possible also with the new system is in-flight telemetry, permitting flying data to be radioed through FM receivers directly from the test aircraft to the computer. This capability allows real-time versus flight-time data and immediate determination of the need for additional test flights.

AIDAS rapid-scanning devices prevent the possibility of a faulty data acquisition system on the aircraft nullifying the results of flight tests.

Previous methods required that the aircraft return from flights and that oscillograph sheets be removed from on-board and examined manually before the need for additional flight tests could be ascertained.

Included in the ADP package is a self-mobile remote van with a smaller-scale EMR computer system containing all essential equipment in the main stationary ground system, including telemetry, magnetic tape units and an x-y plotter for automatic parameter plotting.

The central ground station (nonmobile) furnishes additional equipment such as a line printer, disc storage units, card punch, twice the direct-access core memory, and two plotters.

The Aviation Systems Test Activity (ASTA) will use the van for engineering flight tests at remote and alternate sites. A 25,000 VA generator pulled behind the van provides power for environmental control units.

Acquisition and final implementation of the AIDAS are expected to span a 3-year period. Two additional remote vans and three airborne systems for gathering data concurrently at as many as four test sites are in the acquisition program.

Orientation briefings on the AIDAS following the dedication were given by Thomas Lynch, chief of the ASTA Data Systems Office; Richard B. Lewis, director of flight testing at ASTA; Capts William Johnson and Ledell Pearson of the Data Systems Office; and aero-engineers R. L. Finnestead and Albert Winn.

Watervliet Scientist Wins ASTM Photo Exhibit Award

First prize in the techniques class of the American Society for Testing and Materials photographic exhibit at the recent North American Materials Exposition in Toronto, Canada, was won for the second year in a row by a Watervliet (N.Y.) Arsenal scientist.

John Underwood, who won the award in 1969 with an exhibit entered jointly with Theresa Brassard, scored his repeat performance with a display titled "Fatigue Crack Growth in Mild Steel Shown by Optical Interference." The photograph uses optical interference fringes originally discovered by Sir Isaac Newton.

Col Isenson Takes Command of USASASA

Command of the U.S. Army Small Arms Systems Agency (USASASA) at Aberdeen (Md.) Proving Ground was assumed by Col Raymond S. Isenson when he recently succeeded Col Walter E. Rafert, who had headed the agency since it was activated in November 1968.

Known to the Army R&D community for his achievement in several key assignments, Col Isenson recently completed a tour of duty in Germany with the Military Assistance Advisory Group as chief of the Joint R&D Section supporting the Technology Division of the Federal Ministry of Defense.

Prior to that assignment, he served three years in the Office of the Director of Defense Research and Engineering, Washington, D.C., as director of Research Effectiveness studies, including the HINDSIGHT study which was widely publicized in 1968.

Assigned to the Army Research Office, Office of the Chief of R&D, from 1962 to 1965, he was chief of the Research Plans Office during the period when the first comprehensive long-range plan and technological forecast was prepared. That duty followed a 3-year tour at the Pacific Missile Range where he was involved in design of test instrumentation and support facilities at Kwajalein Atoll.

While assigned to the Army Field Forces Board No. 4 in the early 1950s as chief of the Light Antiaircraft Division, he had test responsibility for such weapons as the 75mm Skysweeper and the twin 40mm M–42 Duster.

In the mid-50s, he returned for several years to civilian life as a design and test engineer in efforts to reduce the vulnerability to electronic countermeasures of the Nike Command-Control System, Missile Master; also, to assemble and prove out the first all-inertial guidance system for the Atlas. He was project manager for the design and development of the basic range instrumentation system for what was to become the Pacific Missile Range.

Col Isenson holds a BS degree in ceramic engineering from the University of Illinois and a master of science degree in electronics from the University of Pennsylvania. He is a registered professional engineer in the State of Illinois.

Among the awards and decorations he is authorized to wear are the Legion of Merit, Joint Commendation Medal, and Army Commendation Medal.

Col Raymond S. Isenson (seated) succeeds Col Walter E. Rafert as CO of the U.S. Army Small Arms Systems Agency at Aberdeen Proving Ground.

Simulation of Electronic Systems to Measure Combat Effectiveness

By Jerald L. Feinstein

What benefit an electronic device or system would yield to combat troops formerly could be known only by testing the system in the field under real or simulated combat conditions. This method is expensive and often impractical, especially for items in the conceptual or developmental stages.

Questions such as the following are familiar to almost everyone:

"What are the concrete benefits, in terms of combat effectiveness, derived from developing a particular concept or system?"

"What are the impacts resulting from a change in requirements, in terms of combat effectiveness?"

"At what level do increases in system technical performance parameters reach areas of diminishing returns?"

"What trade-offs can be made to reduce costs, but maintain the same level of combat effectiveness?"

An answer to these questions requires that a thorough trade-off analysis be made, and that the cost effectiveness of the proposed item or concept be determind to be favorable in relationship to that of competing items throughout the Department of Defense. In essence—make sure that the conceptual innovation or technical improvement results in increased combat effectiveness for a realistic cost.

To respond effectively to such questions poses a paradoxical situation. The actual item or system in question may be in the conceptual or drawing board stage when answers are required. Realistic answers come from actual combat trials which are impossible during these early stages.

The Systems/Cost Analysis Office at HQ U.S. Army Electronics Command (ECOM), Fort Monmouth, N.J., is now prepared to provide realistic answers to such questions during any phase of the equipment/systems development cycle. The objective is to develop a total in-house capability in this area.

In ECOM, it was necessary to develop a realistic, high-resolution, combat simulation that could simulate the items under development in the command's R&D and commodity areas in terms of engineering technical specifications and equipment performance parameters.

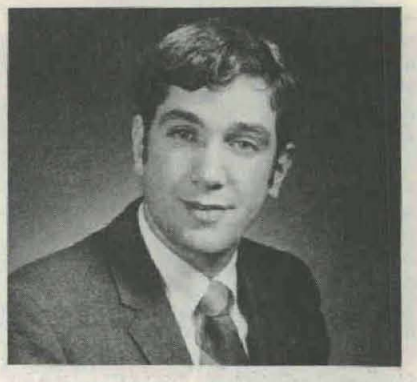
Research Analysis Corp. had developed a computerized combat simulation called "CARMONETTE" III. Individual men, units, vehicles and weapons in this simulation interact in a highly realistic battlefield environment guided only by generalized orders of the type given to platoon leaders. This method was chosen as a foundation on which to graft highly complex surveillance, detection, target acquisition and communication routines.

The modified simulation is to be capable of representing actual electronic systems in terms of real and derived operational or design parameters. The electronic systems are then portrayed in the role for which they were designed. Additional tactical advantage afforded by the system in question may be expressed and evaluated during the simulation.

The total endeavor was guided by a Study Advisory Group (SAG) composed of representatives from the Office of the Deputy Under Secretary of the Army for Operations Research; Assistant Chief of Staff for Force Development; Chief of Staff, U.S. Army; Chief of Research and Development; Behavorial Science Research Laboratory of the U.S. Army Manpower Resources Research and Development Center; Systems/Cost Analysis Office, and the Night Vision Laboratory of ECOM.

Particularly valuable was the assistance and data provided by the Night Vision Laboratory, making it possible to develop the most sophisticated night-vision and surveillance routines.

Trade-off analyses can now be conducted by ECOM on radar, night-vision, surveillance, and target acquisition systems using "real world parameters." The simualtion, in effect, provides an indication of when increased technical performance reaches a point of diminishing returns in terms of combat effectiveness.



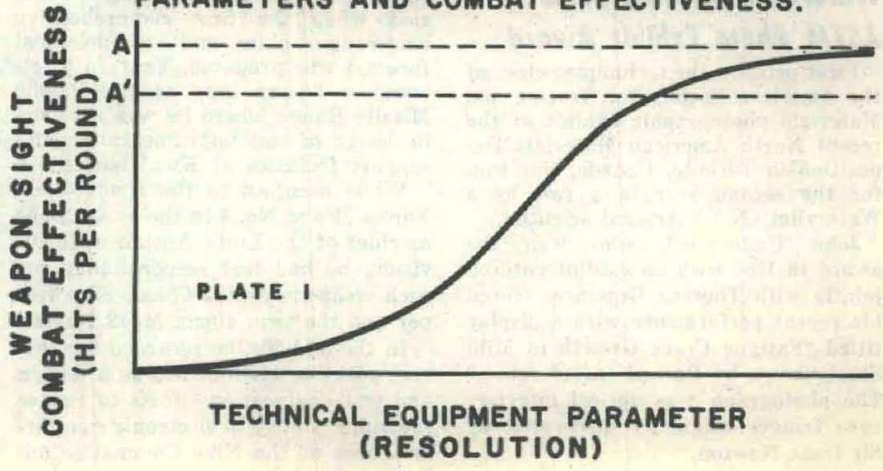
Jerald L. Feinstein is an operations research analyst in the Systems/Cost Analysis Office of the U.S. Army Electronics Command, Fort Monmouth, N.J. He received a BS degree in physics from the University of Oklahoma in 1965 and an MS in engineering science in 1969. Feinstein is currently working towards a PhD in operations research at New York University.

In addition, the method is an inexpensive way of obtaining an indication of performance for a particular device or system. Simulation may be utilized to select field test items.

One of the most valuable applications is in performing systems/cost analysis studies to satisfy the prerequisites required before entry into the contract definition stage of equipment development.

"Quick reaction" trade-off analyses between competing night-vision and radar systems, in addition to their associated combat vehicles and weapons

A GRAPH OF DATA ESTABLISHING A DEFINITE RELATIONSHIP BETWEEN THE EQUIPMENT PARAMETERS AND COMBAT EFFECTIVENESS.



systems, can now be accomplished.

Particularly in the area of concept evaluation, it is possible to simulate engineering items still in the conceptual or drawing board stage with items already fielded and in the current Army inventory.

For example, radar and other sensor systems are simulated in terms of relevant sets of environmental and equipment parameters. They are deployed in the simulation as they would be deployed under normal battlefield conditions.

The outcome of this simulated battle, in terms of casualties, time and the objectives obtained, is entirely dependent on force size, weapon parameters, types of surveillance including radar, night-vision equipment, and tactics.

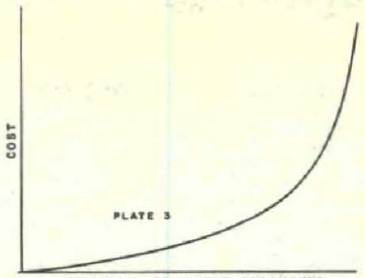
In effect, what occurs is a representation of the variation of equipment parameters in terms of an increase or decrease in casualty levels, times to achieve objectives, and rates of advance.

Generally, equipment parameters such as range or resolution can be increased to limits constrained only by an exploding state-of-the-art. However, it is important to recognize when an increase in an equipment parameter reaches a point of diminishing returns in terms of battlefield effectiveness. This general tendency is shown in Plate 1 using typical simulation output data.

The point A represents the limiting value of combat effectiveness for a given equipment parameter and point A' represents the point of diminishing returns.

Plate 2 represents a typical graph of cost versus combat effectiveness. Here lies another advantage of this technique. Since combat effectiveness is asymptotic to A, there can be no values of combat effectiveness beyond

GRAPH OF DATA RELATING COST WITH EQUIPMENT "PHYSICAL" EFFECTIVENESS



A, insuring a realistic, finite limit for costs.

The graph transforms equipment technical performance parameter data (input data) into levels of combat effectiveness (output data). This is where high-resolution combat simulation is utilized.

For example, some of the equipment technical parameters simulated for a night-vision device are photocathode sensitivity spectrum, lens focal length, modulation transfer function, and system F number.

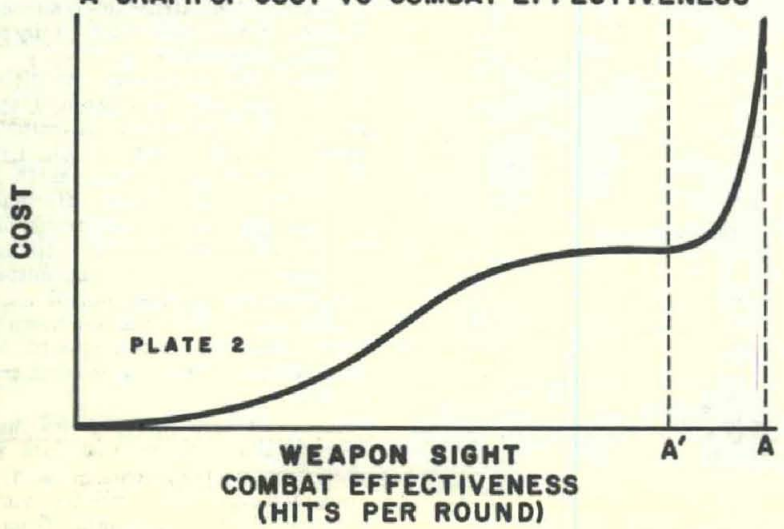
Environmental parameters are atmospheric scattering and absorption cross sections, target and background reflectance spectrum, night sky brightness and relative luminosity, size of target, range, and reflected light levels.

System parameters, under specified environmental conditions and weapons systems, result in a terminated battle with two forms of output. The first type is a step by step event by event sequence of the battle; the other is a tabulation of losses of men and materiel per unit, rates of advance or retreat, resources expended, and a statistical summary of important events.

Plate 3 is an example of the use of equipment technical parameters to represent directly the effectiveness criteria. In this example, costs are not limited by a constrained effectiveness measure and no information is available concerning points of diminishing returns. What can happen is that effectiveness will be limited by "funds available" criteria, with little information available on over or under design of the equipment in question.

The central idea behind this form of analysis is to define effectiveness not in terms of the equipment parameters, but in terms of the combat effectiveness afforded by the technical parameters. The cornerstone of this philosophy is to possess a simulation of the "real world" events in question, and most important, which has been proven to be valid by comparison and agreement with "real world" data.

A GRAPH OF COST VS COMBAT EFFECTIVENESS



SCIENTIFIC CALENDAR

17th General Assembly of the International Union of Biological Sciences, Washington, D.C., Oct. 4–9.

20th Annual Research Equipment Exhibit and Instrument Symposium, sponsored by NIH, Bethesda, Md., Oct. 5–9.

National Aeronautic and Space Engineering and Manufacturing Meeting, sponsored by SAE, Los Angeles, Calif., Oct. 5–9.

Pacific Conference on Chemistry and Spectroscopy, New Orleans, La., Oct. 5–10.

Precision Measurements and Fundamental Constants, sponsored by NBS, Gaithersburg, Md., Oct. 5–10.

Fluid Power Conference and Engineering Display, sponsored by SAE, Los Angeles, Calif., Oct. 7–8.

14th Annual Organic Chemistry Conference, sponsored by AMC, Natick, Mass., Oct. 7–8.

Advanced Seminar on Nonlinear Functional Analysis, sponsored by MRC, Madison, Wis., Oct. 12–14.

1970 Army Symposium on Solid Mechanics, Lightweight Structures, sponsored by AMC, Watertown, Mass., Oct. 13–14.

The Entry Plasma Sheath and its Effects on Space Vehicle Electromagnetic Systems Symposium, sponsored by NASA, Hampton, Va., Oct. 13–15.

International Telemetering Conference, Los Angeles, Calif., Oct. 13–15.

Systems Science and Cybernetics Conference, Pittsburgh, Pa., Oct. 14–16.

International Conference on Antimicrobial Agents and Chemotherapy, sponsored by ASM, Chicago, Ill., Oct. 19–20.

7th Annual AIAA Meeting and Technical Display, Houston, Tex., Oct. 19–22.

Meeting on Power Plant, sponsored by SAE, Chicago, Ill., Oct. 19–22.

Conference on Gaseous Electronics, sponsored by APS, Hartford, Conn., Oct. 21–23.

16th Conference on Design of Experiments in Army Research, Development and Testing, sponsored by ARO-D, Fort Lee, Va., Oct. 21–23.

1970 Meeting of the Association of Engineering Geologists Special International Symposium, sponsored by ARO-D, Washington, D.C., Oct. 22–23.

Electronic and Aerospace Systems Convention, sponsored by IEEE, Washington, D.C., Oct. 26–28.

41st Shock and Vibration Symposium, Colorado Springs, Colo., Oct. 27–29.

International Electron Devices Meeting, sponsored by IEEE, Washington, D.C., Oct. 28–30.

18th Annual Joint Engineering Management Conference, sponsored by IEEE, ASME, and ISA, Chicago, Ill., Oct. 29–30.

U.S. Army Engineer Topographic Laboratories Developing LRPDS

By Allan Kiisk

Development of a Long-Range Position-Determining System (LRPDS) has been resumed by the U.S. Army Engineer Topographic Laboratories (USAETL) at Fort Belvoir, Va., after a lapse of effort initiated in 1961.

Problems in the design, manufacturing and frequency allocation led to the termination of the original contract effort a few years ago. The new effort incorporates the operational concept and much of the basic technology for the LRPDS carried over from the previous developmental activities and experiences.

Some major changes have been introduced, mainly as a result of restrictive changes in frequency allocation along with review of the previous problem areas and analysis of possible improvements.

The USAETL has prepared detailed specifications and has awarded a contract to Motorola, Inc., to design, fabricate and test limited quantities of hardware. The concept is shown in Figure 1.

An LRPDS consists of four subsystems—control equipment, 1 each; calibration and maintenance equipment, 1 each; airborne transponder equipment, 1 each; ground transponder equipment, 10 to 30 each.

Control equipment, including a computer and printer in addition to a transmitter and receiver, and calibration maintenance equipment are housed in shelters mounted on 2½-ton trucks. Trailer-mounted generators provide the power for equipment, including heating and air-conditioning. Shelters provide work space for two operators and two technicians for small-scale repair of system components.

Airborne transponder equipment includes meteorological data sensing and processing devices and a small control box in addition to the transmitter and receiver. An OV–1 Mohawk aircraft will be used initially, but the equipment is not restricted for use in any one particular type of aircraft. LRPDS airborne equipment is limited to 75 pounds and an operator is not needed.

Ground transponder equipment includes an antenna, battery, and data input and readout facilities in addition to the basic transmitter/receiver. Designed for mounting on two packboards, each weighing less than 25 pounds, the transponder can be set up for unattended operation.

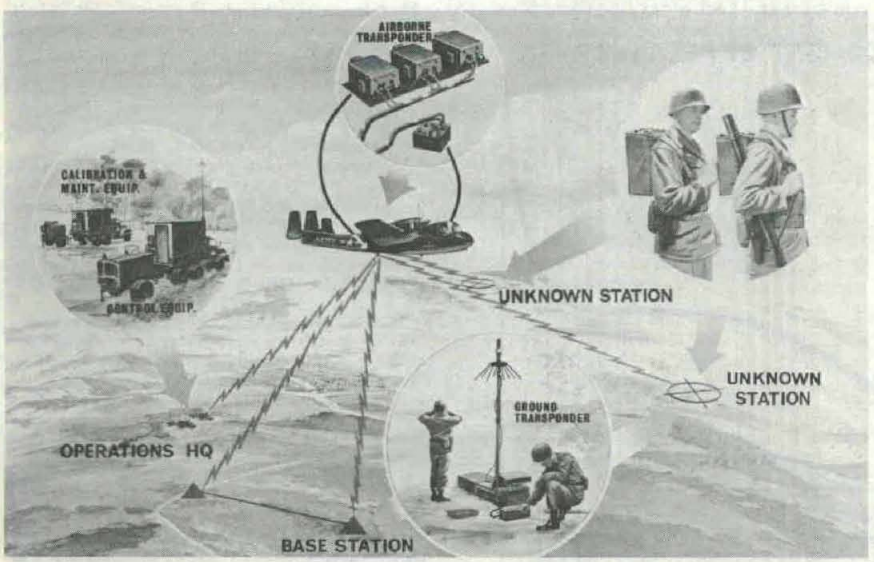


Fig. 1. Long-Range Position-Determining System Concept

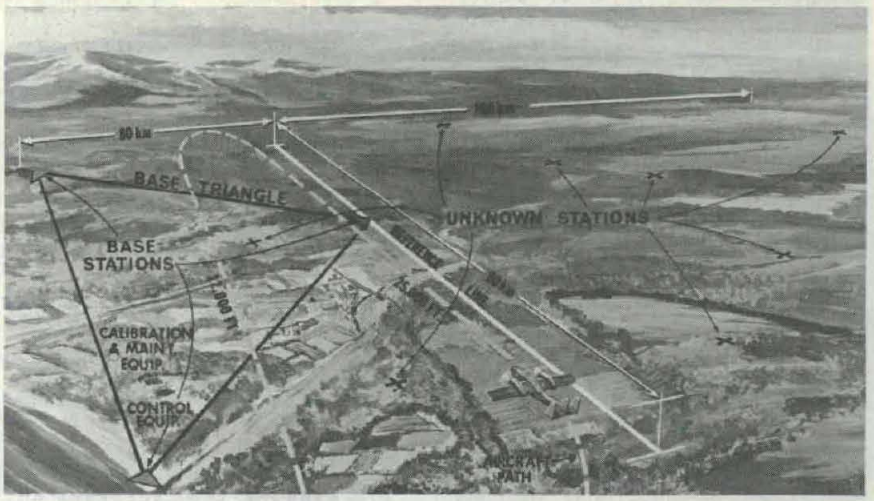


Fig. 2. Long-Range Position-Determining Set-Up

A general view of the LRPDS area of operation and typical equipment layout is shown in Figure 2. To accomplish a typical position-determination mission, ground transponders are set up at points whose coordinates (easting, northing and height) are accurately known. Usually three base stations are in a layout forming the base triangle.

Other ground transponders are set up at points whose coordinates are desired to be known, referred to as unknown stations. As many as 24 unknown stations may be distributed randomly in an area about 90 by 280 kilometers (56 by 175 miles) as shown in Figure 2.

The LRPDS control station (operations headquarters) is set up somewhere in the general area of the base triangle, or on a known point.

When all stations are set up, the airborne station is flown over the base triangle. The airborne transponder transmits a signal received by each ground transponder.

Signal delays between the airborne transponder and each ground transponder are measured at numerous points along the aircraft's flight path. The signal delay or phase shift data, containing range change information, are stored in the ground transponder memory units. At the end of the ranging phase, the data are transmitted to the computer in the control station. Coordinates of all the unknown stations are printed out along with other data received from the ground transponders.

A 2-way data link permits the receipt of manually entered data from the ground transponders and the transmission of the computed position coordinates, or other data, from the

control station to the ground transponders via the airborne station.

When points with known UTM coordinates are not available for use as base stations, the LRPDS can be used to position ground transponders with respect to each other in an assumed coordinate system.

A typical positioning mission, after all the ground transponders and the control station have been set up and the aircraft is prepared for takeoff, is expected to be accomplished in about 30 minutes.

Set-up time for the control station is less than 15 minutes and for ground transponders less than 5 minutes each. The airborne transponder can be installed into an aircraft with a suitable antenna and previously fitted cabling and mounting fixtures in less than 15 minutes.

The LRPDS is intended primarily for artillery use and this development is based on the artillery requirements. Basic design and hardware characteristics are such that various other applications are possible.

For example, the LRPDS can be used to determine the locations of troops, measure distances, perform third and possibly even second order surveys, track an aircraft in flight and determine aircraft positions in connection with aerial photography.

Accuracy of determining the horizontal coordinates of an unknown point is expected to be better than 5 meters (5.5 yards) for points within 30 kilometers (19 miles) and 40 meters (44 yards) for points approximately 200 kilometers (125 miles) from the nearest base station. The vertical coordinate, or elevation, is expected to be determined to an accuracy of 10 meters for points within 30 kilometers of the aircraft path.

Due to aircraft altitude limitations and the consequent geometry limitation, the LRPDS is not expected to provide useful elevation information at distances much in excess of 30 kilometers from the aircraft.

Accuracy of the LRPDS depends on operational factors such as geometry, degree of redundancy in measurements, level of interference and jamming, accuracy of the given base station coordinates, altitude and speed of the aircraft, and terrain conditions.

Accuracy here stated is considered achievable in tactical operations where the aircraft flight path is restricted to certain areas (behind the reference line shown in Figure 2) and where short mission time is essential.

In nontactical operations, however, where one can perform repetitive measurements and missions and can select the most desirable geometry and flight path, higher accuracies are expected to be achievable.

The LRPDS positioning technique is based on the recently invented Range Change Method. Changes in range, rather than absolute range, between the aircraft and ground stations are measured at 10 to 60-second intervals, in synchronism at all ground stations.

Since each station observes and measures different range changes, depending on its location, the location information is contained in the range change measurements. Coordinates of the unknown points are computed by solving numerous simultaneous equations, using iteration and filtering.

The LRPDS uses line-of-sight, or direct wave, radio transmissions. Use of direct wave rather than ground wave transmission (used in LORAN and DECCA, for example) was dictated by the high accuracy requirements. An aircraft is employed as the nodal point for all ranging transmissions. This allows line-of-sight transmission to all ground stations.

The LRPDS uses a code rather than a series of sine waves for the ranging yardstick. Most positioning and distance-measuring systems employ sine waves (SHIRAN, SECOR, MC–8, Tellurometer, Electrotape, for example).

Because of the extremely crowded conditions in the VHF and UHF regions, the LRPDS is allowed to radiate only a single band of frequencies on a single carrier. In the previous stages of LRPDS development, four separate bands of frequencies were used.

The change to a single band introduced difficult problems. With the help of certain advancements in the state-of-the-art in electronics, and with changes in the basic design concepts, solutions have been found.

The LRPDS promises to be a great new tool for quick and accurate positioning and surveying. Current planning calls for the first LRPDS to be field tested in the summer of 1972. Other operatonal systems could be available a year later.

ALLAN KIISK, project engineer and contracting officer's representative on the Long-Range Position-Determining System, began his career with the Corps of Engineers by completing a 1½-year training program with the Army Engineer District, Portland, Oreg., after which he served as a member of the technical staff at the Dallas Dam Project.

In 1963 he transferred to the U.S. Army Engineer Topographic Laboratories, where he has been active in research and development of electronic position-determining and surveying systems, including the Long-Range Survey System, the SECOR geodetic satellite position-determining system, and the Airborne Control System. He conceived and developed the Range Change Method of Determining Positions.

Kiisk earned a BS degree from Oregon State University (1958) and an MS degree from Stanford University (1968), both in electrical engineering. He is a registered professional engineer and a member of the Institute of Electrical and Electronics Engineers.

Land Combat Systems Studied by ASAP, 4 Agencies

Land combat systems envisioned 20 years in the future were studied by representatives of four agencies at a special summer session at the Army War College, Carlisle Barracks, Pa.

Sixteen members and consultants of the Army Scientific Advisory Panel joined in the 2-week study with representatives of the Institute of Land Combat, Advanced Materiel Concepts Agency and the Intelligence Threat Analysis Detachment.

Objective of the study was to ensure that the technologies and conceptual systems being considered by the Army's advanced concepts organizations adequately represent those "which, if supported, could be applied to Army operations during the time period of Land Combat Systems 1 (approximately 20 years in the future)."

Dr. Harold M. Agnew, ASAP chairman at that time (since succeeded by Lawrence O'Neill), presided over the study group and David C. Hardison, science adviser of the U.S. Army Combat Developments Command, was the coordinator of the summer study.

A classified report on the study is being prepared for publication in October.

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(*Continued from page 3*)

covered all of the particular subject or subjects sufficiently to enable the Panel confidently to make a recommendation.

"In still other areas of staff reports, the Panel lacked sufficient confidence in its judgmental capability to deal with the detailed, technical or specialized matter. However, they are of sufficient importance to be submitted with the report as information, without necessarily implying endorsement of each item by the Panel."

Distribution of the appendices is limited to federal agencies having a propriety of interest related to specific areas of their operations. Appendices that had been published as the *Army Research and Development Newsmagazine* went to press are:

"Mechanisms for Change—Organizational History"; "Functional Analysis — Washington Headquarters Staffs"; "Audit Procedures"; and "Correspondence Control and Mail Distribution in Washington Headquarters."

Still in preparation for publication are: "Missions and Functions, Washington Headquarters Staffs"; "Personnel Data and Trends in Staff Sizes"; "Major Weapon Systems Acquisition Process"; "Operational Test and Evaluation"; "Supply, Maintenance and Transportation"; "Telecommunications"; "Automatic Data Processing"; "Conflicts of Interest"; "Comparisons of DoD, NASA and AEC Acquisition Processes"; and "Joint Chiefs of Staff Decision-Making."

From the viewpoint of potential impact upon Military Departments of the Army, Air Force and Navy concerned with research and development, along with procurement of materiel, the panel's recommendation No. 3 is of paramount importance, as stated in the Executive Summary:

"The Deputy Secretary of Defense for Management of Resources should be delegated responsibility for the following functions:

(a) The Military Departments, which should continue under the immediate supervision of their Secretaries;

(b) Research and Advanced Technology;

(c) Engineering Development;

(d) Installations and Procurement (a modification of the present Installations and Logistics);

(e) Manpower and Reserve Affairs;

(f) Health and Environmental Affairs;

(g) Defense Supply Agency; and

(h) Advanced Research Projects Agency.

"There should be an Assistant Secretary of Defense for each of the functions (b) through (f) inclusive, who reports and provides staff assistance to the Secretary of Defense through the Deputy Secretary of Defense (Management of Resources).

"The position of Director of Defense Research and Engineering should be abolished, and his functions reallocated between the Assistant Secretary of Defense for Research and Advanced Technology and the Assistant Secretary of Defense for Engineering Development.

"Functions (g) and (h) should continue to be constituted as Defense Agencies, each under the immediate supervision of a Director.

"The Advanced Research Projects Agency should be delegated the responsibility for all research and exploratory development budget categories. Funds for such research should be budgeted directly to this Agency, and the Agency should be authorized to assign or contract for work projects to laboratories of the Defense Department or in the private sector, as appropriate."

Recommendations No. 1 and 2 of the Executive Summary recommendations are stated as follows:

1. "The functions of the Department of Defense should be divided into three major groupings:

(a) Military Operations, including operational command, intelligence, and communications (herein called Operations);

(b) Management of personnel and materiel resources (herein called Management of Resources); and

(c) Evaluation type functions, including financial controls, testing of weapons, analysis of costs and effectiveness of structures, etc. (herein called Evaluation).

2. "Each of these major groups should report to the Secretary of Defense through a separate Deputy Secretary. Appointees to these three positions should be drawn from civilian life, and should rank above all other officers of the Department of Defense except the Secretary. One of the three should be designated principal deputy.

"The General Counsel, the Assistant to the Secretary of Defense (Atomic Energy), the Assistant Secretary of Defense (Public Affairs), and the Assistant to the Secretary of Defense (Legislative Affairs) would continue to report directly to the Secretary of Defense. The staff of the Office of the Secretary of Defense should not exceed 2,000 people."

As proposed in Recommendation No. 4, the Deputy Secretary of Defense for Operations would be delegated responsibility for Military Operations; the Unified Commands; Operational Requirements; Intelligence;

DeRosa Selected Assistant to Secretary of Defense Laird

Secretary of Defense Melvin R. Laird recently administered the oath as Assistant to the Secretary of Defense (Telecommunications) to Louis A. deRosa, the first appointee to the position established May 21, 1970.

The office was established to consolidate staff responsibility for telecommunications within the Office of the Secretary of Defense, and to strengthen management of telecommunications resources to attain maximum economy and efficiency.

As principal staff assistant to Secretary Laird for telecommunications matters, and for the National Communications System, Mr. deRosa is responsible for development of DoD telecommunications policy, directives to support policy, and for recommending program/budget policies, plans and procedures as they relate to telecommunications.

Formerly corporate vice president, Engineering and Research, with Philco-Ford Corp., he has presented about 100 papers to professional engineering societies in the fields of air navigation, electronic warfare, communication, acoustics and bionics. He has been issued more than 50 patents in psycho-acoustics, radar, direction finding, antennas, communications, receivers, avionics and visual displays.

Mr. deRosa received his BS degree and did graduate work in electronic engineering at Polytechnic Institute of Brooklyn, N.Y. In 1955, he completed the Executive Management Program at Columbia University.

Louis A. deRosa

Telecommunications and Automatic Data Processing; International Security Affairs; the Defense Communications Agency; and the Civil Defense Agency (if Civil Defense is to be retained in the Department of Defense).

Recommendation 4 advocates creation of three major Unified Commands:

(1) A Strategic Command composed of the existing Strategic Air Command, the Joint Strategic Target Planning Staff, the Continental Air Defense Command, and Fleet Ballistic Missile Operations;

(2) A Tactical (or General Purpose) Command, composed of all combatant general purpose forces of the United States assigned to organized combatant units;

(3) A Logistics Command, to exercise for all combatant forces supervision of support activities, including supply distribution, maintenance, traffic management and transportation.

Stipulated in No. 4 recommendation is: "No Commander of a Unified Command should be permitted to serve concurrently as Chief of his Military Command."

Further major organizational changes are proposed in Recommendation No. 5, advocating the following:

(a) To provide the staff support on military operations, and the channel of communications from the President and the Secretary of Defense to the Unified Commands, an operations staff, separate from all other military staffs, should be created.

(b) The responsibilities now delegated to the Joint Chiefs of Staff by the Secretary of Defense to serve as military staff in the chain of operational command with respect to the Unified Commands, and all other responsibilities so delegated which are related to operations and the Unified Commands, should be rescinded; and consideration should be given to changing the title of the Chief of Naval Operations to Chief of Staff of the Navy.

(c) All staff personnel positions in the Organization of the Joint Chiefs of Staff and in the headquarters military staffs of the Military Services which are in support of activities, such as military operations, which are recommended for transfer to other organizational elements, should be eliminated.

(d) The Organization of the Joint Chiefs of Staff should be limited to include only the Joint Chiefs of Staff and a reconstituted Joint Staff limited in size to not more than 250 officers augmented by professional civilian analysts as required.

(e) The Unified Commanders should be given unfragmented command authority for their Commands, and the Commanders of component commands should be redesignated Deputies to the Commander of the appropriate Unified Command, in order to make it unmistakably clear that the combatant forces are in the chain

(Continued on page 48)

2 Army Scientists Present Tech Papers in Europe

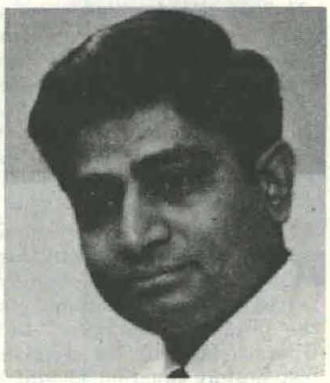
International recognition of two U.S. Army scientists, both with doctoral degrees at an age when long careers are ahead, has come in the form of selection to present technical papers in France and Yugoslavia.

Dr. Yin-Chao Yen, chief of the Physical Sciences Branch, Research Division, U.S. Army Cold Regions Research and Engineering Laboratory, Hanover, N.H., presented his paper at the Fourth International Heat Transfer Conference in Versailles, France, Aug. 31–Sept. 4. It is titled "Onset of Convection in a Porous Medium Containing Liquid with Density Inversion."

Dr. Chandrakant S. Desai of the U.S. Army Engineers Waterways Experiment Station, Vicksburg, Miss., traveled to Belgrade, Yugoslavia, for the International Congress on Rock Mechanics, Sept. 21–27.

He discussed the finite element method as a powerful numerical technique for resolving highly complex engineering problems by use of a computer—a subject on which he prepared his doctoral dissertation.

Dr. Desai is coauthor of a textbook for students and practicing engineers titled "Introduction to the Finite Element Method," which is scheduled for publication in the near future.



Dr. C. S. Desai

Dr. Yin-Chao Yen

DR. YEN has been associated with the U.S. Army Cold Regions Research Laboratory since 1960. He has specialized in research on heat transfer, fluid mechanics and thermal instability due to density inversion, and has authored or coauthored about 30 articles in professional journals.

In addition to his USACRREL dual responsibilities as a technical administrator and research scientist, Dr. Yen has been adjunct associate professor of chemical engineering at the University of New Hampshire since 1965. He received BS, MS and PhD degrees, respectively, from National Taiwan University, Kansas State University, and Northwestern University.

DR. DESAI is a member of the technical staff, Soils Division, Waterways Experiment Station, where he has been employed since he received a PhD degree in civil engineering from the University of Texas. He earned a BS degree in civil engineering from the University of Bombay, India, and MS degree from Rice University in Texas.

In his research at WES, he has been concerned with applications of the finite element method of numerical analysis to complex problems. Involved in his work is the WES mission of scientific investigations into hydraulics, soils, concrete structures, mobility and environment, and nuclear weapons effects.

Picatinny VE on M-551 Fuze To Save About $3.4 Million

Economies calculated at $3,425,100 at the U.S. Army's Picatinny Arsenal, Dover, N.J., are attributed to application of Value Engineering (VE) to the M–551 fuze, small enough to fit easily into a hand.

Five employes of the Ammunition Engineering Directorate conceived and developed the money-saving idea —a change from a machined steel adapter to the detonating point with a mylar (plastic) disc seal to a one-piece zinc die casting that incorporates a thin die-cast web (seal) to replace the mylar.

The die-cast adapter, which saves time and labor, is credited to Charles A. Brown, supervisory engineer, Vincent E. Bozzer, supervisory mechanical engineer, Arthur L. Beese, mechanical engineer, Barney J. Skladany, aeronautical engineer, and W. R. Schneider, industrial engineer.

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(*Continued from page 47*)

of command which runs exclusively through the Unified Commander.

(f) In consolidating the existing area Unified Commands into the Tactical Command, major organizational and functional advantages will be obtained by:

(1) Merging the Atlantic Command and the Strike Command;

(2) Abolishing the Southern Command and reassigning its functions to the merged Atlantic and Strike Command;

(3) Abolishing the Alaskan Command and reassigning its general purpose function to the Pacific Command and its strategic defense functions to the Strategic Command; and

(4) Restructuring the command channels of sub-unified commands.

(g) The responsibilities related to civil disturbances currently delegated to the Army should be redelegated to the Tactical Command; and

(h) The Unified Commanders should be given express responsibility and capability for making recommendations to the Deputy Secretary of Defense for Operations, for operational capabilities objectives and for allocations of force structures needed for the effective accomplishment of the missions assigned to their Commands.

Recommendation No. 6 advocates that the Deputy Secretary of Defense for Evaluation should be delegated responsibility for evaluation and control-type activities, including: (a) Comptroller (including internal audit and inspection services); (b) Program and Force Analysis (a modification of the present Systems Analysis Unit); (c) Test and Evaluation; (d) Defense Contract Audit Agency; and (e) Defense Test Agency.

No. 6 recommends that there should be an Assistant Secretary of Defense for each of the functions (a) through (c) inclusive, who reports and provides staff assistance to the Secretary of Defense through the Deputy Secretary of Defense for Evaluation.

Recommendation 7. The number of Assistant Secretaries in each of the Military Departments should be set at three, and except for the Assistant Secretaries (Financial Management) they should serve as senior members of a personal staff to the Secretaries of the Military Departments without the existing limitations of purview imposed by formal functional assignments. The Assistant Secretary (Financial Management) should become the Comptroller of the Military Department, with a military deputy, as in the current organization of the Department of the Navy.

The Secretariats and Senior Military Staff should be integrated to the extent necessary to eliminate duplication; the functions related to military operations and intelligence should be eliminated; line-type functions, e.g., personnel operations, should be transferred to command organizations; and the remaining elements should be reduced by at least thirty percent.

(A study of the present staffs indicates that the Secretariats and Service Staffs combined should total no more than 2,000 people for each Military Department.)

Recommendation 8. Class II activities (Army), Field Extensions (Air Force), and Commands and Bureaus (Navy), all of which are line rather than staff in character, which are now organizationally located under the direct supervision of staff elements in the headquarters military staffs of the Services, should be transferred to existing command-type organizations within the Services.

Recommendation 9. The Defense Atomic Support Agency should be disestablished. Its functions for nuclear weapons management should be transferred to the operations staff under the Deputy Secretary of Defense for Operations, and its weapons effects test design function should be transferred to the Defense Test Agency.

Recommendation 10. The administration functions presently assigned to the Assistant Secretary of Defense (Administration) should be assigned to a Director of Pentagon Services, reporting to the immediate office of the Secretary of Defense. He should be responsible for operating the facilities and providing administrative support for the Washington Headquarters.

Recommendation 11. A Net Assessment Group should be created for the purpose of conducting and reporting net assessments of United States and foreign military capabilities and potentials.

The group should consist of individuals from appropriate units in the Department of Defense, consultants and contract personnel appointed from time to time by the Secretary of Defense, and should report directly to him.

Recommendation 12. A Long-Range Planning Group should be created for the purpose of providing staff support to the Secretary of Defense with responsibility for long-range planning which integrates net assessments, technological projections, fiscal planning, etc.

This group should consist of individuals from appropriate units in the Department of Defense, consultants and contract personnel appointed from time to time by the Secretary of Defense, and should report directly to him.

Recommendation 13. A Coordinating Group should be established in the immediate office of the Secretary of Defense. The responsibilities of this group should be to assist the Secretary of Defense and the Deputy Secretaries of Defense in coordinating the activities of the entire Department in the scheduling and follow-up of inter-Departmental liaison activities;

- To staff for the Secretary the control function for improvement and reduction of management information/control systems needed within the Department and required from Defense contractors; and
- To assure that each organizational charter of the Office of the Secretary of Defense is of proper scope and coordinated in accordance with the assigned responsibility of the organization.

The responsibility for the Department's Directive/Guidance System, currently assigned to the Assistant Secretary of Defense (Administration), should be assigned to this group. The coordinating group should be headed by a civilian Director, who should also serve as executive assistant to the Secretary of Defense.

Recommendation No. 14. The Army Topographic Command, the Navy Oceanographic Office and the Aeronautical Chart and Information Center should be combined into a unified Defense Map Service reporting to the Secretary of Defense through the Deputy Secretary of Defense for Management of Resources.

Recommendation No. 15. A new development policy for weapon systems and other hardware should be formulated and promulgated to cause a reduction of technical risks through demonstrated hardware before full-scale development, and to provide the needed flexibility in acquisition strategies. The new policy should provide for:

(a) Exploratory and advanced development of selected subsystems and components independent of the development of weapon system;

(b) The use of government laboratories and contractors to develop selected subsystems and components on a long-term level of effort basis;

(c) More use of competitive prototypes and less reliance on paper studies;

(d) Selected lengthening of production schedules, keeping the system in

production over a greater period of time;

(e) A general rule against concurrent development and production efforts, with the production decision deferred until successful demonstration of developmental prototypes;

(f) Continued trade-off between new weapon systems and modifications to existing weapon systems currently in production;

(g) Stricter limitation of elements of systems to essentials to eliminate "gold-plating";

(h) Flexibility in selecting the type of contract most appropriate for development and the assessment of the technical risks involved.

(i) Flexibility in the application of a requirement for formal contract definition, in recognition of its inapplicability to many developments;

(j) Assurance of such matters as maintainability, reliability, etc., by means other than detailed documentation by contractors as a part of the design proposals;

(k) Appropriate planning early in the development cycle for subsequent test and evaluation, and effective transition in the test and evaluation phase; and

(l) A prohibition of total package procurement.

Recommendation 16. The effectiveness of Program or Project Management should be improved by:

(a) Establishing a career specialty code for Program Managers in each Military Service and developing selection and training criteria that will insure the availability of an adequate number of qualified officers. The criteria should emphasize achieving a reasonable balance between the need for knowledge of operational requirements and experience in management.

(b) Increasing the use of trained civilian personnel as program managers.

(c) Providing authority commensurate with the assigned responsibility and more direct reporting for program managers, particularly those operating in matrix organizational arrangements; and

(d) Giving the program manager directive authority, subject to applicable laws and regulations, over the contracting officer, and clarifying the fact that the contract auditor acts in an advisory role.

Recommendation 17. Increased use should be made of parametric costing techniques for developments and procurements to improve the quality of original and subsequent estimates, and to help offset the difficulties of estimated costs of unknowns.

Recommendation 18. A separate program category (those categories of activities used for internal planning and management in the Department, e.g., strategic offensive forces, strategic defensive forces, research and development, intelligence, etc.) should be established for test and evaluation, especially operational testing, and the responsibility for overview of all Defense test and evaluation efforts should be assigned to the Defense Test Agency.

Recommendation 19. Special careers should be established for officers in such staff, technical and professional fields as research, development, intelligence, communications, automatic data processing, and procurement.

Recommendation 20. In order to improve the process of acquisition and retention of military personnel, the Executive Branch should develop, and submit to the Congress for its consideration as necessary, a total military personnel program which coordinates and reconciles all the separate considerations, particularly including: (1) military compensation and retirement, (2) personnel policies on promotion and rotation, and (3) acquisition programs, such as Reserve Officers Training Corps.

Recommendation 21. The duration of assignments for officers should be increased, and should be responsive to

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AMCR 70-50 Details 'Try Before Buy' Policies

Based on an exhaustive year-long study involving eight commodity commands and 42 project managers for materiel developmental items, HQ Army Materiel Command announced Sept. 8 the publication of a new regulation detailing "Try Before Buy" policies.

AMCR 70–50, "Research and Development—Validation Prototyping," prescribes the use of "competitive prototypes," underscored by Deputy Secretary of Defense David Packard in a series of Try Before Buy policy memorandums. (See July–August 1970 edition, page 2 article outlining his views.)

Maj Gen Paul A. Feyereisen, AMC deputy CG for Materiel Acquisition, also has explained in numerous speeches and memorandums to heads of the commodity agencies concerned PROMAP–70 (Program for the Refinement of the Materiel Acquisition Process) as a top priority area of effort.

In a statement accompanying announcement of publication of AMCR 70–50, General Feyereisen commented:

"There is a great need to use the competitive prototype technique to identify and reduce risks in the early acquisition phase, before commitment of large sums of funds for engineering development and in production—and we will be testing more thoroughly in this early acquisition phase."

AMCR 70–50 defines "Validation Prototyping" as the "strategy of fabricating hardware during advanced development for test and experimental purposes designed to provide information required for engineering/operational systems development."

Ben Stutsky, HQ AMC Research, Development and Engineering Directorate, heads a task force for implementation of PROMAP–70 validation prototyping.

The goal is to insure that feasibility studies are sound, the weapon system is reasonably well defined, and that cost proposals are credible—all before the Army commits itself to full-scale development.

Competitive prototyping will require validation prototypes from two or more developers (in-house labs, contractor, or a combination). Prototypes may also include "existing military, commercial or modified-commercial hardware."

AMCR 70–50 breaks new ground in nine areas. Provisions include a new look at risk analysis, advance and exploratory development, component competitive development, full system competitive prototyping for decision to enter engineering development, elimination of paper studies, reduction of documentation needs during advanced development, and requirement for earlier developer prototype testing.

The Stutsky task force has pushed initiation of 13 projects under the competitive validation prototyping process by the AMC commands. In various stages of implementation, they are: ultra-reliable area radio, tactical radio communication system, forward-looking infrared sensor, cargo containers, 5 and 10 kw. generator sets, diagnostic test equipment for UH–1 (Huey helicopter) aircraft, 155mm binary projectile, ammunition for general-purpose machinegun, high-performance fuze, underwater vehicle mining system, remote aerial mine, and antipersonnel mine.

The AMC commands are considering the feasibility of competitive prototyping seven projects: ARSV (Armored Recon Scout Vehicle), HLH (Heavy-Lift Helicopter) components, Multipurpose Unit Mine, Loran C/D Airborne Navigation System, Family of Military Engineer Construction Equipment (FAMECE), Advanced LAW (Light Assault Weapon), and Missile System Target Illuminator.

Defense Panel Report Considered for Impact on R&D

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the requirements of the job as to the career plan of the officer. Officers continued on an assignment for this reason should not be disadvantaged in opportunity for promotion.

Recommendation 22. Executive Orders and Department of Defense Directives with respect to matters of equal employment opportunity for Department of Defense military personnel, civilian employes and contractors, as set forth in the existing comprehensive programs for insuring equal opportunity, should be administered from a sufficiently high organizational level in the Department to assure effective implementation, and the procedures for assessing penalties for noncompliance should be reviewed and clarified.

Recommendation 23. The Secretary of Defense should recommend the clarifying changes in conflict of interest statutes, should amend the regulations to clarify them, and should make certain administrative changes to insure uniform enforcement.

MANAGEMENT OF MATERIEL RESOURCES. Chapter II is devoted to this topic and is the chapter providing the major share of the background for most of the panel's recommendations directed to research and development, organizational, procedural, policy formulation and other problem areas.

The general section of Chapter II begins with this statement:

"The modern history of military organizations and operations demonstrates that the materiel support of the forces is of ever-increasing relative importance, and presents complex defense management problems.

"Advances in science and technology comprise the initiating source of this trend. Weapons, communications, transportation—all have been affected significantly by revolutionary advances in the state-of-the-art; and each advance has been accompanied by great increases in complexity of development, acquisition, maintenance, operation and in cost.

"In short, modern military organizations have become 'hardware' oriented and dependent. Military hardware requires an increasing amount and proportion of total defense resources, aggravating a host of inseparable, associated management problems.

"Materiel management in the Department of Defense can be divided into two distinct over-all areas of activity. The first is acquisition-related, and includes functions associated with research, development, test and evaluation, and procurement. The second phase is post-procurement, and includes supply, maintenance, and transportation.

"Although those activities connected with acquisition are more often in the focus of public and Congressional attention, both areas are critical to combat effectiveness and both have a significant cost impact.

"The growing size of hardware-related expenditures, particularly for acquisition, has been matched by broadening Congressional attention. For instance, the coverage of authorizing legislation, which basically deals with investment items, has been expanded so that it now extends to all research, development, test and evaluation and to all procurements except ammunition, electronics, and general materiel.

"Congressional concern with the post-acquisition phase of materiel management is demonstrated by the breadth of consolidation authority for logistics functions vested by Congress in the Secretary of Defense by the 1958 Amendment to the National Security Act.

"The most severe problems in the acquisition of materiel occur when production is dependent on new development, not with off-the-shelf procurements.

"Military hardware development programs continue to be plagued by the now familiar symptoms of trouble: (1) major cost growths or overruns; (2) schedule slippages; and (3) failures in performance.

"Uncertainty is inherent in the nature of programs which involve advances in technology, and this uncertainty makes it inevitable that some degree of cost growth, delays and short-falls in desired performance will occur in some programs. The frequency and magnitude of such problems which have been experienced, however, surpass significantly those which can be attributable to unavoidable causes. It is clear that a substantial portion of the acquisition problems must be attributed to management deficiencies.

"The problems—and resulting deficiencies—in hardware development programs are clearly too myriad and complex to yield to any single solution, but a combination of changes in policy and procedures can achieve significant improvements in costs, time, and performance.

"Deficiencies in any part of the process—establishment of the technological base, formulation of requirements, acquisition philosophy, cost estimating, testing, contracting, program management, etc.—can adversely affect an entire program.

"If repetitions of the weapon systems debacles of the past are to be avoided in the future, each element of the policies and procedures followed in the past must be carefully examined and constructively revised. Equally crucial is the necessity for

U.S., Canada Cooperate in Research Atop Mt. Logan

Studies of human performance under environmental conditions of 17,500-foot Mount Logan in the rugged St. Elias Mountains of Canada, called the "world's highest scientific laboratory," involved cooperative United States and Canadian effort this summer.

Canadian Forces Mobile Command conducted a maneuver in the St. Elias Mountains. As planned with the Arctic Institute of North America and the U.S. Army Research Office-Durham (N.C.), an element of the Office of the Chief of Research and Development, HQ DA, two maneuver teams were flown to Mount Logan.

Atop the high plateaus they were subjected to experimental research directed toward a better understanding of man's ability to live and work under such high-altitude conditions.

Arctic Institute scientists from United States and Canadian agencies or organizations performed physiological studies dealing with the effects of high altitude upon kidney function, pulmonary problems, retinal hemorrhage and cerebral response to atmospheric conditions.

Supported by the Army Research Office-Durham, Arctic Institute environmental researchers conducted detailed studies along a transect extending from the base camp at Kluane Lake (elevation 2,500 feet) to the Mount Logan scientific station.

Other Projects operating within the framework of the Icefield Ranges Research Project include studies of glaciology, geology, physiography, mammology, and limnology. The over-all objective is a complete, long-term study of the total environment of a high mountain region in which military forces may have to live and operate.

Robert Faylor, director of the Arctic Institute of North America, reports that the Canadian military forces are gaining valuable experience in airmobile operations in a most difficult environment through their annual participation in the program.

Results of the environmental research are being made available to the U.S. Army through reports distributed by the Army Research Office-Durham.

strong, continuing management to assure that the execution of the revised policies and procedures is responsive.

"Even an effective change in policies and procedures cannot be expected to produce immediate benefits, however, for the most meaningful of potential improvements in the acquisition process fall in the initial stages of development programs. The duration of development programs is measured in years, and an improvement in the process will produce the most meaningful results in programs initiated after the changes are instituted."

The report defines research and development within Budget Category VI of the Defense Department into six long-established categories:

- 6.1 Research includes all basic research and that applied research directed toward expanding knowledge in the several scientific areas;
- 6.2 Exploratory Development includes studies, investigations and minor development efforts, varying from applied research to sophisticated breadboard hardware and is oriented to specific military problem areas;
- 6.3 Advanced Development includes all projects for development of hardware for experimental test;
- 6.4 Engineering Development includes development programs in which items are engineered for military use, but which have not been approved for procurement or operation.
- 6.5 Management and Support includes the overhead expense for the other subdivisions of research and development.
- 6.6 Emergency Fund is available for use in any category at the discretion of the Secretary of Defense.

From other than Category VI of the DoD budget subdivisions comes *Operational Systems Development*, which includes development, engineering and test of systems, support systems, vehicles and weapons (Engineering Development) that have been approved for production and deployment.

The breakdown of research and development by performer includes (1) Private Industry, (2) Government In-House, (3) Federal Contract Research Centers (FCRCs), (4) Universities and (5) Foreign Performers.

Admittedly as a rough estimate, since salaries of Civil Service employes usually are not included in the allocation of funds reported, it is estimated that R&D funds are distributed as follows: Industry, about 62 percent; Government In-House, about 30 percent; FCRCs, about 3.5 percent; Universities, about 3 percent; Foreign Performers, about one-tenth of one percent.

The report states that the Emergency Fund, for which performers vary from year to year according to allocation, accounts for one percent or less of the total R&D funds.

Commenting on the Technological Base, the report states:

"One of the most critical distinctions to be made is that between research and development to advance the general technological base related to military needs and the remainder of research and development which is oriented to specific military applications.

"There is an elusive boundary between the two. Generally, R&D to advance the technological base is acknowledged to fall in the budget categories of Research (6.1) and Exploratory Development (6.2), and to a small extent, in Advanced Development (6.3).

"It should be noted that the Exploratory Development category is not altogether limited to advancing the technological base. (The budget categories of Research (6.1) and Exploratory Development (6.2) are controlled by funding level, eg., funds are appropriated to support a level of effort rather than being justified on an individual project basis, as are the other R&D categories.)

"There are several significant characteristics of R&D designed to advance the technological base. First, formal requirements from the military operators are not necessary for, nor do they directly affect, the allocation of funds in these two categories.

"Second, a much more careful analysis of level-funded categories, in which R&D to advance the technological base primarily falls, is required to assure relevancy to military needs than is required in categories which are controlled on a project basis.

"Third, where control is organizationally dispersed, it is much more difficult to detect duplication than where specific requirements must be justified, and identifiable projects planned and approved as a basis for funding.

"Fourth, R&D designed to advance the technological base requires more intensive review in order to insure that the proper allocation of funds is made so that all parts of the militarily relevant spectrum of technology are adequately covered.

"Fifth, the dispersion of control of such R&D makes it difficult to perform audits adequately to insure that such funds are actually used to advance the technological base, and are not used to supplement efforts to develop specific hardware."

One of the report's hard-hitting comments on a critical problem being aggravated by dissenters states:

"The Defense research performed by universities is small and diminishing. Renewed efforts are being made to insure that such research is clearly defense-related. Unquestionably, university participation in Defense research is critical to the maintenance of an adequate pace of advance in the military-related technological base.

"At the present time, only about 14 percent of Government funds supporting university research is from Defense. Participation by institutions and individuals in university research for Defense is on a purely voluntary basis, and should remain so.

"The university defense-oriented research contribution is being damaged by anti-military and 'protecting academic freedom' attitudes and activities of some students and faculties. The consequences of permitting academic freedom to be so interpreted as to inhibit or prohibit voluntary participation in military-oriented research by universities and faculty members will not only be a distortion of academic freedom, but will be a critical blow to the nation's defense requirements."

In criticizing the current organization and procedures for defense research and development, the report states that they "inhibit the degree of control of research and exploratory development and of the expenditures necessary to insure proper application. . . . The overemphasis on mission justification for research and development allocations and funding creates additional incentives for such diversion.

"There is no adequate mechanism to evaluate the performance of the numerous research groups. The dissipation of research, exploratory development and management and support categories of R&D funds on unproductive work in contractor and in-house laboratories, sometimes to support a preconception or position of the organizational contracting element contracting for the research, occurs all too often.

"Based on the foregoing observations, it is concluded that R&D to advance the technological base should be constituted as a separate program, and subject to a continuing intensive review to insure that funds are allocated to militarily relevant research and that all militarily relevant areas of technology are given due consideration in fund allocation.

"Further, Defense research policy should be separated by assignment of responsibility from other development policy. The primary objective should be to insure that technology will be available when needed to meet Defense requirements."

Accomplishments in the first decade of the U.S. Army Satellite Communications (SATCOM) Agency were reviewed on the occasion of the tenth anniversary of its establishment Sept. 6, including development of two successful satellite communication systems.

The SYNCOM Satellite Communications System and the global Defense Satellite Communications System (DSCS) have been developed, including a total of 29 terminals—the AN/FSC–9s at Fort Dix, N.J., and Camp Roberts, Calif., and the AN/MSC–46 and AN/TSC–54.

Terminals of the latter two types are sited in Maryland, New Jersey, Oklahoma, Colorado, Alaska, Hawaii, Okinawa, Philippines, Guam, Vietnam, Korea, Thailand, Australia, Ethiopia, Germany and Turkey.

During President Nixon's 1969 summer trip to Asia, the SATCOM Agency-developed AN/TSC–54 terminals provided an instantaneous, dependable communications link with Washington via the satellites and worldwide stations of the DSCS.

SATCOM Agency also plays a major role in the experimental tactical satellite communications (TACSATCOM) system. Using TACSAT 1, the world's most powerful communications satellite and two families of small terminals, the agency is the focal point for joint service testing of a system to satisfy critical communications needs of U.S. combat forces.

Terminals of varying design include the one-man carry devices for listening only; terminals which break down into packages for backpack by communications teams (team pack); jeep-mounted terminals; shelters transportable by truck, helicopter or cargo aircraft; installations in fixed-wing aircraft or helicopters and seagoing equipment. Any of these terminals—land, sea or airborne—can communicate with any other through the satellite.

In the moon missions during Apollo 10 in May 1969, the TACSATCOM experimental network backed up the command communication for the primary recovery forces. Success of these circuits as backup and during high-frequency blackouts established the user confidence to advance TACSATCOM to a primary role in succeeding Apollo 11 and 12 flights in July and November.

For the first time, Alaskans joined the rest of the country to view major live TV coverage—interviews with the Apollo 11 astronauts, launch of the Apollo 11 spacecraft and eventually, the walk on the moon. This innovation for Alaska was made possible by Army satellite communications terminals and the Air Force TACSAT 1 communications satellite.

In the international aspects, SATCOM Agency has been active in the cooperative NATO program in tactical satellite communications research and development. SATCOM also gives technical assistance to these nations in their development of ground terminals for long-range satellite communications systems.

Agency activities also include participation with the Navy and Air Force in meteorological and navigational satellite systems; with NASA in satellite communications research and development; and with the Project Mallard satellite communications aspects.

The agency operates a headquarters Ground Subsystem Evaluation Facility (GSEF) which performs system and subsystem tests, product improvement tests, maintenance tests and development tests. GSEF major elements are the Engineering Test Facility (ETF) and the Terminal Equipment Test Facility (TETF). The ETF consists of the AN/TSC–54 and AN/MSC–46 terminals, which are identical counterparts to those deployed in the worldwide operational network.

Additionally, there is the LET terminal, designed and fabricated by the Lincoln Laboratories of Massachusetts Institute of Technology. Currently modified to operate with the TACSAT 1 satellite, LET will be modified to work with the Phase II DSCS satellites.

The headquarters Terminal Equipment Test Facility consists of various modems, multiplexers, coders and test equipment. Link terminal simulation equipment represents the major portion of the AN/MSC–46 and a computerized Data Acquisition Facility. Any of the equipment, or combinations thereof, can be patched through to any of the three link terminals in the ETF. These equipments will also be used as part of the Phase II DSCS Program.

SATCOM Agency commander Col Leland D. Wamsted is also Army project manager for Satellite Communications, with responsibility for providing the ground environment for all Department of Defense satellite communications systems.

The agency staff of about 300 includes civilian and military scientists and engineers, a Canadian Air Force officer, and an Australian officer. A Defense Communications Agency Satellite Communications Field Office is headed by a U.S. Air Force officer.

Many personnel are pioneers in space research and development, having participated in early experiments such as Score in 1958, the world's first communications satellite; Tiros, the world's first weather satellite, and Courier, an advanced communications satellite in 1960; and management of the Advent Satellite Communications Program in 1960–1962.

Agency effort now centers on Phase II of the Defense Satellite Communications System, involving technological advances based on results of previous operational experience.

SATCOM Agency takes pride in its share in the birth and growth of satellite communications during the 1960–70 decade and looks forward to other major accomplishments.

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