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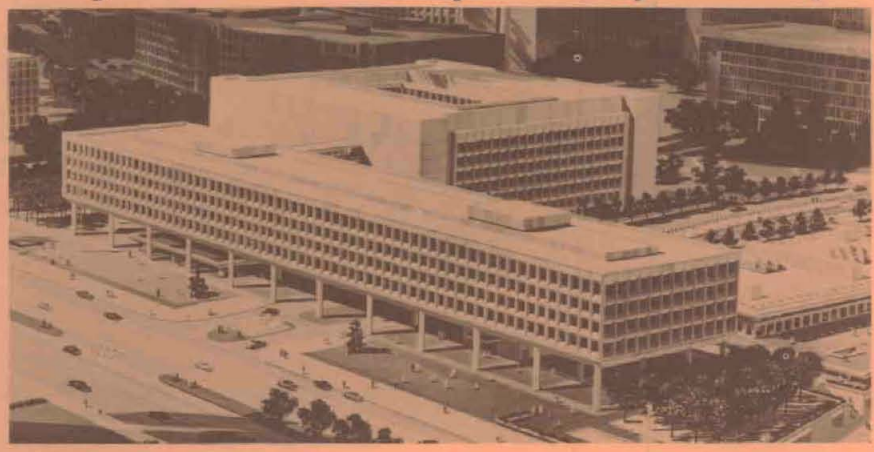
Army Centralizes Responsibility in Computer Systems Command



Establishment of the United States Army Computer Systems Command, scheduled to develop as a central ADP design agency charged with consolidating, coordinating and integrating responsibility for the total effort of the Army in operation of management information systems, is effective Mar. 31.

Army Chief of Staff Memorandum 69-81 approves in principle the plan for the USACSC, as developed in accordance with determinations and recommendations of the final report on SOMISS (Study of Management Information Systems Support). (See *Army Research and Development Newsmagazine*, December 1968, page 1 feature article, for details.)

Some refinements are being made in the over-all plan developed by an Ad Hoc Planning Group, based on comments from all of the commands and other Army elements concerned with various implementation responsibilities. The group is chaired by Brig Gen Henry C. Schrader, Director of Management Information Systems (MISD), Office, Assistant Vice Chief of Staff, Army.

Brig Gen Wilson R. Reed, commanding general, Army Automatic Data Field Systems Command, which will realign to provide the nucleus for organization of the USACSC, will be CG of the new command. Headquarters will be at Fort Belvoir, Va.

The USACSC functions as a Class

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6,500 Defense Employes to Occupy Forrestal Building

Surpassed in magnitude only by the Pentagon along the panoramic skyline of Washington, D.C., the $36-million, 3-block-long Forrestal Building will be opened Apr. 15 to the advance contingent of 6,500 Department of Defense employes who will occupy it by October.

Joggers might get a good warm-up along the frontal expanse of the gleaming white structure, designed for aesthetic appeal in the heart of the redevelopment southwest section of the Nation's capital, as well as for efficiency of DoD operations.

Stretching between 9th and 12th Streets S.W., the building that memo-

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Featured in This Issue . . .

Chesarek Assumes Control Of Army Materiel Command

Nomination of Lt Gen Ferdinand J. Chesarek for promotion to 4-star rank as successor to General Frank S. Besson Jr., who has headed the U.S. Army Materiel Command for seven years—ever since it was in the plan-

(*Continued on page 7*)

Lt Gen Ferdinand J. Chesarek

Westmoreland Addresses Scientific Advisory Panel

Army Chief of Staff General William C. Westmoreland gave the major address at the winter meeting of the Army Scientific Advisory Panel (ASAP), Feb. 17-18, at Edgewood (Md.) Arsenal. The theme of the sessions was "Battlefield Flexibility Alternatives to Nuclear and Conventional Weapons."

General Westmoreland discussed the Vietnam war in general, including the historical background for the current conflict, and commended the numerous contributions of Army research and development activities in meeting urgent requirements. In an earlier closed 1-1/2 hour session with

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Night-Vision Aids Used In Effort to Save Cattle

Two of the U.S. Army's newest light amplification night-vision devices are on loan for a United Nations Food and Agriculture Organization-supported study to try to control the scourge of vampire bats on cattle in Latin America.

Credited with "taking the night from Charlie" in Vietnam combat operations, because of their ability to spot enemy movements under the cover of darkness, the electronic devices, developed mainly by the Army Electronics Command Night-Vision Laboratory, may find an important peacetime role.

Extermination of vampire bats is a vast problem in Latin America,

(*Continued on page 6*)

Army R&D Newsmagazine

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Editor . . . . . Clarence T. Smith
Associate Editor . . . . George J. Makuta

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Department of Defense Armor Materials Program

By Jerome Persh

In a keynote address at a recent Symposium on Ceramic Armor Technology at Battelle Memorial Institute, Columbus, Ohio, under sponsorship of the Defense Ceramic Information Center and the Air Force Materials Laboratory, Jerome Persh challenged the government-industry R&D teams to come up with new solutions. Persh is chief of the Materials Division, Office, Director of Defense Research and Engineering, Washington, D.C.

* * *

My remarks today will address the current technological status of armor materials development, with some observations about how we arrived at this state and thoughts and projections regarding the future of this field of science.

Presently, it appears that we are experiencing a "technological renaissance" in armor materials development. The armor materials community is undergoing a change in philosophy that should enable rapid strides forward in the development of new, improved armor materials.

Rather than utilizing ballistic testing of many different material constructions and processing techniques, the changing philosophy is headed towards the theoretical approach to the ballistic penetration phenomena from a time/momentum transfer standpoint.

These analyses will provide the identification and quantification of the important materials' properties needed to defeat specific threats.

Prior to this conceptual revolution, all known studies examined the energy transfer and absorption after the armor had begun to crack. Crack formation and propagation energies were computed and analyzed after fracture had started. Unfortunately, such studies could provide very little in the way of guidance to the development engineer.

Presently, the Lawrence Radiation Laboratories (LRL), under the sponsorship of Advanced Research Projects Agency (ARPA), provides the "new look" at the problem. By modifying and revising the complex computer codes used in their weapons work, they have demonstrated that stress wave propagation and interaction could lead to the destruction of the armor even before the projectile begins to penetrate the front face.

Furthermore, these computer codes are sufficiently versatile to map the entire stress field in a given armor material of known properties at every instant during the penetration process. At the same time they describe the changing shape of the projectile.

Advanced experimental studies have verified the basic adequacy of the calculation schemes and have pointed the way for greater sophistication of the analysis. What this adds up to is that the materials development community will have guidelines for the development of materials to defeat specific threats.

In the long run, it [this progress] should obviate the need for massive ballistic testing programs to develop new armor materials. Perhaps the more important consequence is that these analytical techniques can be used to avoid costly materials development programs which can result in little improvement in performance.

Turning the argument around, it is conceivable that we can use modifications of these analyses for projectile materials and design for defeating known enemy armors. This is what I mean by "technological renaissance."

As with all technological developments, it is almost impossible to pinpoint a beginning. But certainly one initiation point appeared at the time the National Aeronautics and Space Administration (NASA) inaugurated work concerning micrometeorite penetration of satellites in the late 1950s.

Micrometeorites were considered to be a serious problem for satellites that had the mission of long life in space. The NASA experience with the Echo sphere showed that micrometeorites are not a serious threat.

The science of hypervelocity impact of minute particles, however, was seriously started over this early concern. When it evolved that the mechanics of penetration could be treated in a sophisticated analytical fashion, studies were inaugurated in

(*Continued on page 24*)

Jerome Persh

Westmoreland Addresses Scientific Advisory Panel

(*Continued from page 1*)

ASAP members, he discussed many of the problem areas and materiel needs.

The ASAP advises the Secretary of the Army, Chief of Staff, Assistant Secretary of the Army (R&D) and the Chief of R&D on scientific and technical matters of concern to the Army. The 25 authorized members are assisted by selected specialists who serve as consultants on various studies and projects. All are representative of the executive level of business and academic institutions.

Maj Gen Frank G. White, CG of the U.S. Army Munitions Command, and Col Paul R. Cerar, CO of Edgewood Arsenal, welcomed the ASAP to Edgewood, preliminary to briefings on defensive activities in the chemical and biological field at the installation.

Topics included "Medical Defense Aspects of Nerve Agents," by Col Henry T. Uhrig, chief, Medical Research Laboratory; and "Detection of Chemical Agents by Infrared and Laser Techniques," by Harvey Tannenbaum, chief, Infrared Applications Branch of the Defense Development and Engineering Laboratories (DDEL).

Bertram L. Karpel, chief of the DDEL Physical Protection Laboratory, discussed "Individual Body Protection." An estimate of a chemical attack by an unfriendly foreign power was presented by Francis J. Zalesak, chief, Chemical Branch of the Foreign Science and Technology Center, Army Materiel Command.

Col Dan Crozier, CO of the Army Medical Unit at Fort Detrick, Md., briefed the group on "Medical Defense Aspects of Biological Agents." Dr. Benjamin Warshowsky, chief, Rapid Warning Office of the Commodity Development and Engineering Laboratories at Fort Detrick, spoke on "Biological Agent Detection and Warning."

"National Policy and CB Program Status" was the topic of the closing address by Col James B. Owings, chief, Plans and Policy Division of the Directorate of CBR and Nuclear Operations, Office of the Assistant Chief of Staff for Force Development.

Dr. William G. McMillan, professor of chemistry at the University of California, was sworn in as an ASAP member and Dr. Ivan Flores, computer consultant and professor of statistics at the City University of New York, took his oath as a new consultant. ASAP currently consists of 22 members and 46 consultants.

ASAP Chairman Dr. Harold M. Agnew and Vice Chairman Dr. Ralph E. Fadum, counted as members, also serve on the ASAP Executive Committee. Dr. Agnew is Weapons Division Leader at the Los Alamos (N. Mex.) Scientific Laboratory. Dr. Fadum is dean of the School of Engineering, North Carolina State University.

Other members of the executive committee are Charles L. Poor, Acting Assistant Secretary of the Army for R&D; General Frank S. Besson Jr., CG of the Army Materiel Command until this past month; Lt Gen. A. W. Betts, Chief of R&D; and Lt Gen Harry W. O. Kinnard, CG, Combat Developments Command. Lt Col Wayne D. Miller is executive secretary of the panel.

ARMY CHIEF OF STAFF General Westmoreland meets with Army Scientific Advisory Panel members (from left) Dr. Marvin R. Gustavson, leader of the Military Applications Group, Lawrence Radiation Laboratory, University of California (UofC); Dr. William H. Martin, senior consultant-at-large, Washington, D.C.; Prof. David T. Griggs, geophysics, UofC; and Acting Assistant Secretary of the Army (R&D) Charles L. Poor.

THE ARMY RESEARCH COUNCIL (TARC) members posed with Chief of R&D Lt Gen A. W. Betts when he presented Certificates of Achievement Feb. 27, on behalf of Acting Assistant Secretary of the Army (R&D) Charles L. Poor, to members who served during 1968. *Front row* (from left) are new member Dr. Hermann Robl, deputy chief scientist, Army Research Office-Durham, N.C.; Dr. J. Post Hallowes, director, Physical Sciences Laboratory, Army Missile Command, Redstone (Ala.) Arsenal; General Betts; Dr. Thomas E. Sullivan, chief, Materials Sciences and Technology Branch, Physical and Engineering Sciences, U.S. Army Research Office (USARO); new member and chairman of TARC, Dr. I. R. Hershner Jr., chief, Physical and Engineering Sciences Division, USARO. *Back row*, Lt Col Sylvester L. Wilhelmi, executive secretary of TARC, Research Plans Office, USARO; Dr Leon T. Katchmar, deputy director, Human Engineering Laboratories, Aberdeen (Md.) Proving Ground; Dr. E. Kenneth Karcher Jr., chief, Social Sciences Branch, Behavioral Sciences Division, USARO; new member Dr. Fernand de Percin, chief, Regional and Special Projects Branch, Environmental Sciences (ES) Division, USARO; new member Dr. Lester W. Trueblood, director, Earth Sciences Laboratory, Natick (Mass.) Laboratories; new member Dr. Robert E. Weigle, chief scientist, Watervliet (N.Y.) Arsenal; Col William H. Meroney, director, Walter Reed Army Institute of Research, Washington, D.C. Col Donald L. Howie, chief, Life Sciences Division, USARO, was not available when photo was taken. Members who retired are Dr. Apstein (past chairman), associate technical director, Harry Diamond Labs, Washington, D.C.; Dr. Hoyt Lemons, chief, Geophysical Sciences Branch, ES Division, USARO; Dr Kay F. Sterrett, chief, Research Division, U.S. Army Terrestrial Sciences Center, Hanover, N.H.; and W. R. Benson, deputy director, Nuclear Engineering, Picatinny Arsenal, Dover, N.J.

Army Centralizes Responsibility in Computer Systems Command

(*Continued from page 1*)

II Activity under the Office of the Assistant Vice Chief of Staff (OAVCSA).

Creation of the USACSC climaxes extremely intensive study and planning effort initiated in November 1967 by Chief of Staff Memorandum 67-444, directing formation of the SOMISS group.

Representation on this group has been provided by the Continental Army Command, Materiel Command, Combat Developments Command and such HQ DA staff agencies as the Deputy Chiefs of Staff for Personnel, Operations, Logistics, Intelligence, Communications-Electronics, and Force Development; also, the Chief of Research and Development, and Comptroller of the Army.

Participation was broadened as the SOMISS project required by the participation of various other Army elements, including the U.S. Army Pacific (USARPAC), U.S. Army Data Support Command (USADATCOM), U.S. Army Strategic Communications Command (USA STRATCOM) and the Civilian Personnel Office, Fort Belvoir.

Initially, as of Apr. 1, the total USACSC staffing will be 466 personnel, officers and civilians, but the number is scheduled to approximate 1,400 in FY 1970. Eventual staffing is still conjectural, subject to further studies of manpower requirements as SOMISS recommendations are implemented. Estimates of the ultimate force range into about 3,000.

An early augmentation of the USACSC HQ staff by 375 personnel, by drawing in talent from U.S. Army elements worldwide, has been approved. Personnel and spaces for the FY 1970 build-up will be pulled in from CONARC, U.S. Sixth Army, U.S. Army Europe, U.S. Army Pacific, Deputy Chief of Staff for Personnel in support of their projects being transferred.

The approved plan for organization and time-phased development of the over-all scope of USACSC activities is a 178-page document, including annexes ranging alphabetically through J. Emphasized is an orderly transition to achieve over-all objectives by utilizing effectively all available resources, supplemented by the best obtainable new talent in the highly competitive ADP field.

Stressed also is that "in the near time frame, every effort will be made to exercise greater technical supervision over contractor efforts, with a stated goal of reducing contractor effort to a minimum in the next three years."

Recognized by the plan, however, is that "contractor assistance will be required for some period of time while in-house expertise is developed."

Similarly, the plan concedes that "specific ADP projects that will become the responsibility of the USACSC are today being used for full-scale operational support and cannot be reoriented easily. . ."

Cited as examples of this type of projects are the Standard Supply Systems (3S), Supply and Maintenance Agency System (S&MA), Personnel Management and Accounting Card Processor (PERMACAP), and Active Army personnel of Continental Army and Major Overseas Commands Systems (CARMOCS(A).

"As the USACSC assumes responsibility for these projects and plans the integration of these systems with other systems into uniform ADP systems," the plan states, "the current operational projects must be maintained in operational status until the next generation of Army-wide, multicommand systems can be developed and installed. . ."

Computation of resource requirements for ADP systems development is conceded to be a "difficult task with many unknowns in this rather new field. One of the most recent computational techniques was developed by the Army Automatic Data Field Systems Command (ADFSC) and presented in 'Report on System Support Requirements for the Army in the Field,' June 1968."

The Plan Guidelines section of the over-all plan ends with:

"Certain projects covered in this plan must continue substantially as at present, based on their critical importance in supporting current operations. There can be no suspension of such project activity to accommodate establishment of the USACSC, or efforts on next-generation systems."

Effective Mar. 31, the USACSC will assume responsibility for such ADFSC projects as: Combat Services Support System (CS_3) Direct Support/General Support Unit (DSUL-GSU) Tactical Operations System (TAC), Tactical Fire Direction System (TACFIRE), and the Division Logistics System Test/Seventh Army Card Processor System (DLST/SEACAPS). Personnel resources and contractor activities of ADFSC will be transferred.

Between Apr. 1 and July 1, the USACSC will assume project responsibility for CONARC Class I Automated System (COCOAS); and Centralization of Supply Management Operations Projects (COSMOS). Transfer of Personnel Management and Accounting Card Processor (PE-

HDL Associate Director Wins Electronics Award

One of the coveted national awards made annually to recognize notable achievement in electronics, the 1968 Harry Diamond Memorial Prize Award of the 160,000-member Institute of Electrical and Electronics Engineers, came "home to roost" Feb. 14.

Quite by coincidence, the winner was Dr. Maurice Apstein, associate technical director of the Harry Diamond Laboratories, who in January concluded a year of service as chairman of The Army Research Council (TARC).

Established in 1949 to honor the memory of the founder of the Diamond Ordnance Fuze Laboratories (redesignated the Harry Diamond Laboratories in 1962), the award to Dr. Apstein was ". . . for contributions to ordnance electronics and inspiring leadership in the work of government laboratories."

Dr. Maurice Apstein

After 18 years with various industrial organizations in research and development activities, Dr. Apstein entered U.S. Civil Service 19 years ago as an employe of the U.S. National Bureau of Standards. He was one of the original staff shifted from NBS to provide the nucleus of the newly established Diamond Ordnance Fuze Laboratories in 1953.

Dr. Apstein received a bachelor's degree in electrical engineering from the College of the City of New York, a master's degree from George Washington and PhD degree from American University in Washington, D.C. Holder or coholder of 14 patents, he has authored more than 25 technical papers published in professional journals and is a Fellow of the Institute of Electrical and Electronic Engineers and Washington Philosophical Society.

RMACAP) and active Army CARMOCS (Continental Army and Major Overseas Commands Systems) will be accomplished by Oct. 1, 1969.

The Standard Supply System (3S) will become the responsibility of the USACSC Oct. 1, 1969. However, because of the criticality of the mission support provided by the 3S, operational control of the system will remain with USARPAC for some period after that. Similarly, U.S. Army Europe will retain operational control of the Supply and Maintenance Agency System (S&MA). Details of transfer to USACSC will be worked out jointly.

Future conceptual projects envisioned for USACSC include: Tactical Operations System (TOS–75); The Army Authorization Document System (TAADS) (field level); The Army Automated Budget System (TAABS) (field level); Continental Army and Major Overseas Command System (CARMOCS); Integrated Facilities System (IFS) (field level); Theater Army Support System (TASCOM); and Military Police Operations and Information System.

With respect to USACSC longer-range staffing needs, the plan calls for a major task effort by the new command, with guidance from MISD, the major commands and HQ DA staff agencies, to assess realistically the active and concept projects and determine additional resource requirements.

The SOMISS report recognized that, within the personnel constraints placed on HQ DA, the staff agencies themselves may not be able to build up internally to accomplish the detailed functions necessary for successful systems efforts. Recommended is a required build-up within Class II activities under selected HQ DA staff agencies to perform the full scope of these responsibilities.

The implementation plan states: "The SOMISS concept can be successful only if the DA functional staff agencies, augmented by Class II activities as necessary, are capable of discharging their responsibilities for requirements formulation, procedures development, and systems monitoring. HQ DA staff agencies will provide on-site liaison to the USACSC.

"Although HQ DA staff agencies are responsible for the formulation of detailed functional system requirements for all multicommand ADP systems, it is recognized that the U.S. Army Combat Developments Command represents a unique base of knowledge in the general area of combat and combat support systems. In these areas, USACDC will formulate the detailed functional system requirements as an agent of HQ DA."

U.S. Army Materiel Command support responsibility to the USACSC is spelled out as: "Since the USACSC will not perform materiel research, development, test, evaluation, and production, it will rely on the U.S. Army Materiel Command to provide such support, including logistic support and any other support for which USAMC is traditionally responsible.

"The USACDC will provide on-site liaison to interpret concepts and doctrine, as required, and insure that ADP systems produced by the USACSC are consistent with approved concept and doctrine. It will also . . . formulate detailed requirements for combat and combat support.

"The liaison group at the USACSC will include personnel from U.S. Army Strategic Communications Command and the Office of the Assistant Chief of Staff Communications-Electronics to insure effective communications-electronics planning and support for multicommand ADP systems. Similarly, the USACSC will depend on and coordinate support functions of other agencies."

User command responsibilities are delineated in the USACSC implementation plan in the statement:

"Just as HQ DA is responsible for detailed functional system requirements, and USACSC is responsible for ADP system development, the Army commands are responsible for presenting command requirements to be included in standard systems, and the system operations.

"Systems developed by USACSC must be thoroughly tested to assure that they respond effectively to authentic requirements. Even so, the requirement for trained and qualified operational personnel and the impact of new systems upon the user commands can be expected to present difficulties in establishing and maintaining proper system operation.

"USACSC will contain organizational units of field support and liaison personnel who will work as field engineering representatives and data systems experts in support of the user commands. Field engineering representatives will be available to all user installations of USACSC-developed systems, and liaison offices will be established at HQ USCONARC, USAREUR and USARPAC. . . ."

Changes to CSR 10–25 will detail the role of the Army Assistant Vice Chief of Staff in managing centralized multicommand ADP systems development under the USACSC. The changes also will reflect the role of MISD (Management Information System Directorate) as arbiter and principal adviser to the AVCS in planning and developing multicommand systems.

Publication of a DA Pamphlet is scheduled as a guide for the planning, development, installation, operation and maintenance of multicommand ADP systems. The pamphlet will portray the life cycle of such systems and identify milestones, decision points, and responsible agencies. A tabular matrix of tasks and agencies provides visibility of command and staff responsibilities.

Other documents prescribing the respective responsibilities and functions involved in operations of the USACSC will include a Project Manager's Charter and AR 10–9.

Col Hanes Assigned as STRATCOM Chief of Staff

Duties of the chief of staff, U.S. Army Strategic Communications Command (STRATCOM), Fort Huachuca, Ariz., have been assumed by Col Wallace M. Hanes, who served until recently with the Special Studies Group, Joint Chiefs of Staff, Washington, D.C.

Col Hanes is a graduate of the University of Maryland and has done graduate work at American University in Washington, D.C. He is a graduate of the Command and General Staff College and the Army War College.

For his exploits as a combat commander, Col Hanes has been awarded, among other honors, two Silver Stars and the Distinguished Service Cross.

Col Wallace M. Hanes

During World War II, he served mainly in the Italian theater of operations. In the Korean War, he commanded the U.N. Raider Forces (General Headquarters Special Activities Group) and also served with the U.S. Army 2d Infantry Division. Later, he commanded the 502d and 503d Airborne Infantry Regiments.

Col Hanes has served as chief readiness officer for NATO Ground Forces, Supreme Allied Command Europe; as a member of the Continental U.S. Defense Planning Group of the Permanent Joint Board of Defense—Canada/U.S.; with the Inter-American Defense Board; the Army General Staff Special Warfare Directorate, in the Office of the Special Assistant for Counterinsurgency and Special Activities, Joint Chiefs of Staff; and assistant to the Assistant Secretary of the Army.

Night-Vision Aids Used in Effort to Save Cattle

(*Continued from page 1*)

where the rabies they carry causes a loss of cattle estimated by the United Nations Food and Agricultural Organization at about $350 million annually, David A. Belnap reported in the *Los Angeles Times.*

Compounding the problem is that of killing the bad bats without snuffing out the good bats. Vampire bats constitute a relatively small percentage of the total bat population, and the good bats are beneficial to man because they help to keep the insect hordes of Latin America in balance.

Greatly increased knowledge of the night-time feeding habits of the vampire bats is needed in an effort to determine how they may best be eradicated, that is, selective destruction of the bad and not the good bats. Studies require a night-seeing capability that will not disturb the bats as they feed on blood of animals. U.S. Army equipment may be the answer.

Recognizing the enormity of the control problem, the Food and Agricultural Organization and also the Development Program of the United Nations have initiated a 4-year cooperative research training program with countries desiring assistance.

The secrecy shroud over the U.S. Army's use of the new night-vision devices in Southeast Asia was removed last summer. (See July-August edition of *Army Research and Development Newsmagazine,* page 7, for details.) The sub-loan of four pieces of this equipment for the United Nations study, it is emphasized, is possible only under special limitations.

Arthur Greenhall, a bat ecologist formerly on the staff of the U.S. Fish and Wildlife Service and currently a research associate of the Smithsonian Institution, Washington, D.C., is one of the members of the FAO-DP United Nations team survey the problems of controlling vampire bats.

Inasmuch as the U.S. Army night-vision equipment desired was not available for purchase, Greenhall requested through Dr. George E. Watson, chairman of the Smithsonian Department of Vertebrate Zoology, that the possibility of arranging for a subloan be considered. Dr. Watson is currently conducting related biomedical research under an Army contract.

The U.S. Army Medical Department is interested in learning all that is possible about the diseases endemic to all areas of the world, the disease reservoir areas, and modes of transmission.

One of the factors influencing the loan of the Army equipment to the Smithsonian Institution and subsequent utilization by Greenhall is that techniques he is developing may also be applicable to other research projects of the Smithsonian.

Foremost among several suggested uses, following a briefing and demonstration of the equipment at the Smithsonian, was for determination of feeding habits of fruit-eating bats, which destroy vast quantities of fruit in the tropics of the world.

Loan of the night-vision devices to the Smithsonian Institution, as another U.S. Government agency, was thus approved by the Army Chief of Research and Development in cooperation with the CG of the U.S. Army Materiel Command for four months.

Initial studies are being made at a field laboratory in the Ministry of Agriculture Experiment Station west of Mexico City, Mexico, with the research headquarters in the Instituto National de Investigaciones Pecuarias in Palo Alto.

Vampire bats infected with rabies are found in every Central and South American country and on the Island of Trinidad in the Caribbean. Rabies in the vampire bats appears to run a 5-year cycle. Not all bat colonies in a geographical area or in a colony are stricken simultaneously.

Dr. James H. Steel, chief of the Veterinary Public Health Section of the National Communicable Disease Center, Atlanta, Ga., stated recently that vampire bats of tropical America "are perhaps the most important reservoir of rabies in the Americas. This disease must be considered the most serious problem of animal health confronting Latin America today."

In Mexico alone, it is calculated that an average of about 100,000 cattle die every year because of rabies infection. Multiplied in relation to losses throughout all South American countries, the impact upon the cattle-growing industry, with resultant malnutrition among many thousands of people, can be appreciated.

The problem of vampire bats in Latin America is an old one. Vasco Nunex de Balboa is reported to have experienced their depredations as the bats infected horses and men while they struggled across the Isthmus of Panama to discover the Pacific Ocean 455 years ago.

Loan of two of the U.S. Army's Starlight Scopes and two crew-served night-vision devices, provided that their capabilities lead to knowledge that will lead to control of vampire bats—through techniques other than the frequently cost-prohibitive immunization of cattle—may prove once again that Army research, though directed primarily to military objectives, often produces incalculable benefits to the civilian population.

Clarke Trails Cassidy as Chief of Engineers Aug. 1

Promotion to 3-star rank is scheduled for Maj Gen Frederick J. Clarke when he succeeds Lt Gen William F. Cassidy as Chief of Engineers Aug. 1.

President Richard M. Nixon announced the nomination of General Clarke to step up from the Deputy Chief of Engineers position he has held three years.

General Cassidy will conclude a 3-year tour as Chief of Engineers when he retires from active service, ending a 38-year military career.

General Clarke has been trained for the responsibilities of the Chief of Engineers by a 31-year career following graduation from the United States Military Academy with a degree in engineering. He has a master's degree in civil engineering from Cornell University (1940), and is a graduate of the Command and General Staff College, Armed Forces Staff College, National War College.

During his current assignment at Fort Belvoir, Va., General Clarke also served a year as CG of the U.S. Army Engineer Center and commandant, U.S. Army Engineer School.

From 1963 to 1965, he was director, Military Construction, Office of the Chief of Engineers, Washington, D.C. This assignment gave him worldwide responsibility for the military construction program of the Corps of Engineers. He was from 1960 to 1963 the engineer commissioner of the 3-man commission responsible for administration of Washington, D.C.

Registered as a professional engineer, General Clarke is a Fellow of the American Society of Civil Engineers. He is a member of the Society of Professional Engineers, District of Columbia Society of Professional Engineers, and the American Public Works Association.

Maj Gen Frederick J. Clarke

SECRETARY OF DEFENSE Melvin R. Laird (third from right) recently attended his first meeting with the Joint Chiefs of Staff at the Pentagon. Left to right are General Bruce Palmer Jr., Vice Chief of Staff (Army Chief of Staff General William C. Westmoreland was overseas at the time); Deputy Secretary of Defense Paul H. Nitze; Deputy Secretary of Defense David Packard; Admiral Thomas H. Moorer, Chief of Naval Operations; Lt Gen Lewis W. Walt, Assistant Commandant of the U.S. Marine Corps; General John P. McConnell, Chief of Staff, U.S. Air Force; Mr. Laird; Former Secretary of Defense Clark M. Clifford; and General E. G. Wheeler, Chairman, Joint Chiefs of Staff.

Chesarek Assumes Control of Army Materiel Command

(Continued from page 1)

ning stage in February 1962—was announced Feb. 20.

President Richard M. Nixon selected the Army Assistant Vice Chief of Staff, subject to confirmation by the Senate, for a promotion that gives him command over an agency that is currently spending about $14 billion annually and operates with a $24-billion inventory.

General Besson headed the planning group for development of the organization of the Army Materiel Command and continued as CG when it was officially activated Aug. 1, 1962. His new assignment is chairman of a Joint Logistics Review Board established under Joint Chiefs of Staff auspices.

The board will conduct a study of the logistics systems in support of military operations in Southeast Asia —a problem with which he has familiarized himself by frequent visits to the area during the years since the build-up for the Vietnam war.

General Chesarek, a 55-year-old U.S. Military Academy graduate (Class of 1938), now has responsibility for the AMC nationwide network of 86 military installations and more than 100 activities, including more than four-fifths of the Army laboratories. AMC has about 15,000 military and 164,000 civilian personnel, inclusive of those in nine major subcommands.

During World War II, General Chesarek served in the European Theater of Operation as commander of the 28th Field Artillery Battalion, 8th Infantry Division. He participated in the Normandy, Northern France, Rhineland and Central Europe campaigns.

Military assignments have given him a widely varied range of experience, including legislative liaison officer, G-4 Division, Department of the Army; chief, Military Personnel and Manpower Division, Office of the Deputy Chief of Staff for Logistics, HQ DA; military assistant and executive officer to the Assistant Secretary of Defense for International Security Affairs; chief of staff, U.S. Army Communications Zone, Europe; and

Chief of staff, Southern European Task Force in Italy; commanding general, 4th Logistical Command in France; assistant deputy chief of staff, Logistics (Materiel Readiness), HQ DA; assistant deputy chief of staff, Logistics (Programs), HQ DA; and Comptroller of the Army.

General Chesarek has an MS degree in business administration from Stanford University and has attended the Advanced Management Program at Harvard University. He is a graduate of the Artillery School, Fort Sill, Okla.; the Armed Forces Staff College, Norfolk, Va.; and the National War College, Fort McNair, Washington, D.C.

Among his decorations are the Distinguished Service Medal, Silver Star Medal, Legion of Merit, Bronze Star with Oak Leaf Cluster, Purple Heart, Air Medal, Army Commendation Medal, French Croix de Guerre with Palm and Star, and the Luxembourg Croix de Guerre.

Shillito Becomes ASD (I&L) as Morris Resigns

Barry J. Shillito, Assistant Secretary of the Navy (Installations and Logistics) since April 1968, became Assistant Secretary of Defense (I&L) when Thomas D. Morris resigned to accept appointment as an executive of Litton Industries.

Born in 1921 in Dayton, Ohio, Mr. Shillito received a BS degree from the University of Dayton in 1949. A pilot in the Army Air Corps during World War II, he was a prisoner of war in Germany from late 1943 to the end of hostilities.

From 1962 to 1968, he was with the Logistics Management Institute, a nonprofit research organization concerned with major defense logistics problems, and was president when he resigned to accept appointment as Assistant Secretary of the Navy.

From 1949 to 1954, he was a section chief and contracting officer for the Air Material Command at Wright-Patterson AFB. He joined the Hughes Aircraft Co. as director of materiel in 1954 and became director of sales in 1958. The following year he accepted appointment as executive vice president of Houston Fearless Co. and promoted to president in 1960.

Barry J. Shillito

6,500 Defense Employes to Occupy Forrestal Building

(*Continued from page 1*)

rializes the late James V. Forrestal, the first Secretary of Defense, is sited on 11 acres it shares with the beautiful new L'Enfant Plaza, with an overview of the Potomac River.

Across the river, on the Virginia side, is the Pentagon, heralded as the "world's largest office building." That means the Forrestal Building will settle for the distinction of being the largest office structure, by a wide margin, in Washington, D.C.

Further comparison reflects that the Pentagon provides about six million square feet of space, with 3.7 million feet classed as usable office space. The Forrestal Building has 1.7 million square feet, with 1.26 million usable for offices and other facilities such as the cafeteria, garage and General Services Administration area.

The Army will be allotted roughly two-thirds the total office space of 900,000 square feet. Occupants will include elements of the Office of the Chief of Engineers now in Building T-7, units of the Office of The Surgeon General in Main Navy, elements of the Office of the Adjutant General in Tempos A and B, and the Office of the Chief of Chaplains in Tempo A.

The Army Chief of Communications and Electronics staff, presently in the leased Nelson Building, also will move into the Forrestal Building, along with the Civilian Personnel Training Center in Tempo B, the Provost Marshal's Office in Main Navy, and the Office of the Inspector General in the Yards and Docks Building.

Air Force occupants will include the staffs of the Office of Special Investigation, elements of the Civilian Personnel Directorate, Judge Advocate General, Surgeon General, and the Directors of Civil Engineering, Security Police, and Transportation.

Responsibility for administration of the building is assigned to the Army as the principal occupant.

Originally designated Federal Office Building 5, the structure was renamed by President Lyndon B. Johnson in 1965. Construction also started that year, although Congress authorized the project in 1961 and approved funding for it in 1963.

Architectural innovation characterizes the Forrestal Building. Most strikingly different is the use of 30-foot pillars along the Independence Avenue and the 9th and 12th Street sides to support the main 4-story North Building. With the 10th Street Mall passing below it, the structure appears to be floating above the street.

The South Building rises nine stories above ground level, with two floors below, and is constructed in the form of a rectangle, with an interior court open to the sky. Connecting the north and south's structures is another architectural innovation with dramatic eye appeal—a glass-enclosed aerial walkway.

Impressive also is the concept of the entrances, provided through two lobbies built around elevator cores at each end of the North Building. The step-ladder structure of the U-shaped complex is completed by the 2-story West Building, which includes the central cafeteria on the top floor.

Offices occupy the first floor of the West Building, which also accommodates a 250-seat auditorium. Food prepared in the below-ground level is delivered to the 900-seat cafeteria by a conveyor system. A separate dining room accommodates 150 persons.

Designers believe the cafeteria will achieve recognition as the finest in any U.S. Government building. Features are wall-to-wall carpeting throughout, electrical illumination supplemented by a system of skylights, and a broad patio at dining level that extends around the building.

Large windows on all sides of the cafeteria offer a magnificent view of the ultramodern L'Enfant Plaza, completed late in 1968, and the Potomac River. Flower boxes and benches are being placed along the patio. Ultimately tables and umbrellas may help to beautify it, although not programed at present, an official stated.

If description of the concept of the functional design of the Forrestal Building was limited to two words, "maximum utilization" would be most accurately definitive. Modular construction and centralization of service facilities are other key words. Many facilities are designed for joint use.

Typical, for example, are the conference rooms, which are designed with partitions that can be used to provide the best amount of space needed for a particular conference. This will permit several meetings at the same time by subdividing one room primarily designed to accommodate large meetings. The plan also permits maximum utilization of equipment by careful scheduling.

"Through central control of assignments," a Department of Defense office space management official explained, "we anticipate that it will be possible to achieve maximum utiliza-

Maj Gen Lang Selected to Command MTMTS

Maj Gen Clarence J. Lang, chief of staff, U.S. Army Materiel Command, has been selected to command the Military Traffic Management and Terminal Service (MTMTS) when Maj Gen John J. Lane retires Mar. 31 after 35 years of military service.

MTMTS is one of three single-manager transportation agencies responsible for Department of Defense transportation. Jointly staffed, it manages military traffic, land transportation, and operation of common-user ocean terminals in the United States. MTMTS monitors the expenditure of $2 billion annually with the U.S. commercial transportation industry.

Prior to his AMC assignment in July 1967, General Lang was director of Logistics, U.S. Strike Command, MacDill Air Force Base, Fla. His first Washington, D.C., assignment was with the Transportation Division, Office of the Joint Chiefs of Staff. Two years later, he served briefly as special assistant to the Army Chief of Transportation.

In 1961 he was assigned as deputy executive director of the Military Traffic Management Agency. When the agency became the Defense Traffic Management Service, he was appointed deputy commander.

General Lang was deputy commander of the Army's Transportation Center and assistant commandant of the Transportation School at Fort Eustis, Va. (1963-64). Following graduation from the Armed Forces Staff College in 1956, he was assigned to Okinawa as IX Corps Transportation officer.

During World War II, he was with the 28th Quartermaster Group in Northern Ireland, England and Africa, and was named its commander in 1944 while in France.

Maj Gen Clarence J. Lang

tion of the conference rooms—as high as 90 percent of time available. In many government buildings, they are unused much of the time."

Modular construction also means that space requirement changes of various offices and agencies can be made quickly, efficiently and at minimum cost. Each module throughout the Forrestal Building is five feet square, with telephone, lighting and air-conditioning lines centralized in the floor under the module.

Partitions are fastened to metal studs and the floor in such a way that they can be moved and reused in line with the modular design. This means that materials are virtually 100 percent reusable, it was explained; also, that moves can be made without extensive rewiring for telephones, lights, air-conditioning, etc.

Electrical lighting will provide 80 candlepower uniformly throughout the building, thereby meeting modern standards for the best illumination for office workers. Generous use of windows provides efficient natural lighting and all windows are tinted to minimize sun glare.

Among the various joint-use facilities will be a military/civilian health center, believed the first of its kind in the Washington, D.C., area. Centralization will permit installation of the most modern treatment facilities and operation with smaller staffs of medical specialists, nurses and clinical technicians at minimum cost.

Mail handling systems are the result of extensive studies for rapid and efficient distribution throughout the huge complex. Mail will be delivered to a central loading platform and sorted initially in a Defense Post Office for distribution to each floor. There facilities will be provided for sorting and delivery to each office. The schedule provides for six mail deliveries and pickups daily.

Classified waste disposal also is representative of time-saving, cost-cutting innovation. Instead of requiring each chief clerk of an office to monitor personally the delivery of "burn bags" to various collection points, as is the practice in most government buildings, the bags will be dropped into a secure chute system to the basement.

The system will convey the bags into a vault, and thence into a waste-destruction system—a new water and centrifugal force method that will obliterate all markings and grind the paper into tiny pellets. The pellets then will go into "dumpsters" for final disposition.

Classified films, when they become waste material, will be handled separately, using normal destruction methods, because the water force method is fully effective only on paper products.

Computer and automatic data processing facilities are centralized for the entire complex in a below-ground level facility connecting at floor level with all of the buildings. Similarly, the complex is served by a central printing plant, and a central medical library that will be filled principally with books from the Office of The Surgeon General.

The subterranean level also accommodates an 822-vehicle garage. Inadequacy of parking and garage facilities is in almost unvarying complaint from U.S. Government office workers, and it is recognized that the Forrestal Building probably will encounter one of its major criticisms on this score, though studied efforts are being made to minimize the problem.

Originally, the garage plan provided for only 565 vehicles, but the capacity was increased by adoption of a "stacked parking" plan. This means that vehicles will be stacked in closely in a manner that will not permit movement during working hours, except in special cases.

Assignment of parking spaces will be made on the basis of rank or civil service grade. Under study is a proposal for a supplementary point system that would offer special incentives for car pools—that is, assignments influenced by the "weight" of the points of the riders in each car.

Extensive efforts also are being made to provide the best possible mass transportation. The Southwest Area Transportation Committee, representative of the Departments of Defense, Housing and Urban Development, Transportation, Agriculture, and Health, Education and Welfare, and the General Service Administration, has been pushing for direct bus service from major regional areas.

The committee succeeded in its efforts to assure a subway stop at the Forrestal Building when the subway is completed. Bus stops are provided at 12th Street and Independence Avenue and at 7th and D Streets. The 12th Street loop is connected to the building and the 9th Street expressway will be when completed.

With respect to providing the optimum working environment, studied consideration has been given to other factors than air conditioning, lighting (natural and artificial), telephones and floor space needs. One of the innovations is vertical venetian blinds, which present a more attractive appearance with better lighting.

Walls throughout office buildings will be uniformly off-white except that accent colors from entry corridors will be carried through to certain walls. Corridors will be vinyl covered in two vivid complementary colors, in varying combinations at different levels, the modern treatment, that is, as compared to pastel coloring in the Pentagon.

Medical R&D Command Renames Fort Detrick Army Medical Unit

U.S. Army Medical Research Institute of Infectious Diseases (USAMRIID), is the new name of the former U.S. Army Medical Unit, Fort Detrick, Md.

Established in June 1956, the unit is a Class II activity of the Office of The Surgeon General. Attached to Walter Reed Army Medical Center, Washington, D.C., for administrative and logistical support, it is an element of the U.S. Army Medical Research and Development Command.

The institute's mission is to conduct studies related to defense against biological weapons and to develop appropriate biological protective measures, diagnostic procedures and therapeutic methods.

Col Dan Crozier has commanded the institute since July 1961.

MERDC Employe Earns Third Award In Less Than a Year

Honors for his work in nuclear, electromagnetic pulse effects were accorded to William J. Haas for the third time in less than a year when he was presented the Edward S. Barber Memorial Award at a dinner meeting Feb. 22.

The award is made annually by the Northern Virginia Chapter, Virginia Society of Professional Engineers to honor one of its distinguished charter members. Barber was a professor of soils mechanic's and foundations at the University of Maryland, a consultant to the U.S. Bureau of Public Roads, and was known for other contributions to civil engineering.

William J. Haas

Haas was recognized first in 1968 when he was selected for the Commanding Officers Medal for Scientific Achievement as an employe of the U.S. Army Mobility Equipment Research and Development Center, Fort Belvoir, Va. Later he was presented a Department of the Army R&D Achievement Award by Lt Gen Austin W. Betts, Chief of Research and Development.

HALF-MILE HOLE in fog bank made by HH–3E helicopter in 3 minutes.

Helicopter Fog-Dispersal Idea Aids Vietnam Rescues

Rescue of a survivor of a plane crash in dense fog in Vietnam was accomplished recently by applying a concept developed by James Hicks, U.S. Army Terrestrial Sciences Center, Hanover, N.H.

Two U.S. Air Force HH-53B helicopters hovered over the 400-foot-thick fog about 20 minutes until a hole appeared through which one was maneuvered to make the rescue.

While studying fog conditions at Thule Air Base five years ago in the Arctic, Hicks told officials that the fog might be dispersed by the downwash of a helicopter rotor if it was flown directly over the fog.

With the cooperation of base officials, he set up a test demonstration at Thule in July 1964. Fog was dispersed over a dock area with a hovering helicopter creating the downwash.

What happens, he explained, is that the fog, comprised of minute suspended water droplets is mixed with overlying warmer or drier air by the action of the helicopter rotor blades. Evaporation then occurs and the fog disappears. How long it stays clear depends on meteorological conditions.

The experiment was reported in a publication in the U.S. Army Cold Regions Research and Engineering Laboratory (CRREL) series of special reports, "Experiments on the Dissipation of Warm Fog by Helicopter-Induced Air Exchange over Thule AB, Greenland," AD474070: 1965.

". . .Certain types of shallow fogs can be dispersed," the report states, "by the downwash created by helicopters flying at near-hovering airspeeds at altitudes a few feet above the top of the fog."

Under certain conditions, one helicopter can clear an area about 100 yards wide by a mile long in less than five minutes. Some fogs, however, are too deep or otherwise do not lend themselves to dispersal by this means.

Last February, the Air Force adopted the Army's fog-dispersal idea as a potential way to expand rescue operations in Vietnam. Ground fogs there frequently delay or prevent helicopter rescue of downed or besieged military personnel. Tests at Eglin Air Force Base, Fla., proved feasibility of the technique.

In reporting test results, Vernon G. Plank and Alfred A. Spatola of the Air Force Cambridge Research Laboratories in Bedford, Mass., said:

". . .A helicopter, such as the HH-53B, should be able to create a swath of clearing some 200 to 500 feet wide along a runway 10,000 feet long, through ground fog 200 feet thick, in less than 10 minutes."

This presumption depends upon the air above the ground fog, when transported downward by the rotor and mixed with the cloudy air, being sufficiently unsaturated (relative humidity about 95 percent or less) to be able to absorb the cloud liquid water when it evaporates.

"The clouds around this helicopter simply became grayer and grayer in appearance until, all at once, it became obvious that one was looking directly through the cloud deck at the wavelets on the Gulf surface," one test pilot reported.

Together with Dr. E. M. Frisby and Albert Tebo of the Atmospheric Sciences Laboratory, U.S. Army Electronics Command, Fort Monmouth, N.J., Hicks participated in tests of the fog-dispersal technique last fall at Smith Mountain Airport, Va.

Conducted primarily by the Air Force, these tests further verified the acceptability of the technique for rescue operations and for dispersing fog at airports. During one of these tests, a lost boatman was able to find his way back to shore because of the clearing of the fog in his vicinity by two Air Force helicopters.

The nation's press reported recently that another man was rescued in Vietnam by a helicopter after it had successfully forced through a bank of fog. There are probably more than these two men who owe their rescue to the fog-dispersal technique, and Army officials believe that many more lives may be saved as the understanding of the method is broadened.

Research work in this and other phases of atmospheric modification of interest to the Army is the special responsibility of the Atmospheric Sciences Laboratory and its director, Kenneth M. Barnett.

Under his guidance, very close cooperation has been developed between the scientists of the Atmospheric Sciences Laboratory and those of the U.S. Army Terrestrial Sciences Center at Hanover, N.H., whose commanding officer and director is Lt Col John E. Wagner.

In recent months, both groups have benefited from the enthusiastic support of a newcomer to the task, Lt Col W. West, now deputy director, Atmospheric Sciences Laboratory.

AMC Names Project Manager For M113 Personnel Carrier

Production of the M113 Armored Personnel Carrier, under the Coproduction for Security Program(CSP) between the United States and Italy, is now managed for the Army by Lt Col Arthur L. Goodall.

As project manager for the $120 million program, Lt Col Goodall exercises full authority of the commanding general, U.S. Army Materiel Command. The M113 project was initiated by an agreement in 1963.

Col Goodall graduated from Washington University in 1952 with a BS degree in industrial engineering. He has an MS degree in logistics management from the Air Force Institute of Technology, Wright-Patterson Air Force Base, Ohio.

In 1966 he activated the 191st Ordnance Ammunition Battalion at Fort Sill, Okla., and accompanied the unit to Cam Ranh Bay, Vietnam, where it operated a tri-service ammunition storage facility.

In addition to demonstrating the possibilities of cooperative procurement and R&D efforts between the U.S. and its NATO allies, the success of the CSP assists the U.S. and helps solve the balance of payments problem while providing a mutual-use standardized piece of equipment.

3 Services Use TACSAT I in Satellite Communications Program

TACSAT I was launched into orbit Feb. 9 as a tri-service experiment for first-phase evaluation of a tactical satellite communications system intended to satisfy a critical need of U.S. combat forces. In-depth testing will be under guidance of a joint service advisory group.

The TACSATCOM Program is a cooperative research and development effort of the Department of Defense, directed by an executive committee—the Tactical Satellite Communications Executive Steering Group (TSEG)—staffed by members of the Army, Navy, Air Force and Marine Corps.

Experimental equipment consists of the UHF/SHF (Ultra High Frequency/Super High Frequency) TACSAT I satellite in orbit, plus two families of UHF/SHF ground terminals designed for use by the three services.

Six basic terminal configurations are incorporated in the network: manpack devices for receiving only (alert/broadcast receiver); terminals that break down into packages for backpack by teams; jeep-mounted terminals; ground shelters transportable by truck or aircraft; terminals for installation in aircraft; and shipboard terminals.

Any of these terminals, UHF or SHF, land, sea or airborne, can communicate with each other, either straight through the satellite in the same frequency band or by means of a cross connection between the UHF and SHF repeaters in the satellite.

The newly developed terminals incorporate sophisticated design features representing major advances in technology and application. Modular construction concepts and commonality of basic components are incorporated in the design to insure ease of operation, minimize problems of maintenance and supply, and simplify personnel training.

Particularly important for tactical operations is the "alert" or warning device making it possible, for the first time, for front-line troops to receive warning messages over great distances.

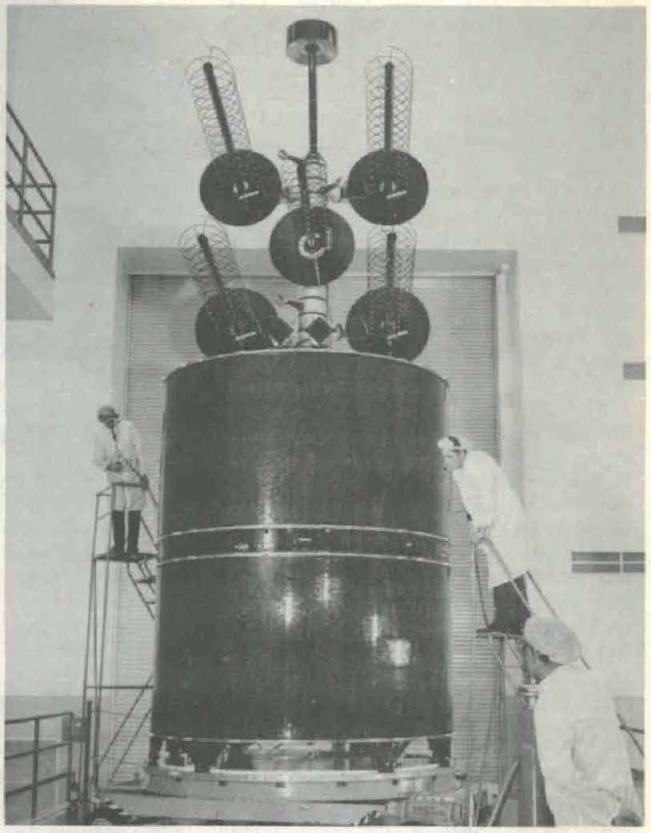
To provide a commonality between ground, airborne, and shipboard terminals, the TSEG devised a new management technique—the "lead service" concept, for the acquisition of ground equipment.

The Navy was responsible for development, coordination and publication of the joint test plan for TACSAT I.

The Army Satellite Communications (SATCOM) Agency is the lead service for procurement of all SHF terminals, with RCA Defense Communications Division as prime contractor.

The Air Force Electronic Systems Division is the lead service for procurement of all UHF tactical terminals, with Collins Radio Co. as prime contractor, and of all common modems, with Sylvania Electric Products as contractor.

Coordinated tests will be performed under the direction of a TACSATCOM Joint Service Test Directorate, set up as an adjunct of TSEG, and located at SATCOM Agency headquarters, Fort Monmouth, N.J. The Air Force will assign the test director, the Army and Navy will each provide a deputy. Testing will conform to jointly prepared plans.



IN ORBIT 22,300 statute miles above Earth, 1600-pound TACSAT I, the largest communications satellite ever built, is being used in the TACSATCOM Program by the Army, Navy, Air Force and Marine Corps. The spin-stabilized satellite's solar cells and outer structure spin at 54 revolutions per minute while the spiral-wound helical antenna array remains stationary and pointed toward Earth for communications relay with UHF or SHF land, sea or airborne terminals. *(See additional pictures, page 36.)*

SATCOM Agency's Satellite Communications Test Operations Center (SCTOC) will serve as the TACSATCOM I Test Coordinating Center (TCC). With each of the services operating its own terminals in these exercises, the TCC/SCTOC responsibilities will involve coordination of service operations as well as technical communications experiments.

Project Manager Test Offices (PMTO), one for each participating service located at each service's headquarters, also have been established. Direct communications facilities between each PMTO and TCC/SCTOC will provide for coordination and direction of testing.

The Army PMTO is the SATCOM Agency Test and Evaluation Directorate and data reduction will be performed at the Agency Data Center, a facility which also has been made available to the military services.

Terminals assigned to the Army for test and evaluation are located at the SATCOM Agency TACSATCOM staging area, Field Station No. 1, at Naval Air Station, Lakehurst, N.J.

Under technical management of the Test and Evaluation Directorate, these terminals are being operated by military crews who gained experience with the Agency's Experimental Army Satellite Tactical Terminals (EASTT). See *Army R&D Newsmagazine*, November, 1968, p. 18.

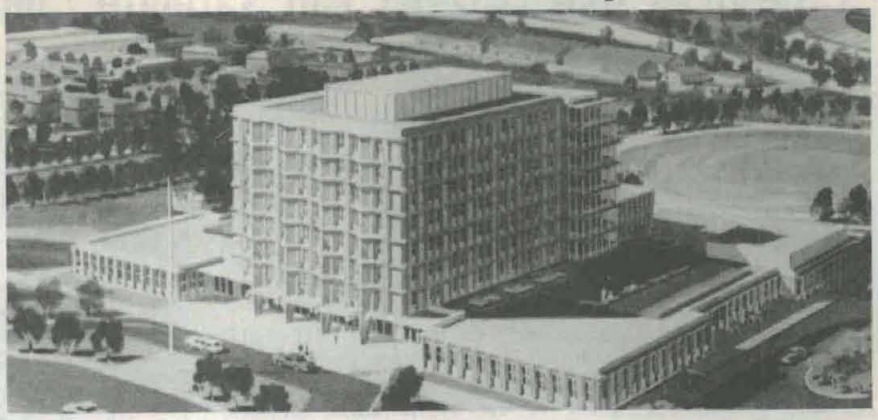
TACSATACOM I operational training was given in contractor-run classes sponsored by the SATCOM Agency. Graduates include civilian engineers and technicians and military specialists from the three services, plus employes of selected civilian support organizations.

Army Dedicates $15 Million Letterman General Hospital

Dedication of the $15-million, 10-story new Letterman General Hospital, replacing a conglomerate of buildings dating back as far as 1898, in mid-February gave the U.S. Army its most modern general hospital. In fact, it is the first Army General Hospital dedicated in the U.S. in 30 years.

Army Surgeon General (Lt Gen) Leonard Heaton returned to San Francisco to dedicate the successor to the hospital where he began his career as an intern in 1920. From 1945 to 1953, he served there as chief of surgery, chief of professional service, and then as commanding general.

Strictly speaking, the word "replaces" applied to the beautiful new structure overlooking San Francisco Bay and the Golden Gate Bridge does not mean that all of the old Letterman General Hospital conglomerate is phasing out immediately. Capacity of the old exceeds that of the new and the overflow (certain categories) will stay in old buildings until the new structure can handle them.



Construction was started in 1965 and the new hospital presently contains 550 beds, half of which are 4-bedroom suites and the remainder single and double-room units. Each patient's room has its own television, an intercom system links all facilities, and in every way the hospital is equipped for the finest medical service.

Hailed as one of the most dramatic improvements is the 3-story block at the base of the hospital to house all of the out-patient clinics. The old clinics were crowded and widely scattered in separate buildings.

One of the finest traditions the new hospital will aim to carry on is the history of the old conglomerate as one of the U.S. Army's finest teaching hospitals. Twenty-eight interns arrive each summer and about 115 medical officers are in the various stages of residency in 16 fields of specialty. The two physicians taking the one-year radioisotope Fellowship, it was stated, "could get this training at no other Army hospital."

Designated originally as the U.S. Army General Hospital, Presidio of San Francisco, the facility was renamed in 1911 to honor Jonathan Letterman, the Civil War surgeon who originated the Ambulance Corps and set up the plan for evacuation of wounded from the battlefield.

MICOM Selects Dr. Hallowes as Chief Scientist

Chief scientist of the U.S. Army Missile Command is the new title of Dr. John P. Hallowes Jr., who has performed many of the functions since Dr. William W. Carter departed in August 1967 to become Assistant Director of Defense Research and Engineering (Nuclear Programs).

Dr. Hallowes will continue to serve also as director of the Physical Sciences Laboratory of MICOM's Research and Engineering Directorate. He has retained this office while gradually assuming more and more of the duties assigned to Dr. Carter until he moved to Washington, D.C.

Dr. Hallowes began his career at Redstone in 1951 and he worked mainly in the Guidance and Control Laboratory until he transferred to the Physical Sciences Lab, which he has headed since 1960. Prior to joining the MICOM staff, he was employed by the Curtiss-Wright Corp. in Columbus, Ohio, and the U.S. Navy Mine Countermeasure Station at Panama City, Fla.

Dr. Hallowes was graduated from Georgia Institute of Technology with a BS degree in electrical engineering and earned master's and doctoral degrees in physics at Vanderbilt University. In addition, he is a graduate of the National War College course for U.S. Government employes with outstanding potential for top executive positions.

A registered professional engineer in Alabama, Dr. Hallowes is a member of Tau Beta Pi (honorary engineering society), Eta Kappa Nu (scholastic achievement in electrical engineering), and Sigma Xi. Other professional affiliations include the American Physical Society, Institute of Electrical and Electronics Engineers, Joint Services Technical Advisory Committee, and the American Ordnance Association. He is also a member of The Army Research Council (TARC), the group of 11 Army senior scientists concerned with the long-range programing of Army research and also with representing the Army in their areas of scientific specialty on the Joint Discussion Forums serving the Director of Defense Research and Engineering.

Dr. John P. Hallowes Jr.

ECOM Engineer Gets Patent For Ceramic Element Switch

U.S. patent No. 3,405,289 was issued recently to electronic engineer Emanuel Gikow of the U.S. Army Electronics Command Laboratories, Fort Monmouth, N.J., for a relay method designed primarily for remote switching of various kinds of equipment and circuits.

Gikow is chief of the Circuit Elements and Networks Branch in the Electronic Components Laboratory. The new switch employs a piezoelectric ceramic element instead of a coil. The coil type of relay is activated by a magnetic field, whereas the piezoelectric device is activated by mechanical distortion induced by a voltage.

Chief advantages, Gikow said, are extremely low power requirements, smaller size, and insensitivity to extraneous magnetic fields which might cause failure of conventional relays.

MUST Combat Concept Proves Merit in Vietnam

Outstanding results in treatment of combat casualties in Southeast Asia have proved the merit of MUST (Medical Unit, Self-contained, Transportable), a hospital fashioned of inflatable units that can be moved rapidly where it is most needed.

Six of the MUST hospitals are currently in operation in Vietnam. With refinements that have been made during the past two years, they have been acclaimed as "more advanced than many hospitals in America."

Following a demonstration of the most recent improvements at Fort Sam Houston, Tex., home of the world-famed Brooke Army Medical Center, the MUST refinements are being field tested in Vietnam.

Several inflatable "rooms" are joined together to make up a MUST hospital, a feature that permits assembly of units tailored to fit requirements of a particular military situation. Results in Vietnam have earned the praise of "the most modern field hospitals in the world."

MUST hospitals are complete with well-designed operating rooms, central sterile preparation rooms, modern ward facilities, electrical power generators, heating and air conditioning, and numerous other features.

Outside temperatures may range from 65 below to 120 degrees above zero, but a "total energy system" housed in a large box of motors and electronic gear assures the comfort of patients and the hospital staff.

Some of the latest innovations include a Water and Waste Management System, consisting of a utility room complex, incinerator, waste treatment unit and a water purification unit containing enough tanks to store all the potable water required for operation of a given MUST complex. A 400-bed evacuation hospital requires 46,000 to 60,000 gallons daily.

When the MUST experimental unit was first unveiled to the public, some Army medical authorities called it the most excitingly dramatic development ever conceived for improved field hospital requirements geared to the highly mobile requirements of modern warfare. Other medics conceded they were skeptical about the concept.

The results in Vietnam have made seers of the optimists.

Medical Unit, Self-contained, Transportable Complex

Edgewood Aids R&D Careers by Postgraduate Training

U.S. Army educational programs to upgrade capabilities of scientists, engineers, technicians and managers considered to have outstanding potential for future research and development assignments are serving the interests of four Edgewood (Md.) Arsenal personnel.

The Army is paying the full cost of their postgraduate work, including tuition, books and incidental fees, for Margaret Olivier, Charles Williamson, Arnold Futterer and Joseph Delaney. Meanwhile they receive their salaries as Edgewood employes.

Mrs. Olivier, a biologist in the Research Laboratories, has been attending the University of Maryland since September 1967. A supervisory research physicist at the Nuclear Defense Laboratory, Futterer has been studying nuclear physics at the University of Virginia for six months.

Williamson, a chemist in the Research Laboratories, began postgraduate work at Johns Hopkins University last September. Delaney is a psychologist in the same laboratories and has been studying at the University of Delaware since the fall of 1967.

The President's Task Force on Career Advancement pointed out recently that many career officials entered government service as specialists and gradually progressed to managerial and executive positions.

Updating and increasing managerial skills is considered an important asset in managing the large and complex organizations of today, the Task Force noted. Long-term Army training is mainly postgraduate work.

An employe who receives long-term training at government expense must commit himself to working for a federal agency for a period equivalent to three times the training period.

Nominations for long-term training to begin in the fall of 1969 must be made now to the training and development division at each Army installation so that necessary justifications may be prepared for the fall semester.

Field Testing of MUST Medical Lab Begins in May

Clinical evaluation and feasibility demonstration of the U.S. Army's new Field Medical Laboratory, built upon the inflatable-units concept embodied in the Army's MUST (Medical Unit, Self-contained, Transportable) hospital, are slated to begin in June.

The prototype assembly is expected to contain more than 400 pieces of major laboratory equipment, allowing for necessary duplication of some 125 generic line items selected from more than 1,000 existing commercial and military items by an evaluation team of medics and engineers.

Designed into the laboratory is a disease investigative system capability for performing more than 500 different procedures, a significant increase over the existing field lab. One of the novel concepts is that the transit case for equipment items will serve as the base for bench tops when the laboratory is set up.

Facilities also will ensure that experiments can be conducted in a reasonably dust-free, temperature-and-humidity-controlled environment.

Among capabilities designed into the prototype are investigations in chemistry and toxicology, clinical microscopy, environmental health engineering, nuclear medical science, veterinary sciences, pathology and entomology. The over-all system is designed for operations in any available shelter of adequate size.

Developmental work on the laboratory system has been performed by North American Rockwell Corp., under a contract awarded in 1965 by the U.S. Army Medical Research and Development Command. Specifications call for a system capable of providing total laboratory support for both known and anticipated requirements for the Army in the field. Considerations have involved worldwide environments and all levels of warfare.

Maj James M. Orr

Maj Colbert L. Dilday

Lt Col Florian O. Cornay

Five Officers Report for OCRD Assignments

Five officers reported recently for new assignments with the Office of the Chief of Research and Development, HQ Department of the Army.

LT COL VICTOR H. BRAY is serving as a staff officer with the Test and Evaluation Branch, Management and Evaluation Division, OCRD. He recently completed a tour of duty with the 2d Battalion (105 SP) 15th Artillery, Fort Wainwright, Alaska (1967-68).

Lt Col Bray received a BGE degree in 1964 from Omaha University and completed the Command and General Staff College (C&GSC) in 1963 and the Armed Forces Staff College (AFSC) in 1967.

From 1964 to 1967, he was a project officer with the Institute of Combined Arms and Support, U.S. Army Combat Developments Command, Fort Leavenworth, Kans. He served from 1960 to 1962 as a Field Artillery Target Acquisition research officer at the U.S. Artillery and Missile School, Fort Sill, Okla.

Lt Col Bray has earned the Legion of Merit (LOM), the Air Medal (AM) with two Oak Leaf Clusters, and the Army Commendation Medal (ARCOM).

LT COL FLORIAN O. CORNAY was assigned as a staff officer, Physical and Engineering Sciences Division, Army Research Office, after a tour as commanding officer of the 1st Battalion, 65th Artillery, Okinawa.

With HQ 6th Region, U.S. Army Air Defense Command (1965-67), he was a plans and programs and later a surface-to-air missile staff officer. With the Air Defense Artillery Combat Developments Agency at Fort Bliss, Tex. (1960–63), he was a space defense project officer.

Graduated from the U.S. Military Academy in 1950, he earned an MS degree in electrical engineering from Georgia Institute of Technology in 1960. He has completed the C&GSC (1964), the AFSC (1967), and the Defense Atomic Support Agency course.

Lt Col Cornay holds the ARCOM Medal with OLC and the Parachutist Badge. He is listed in *Who's Who in Electronics* and was instrumental in organizing the Air Defense Agency at Fort Bliss.

MAJ COLBERT L. DILDAY, a new staff officer in the OCRD Communications-Electronics Division, was graduated from the AFSC in January. He served two tours in Vietnam (1964-65, 1967-68) with aviation companies as an executive officer and an Infantry brigade aviation staff officer and aviation company CO, winning the Air Medal with 34 OLCs. He also holds the ARCOM Medal and the BSM.

Maj Dilday has a BS degree (1955), agricultural engineering, from N. Carolina State College and a BS degree (1964) in aeronautical engineering from Georgia Institute of Technology. Assigned to the U.S. Army Electronics Command, Fort Monmouth, N.J., in 1965, he served until 1967 as an R&D coordinator.

MAJ EMILIO B. ZAMORA completed a second Vietnam tour prior to assignment as staff officer with the Long Range Plans Branch, Plans Division, OCRD.

Graduated from New Mexico State University with a BS degree in vocational education in 1955, he received an MS degree in business administration from the University of Tennessee in 1962. He graduated from the C&GSC in 1967.

Maj Zamora served with the U.S. Army Aviation School at Fort Rucker, Ala. (1964–66). He holds the Distinguished Flying Cross, AM with 15 OLC, ARCOM Medal and the Vietnam Gallantry Cross with Silver Star.

MAJ JAMES M. ORR completed studies at Tulane University for an MBA degree in operations research (to be awarded in May), prior to assignment to the Military Advisers Branch, Studies and Analysis Division, Army Research Office. He earned a BA degree in mathematics from Wheaton (Ill.) College in 1955.

After serving as an instructor at the U.S. Army Air Defense School, Fort Bliss, Tex. (1965-66), he completed the C&GSC course. He served as an adviser with the 9th Infantry Division, ARVN (1964-65) and with the 3d Missile Battalion, 68th Artillery in Minnesota (1963-64).

He holds the BSM, AM, Vietnam Service Medal and National Defense Service Medal.

CDC Appoints Dr. Archer ILC Scientific Director

Dr. William L. Archer, former director of the Combat Operations Research Group (CORG), has been appointed scientific adviser to the Institute of Land Combat (ILC), Army Combat Developments Command, Fort Belvoir, Va.

An operations research systems analysis specialist with wide experience in nuclear effects, antitank defense, tactical war gaming, combat surveillance and intelligence, Dr. Archer served at CORG four years, the past three as director. Staffed with civilian scientists, CORG operates under an Army contract with Technical Operations, Inc.

Born and educated in Canada, Dr. Archer served as a Canadian Army officer in France and Germany during World War II. He received bachelor's and master's degrees in chemistry from the University of Western Ontario and a PhD in physical chemistry from McGill University, Canada.

Since 1950 he has been associated with the Defense Research Board of Canada and was a Canadian representative with the Operations Research Office at HQ Far East Command and the Eighth U.S. Army during the Korean conflict. From 1954 to 1957, he was on the staff of the scientific adviser to the Army Council in the War Office, London, England.

Dr. Archer is a member of the National Research Council of Canada, the Operations Research Society of America, and is a past national secretary of the Canadian Operational Research Society (1960–63).

Dr. William L. Archer

Constructive Credit Approved in Lieu of USACGSC

Officers selected by a Department of the Army board may be granted constructive credit in lieu of attendance at the U.S. Army Command and General Staff College (USACGSC), under a program approved by the Army Chief of Staff in February.

General William C. Westmoreland, Chief of Staff, observed while serving as CG of the U.S. Military Assistance Command, Vietnam, that a need existed for a program whereby selected officers could be granted constructive credit in lieu of USACGSC attendance—based on demonstrated knowledge and outstanding performance in key staff and command positions in Vietnam combat.

In August 1968 he directed that a study be made of the feasibility of such a program. Findings of the study, conducted by the Deputy Chief of Staff for Personnel, showed that some officers have acquired knowledge and experience generally equating to that which could reasonably be expected of graduates of USACGSC residence training.

General Westmoreland has established the following criteria for award of constructive credit:

Completion of eight years commissioned service, efficiency ratings competitive with USACGSC selectees, demonstrated proficiency during six months of combat duty in Vietnam in one or a combination of positions as commander of a brigade, or divisional artillery, or armored cavalry regiment, or of a group, or of a higher unit, or service as chief of a principal general or special staff section of a division or logistical command, or in a comparable position on a higher level staff, or as senior adviser to Vietnamese division or higher commanders, or as senior province advisers.

Officers are not required to submit applications under this program. Such action is unnecessary because records of all officers in the grades of major and lieutenant colonel who are not USACGSC graduates and who qualify under the criteria will be considered by the DA selection board for award of constructive credit.

Officers granted constructive credit will not be programed to attend the USACGSC. Constructive credit may be declined in writing by an officer who prefers to attend the course. However, selection to receive constructive credit does not imply that an officer will be selected to attend the college if he declines the credit.

The credit granted an officer under this program will be given the same consideration as satisfactory completion of the resident course.

Corpus Christi Center Adds Helicopter Repair Test Cells

Completion of a $1.3 million aircraft turbine engine test cells installation at the Army Aeronautical Depot Maintenance Center, Corpus Christi, Tex., was announced Feb. 17.

Simultaneously, it was disclosed that an additional $573,000 contract for modifying existing units and adding another three test cells is scheduled to be awarded this month. ARADMAC now operates 11 test cells as the Army's major helicopter overhaul and repair depot.

Until the project of expanding test cell facilities was started in 1968, ARADMAC was testing at an annual rate of about 4,600 engines. With the projected expansion and improvements, the facility will be able to test 6,500 engines annually.

"The new test cells provide a more sophisticated type of testing of turbine engines," explained John R. Bacon, chief of the Facilities Division, Directorate for Services. "We are installing computerized operations to operate automatically the engines at the various speeds and loads. Continuous automated readings will indicate engine operations within the acceptable limits."

Army Aeronautical Research Lab Using Test Pilot

Research goals related to subsonic aircraft flight are expected to be advanced greatly at the U.S. Army Aeronautical Research Laboratory, NASA-Ames Research Center, Moffett Field, Calif., by recent assignment of an experienced test pilot.

Maj James J. Satterwhite is working in the laboratory under the cognizance of George E. Cooper, chief, Flight Operations Branch. He will join with NASA test pilots in performance of subsonic flight investigations. Many are joint projects between the laboratory and Ames Research Center that have achieved a high degree of effectiveness.

Among the joint-effort projects are control systems research and terminal flight operations, utilizing the XV—5B aircraft; studies of high-lift devices for STOL operation with the YOV–10A aircraft; and investigations of stability, control and handling qualities of V/STOL aircraft, using the X–14A for experiments.

Maj Satterwhite is a recent graduate from the Naval Test Pilot School, Patuxent River, Md., and received the Navy League Award as the outstanding student of his class. The course includes instruction in aerodynamics, aircraft performance, stability and control; also, flight evaluations of high-performance jet aircraft and modern helicopters.

While assigned to the U.S. Army Aviation Test Activity at Edwards AFB, Calif., Maj Satterwhite was a member of the XC–142A Tri-Service Test Team. He also has served a tour with the 25th Infantry Division in Hawaii and a tour with the Army Concept Team in Vietnam (1966–67). He graduated from the U.S. Military Academy (1959) and has an MS degree in aerospace engineering (Massachusetts Institute of Technology.

Included among his awards are the Bronze Star Medal, the Air Medal with four Oak Leaf Clusters and the Army Commendation Medal.

Army RDT&E, Procurement Contracts Total $269.5 Million

Army contracts exceeding $1 million each for research, development, test, evaluation and procurement from Jan. 9 through Feb. 8 totaled $269,577,743.

Four contract modifications and two new contracts totaling $32,831,609 awarded to Olin Mathieson Chemical Corp. are for ammunition, propellants and support services.

Remington Arms, Inc., was issued a modification and a new contract totaling $25,174,870 for small arms ammunition. Mason and Hanger-Silas Mason Co., Inc., is receiving $22,331,312 in two contract modifications to load, assemble and pack ammunition items, and for support services.

General Motors Corp. gained $14,799,290 in a contract modification for 155mm howitzers and a definitization to a contract for M-60 transmission assemblies. Federal Cartridge Corp. was awarded a $13,236,510 contract for small arms ammunition.

Kaiser Jeep Corp. was issued a $12,985,294 contract modification for 2½-ton trucks. Day and Zimmerman, Inc., is receiving $10,274,955 to load, assemble and pack ammunition. AVCO Corp. will receive $10,199,311 in two definitizations and two new contracts for fuze parts and hand grenades and for 155mm projectile components.

Contracts under $10 million. Motorola, Inc., $9,587,000 (two contracts) for radar surveillance sets and electronic equipment; Goodyear Tire and Rubber Co., $8,223,302 (three contracts) for pneumatic tires and for track shoe assemblies; and

Texas Instruments, Inc., $7,221,660 (two modifications) for electronics equipment; Firestone Tire and Rubber Co., $5,273,420 to load, assemble and pack ammunition and components; Bell Aerospace Corp., $5,068,279 for work at the Electro Magnetic Environmental Test Facility and for UH-1 helicopter components.

Contracts under $5 million. Chrysler Motor Corp., $1,600,177 for cargo trucks and ambulances, and $2,943,550 for second source-production of the TOW missile; EMCO Porcelain Enamel Co., Port Chester, N.Y., $3,800,000 for ammunition boxes; R&D Constructors, Inc., Park Ridge, Ill., $3,725,429 for design and construction of a fuel supply system and a field maintenance hanger for the C-5A aircraft; and

Ingraham Industries Division of McGraw Edison, $3,588,951 for artillery fuzes; Stevens Manufacturing Co., Ebensburg, Pa., $3,549,550 for 1½-ton trailers; Temco, Inc., $3,458,084 (two modifications) for parts for projectiles; and

Continental Motors Corp., $3,386,099 for military standard engines; Maremont Corp., Saco, Me., $3,183,648 for M60 machineguns, barrel assemblies and bipods; General Electric Co., $3,106,652 for aircraft machineguns; and

Honeywell, Inc., $2,831,250 for delay plungers and bomb fuzes; Lockheed Aircraft Corp., $2,627,843 for equipment and services in connection with underground nuclear testing at the Nevada test site; Northrop Nortronics, $2,549,666 modification contract for voice warning systems for aircraft; Kollsman Instrument Corp., Elmhurst, N.Y., $2,538,621 for mine firing devices; Scovill Manufacturing Co., Waterbury, Conn., $2,410,337 for bomblet fuzes; and

Bell and Howell Co., $2,302,020 for projectile fuzes; Morrison Knudsen Co., Inc., $2,213,857 for Phase II construction of Boston Perimeter Acquisition Radar for the Sentinel System Command; and

Page Communications Engineers, Inc., Washington, D.C., $2,183,615 for microwave terminals; Zenith Radio Corp., $2,120,250 modification for parts for fuzes; Hayes Albion Corp., $2,052,000 for parts for rocket warheads.

Contracts under $2 million. Norris Industries, $1,827,131 for 105mm cartridge cases; Uniroyal, Inc., $1,795,705 for pneumatic tires; United Aircraft Corp., $1,658,505 for OV-1D aircraft propeller systems; and

United Metal Cabinet Corp., Pottsville, Pa., $1,637,804 for ammunition containers; Martin Marietta Corp., $1,600,000 modification contract for the Pershing Improvement Program; Amron Corp., $1,580,056 for metal parts for projectiles; Standard Products Co., Cleveland, Ohio, $1,502,933 for track shoe assemblies; and

Emerson Electric Co., $1,470,000 for XM28 armament subsystems for helicopters; Sun Battery Co., Santa Anna, Calif., $1,436,444 for storage batteries; Supreme Products Corp., Chicago, Ill., $1,436,000 for bomb tail fuzes; Raytheon Co., $1,428,949 for multiplexers and spare parts kits; Fairchild Camera, $1,403,325 for production engineering of XM579 fuzes; and

Douglas and Lomason Co., Columbus, Ga., $1,343,792 for fragmentation bombs and adapter clusters for 100-pound bombs; Technical Operations, Inc., Burlington, Mass., $1,300,000 for 1,333 man-months of scientific, technical and support effort for studies for the Combat Developments Command; and

1000th HUEY HELICOPTER to be completely overhauled since 1961 at the U.S. Army Aeronautical Depot Maintenance Center (ARADMAC), Corpus Christi, Tex., stands ready for flight test. Original cost of the 1000 Hueys totaled $239 million; total funded cost for labor and material to restore them to like-new condition was $66,925,000. During FY 1963, four Hueys were overhauled; 21 were repaired in 1962 and the figure in 1965 dropped to 19. The total increased to 59 in 1966, 192 in 1967, and 429 in 1968 and for FY 1969 is 495. Posed are crew chief Francis Collins (left) and test pilot Norman Stowe.

Sperry Rand Corp., $1,267,302 for gyromagnetic compass sets; Packard Bell Electronics Corp., $1,262,810 for transponder test sets; Parsons Manufacturing and Stamping Co., Cordova, Tenn., $1,245,438 for rotating discs for 4.2-inch obturating assemblies; Aerojet General Corp., $1,214,986 for 2.75-inch rocket warheads; and

Waukesha (Wis.) Motor Co., $1,157,870 for generator sets; Susquehanna Corp., West Hanover, Mass., $1,125,210 for 2.75-inch motor igniters; Hercules, Inc., $1,113,695 to manufacture propellants; and

Triangle Electronic Manufacturing Co., Poughkeepsie, N.Y., $1,094,401 for cable assemblies; Chamberlain Manufacturing Corp., $1,089,811 for 8-inch projectile body assemblies; North American Rockwell, Anaheim, Calif., $1,080,000 classified contract; and

Eastman Kodak Co., $1,079,736 to manufacture explosives; Hughes Tool Co., $1,043,169 for product improvement on the OH-6A helicopter; and American Fabricated Products Co., Indianapolis, Ind., $1,044,260 for 81mm mortar fin assemblies.

ALMC Offers 8 Computer Courses to AMC Personnel

Eight courses to train Army Materiel Command (AMC) personnel for application of computer systems to the Army Wholesale Logistic System will be offered by the Army Logistics Management Center, Fort Lee, Va.

Varying from one to four weeks duration and in frequency from three to 10 times a year, all of the courses are slated to begin by June 30. Classroom instruction and supervised on-the-job training will be provided for functional as well as ADP personnel at all levels in the AMC.

Designated NAPALM (National ADP Program for AMC Logistics Management), this program is expected to become the largest computer application in the world. The Army Logistics Management Center was chosen for the mission because of its educational flexibility and its success in classroom instruction as well as on-the-job education programs.

In preparation for this mission, the center has provisionally organized a new Automated Logistics Systems Department directed by Lt Col Frances E. Castleberry. Her title is assistant commandant for Automated Logistics Systems at the center.

The eight courses will be offered principally to military and civilian personnel employed by AMC installations and activities. Two courses will provide training in business and scientific information programing. COBOL (Common Business Oriented Language) is the principal subject for business-type programers with no experience.

A concentration of small group and individual programing projects will prepare those who complete the training to do COBOL programing upon return to their installations.

"ADP Systems Analysis" is the title of a course intended to produce an ADP-oriented analyst from applicants who have a knowledge of computer hardware capabilities and also have some experience in programing methods.

A one-week seminar will be presented for those people currently managing AMC data-processing installations. Its purpose is to discuss data processing standards, regulatory documents, and problems of mutual interest between logistics managers and computer specialists.

Four other courses are designed to orient people working in the various levels of functional logistics management in the general capabilities of ADP systems, the organization of data-processing installations, the necessity for good communication between functional and ADP management, and the functional manager's responsibilities in system design.

One of these courses (a Top-Level Management Seminar) includes discussion of the ways in which a top-level logistics manager can evaluate the effectiveness of his data-processing element and its production.

Maggs Research Lab Selected for IDL-DoD Program

Maggs Research Laboratory at Watervliet (N.Y.) Arsenal has been selected as one of 11 Department of Defense research facilities that will participate in the Interdisciplinary Laboratories—Department of Defense (DoD) Interaction Program.

Sponsored by the DoD Advanced Research Projects Agency (ARPA), the basic research program involves the interdisciplinary labs of 12 leading universities and will be monitored by Battelle Memorial Institute, Columbus, Ohio.

The program was established for identification of materials problems of the future, such as development and utilization of highly specialized composite materials, for the military and the general technical community.

Maggs Research Laboratory personnel will work with scientists attached to the interdisciplinary laboratories at Brown University, the University of Chicago and Cornell Univ.

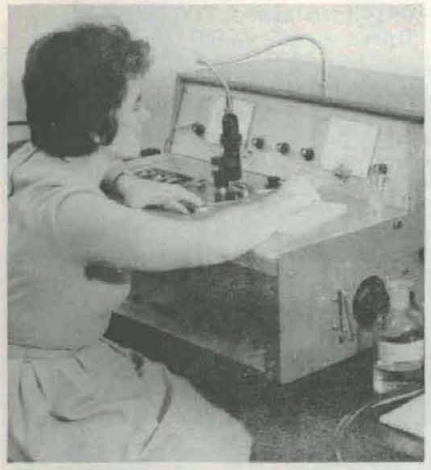
Other universities in the IDL-DoD program are Purdue, Stanford, Northwestern, Pennsylvania, Massachusetts Institute of Technology, Illinois, Harvard, Maryland, North Carolina.

ASAG Holds Spring Meet at ARADMAC

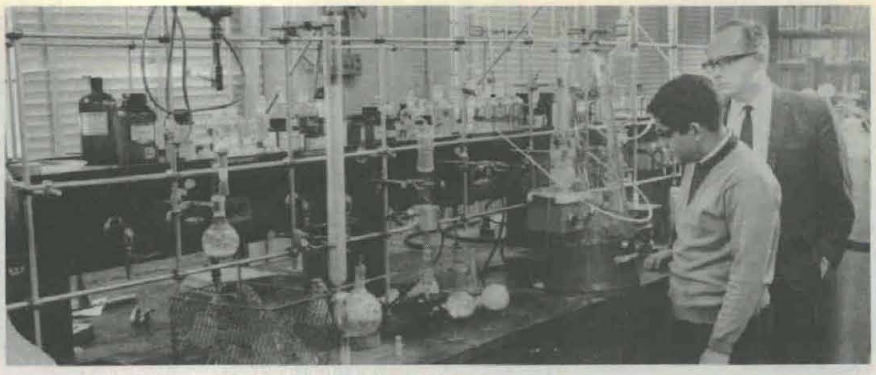
ARMY AVIATION SYSTEMS COMMAND Scientific Advisory Group (ASAG) members convened in mid-February at the U.S. Army Aeronautical Depot Maintenance Center (ARADMAC), Corpus Christi, Tex. AVSCOM Commander Maj Gen John Norton addressed the group on over-all command operations and Col Luther G. Jones Jr., ARADMAC commander, briefed them on installation activities. Shown during a tour of the industrial complex at the center are (l. to r.) Joe Cantu, value engineer program manager for ARADMAC; Charles H. Zimmerman, aviation scientist and consultant with ASAG; Prof. Rene H. Miller, ASAG chairman, Massachusetts Institute of Technology, and General Norton. Other members of ASAG who participated are Dr. William Bollay, Stanford University; Fred W. Wolcott, Research Analysis Corp.; Dr. Kurt H. Hohenemser, Washington University; and Dr. Leon Z. Selzer, Parks College of Aeronautical Technology.

TECHNICIAN Jay Rogers aligns high-speed photographic equipment to study ballistic penetration in the Polymer Physics Section of the new lab.

MEASUREMENT OF FAR INFRARED characterization of organometallic polymers is made by Capt Peter J. Moehs in Organic Synthesis Section.



IN THE PHYSICAL CHEMISTRY SECTION, Miss Elizabeth Cilley measures molecular weight and shape with new light-scattering instrumentation.



ARMY MATERIALS AND MECHANICS RESEARCH CENTER employes, Dr. Bhuvan Pant and Dr. Wenzel E. Davidsohn, check a polymer in the making at the Organic Synthesis Section, Fibers and Polymers Laboratory.

AMMRC Concentrates Specialized R&D Capabilities In Newly Established Fibers, Polymers Laboratory

Continuing concentration of specialized capabilities at the U.S. Army Materials and Mechanics Research Center, established in 1967 at Watertown, Mass., is evidenced by its newest facility, the Fibers and Polymers Laboratory formerly at the Natick Laboratories.

The staff and equipment of the nearby Natick element were moved almost intact as an operational organization into remodeled accommodations on the fifth floor of Building 39, a former auditorium and storage area.

Renovation of this section of the Watertown facility served to concentrate scientists, engineers and technicians engaged in related fields of Army research and development activities. The fifth floor also has the Monomer Synthesis Lab, Polymer Synthesis Lab, Visiting Scientists Lab and the technical library.

Housed on the fourth floor is the Dynamics Testing Laboratory, where ballistic tests of fibers and energy absorption materials for personnel armor applications are conducted. Much of the effort in this lab on fibers, sheets and glass-reinforced plastics has been directed toward priority Southeast Asia combat requirements.

First and second floors of the building provide facilities for the polymer physical chemistry group, which is concerned with investigation of characteristics of polymer systems and fibers using X-ray diffraction, electron microscopy and light-scattering techniques. Computer-controlled, 4-angle diffractometer studies of solid-state crystalline polymer materials and molecular weight determination studies also are in progress.

Prior to establishment of the AMMRC, research in the disciplines now being conducted at the center was distributed among various Army laboratories and commands. Each attempted to develop an independent materials research capability reflecting its individual mission requirements.

The decision to create the AMMRC was a natural response to the increasingly obvious advantages to be gained by centralizing materials and mechanics research capabilities, in line with the growing sophistication and specialization of the programs needed to satisfy more efficiently the Army's needs.

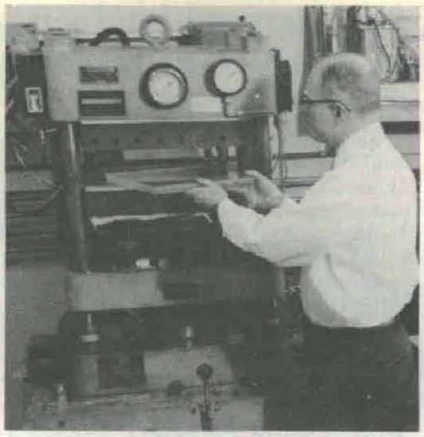
Under the direction of Dr. George R. Thomas, the Fibers and Polymers Laboratory is serving as the nucleus for a growing and aggressive polymer research effort. The program is expected to more than double in size and scope over the next two or three years.

Fundamental studies in the traditionally defined disciplines of monomer and polymer synthesis and polymer structure and properties seek to provide a broadly based understanding of the factors which control their properties and performance, leading to the more effective utilization of available polymers or the modification of current polymers for Army materiel requirements.

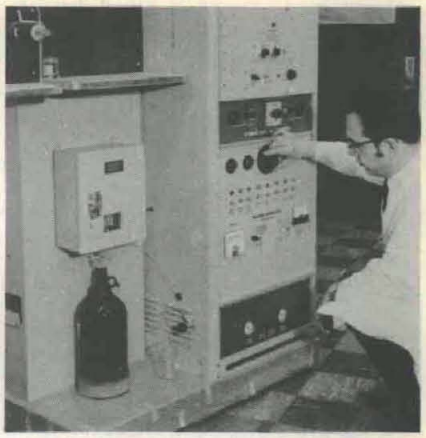
In monomer synthesis, attention is being focused mainly on the synthesis, chemistry and physical properties of new functional substituted organo-metallic derivatives of the main groups III, IV and V. Fields of research in this category are in polymers with metal atoms, inorganic polymers, new polymerization reactions, catalysis and polymerization kinetics.

Some of the other prime research areas are in characterization of molecular structure of polymers, adsorption and diffusion of small molecules in polymers, bulk structure and properties

TENSILE STRENGTH of a polymeric sample is measured by Pvt Lonnie M. Cole Jr. in Polymer Physics Section of the Fibers and Polymers Laboratory.



TECHNICIAN Richard Ames laminates transparent armor in Polymer Processing Section at Army Materials and Mechanics Research Center Lab.



MOLECULAR WEIGHT distribution of a polymer is measured by chemist Domenic Macaione, Physical Chemistry Section, Fibers and Polymers Lab.

of polymers, and mechanical behavior and failure mechanisms in polymers.

AMMRC's Fibers and Polymers Laboratory currently is staffed with 28 research professionals, 18 civilians and 10 military, 13 of whom have PhD degrees. Fifteen have bachelor's or master's degrees.

Further staff expansion of the Fibers and Polymers Laboratory is anticipated, consistent with its increasing activities in support of U.S. Army Materiel Command programs. Researchers are synthesizing special polymers in response to the antiballistic missile program; working with the Army Aviation Systems Command on graphite- and boron-reinforced plastics; with the Weapons Command on expendable cartridge cases and obturator pads; and with the Munitions Command in response to 5-year program requirements.

AMMRC's fibers and polymers research effort benefits greatly from its close proximity to Massachusetts Institute of Technology. Harvard, Boston and Northeastern Universities also are located only minutes away.

An additional advantage is the exceptional capability in metallurgy, solid-state physics and applied and theoretical mechanics represented by the other laboratories already functioning at the Army Materials and Mechanics Research Center, including a nuclear reactor for neutron beam studies.

Over the next three years extensive reconstruction of AMMRC is programed to provide expanded laboratory facilities, an auditorium, more extensive library services, and other research support improvements.

The transfer of programs, personnel and equipment from other Army laboratories to the AMMRC will be synchronized with the building program as it grows to its full planned strength. The addition of the Fibers and Polymers Laboratory is the first major step toward the objective of making the AMMRC a national leader in its field.

Watervliet Arsenal Improves Laboratory Facilities

Fifty Watervliet (N.Y.) Arsenal scientists, engineers and technicians will soon move into quarters being constructed to meet increasing research responsibilities of the heavy weapons design and development installation.

The job of transforming 24,444 square feet of floor space formerly used for supply services and storage into a complex of ultra-modern laboratories is part of a $955,000 Military Construction-Army project. New facilities also are being built for the arsenal's Experimental Mechanics and Thermodynamics Lab and for expansion in its Maggs Research Center.

The completely equipped, air-conditioned, humidity-controlled labs will be devoted to three principal areas of materials research. The Solid-State Physics Lab, headed by Dr. L. V. Meisel, is designed to obtain knowledge on how atomic defect structures are related to properties and damage.

The Electrochemistry Lab is directed by Dr. Fritz J. Sautter and is concerned with studies of elevated temperature strengthening through interfacial and surface mechanisms.

The Physical Chemistry Lab directed by Dr. Iqbal Ahmad develops high-strength composite materials through utilization of high-strength and high-modulus fibers and whiskers.

Facilities being installed in the existing Experimental Mechanics and Thermodynamics Laboratory will provide for expanded programs in fluidics and automatic controls, photoelasticity and heat transfers.

Dr. Frederick W. Schmiedeshoff, Watervliet Arsenal research director, said activities in the new laboratory area will include electro-deposition, thermo-physical properties, composite testing and whisker growth, mass spectrometry, vacuum deposition, interfacial and surface chemistry, cryogenics, ultrasonics, gas chromatography, radiological preparations, electrical measurement, anelastic relaxation, magnetic properties, X-raying and a technical library.

Dr. Schmiedeshoff noted that the new facilities complement the steady growth of arsenal scientific and engineering talent required to generate knowledge on the behavior of materials in severe environments. Further expansion is contemplated, he said, and long-range plans include construction of a neutron activations analysis laboratory and acquisition of a third-generation computer.

Cheyenne Armor Kits Ordered For 50-Caliber Protection

Armor kits for the U.S. Army AH–56A Cheyenne helicopter to provide protection against .50-caliber ammunition will be delivered under a recent $5 million subcontract award.

The boron-carbide composite armor developed by Norton Co. is reported the first capable of stopping .50 caliber armor-piercing projectiles, which have a kinetic energy four times that of .30 APM2 projectiles.

Specifications for the new armor provided that to protect personnel and vital components some armor had to withstand temperatures up to 400°F., plus producing minimum deflecting of the panel when struck.

U.S. Army Men Address U.K. Royal Aeronautical Society

Invitations to present technical papers before England's Royal Aeronautical Society are a form of distinction rarely accorded to United States military personnel, but two Army men achieved the honor Mar. 6.

Technical Director Paul F. Yaggy of the U.S. Army Aeronautical Research Laboratory, NASA-Ames Research Center, Moffett Field, Calif., joined with Maj Gen George F. Seneff, CG of the 3d Infantry Division, U.S. Army, Europe, in presenting papers on U.S. military aircraft.

"Future Rotorcraft Research in the U.S.A." was the title of Yaggy's presentation. General Seneff, who served as chief of the Air Mobility Division, Office of the Chief of Research and Development from June 1956 to August 1959, spoke on "Experiences in the Deployment of the Helicopter in Southeast Asia."

Yaggy discussed the historical development of the tremendously accelerated utilization of the helicopter as a military aircraft during the past decade, with the attendant R&D problems of improving economy and all-around operational capability.

The paper considered the various qualities of the "pure" and various types of compound rotorcraft, and the complexities of achieving the design factors for maximum speed and flexibility for modern Army needs.

Problems are such he said, that sophisticated theoretical and experimental research must precede models permitting parametric studies—"the best skills of both the aeroelastician and the aerodynamicist must be coupled in order to realize the desired results.

"It is heartening to note that such efforts are being put forth."

The paper also discussed "novel concepts for the exclusion, suppression or deferment of limiting phenomena."

General Seneff reported on airmobile operations in Vietnam and the tactical need to increase the input of helicopters in both numbers and variety—for assault, troop movement, command and control purposes, forward area resupply, medical evacuation, and as a flying gun platform or gunship.

AMC Sets Up Liaison Office At Army Infantry Center

Establishment of a Research and Development Liaison Office at the U.S. Army Infantry Center, Fort Benning, Ga., was announced Feb. 26 by the Army Materiel Command.

The office will, for the first time, provide a direct link between the Director of Research, Development and Engineering, Army Materiel Command, and the infantry community at Fort Benning.

Col Robert H. Robinson, a seasoned Vietnam veteran, heads the office, which aims to assure timely exchange of views between the developer, user and trainer on materiel developments, requirements, doctrine and tactics as they affect the individual soldier. The interface will be between the U.S. Army Combat Developments Command Infantry Agency, the U.S. Army Infantry Board and the Infantry Center Team at Fort Benning regarding R&D state-of-the-art and new equipment developments.

In the near future, a program will be initiated to provide the individual soldier with an opportunity to express his views on the adequacy of individual equipment issued to him.

In the active solicitation of ideas from the individual soldier, the CDC agency in collaboration with the AMC Infantry R&D Liaison Office plans to interview Vietnam returnees to gain first-hand knowledge on the utility and effectiveness of individual equipment under actual combat conditions.

Army Materiel Command Assigns 3 to Headquarters

Three new employes of the Army Materiel Command's Research, Development and Engineering Directorate, Julius Miller, Lowell M. Moses and Roger W. Hanson, have been assigned to the Technical Coordination Branch of the Program Management Division.

Miller was a scientific staff assistant at Edgewood (Md.) Arsenal until reassigned. A graduate of Johns Hopkins University, Baltimore, with a BS degree in chemistry, he holds a patent for a Smoke Grenade Filling containing encapsulated oil and pyrotechnic materials he discovered while working for the arsenal as a physical research chemist.

Moses returned to the Army Materiel Command after spending a year in Vietnam as an industrial specialist with the U.S. Army Procurement Agency. Prior to his Vietnam service, he served two years with AMC in the Office of the Directorate of Materiel Readiness and Office of the Main Battle Tank Project Manager.

A 1930 graduate of the Massachusetts Institute of Technology, he holds a BS degree in Aeronautical Engineering.

Hanson transferred to AMC Headquarters from the Army Missile Command where he was the senior command representative on the Land Combat Support System project at the RCA plant in Burlington, Mass.

A native of Boston, he received a BS degree in industrial engineering from Northeastern University, Boston, in 1954.

TECOM Announces Assignment of Col Gust to ATB

Assignment of Col Daniel G. Gust as the new president of the U.S. Army Aviation Test Board, Fort Rucker, Ala., has been announced by the U.S. Army Test and Evaluation Command.

Col Gust joined the Aviation Test Board last September as deputy president, following a tour of duty in Southeast Asia. While in Vietnam, he served initially as deputy commander of the 1st Aviation Brigade and then assumed command of the 16th Combat Aviation Group.

Graduated from the Command and General Staff College in 1953, he was sent to Korea to command the 1st Battalion of the 7th Infantry Regiment and later served as the regimental executive officer.

Col Gust qualified as an Army aviator in fixed- and rotary-wing aircraft in 1961 and served with the 3d Infantry Division in Germany as aviation officer and later became deputy Army aviation officer, HQ Seventh U.S. Army. He later became chief, G2 Operations Division.

Following an assignment with the Army Aviation School at Fort Rucker as director of advanced fixed-wing training, he entered the Army War College in 1964. He commanded the 2d Brigade Advanced Infantry Training at Fort Ord, until he left for Vietnam in 1967.

Col Gust's decorations and awards include the Silver Star (two Oak Leaf Clusters), Legion of Merit, Distinguished Flying Cross, Soldier's Medal, Bronze Star Medal (three Oak Leaf Clusters), Air Medal (15 Oak Leaf Clusters), Army Commendation Medal (one Oak Leaf Cluster) and the Purple Heart (two Oak Leaf Clusters). He is also entitled to the Combat Infantryman Badge and the Senior Army Aviator Badge.

Col Daniel G. Gust

Response to Changing Trends With New Ideas Pays Off

Changing times, trends and requirements have a special significance for Billy J. Bryant of the Strategic Communications Command (STRATCOM)—a need for new ideas that he has exploited for some $1,200 additional spending money the past year.

Bryant is a communications specialist with the STRATCOM Communications Engineering and Installation Agency (CEIA) and he has engineered equipment changes to earn four incentive awards plus a Sustained Superior Performance Award.

Otis E. Burnett, CEIA commander, recently presented the checks and certificates citing the achievements. Bryant engineered a telephone circuit to eliminate the need to rewire large portions of Army Telephone Central Offices that make Automatic Voice Network (AUTOVON) and Federal Telephone System (FTS) direct dialing circuits completely automatic.

Another program he initiated was a circuit engineering change of a telephone switchboard equipped with key-pulsing equipment. The modification provided continuous communication between caller and operator when the key sender is in operation.

Bryant's third award was for an engineering change which saved thousands of feet of communications wire and hundreds of manhours in installation time. It dealt with line-load control equipment in telephone exchanges.

Implementation of a fusing device to prevent complete loss of ringing current in a telephone exchange equipped with all electronic signal units was another of his innovations. During an emergency, the proposed improvement would assure rapid and uninterrupted communications.

Bryant entered military service in July 1948. Later he was employed as a civilian with the U.S. Army Plant Engineering Agency, which became the Installation and Construction Division under STRATCOM-CONUS. The agency was changed in 1968 to STRATCOM-CEIA and headquartered at Fort Huachuca, Ariz.

Laser Potential Evidenced On Construction Projects

Laser beam instrument experiments conducted in recent months in bay areas along the Florida and California coasts point promisingly to the potential for use in various Army Corps of Engineers pipeline and harbor channel dredging operations.

The laser beams are used as a reference line or plane to guide equipment alignment or location. Precise laser control, providing a narrow parallel beam for long distances, permits savings in construction costs and greater accuracy because operators can check intermediate alignment of equipment at any time.

Laser control is reported useful for aligning dredges, determining the state of the tide, guiding tunneling machines, installing sewer pipe, checking "tights" in tunnels, boundary markers, positioning marine equipment, and other construction.

One of the outstanding examples is the use of a laser beam to provide constant centerline reference for a breakwater construction project being done for the Corps of Engineers under a 2-year, $8-million contract with Silberger Constructors at Dana Point in southern California.

Another application of the laser beam is around-the-clock use to guide dredges excavating a trench in San Francisco Bay for the transbay rail transit tube. The trench will stretch 20,000 feet across the bottom of the bay between San Francisco and Oakland, and be 15 to 85 feet deep.

Similarly, a laser beam has been used experimentally for control of pipeline dredging in Apalachicola Bay, Fla., to the Carrabelle section of the Gulf Intracoastal Waterway maintenance project. Some problems were encountered because of the need for a satisfactory portable power supply for use of the laser in isolated locations where steep banks complicate the operational factors.

Engineers' Efforts Reduce Destruction in California Flood

Mud slides and rampaging mountain streams that ravaged portions of California's Los Angeles County in recent weeks, causing damage aggregating millions of dollars, would have resulted in far greater destruction except for the Army Corps of Engineers flood preparedness efforts.

Lt Gen William F. Cassidy, Chief of Engineers, Department of the Army, reported in Washington, D.C., that damage losses undoubtedly would have been much more than one billion dollars higher except for "the biggest metropolitan flood prevention operation in history."

Terming the property and life-saving returns of the preventive measures "the most dramatic justification for flood control measures ever seen," General Cassidy said the recent deluge down mountain sides following prolonged rainfall was much greater than the previous record flood of 1938.

Investment of $340,000,000 of federal funds and $750,000,000 of local funds, he said, returned more than 100 percent dividends in the recent floods. Most of the raging waters were trapped in flood and debris control dams or flowed harmlessly within banks of hundreds of miles of channels and thousands of miles of storm sewers, it was reported.

Throughout the Sacramento and San Joaquin River basin, the 1,300 miles of river levees and numerous multiple-purpose dam and reservoir projects functioned as designed, General Cassidy said. Through a system of bypasses, flood flows of the Sacramento River were shunted around the capital city, permitting business as usual.

Control of floods through such construction projects by the Army Corps of Engineers is an essential and sound investment, Cassidy stated.

Target Missiles Manager Assigned

Lt Col James W. Donald has been named acting product manager for target missiles at the U.S. Army Missile Command, following an assignment as CO of the Louisiana Army Ammunition Plant since May 1967.

He holds a BS degree in mechanical engineering from Auburn University. He has served tours of duty at Redstone Arsenal (1958–1960), in Europe and in the Far East.

Maj Mason Assigned as AMMRC Deputy Director/CO

Maj Joseph B. Mason is the new deputy director/CO of the Army Materials and Mechanics Research Center (AMMRC), Watertown, Mass., following a tour of duty as chief, Doctrine Branch, Training Media Division, U.S. Army Chemical Center and School, Fort McClellan, Ala.

Maj Mason received a BA degree in biology from Vanderbilt University and was commissioned through the ROTC program in 1953. He attended the Chemical Corps School at Fort McClellan and was assigned to Camp Detrick, Md., in 1954.

In addition to other tours of duty at Fort McClellan, Maj Mason has served at Pine Bluff Arsenal, Ark.; 11th Transportation Command, France; and Fort Carson, Colo.

Maj Joseph B. Mason

Federal July 1 Salary Increase Averages 9.1 Percent

Officials of U.S. Government employe organizations have until Mar. 26 to comment on proposed pay scales, submitted by the Bureau of the Budget and the Civil Service Commission, based on Bureau of Labor statistics compiled for industry comparable pay under the 1967 Federal Salary Act.

Salary increases proposed for some two million employes range from 3 percent at the GS–2 level to 10.8 at the GS–18 level. The over-all average is 9.1 percent. Increases are calculated to provide pay equivalent to private industry wages as of June 1968. General Schedule (GS) salaries for each grade and step, effective July 1, are shown in the table below:

PROPOSED GENERAL PAY SCHEDULE

	1	2	3	4	5	6	7	8	9	10
GS–				(payline)						
1	$ 3,889	$ 4,019	$ 4,149	$ 4,279	$ 4,408	$ 4,538	$ 4,668	$ 4,798	$ 4,928	$ 5,057
2	4,360	4,505	4,650	4,795	4,940	5,085	5,230	5,375	5,520	5,665
3	4,917	5,081	5,245	5,409	5,573	5,737	5,901	6,065	6,229	6,393
4	5,522	5,706	5,890	6,074	6,258	6,442	6,626	6,810	6,994	7,178
5	6,176	6,382	6,588	6,794	7,000	7,206	7,412	7,618	7,824	8,030
6	6,882	7,111	7,340	7,569	7,798	8,027	8,256	8,485	8,714	8,943
7	7,639	7,894	8,149	8,404	8,659	8,914	9,169	9,424	9,679	9,934
8	8,449	8,731	9,013	9,295	9,577	9,859	10,141	10,423	10,705	10,987
9	9,320	9,631	9,942	10,253	10,564	10,875	11,186	11,497	11,808	12,111
10	10,252	10,594	10,936	11,278	11,620	11,962	12,304	12,646	12,988	13,330
11	11,233	11,607	11,981	12,355	12,729	13,103	13,477	13,851	14,225	14,599
12	13,389	13,835	14,281	14,727	15,173	15,619	16,065	16,511	16,957	17,403
13	15,812	16,339	16,866	17,393	17,920	18,447	18,974	19,501	20,028	20,555
14	18,531	19,149	19,767	20,385	21,003	21,621	22,239	22,857	23,475	24,093
15	21,589	22,309	23,029	23,749	24,469	25,189	25,909	26,629	27,349	28,069
16	25,044	25,879	26,714	27,549	28,384	29,219	30,054	30,889	31,724	32,559
17	28,976	29,942	30,908	31,874	32,840					
18	33,495									

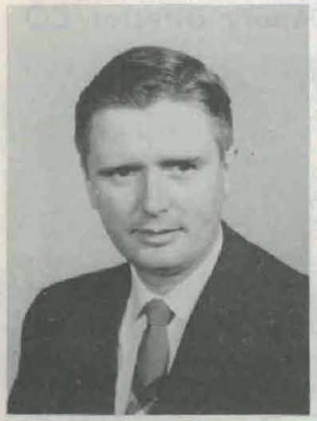
MERDC Nominates Goss for Outstanding Engineer Award

"Outstanding Engineer" recognition was given to Melvin L. Goss by the U.S. Army Mobility Equipment Research and Development Center, Fort Belvoir, Va., when he was nominated for this annual award made by the National Engineering and Architectural Societies, Washington, D.C.

Each year, government agencies and private firms within a radius of 35 miles of the White House are invited to nominate an engineer and/or architect for consideration for one of two awards.

The Mobility Equipment R&D Center (and its forerunner, the Engineer R&D Laboratories) have had four winners in the competition since it was instituted about 12 years ago.

Goss was selected as the MERDC representative this year for his work in advancing the state-of-the-art in high-speed induction motor technology. He had responsibility for the installation and operation of a simulation facility, including a large analog computer and a small digital computer, on which he performed a detailed analog simulation of a high-speed inductor motor.



Melvin L. Goss

Results of this simulation have provided, according to the citation justifying his nomination, a new insight of the dynamic behavior of the induction motor, and have contributed to the establishment of new design parameters in solid-state conversion equipment with improved performance.

Goss has been associated with the Engineer R&D Laboratories and the MERDC since 1951, following graduation from Purdue University in 1950 with a BS in electrical engineering. He earned a master's degree from George Washington University in 1965 and is presently employed in the Power Technology Division of the Electrotechnology Laboratory.

Chapparal Battery Formed At Fort Bliss Training Unit

Activation of the U.S. Army's first self-propelled Chaparral battery as part of a training battalion at Fort Bliss, Tex., was announced Feb. 12.

The Chaparral/Vulcan battalions will provide low-altitude air defense in forward battle areas. The Chaparral is a heat-seeking missile, and the Vulcan is a 20mm rapid-firing gun; they will complement each other by combining quick-reaction and extremely low-altitude capability of the Vulcan with the longer-range capability of the Chaparral.

The combat battalion will be organized with a headquarters and headquarters battery, two Chaparral and two Vulcan batteries, with 12 firing units in each battery.

The Army Missile Command's Chaparral Management Office, headed by Lt Col Donald H. Steenburn, directs the development, production and field support of the Chaparral. The Chaparral/Vulcan project manager is Col Robert C. Daly at HQ Army Materiel Command, Washington, D.C.

Dental Corps Studies Point To Problem Among Recruits

U.S. Army Dental Corps studies continue to reveal a significant dental health problem among about 650,000 men who annually enter as recruits.

Statistics show that among each 1,000 men there is a total of 7,940 cavities in need of treatment; a requirement for 190 full or partial dentures and 200 fixed bridges to replace missing teeth; an average requirement for the extraction of one tooth per man; and approximately 800 men with inflamed gums.

A total of four to five million hours of treatment would be required to handle the dental problems of each year's new recruits. In addition, each man generates an extra two to three hours of required treatment per year while in the Army until his oral disease is brought under control through preventive measures.

In Vietnam a 1968 study revealed that dental emergencies (defined as a condition causing pain) occur at the rate of more than 140 per 1,000 men each year. One out of every eight men in Vietnam suffers a dental emergency during his tour of duty.

The Army studies on recruits reflect findings of the National Health Survey showing that the nation as a whole has rather poor dental health. The American public has approximately one billion unfilled cavities.

Management School Features OR/SA Executive Course

One of the highlights of the recent Operations Research/Systems Analysis Executive Course at the U.S. Army Management School, Fort Belvoir, Va., was a presentation by Col Russell D. McGovern, chief, Studies and Analyses Division, Office, Chief of Research and Development.

Col McGovern discussed the Army's Operations Research and Systems Analysis Studies Program, including part of the subject material on the Project Advisory Groups article bylined by him in this edition of the *Army R&D Newsmagazine*, page 28.

The presentation of the Army Management School was the seventh Col McGovern has made during the past year for the OR/SAEC. Since the courses were instituted in January 1968, more than 500 students have graduated. Each 4-week course is programed for 64 participants.

All echelons with the Department of the Army are concerned with OR/SA studies, he emphasized, and need them to support ongoing programs. He detailed the organization and management procedures for these studies, including contracting for them.

Among organizations managing OR/SA studies are the Army Study Advisory Committee, under the Assistant Vice Chief of Staff, Department of the Army, and the Studies and Analyses Division which he heads; also the Project Advisory Group (PAG), a steering committee with representation from all agencies interested in each study.

Certain questions should be answered prior to initiating a study, he said, such as: Can OR/SA solve the problem? What can OR/SA do that a good staff study could not? Is there a need for the study? Could we get along without it? Timely, accurate, critical reviews must be made continuingly, it was stressed, to insure that the study "stays on the track" and meets objectives for which it was designed. Dialogue between the Army sponsor and the analyst is essential throughout the study.

The Army Management School OR/SAEC teaching methodology is split about 50/50 between informal lectures and small group (10–15 men) study and analysis tasks. Programing provides for presentations by guest speakers (senior commissioned officer and civilian employes) of the Army, Navy, Air Force and Marine Corps.

About 35 percent of the course deals with economics, cost analysis, effectiveness analysis and system analysis methodology; 15 percent is devoted to simulation and modeling, including automatic data processing; 11 percent to queueing, reliability, PERT and decision theory; 11 percent to mathematical program; 10 percent to probability statistics; 7 percent to war games and games of strategy; 6 percent to algebra and calculus; and 5 percent to intangible aspects of OR/SA management.

Subjects are taught in a highly applied manner, making extensive use of military problems and case studies, some of which are presented by the experts who performed them within contractor and at highest-level staff organizations. Other case studies are developed by the resident faculty.

A recent OR/SAEC included such military problems and case studies as: airlift/sealift and strategic deployment; M–39 20mm gun barrels (statistical analysis); REVAL Wheels (force planning study); DYNAMO (simulation of land combat); Main Battle Tank-70s (political constraints);

M–14 rifle acceptance testing; helicopter reconnaissance tactics (statistical analysis); variety and movement in Army training; optimal allocation of enlisted men; Advanced Aerial Fire Support System (AAFSS) cost and effectiveness trade-offs; battalion slice input/output model;

Navy search and rescue boats; military assistance to hypothetical country; TORQUE (research planning model); strategic systems analysis (antiballistic missile systems); 750-pound bombs vs missiles; AAFSS costing; small arms weapons study; Army missile battalion vs Air Force fighter-bomber squadron; inequality and insurgency (a statistical study);

Lanchester equations for insurgency (Phase II); new myths and old realities of insurgency; analytical models of Cuban Revolution; feasibility study of computer simulation of counterinsurgency; analysis of Shillelagh missile data; and studies management via Program Advisory Group.

APG Honors 'Senior Citizen' for 50 Years Service

Half a century of civilian service at the U.S. Army's Aberdeen (Md.) Proving Ground was appropriately recognized Feb. 14 when Claude E. Brown, chief of the Infantry and Aircraft Weapons Division, Materiel Test Directorate, was honored.

The Valentine's Day tribute was an en masse turn-out of friends and coworkers who have developed an affectionate esteem for "Mr. APG" or "APG's Senior Citizen."

First drawn to APG as a timekeeper for a construction contractor on Nov. 15, 1917, Brown entered government service as a laborer Sept. 28, 1918. Through the years he studied, increased his experience as well as his book learning, and by 1942 became an associate ordnance engineer.

World War II interrupted his civilian career June 21, 1942, but he was assigned to this post as an Army captain. In September 1946, he was discharged with the rank of major and returned to civilian status, later advancing to chief of the Infantry and Aircraft Weapons Division.

During his youth he gained renown as a well-rounded athlete, with a particularly enviable reputation in baseball, and he and his wife are still ardent fans of the Baltimore Orioles.

When friends jokingly inquire how long he has been employed at the APG, Brown has a stock answer: "Why, I came here on the first truck of gravel—it seems that long ago."

HALF CENTURY OF SERVICE at Aberdeen Proving Ground (APG) was recognized recently as Claude E. Brown was congratulated by Col Paul A. Troup Jr. (left), director, APG Materiel Test Directorate, and Col George C. Clowes, APG commander, who presented him with a Certificate of Service.

Department of Defense Armor Materials Program

(*Continued from page 2*)

the military departments on the subject of earth-boring weapons.

These studies moved the technology ahead, but in this case the various earth media were the target material. While these analyses were under way, comprehensive studies of offensive weapon vulnerability to various threats were started in the military departments, as well as by the Atomic Energy Commission (AEC), upon recognition of a potential enemy antiballistic missile (ABM) system.

The ARPA/LRL work was started several years ago when it was realized that these prior technological advances could be coalesced and unified to provide a solution to the ballistic penetration problem. It is not implied that the ARPA/LRL work by itself will provide lighter weight armor with greater protection, but most certainly it can lead to a degree of optimization not achievable.

The development of lighter weight armor materials is a job for the materials people. Desirable materials properties and design guidelines are now foreseeable. One can also envision armor playing a structural role, rather than being parasitic.

Having discussed this background, the question naturally arises, "Where do we go from here?" It is abundantly clear that to get the maximum effectiveness from the LRL work, it must be made available to the armor materials development community.

As a first step, a semiformal cooperative program is being established between the Army Mechanics and Materials Research Center (AMMRC), Lawrence Radiation Laboratories, and Advanced Research Projects Agency.

In the meantime, the AMMRC is in the process of reorienting their armor materials development program in accordance with this philosophy.

In the near future, discussions are planned with Navy and Air Force scientists and engineers engaged in armor materials development to establish comparable arrangements.

To this point the discussion has concerned armor materials development as a general area, not distinguishing between those for personnel, vehicles or aircraft, nor between metals and ceramics. To discuss the materials aspect of the subject, one must get more specific. It is obvious that the advances necessary in lightweight ceramic armor will require more sophistication than is available with conventional ceramics and processing techniques.

Extensive ballistic testing results show this to be true. More than likely it will be necessary for the materials engineers to synthesize new compounds and cermets to produce the desired properties. New processing procedures, such as vapor-phase deposition and single crystal growth techniques, will be required, as will ingenious schemes for preferential stressing patterns.

Compositing concepts, using high- or low-modulus fibrous arrays, have not been explored with any degree of rationality. It would seem that this latter technique would be a powerful scheme for tailoring properties analogous to what has been demonstrated in the resin-matrix composites.

The area of ceramic transparency must be fully explored. Many of our critical applications require transparent armor with a high degree of protection. New design concepts for using these new materials must be evolved. Fabrication and joining techniques must be developed without compromising ballistic performance.

The use of armor as a structural member is important for many applications. Furthermore, meaningful nondestructive test techniques and assurances of quality must be evolved for the new materials and processes.

One could say that it is a "brand new ball game." The ceramic materials community is confronted with a fantastic challenge at this time. We will try to do our part in meeting this challenge but only through a high degree of industry-government cooperation can we be successful.

User Program Assesses Commando at Fort Gordon

Troop experience and suggestions to make the Commando V–100 (XM–706) armored escort vehicle easier to drive, more comfortable and quieter in operation are being evaluated by a User Assessment Program.

The Military Police Agency at Fort Gordon, Ga., is evaluating the merit of proposals for improvement as an element of the Army Combat Developments Command, Fort Belvoir, Va. The CDC has the mission of insuring that users in the field have a strong voice in influencing development of doctrine, hardware and organization of combat elements.

Over a period of several months the MP Agency gave V–100s to men in the 3d and 4th Advanced Individual Training Brigades and officer courses at Fort Gordon. CDC received valuable opinions from the units, reinforced by "user views" from MPs of the XVIII Airborne Corps, Fort Bragg, N.C., and in Vietnam.

Capable of land speeds up to 60 miles an hour, the amphibious Commando features a twin 7.62mm machinegun cupola and 11 gun ports for small arms firing. Used primarily for antiguerrilla warfare and convoy escort, it has specially designed run-flat tires, enabling it to remain in action if the tires are hit by enemy fire.

Commando V–100 (XM–706)

The User Assessment Program changes may seem simple when compared to complex weapons systems in Army development. They mean a lot, however, to the man whose morale and performance hinge on enthusiasm for the equipment with which he has to live and work.

For example, one CDC proposal resulted in a new accelerator pedal for firm foot support to prevent fatigue of the driver whose Commando is capable of 400-mile, nonstop treks over difficult terrain. Another result is that the 6-foot soldier at the wheel will find increased ease because of adjustable seating provided in the latest production models.

A key tactical consideration is reducing noise levels in night operations and close-in encounters with the enemy. CDC hopes to cut the "noise signature" of the Commando by modifications on hatchways and a sound damper on the transfer case.

Recommended also are high-durability interiors to withstand tropical climate, expected to improve time/cost factors in maintenance. Other suggestions have brought standard military electrical fixtures to new models and turn signals to aid convoy movement.

The Commando is protected by armor plating and its 24-inch off-ground clearance is a safety factor against mine blasts. Eighteen compact vision blocks with the ballistic strength of armored plating give the V–100 the appearance of a formidably guarded vehicle.

Man's Job Is What He Makes It!

Take Your Cue From One Who Made Hard Job Zestful

PLEASED COUNTENANCE of Algert Ruzgis, chief of the Army Electronics Command Systems and Cost Analysis Office, probably reflects the way he feels about these members of his professional staff. All college graduates, they range from GS–7 to GS–13. Left to right are Seton Malone, mathematician; Amelia Yetman, operations research analyst; Maureen Butler, program analyst; Judy Blondeau, management analyst; and Elaine Gammarino, program analyst.

'Tis rightly said that a man's job is what he makes it, as beautifully evidenced by Algert Ruzgis, who has made his what nearly every red-blooded man might dream it to be—you know, lively, stimulating, spiritually satisfying, surrounded by lovely, intelligent, devoted women.

Even more provocative to those who may feel frustrated in the tedium of their jobs, he didn't plan it that way; it just sort of happened, with an assist from Lady Luck—and Al's discerning eye for talent!

In fact, it started with what many bosses find an exceedingly vexatious, exasperating task—trying to find highly skilled manpower. Al's job was to man the Army Electronics Command System and Cost Analysis Office with competent technical people—mathematicians, economists, lots of all-around brains, zest for the difficult, able to cope with the complex.

That was about two years ago and Ruzgis has completely solved his staffing problem, by substituting womanpower for manpower in five key jobs. Naturally, he takes a bit of ribbing from male cohorts about this infiltration of beauty with brains into what was considered a man's world.

Ruzgis blandly replies that he has complete confidence in women, as further evidenced by one of his recreation activities the past two summers, during which he has directed a 625-member girls' softball league. Moreover, he's a proud daddy, with two lovely young daughters of his own!

The Systems and Cost Analysis office is the ECOM's focal point for review and validation of short- and long-range materiel system analyses and cost studies. It conducts research in systems, cost analysis and methodologies. It has a data and statistics division, a research and methodology division, a systems analysis division, and a cost analysis division.

The office is charged with planning, developing and administering the ECOM Systems and Cost Analysis Program, and it has opposite numbers upwards through the chain of command, all the way to the Department of Defense.

"The press, under Former Defense Secretary McNamara," Ruzgis says, "dubbed the DoD counterparts of these people his 'Whiz Kids.' I like to call my five young women analysts our 'Whiz Girls.' "

Senior member of the Whiz contingent is Amelia (Mig) Yetman, an operations research analyst with nine years of government service. After graduating from Douglas College in 1958, Mig taught chemistry and mathematics at Red Bank (N.J.) High School before coming to Fort Monmouth. At 33, she is a GS–13 and has just returned from her second trip to England, where she has been working on cost evaluation procedures involving the 4-nation Mallard Project to develop a worldwide strategic communications system.

Mig joined the Systems and Cost Analysis Office in 1967, after working with the Army Security Agency at Fort Monmouth and at Vint Hill Farms Station, Va., as well as in the ECOM Maintenance Engineering Directorate. She is the daughter of Mrs. Edward Yetman, Farmingdale, N.J.

Another former high school teacher in the group is Judy Blondeau, 24, a management analyst. Judy arrived at her present job via the Army Materiel Command's management interne program, which she entered in 1967, after graduating from North Carolina State University.

A history major, Judy taught in the Goldsboro (N.C.) High School before deciding to enter government service. Daughter of Mr. and Mrs. Orville E. Blondeau, Calais, Maine, she now lives in Monmouth Beach, sharing an apartment with two other girls.

One is Maureen Butler, 23, a program analyst in the Systems Evaluation Division. Maureen received a BS degree in economics in 1967 from Indiana University. Her parents are Mr. and Mrs. William J. Butler of Westfield, N.J.

Mathematician Seton Malone, 21, daughter of Mr. and Mrs. Edward M. Malone, Allenhurst, N.J., graduated from Monmouth College last June as a math major. Seton is with the Systems/Analysis Methodology Branch in the Systems and Cost Analysis Office.

Elaine Gammarino, 23, is a program analyst in the Cost Methodology Division. She is a 1967 graduate of Wake Forest College, Winston-Salem, N.C., and an economics major. In private life she is Mrs. Rudolph Gammarino, since September 1968 the wife of a physicist in the command's Electronics Components Laboratory.

To get the right people for the jobs, the Systems and Cost Analysis Office worked closely with Civilian Personnel officials. Men and women applicants were interviewed and the best qualified were accepted.

"The girls competed against male applicants in some cases," Ruzgis said. "Being a woman was neither an asset nor a liability in our evaluation of the candidates."

The punchline to the girls' success story, however, is that in the same professional categories, 15 *men* made the grade too—*only one-quarter* of the Ruzgis task force is *female*. But most women will be gratified to know that five ladies applied, were hired, and are doing an exceptional job.

LCSS Engineering Contract Let

The U.S. Army Missile Command announced Feb. 17 the award of a $2,380,000 contract to RCA to provide engineering services for the Land Combat Support System (LCSS).

LCSS is automatic electronic test equipment designed to isolate faults and malfunctions in specified components of designated land combat tactical missile systems. It also provides facilities for repair of those components. Lt Col Frank A. Matthews is system product manager for MICOM.

Kudos

MERITORIOUS CIVILIAN SERVICE. *Dr. Arthur N. Gorelick,* director of the Biological Science Laboratories, and *Frank L. Baker,* chief of the Security Office, received the Decoration for Meritorious Civilian Service (DMCS) during a recent annual awards ceremony at Fort Detrick, Md.

Maj Gen John J. Hayes, Assistant Deputy Chief of Staff for Logistics (Supply and Maintenance), presented the Army's second highest civilian employe award at a program that also honored 185 Fort Detrick civilian employes for completion of 30, 20 and 10 years of federal service.

Dr. Gorelick was commended for contributions to the technical direction and performance of biological research at Fort Detrick from 1946 through 1968. Baker's outstanding administration of the security function and his supervisory responsibilities earned him the award for the period 1964 to 1969.

General Hayes presented 30-year Length of Service Awards to *James W. Brown, John L. Converse, Bloyce C. Lewis, Maurice F. Orris, Donald E. Seymore, Wilbur Snead* and *Rodney E. Willard.* Representative J. Glenn Beall Jr. of the Sixth Congressional District of Maryland presented the 20- and 10-year Length of Service Awards.

LEGION OF MERIT. *Col Thomas S. Schreiber* received the LOM for his "decisive leadership, technical skill, foresight, and well-calculated planning." Results were termed of great significance to the progress of R&D programs and projects of major importance to the Armed Forces and the nation.

He was cited for his performance from August 1960 to October 1967. Service during this period included assignments as assistant executive and special assistant to the Chief Signal Officer, HQ DA; chief, Communications Electronic Warfare Branch, Communications-Electronics Division, and staff officer and chief, Mid-Range Plans Branch, Plans Division, OCRD; and

Research and development program manager in the Office of the Director for Ballistic Missile Defense; and chief of the Advanced Systems and Technical Requirements Branch, Office of the Director of Defense Research and Engineering, Office of the Secretary of Defense.

SUPERVISORY mechanical engineer Donald E. Petersen received the Decoration for Meritorious Civilian Service from Maj Gen O. E. Hurlbut, CG of the U.S. Army Weapons Command, for technical knowledge and outstanding leadership in obtaining critical improvements in weaponry at Rock Island, Ill. Cited particularly was his outstanding contributions in developing the Airmobile Firing Platform.

Dr. Ralph H. Pennington, assigned recently as assistant director/chief of the Data Processing Division, Army Ballistic Missile Defense Agency, was awarded the first Oak Leaf Cluster to the LOM. The award honored his outstanding performance while on special duty as an Air Force colonel in 1967 with the Institute of Defense Analyses (IDA), particularly his work toward the successful completion of the STRAT-X study.

Lt Col Robert B. Farmer, White Sands (N. Mex.) Missile Range (WSMR), received the LOM for service as logistics officer while with the 1st Infantry Division Support Command in Vietnam. He also was awarded the Soldier's Medal for heroism during the same tour.

BRONZE STAR MEDAL. *Lt Col Henry L. Davisson Jr.,* assigned to the Technical and Industrial Liaison Office, OCRD, since August 1968, received the BSM (second OLC) with "V" device, for heroism while serving in his previous assignment as CO of the 2d Battalion (Mech.), 2d Infantry, 1st Infantry Division in Vietnam.

ARMY COMMENDATION MEDAL. *Lt Col Robert L. Johnson* was commended for service as the U.S. Army Standardization Group representative to the Australian Department of Supply and to the Master General of Ordnance Branch, Australian Army, from July 1965 to July 1968.

Now assigned as a staff officer with the Air Defense and Missiles Division, OCRD, he was the first U.S. Army representative assigned to the Australian Department of Supply. He performed liaison in all matters on standardization of Army equipment, concepts, operations, logistics and management among Armies of the U.S., United Kingdom, Canada, Australia and New Zealand.

Dr. Colin M. Hudson received the ACM from Maj Gen O. E. Hurlbut, CG of the U.S. Army Weapons Command, for outstanding performance of duties as deputy for research and engineering and chief scientist at Rock Island (Ill.) Arsenal from January 1968 to January 1969.

Maj Gen H. G. Davisson, CG of WSMR, presented ACMs to two officers assigned to the range. *Lt Col Pedro Cordero-Lopez* was honored for service as staff officer with Sergeant and TOW missile projects during the past 18 months. *Maj Henry J. Van Dorne,* recently retired after more than 20 years of Army service, was cited for achievements with the U.S.

HDL Microwave Researcher Earns Special Act Award

Development of techniques for producing lightweight, efficient, low-cost microwave antenna and related components for missiles and spacecraft recently earned Howard S. Jones Jr. a $175 Special Act Award.

A senior research supervisor at the Harry Diamond Laboratories (HDL), Washington, D.C., Jones has authored more than 30 technical papers and reports on his work in the microwave field, and has presented papers at symposiums in several foreign countries. He is inventor or co-inventor for 15 patent awards.

He received his BS degree in mathematics from Virginia (Richmond) Union University (1943) and has attended the graduate school at Howard University, where he was an assistant professor from 1959 to 1964.

Registered as a professional engineer, he is a member of the professional group on Microwave Theory and Techniques and also the group on Antennas and Propagation. He is a member of the Institute of Electrical and Electronics Engineers and the American Association for the Advancement of Science.

Howard S. Jones Jr.

Army Electronic R&D Activity at WSMR.

PERFORMANCE/SUGGESTION AWARDS. Eleven employes of the U.S. Army Mobility Equipment Research and Development Center, Fort Belvoir, Va., received $835 for superior work or for cost-reduction suggestions.

Edward M. Abel, Milton E. Kicherer and *Mrs. Tommye L. Pickett* each received $100 outstanding ratings for sustained superior performance.

Others who received cash awards for suggestions are *Mrs. Catherine L. Waggy*, $165; *David Flandermeyer* and *John Bell*, $100 each for a joint suggestion; *Mrs. Rose C. Lavois*, $55; *Richard H. Davis*, $40; *John T. Wasdi, Mrs. Lorraine Gordon* and *Joseph F. Kennedy*, $25 each.

Col Robert L. Ednie, director, U.S. Army Engineer Reactors Group (USAERG), presented awards to five civilians at Fort Belvoir. *Walter J. Kreeger* received $340 for suggesting that Jordan Rad Guns used for high-range gamma survey be repaired by the USAERG rather than replaced on an emergency basis.

Mrs. Nola Mae Cottle received a $15 suggestion award; *Michael A. Stollemeyer*, an outstanding rating and quality in-grade salary increase, *Joseph R. Randall*, an outstanding rating and $100 sustained superior performance award; and *George W. Knighton*, an outstanding rating.

Dragon Passes Arctic Tests

Arctic environment tests termed "highly successful" have proved that bitter cold does not stop the Dragon, even when the temperature plunges to more than 50° below zero.

Tests were made at Fort Greely, Alaska, to evaluate engineering development hardware of the 28-pound, shoulder-fired "tank-killer," preliminary to more advanced development of the weapon system.

Dragon missiles carrying high-explosive warheads or telemetry packages connected accurately with stationary targets. During the next phase, soldiers carried Dragon equipment into the field, assembled it, and ran through firing procedures to evaluate man-equipment effectiveness.

The tests were conducted by the U.S. Army Missile Command, which manages the Dragon program, and the Army Test and Evaluation Command with support of McDonnell-Douglas Corp., Dragon prime contractor. Col Kenneth C. Van Auken is project manager.

Noonan Receives SRSA Award for Infrared Work

Contributions to state-of-the-art advances in infrared detectors and image converters have gained for Jon A. Noonan, a scientist at the U.S. Army Night-Vision Laboratory, the 1968 Scientific Achievement Award of the Fort Belvoir (Va.) Branch, Scientific Research Society of America.

Col Edwin T. O'Donnell, commander of the U.S. Army Mobility Equipment Research and Development Center at Fort Belvoir, presented the award to Noonan at a recent dinner meeting of the SRSA Branch. Noonan was cited for discovery of a 5-level infrared quantum counter, permitting study of new combinations of rare earth ion levels.

Jon Noonan and Col O'Donnell

Noonan was graduated in 1962 from Pennsylvania State University with a BS degree in physics. From 1963 to 1965, he served as an enlisted man at the Engineer R&D Labs (now the MERDC). He has completed graduate courses in physics of electricity and magnetism, quantum mechanics, and advanced calculus at Iowa State University, and mathematics, physics (theoretical mechanics) and solid-state physics at Catholic University.

While employed with the Night-Vision Laboratory, he has coauthored a number of papers on research published in professional journals.

Dr. Frese Heads Mallard Joint Engineering Agency

Dr. Robert E. Frese, chief scientist from March 1959 to 1963 at the U.S. Army Electronics Proving Ground (USAEPG), Fort Huachuca, Ariz., has been appointed director, Joint Engineering Agency, MALLARD Project.

For the past five years, the 40-year-old scientist has been a research manager in the IBM Corp. Federal Systems Division in Gaithersburg, Md. He has engaged in major defense programs that involve tactical data processing, laser technology and night-vision techniques.

Maj Gen Paul A. Feyereisen, U.S. program-project manager for the 4-nation MALLARD tactical communications system being developed with the United Kingdom, Canada and Australia, announced the appointment.

Composed of military and civilian personnel from the four nations, the Joint Engineering Agency is responsible for providing recommendations to the Program Management Board on all tactical and management aspects of the long-range multimillion-dollar MALLARD Project. The system is scheduled to be put in the field in the 1975–77 period.

The board consists of General Feyereisen, Brigadier Harry Roper, UK project and program manager, Lt Col Douglas C. Coughtry, program manager for Canada, and Lt Col Lisle G. Moore, program manager for Australia.

Dr. Frese received his BS degree in electrical engineering and mathematics (1951), MEE degree (1952) and PhD in the same field (1959), all from the University of Michigan. While studying for his doctorate, he was a lecturer and instructor, and he continued at Michigan as an assistant professor.

Dr. Robert E. Frese

From 1952 to 1957, he was a research associate at the university's Willow Run Laboratories, and a consultant from 1957 to 1959. The greater part of his work there entailed studies and testing of the vulnerability of air-defense systems to countermeasures.

Among his honors, Dr. Frese received the Edward Wilkenson Miller Undergraduate Award in mathematics from the University of Michigan in 1951. His studies at the university were aided by a Westinghouse Fellowship.

He received the Army's Decoration for Meritorious Civilian Service in 1962, and IBM's Outstanding Contribution Award in 1966. Affiliations with societies include Phi Eta Sigma, Eta Kappa Nu, Tau Beta Pi, Phi Kappa Phi and Sigma Xi.

PAG-WHAT'S THAT?

By Col Russell D. McGovern

If you are in the business of managing a study project—as substantial numbers engaged in Army research and development activities are—the answers to the question posed in the title and to other questions in this article should be of interest to you.

A constant effort aims to improve the end products or results of the Department of the Army Operations Research/Systems Analysis study program. The Office of the Chief of Research and Development (OCRD), as the responsible agency for the administration of these studies, is continually striving to improve and simplify contractual study management techniques.

The PAG (Project Advisory Group) is a method used by OCRD to manage Operations Research and System Analysis Studies. Use of the PAGs, of course, is not limited to the management of this specific type of study program. PAGs could be used for many different study projects, ranging from a multiagency "in-house" study effort to a multicontractor-supported research or developmental study project.

The PAG, as used within OCRD, consists of a chairman and as many members as are required to monitor a given Army contract study. The objective is to assure that the Army-sponsored studies are of high quality and that results are specifically responsive to Army needs.

Q. *Who establishes the PAG?*

A. OCRD, in coordination with the sponsoring Department of the Army Staff agency, will establish PAGs for all Research, Development Test and Evaluation (RDT&E) funded projects contracted through the Army Research Office and being performed by a contractor under provisions of Army Regulation 1–110. The Army Chief of Staff recently (C/S Memo 68–450, Nov.. 26, 1968) expressed his personal interest in the proper management of Operations Research/Systems Analysis studies.

* * *

Q. *Is the PAG chairman for each OR/SA study provided by OCRD?*

A. No. The sponsoring Department of the Army (DA) staff agency designates an officer, normally in the grade of colonel, or a civilian in grade GS–15 or higher, as the PAG chairman or project officer. The sponsor also recommends other Army agencies that should provide membership on the PAG based on input requirements and projected interests.

Q. *What particular selection prerequisites should the PAG chairman and members meet?*

A. It is considered of particular importance to the Army and to research contractors that the chairman and members be assigned to the PAG for not less than one year, or through completion of a study project.

When this cannot be done, alternates should be briefed by PAG members early enough to provide adequate overlap to insure a high degree of PAG and study continuity. Changes in agency representation should be reported, in writing, to OCRD (ATTN: CRDSTA).

Q. *How about qualifications in the OR/SA area?*

A. Supervision of study progress requires an appreciation for the problems and methods used by those who are to conduct the research. PAG members should acquaint themselves with the steps to be taken by the research personnel to meet study objectives. They should have at least a broad knowledge of OR/SA methods, capabilities and limitations, particularly as they relate to the study in question.

Several sources for gaining a general knowledge of OR/SA are readily available to the Army staff, including a 1-week OR/SA orientation course held three times yearly, at the Army Research Office and a 4-week OR/SA executive course nine times yearly at the Army Management School.

Q. *How large should a PAG be?*

A. Small PAGs are usually more effective than large ones. The most important consideration is the quality of PAG membership with a professional staff interest in the study. Each member fulfills specific assigned responsibilities related to his agency's interest in the study.

Q. *Once established, what are the functions of the PAG and how does it operate?*

A. Initially PAG functions to insure that the work statement clearly defines, *in writing*, the problem, the study and subtask objectives and study assumptions for the research agency. The goal is to ensure that these may be translated into research objectives specifically addressed to Army problems.

Each PAG will convene at least once every three months, in accordance with AR 1–110, for in-process reviews. Meetings are scheduled when study milestones have been reached or critical decisions must be made regarding future study direction.

The first PAG meeting is critical to the start of a successful study program. Close coordination between the study sponsor and the contractor prior to the initial meeting is particularly important. The following areas should be defined, agreed upon and included on the agenda:

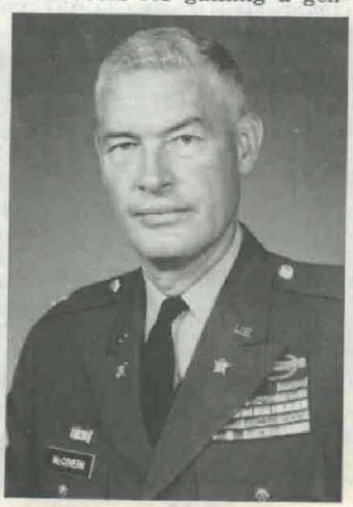
1. A full explanation of the *Army's need for the study*, including the situation that generated the study requirement.

2. A *statement of the problem* that explains exactly what needs to be accomplished. This does not include *how* but rather *what* is to be done.

3. A statement of *how the Army will use the results* of the study and who will have an interest in it. If the study entails the development of a system or a model, the eventual operating agency to receive and employ the system should be designated and coordination effected with that agency.

4. An outline of the *documentation* requirements. This should include a mutual understanding between the sponsor and contractor, resulting in a statement of what the study will produce—such as type and format of report, model, card decks and computer tapes (to include computer compatibility). Due dates for this documentation should also be a part of the understanding.

5. A *task and milestone schedule*



COL RUSSELL D. McGOVERN has been chief of the Studies and Analyses Division, U.S. Army Research Office (USARO), OCRD, since July 1967. He was executive to the Director of Army Research (1963–64), after two years in the former Human Factors and Operations Research Division, USARO.

After serving as battalion commander, 1st Cavalry, 2d Division, Korea (1964–65) he was assigned from 1965 to 1966 to the U.S. Military Academy (USMA), where he organized and was the first director of the Office of Research.

Col McGovern has a BS degree from the USMA, an MS degree in psychology from the University of Miami, graduated from the National War College in 1967 and completed the Command and General Staff College in 1956.

for the year's work program should be prepared by the contractor and agreed to by the PAG chairman. This schedule will enable the PAG to see graphically the work program for the coming year. The schedule is not intended to "tie the hands" of the contractor, but to serve as a general guide to improve understanding between the contractor and the PAG.

6. An explanation and *description of the methodology* the contractor will use to conduct the study will alert PAG members as to what OR/SA area they should become familiar with to monitor properly the study effort.

Q. *What reports are associated with the PAG?*

A. Basically two categories of reports are required. The first are the *interim reports*, such as the minutes of the PAG meeting. Within 10 days, the PAG chairman must prepare minutes of the meeting and submit 10 copies through the sponsoring agency to OCRD, ATTN: CRDSTA, for approval and distribution by OCRD to the research contractor.

The minutes serve to provide the OCRD with information and guidance for official contractor notification. They are also part of the Department of the Army record to reflect critical stages reached in the Army management of the study project.

The following *final reports* are associated with completion of the study.

1. Evaluation of Contractor's Performance and Product to OCRD, ATTN: CRDSTA, required by AR 1–110, Jan. 22, 1968, within 30 days of study completion or termination.

2. One copy of the draft final report is submitted by the contractor to each PAG member for review. The PAG chairman consolidates comments and prepares a coordinated PAG position on the study, covering validity or realism of assumptions, accuracy of data, findings, conclusions and their relation to findings, responsiveness of study to project directives, security classification and recommended distribution. This position is submitted by letter through the sponsor to OCRD, ATTN: CRDSTA.

3. Twenty (20) copies of each final report, along with DD Form 1473 are to be submitted to the Defense Documentation Center (DDC) concurrent with primary distribution. Information copies of the primary distribution list should be submitted to OCRD, ATTN: STA Division, as required by AR 70–11, Oct. 8, 1968, and AR 70–31, Sept. 9, 1966.

4. RCS OSD–1399 submission should be forwarded within 30 days subsequent to study completion to OCRD, ATTN: CRDSTA, and OAV-CofSA, ATTN: Director of Studies, required by C–1 of AR 70–31, Feb. 12, 1967.

Q. *Where can I get additional information on the PAG?*

A. AN OCRD pamphlet, "The Project Advisory Group and Its Duties," was published in March 1968 and revised in January 1969. In this document the following detailed information is available: 1) the composition of a PAG; 2) the duties of the chairman, members and OCRD military adviser; 3) preparation for and conduct of PAG meetings; 4) reports required; 5) copy of CSM 68–450, Nov. 26, 1968; 6) copy of AR 1–110, Jan. 22, 1968.

In addition, guidance is provided on the preparation of minutes, meeting notification and other pertinent information to assist study sponsors and PAG chairmen in executing their responsibilities for the management of their study effort.

This pamphlet may be obtained from Office of the Chief of Research and Development (ATTN: STA Division), Washington, D.C. 20310.

MICOM Loses 5 With 140 Years Experience

U.S. Government service experience totaling 140 years (96 in Civil Service positions and 44 in military duties) was lost to the Army Missile Command Research and Engineering Directorate's Ground Support Equipment Laboratory when five of its employes retired as Feb. drew to a close.

Casper J. Koeper accounted for 35 years. Virgil Cagle had 32 years, 4 months and Manuel Denning, 29 years, 3 months, inclusive of 20 years each in the Army. William Young had 27 years, 10 months, including 25 years Civil Service employment, and Hubert C. Jennings retired with 15 years, 10 months service.

Koeper was chief of the Requirements and Analysis Branch and had worked at Redstone Arsenal since 1949. He organized the design activities of the Army Ordnance Rocket Center when rocket and missile work first began at Redstone Arsenal and also directed preparation of the original feasibility study reports for the Honest John weapon system.

Cagle, a retired Army officer, became a civilian engineer employe at Redstone Arsenal in October 1956. Denning also joined the Redstone Arsenal staff following his retirement from the Army in 1960. He was a guided missile mechanical inspector.

Young was chief, Launch Systems Branch and had been employed at Redstone since 1951. Graduated as a mining engineer and geologist from the Colorado School of Mines, he worked at almost every known gold and silver mine in the west as well as many other mines in the south and mid-west before he joined MICOM.

Jennings, a mechanical engineering technician, had worked at Redstone since 1954 and his experience included all phases of launching and handling, fueling, mechanical maintenance, transportation and packaging of aircraft armaments; also the Sergeant, Pershing, Jupiter "C," Redstone Mercury, and Redstone missiles.

Metzler Takes Command of Aberdeen R&D Center

Col Howard C. Metzler has taken command of the U.S. Army Aberdeen (Md.) Research and Development Center (USAARDC), succeeding Col John C. Raaen Jr., who has been reassigned to the U.S. Army in Vietnam after serving two years at the center.

Graduated from the U.S. Military Academy in 1944, he also has an MS degree in civil engineering from Iowa State University. He has completed courses at the National War College, Army Command and General Staff College, Air Force Special Weapons School and Army Engineer schools.

Col Metzler has served in Europe, Okinawa and Korea. His recent assignments have included command of the Seneca (N.Y.) Army Depot and with the Defense Atomic Support Agency as chief of the Blast and Shock Division and chief, Shock Physics Division.

Other assignments in the United States have included research and development staff officer and staff officer, Materiel Development Division, Office of the Chief of Ordnance.

He has been awarded the Bronze Star Medal, Army Commendation Medal, American Defense Service Medal, American Campaign Medal, Europe-Africa-Middle East Campaign Medal with two service stars, World War II Victory Medal, American Occupation Medal-Japan, and the National Defense Service Medal with OLC.

Col Howard C. Metzler

ATAC Develops X-Ray Standards for Partial Penetration Welds

By Joseph Dudzinski and Walter Wulf

X-ray standards and procedures for controlling the quality of partial penetration welds have been developed by the U.S. Army Tank-Automotive Command, Warren, Mich., and published in USATACOM Technical Report No. 8910–Phase II.

In response to an urgent need for this method of control, the Army Standardization Office is planning to embody the work of the USATACOM engineers in a fully coordinated military specification. Authorization for the project has been received from the Army Materials and Mechanics Research Center under the Materials Testing Technology Program.

Partial-penetration welds have been used for joining heavy aluminum to aluminum and steel to steel for about 10 years. They differ from the conventional full-penetration welds in that approximately one-third of the central portion of the weld is unfused. Strength of these welds compares quite favorably with full-penetration welds, because the unfused area is located in the neutral-stressed zone, similar to a tube and solid-bar relationship.

Using partial penetration welds reduces costs. Approximately one-half as much weld filler metal is required and a substantial savings in labor is realized. The relationship between the two types of weld joints is shown in Figure 1.

Many welding engineers have used this economical procedure since its introduction. Unfortunately, no radiographic standards have been available for acceptance inspection. The standards for full-penetration welds are inappropriate for use on the wide variation and complexity of joint designs used in partial-penetration weldments.

Individual contractors, as a result, have been required to establish special standards for each production contract from preproduction units. This method served satisfactorily during the interim period.

With the normal variations in weld quality experienced by different manufacturers, it was extremely difficult to maintain uniform weld quality throughout the country. Further, the lack of a universal standard has presented a major production bottleneck in the event of a national emergency.

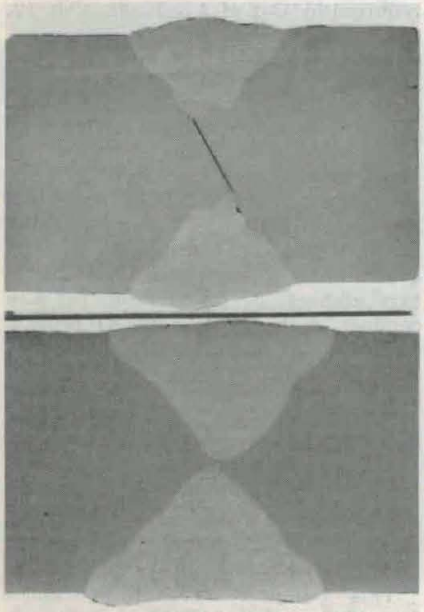


Figure 1. Photomacrographs of full- and partial-penetration joint designs.

Unlike other specifications, the new USATACOM document contains special educational data to assist design engineers, radiographers, welders and inspection personnel in understanding the general application and inspection requirements of partial-penetration weldments.

Drawings of the most common joint designs show recommended radiation angles and film location to achieve the best results, including standardized inspection procedures.

Photomacrographs of actual weld-flaw specimens are included to assist design and materials engineers in establishing appropriate soundness requirements. These will also aid radiographers with film interpretation and serve as a training guide for welders.

Another major benefit of the document is the quality lithograph reproductions of the standards, permitting direct viewing of the radiographs with reflected light. Most X-ray standards are reproduced on film, which requires the use of special viewing equipment in a darkened room.

Film reproductions are generally employed because it is easier to maintain image detail of the original negative. USATACOM engineers, by providing special controls for the master photographic copy required for the litho reproductions, retained about 90 percent of the detail of the original image. This method simplifies practical utilization of the document by concerned personnel not having ready access to film-viewing equipment.

Savings in costs to be realized from the application of the standards promise to be significant. Achieving uniformity in weld evaluation criteria and proper X-ray exposure techniques will reduce unnecessary weld repairs by minimizing confusion in radiographic interpretation.

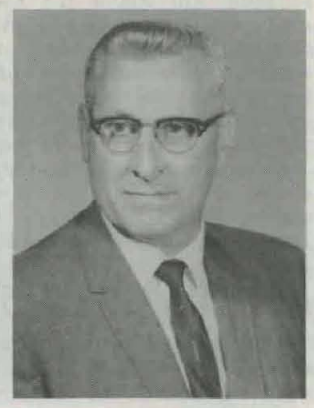
Furthermore, the circumstances by which improper welding conditions cause specific types of flaws are clarified in the report. This should lead to general improvement in welding quality.

Associating radiographic terminology with film appearance and cross-sectional weld-zone illustrations provides valuable technical guidance for production welding and evaluation personnel. Undoubtedly, these benefits will provide substantial savings when utilized on a wide variety of military materiel.

Another objective of the current program is to determine the influence of various weld flaws on quality and structural integrity.

For lack of a better method, present radiographic acceptance standards are based primarily on the prac-

Joseph Dudzinski



Walter Wulf

Joseph Dudzinski studied industrial engineering at Wayne State University in Detroit, Mich. Employed by USATACOM and it's predecessor organizations since 1948, he served for several years as chief of the Physical Testing Section of the Materials Division. Since 1958 he has been a materials program engineer.

Walter Wulf studied mathematics and physics at Macomb Community College in Michigan. Since 1946, he has served as a physical science technician in the USATACOM Materials Division, specializing in the field of nondestructive testing.

tical judgment of materials and welding engineers. Decisions are difficult to make because of the constant changes and improvements being made in material strength, welding procedures and structural designs.

Consequently, many engineers have expressed a desire to supplement practical judgment with quantitative data, based on measuring the influence that varying amounts and types of flaws have on the structural strength of weldments. This knowledge will assist them in establishing realistic soundness requirements.

To accumulate this knowledge, USATACOM is conducting comprehensive physical tests, consisting of tensile, bend, and impact stresses on actual weld-flaw specimens.

Approximately 50 percent of the work has been completed, consisting primarily of steel-sample testing, and results to date are encouraging. Useful data has been compiled on the detrimental effects of scattered porosity, linear porosity, lack of fusion, and incomplete penetration.

Provided results of experiments on aluminum welds, soon to be tested, are equally successful, the final report will provide Army engineers with a greatly needed tool for establishing firm quality-assurance provisions for partial-penetration weldments.

Edgewood Renews Emphasis on 'Lessons Learned' Program

Lessons Learned, an Army program devoted to putting the "better way" of doing things into effect wherever and whenever possible, is receiving renewed emphasis at Edgewood (Md.) Arsenal.

The program was initiated about three years ago by the Army Chief of Staff, who directed that innovations not covered by specific directives or other publications be documented and disseminated throughout the Army. The goal is to enable every interested activity to benefit from the lesson learned and some results have been far-reaching.

An Edgewood Arsenal civilian employee noted that training manuals and handbooks did not reflect the latest modifications to an Arsenal-managed item of equipment. Confused field personnel, using the manual, were terming the equipment "incomplete" because a specified component was not included.

Due to the lesson learned in revising the field manuals to reflect the component deletion, it is now Army-wide policy that major changes in standard equipment should not be made unless the manuals and other reference documents are also changed to reflect the differences.

Coordinator of Edgewood Arsenal's Lessons Learned Program is Archie L. Handy of the Plans and Readiness Operations Office. He noted that lessons learned should reflect actual experiences in which problems are solved in a manner not ordinarily used.

"This is how they differ from suggestions," he explained, "because a suggestion does not always involve actual implementation of the solution, while a lesson learned item does. Such lessons learned should be documented while they are still fresh in the originator's mind."

Employees at the action officer level —project engineers, contract negotiators and the like—are considered most likely to encounter problem situations where they can apply innovations to come up with solutions not covered by existing guidance.

Each item is evaluated by a Lessons Learned Committee composed of representatives from the arsenal's six national mission directorates, the Office of the Comptroller and the Office of Customer Relations and Commodity Management.

If the committee believes the Lesson Learned has possibility for broader applications or that the item requires higher-level action, the idea is referred to the Munitions Command Lessons Learned Committee.

A special certificate will soon be available for each employee submitting a Lesson Learned item. Acceptance of an item may lead to recognition for the submittor under the Incentive Awards Program.

Picatinny Lab Develops Squib Energy Measuring Device

How much energy is required to detonate an explosive squib to activate mines is no longer difficult to measure accurately in "real" time—i.e., when it is happening. The energy can be determined precisely with a new system at Picatinny Arsenal.

Single short-duration pulses of electrical energy can be measured while they are flowing through the circuit with a device developed by Victor Kwast, an electrical engineer in the Ammunition Engineering Directorate.

Practically every day engineers face this problem: How much electrical energy does a squib (usually about the size of a pencil eraser) consume prior to detonation? The squib resistance varies much like that of a light bulb, i.e., low when cold, high when hot.

Victor Kwast

Kwast's instrumentation technique time-integrates the instantaneous voltage across the squib multiplied by the instantaneous current through the squib for the total duration of the energy impulse.

The energy value is presented in milliwatt seconds on a digital readout with an over-all accuracy of one percent. In addition, by replacing the squib with a standard register, a measurement of the energy delivered by a generating source results.

A design data package is being prepared for Kwast's device, which it is estimated can be produced for about $500. Indications are that it will find wide use as an R&D evaluation tool. It is expected the device will prove of worth in the quality acceptance testing of electrical detonators and various generators used to initiate mines and rockets.

Kwast earned an electrical engineering degree in England at the Imperial College of Science and Technology, and came to Picatinny after 10 years experience with Weston Instruments, Inc.

SCIENTIFIC CALENDAR

2d International Reliability/Quality Control Seminar, Niagara Falls, Ontario, Canada, Apr. 12.

10th Structures, Structural Dynamics and Materials Conference, sponsored by ASME and AIAA, New Orleans, La., Apr. 14–16.

International Engineering-Educational Conference, sponsored by ASM, Metals Park, Ohio, Apr. 14–17.

Conference on the Physics of Liquids, Norwich, England, Apr. 15–18.

Structural Dynamics and Aeroelasticity Specialist Conference, sponsored by AIAA, New Orleans, La., Apr. 16–17.

Geoscience Electronics Symposium, sponsored by IEEE, Washington, D.C., Apr. 16–18.

Conference on Switching Techniques, sponsored by IEEE, London, England, Apr. 21–25.

Solid State Chemistry Conference, Scottsdale, Ariz., Apr. 21–25.

23d Annual Meeting of the Research and Development Associates, Inc., West Point, N.Y., Apr. 22–24.

7th Symposium on Nondestructive Evaluation of Components and Materials in Aerospace, Weapons Systems, and Nuclear Applications, San Antonio, Tex., Apr. 23–25.

1969 Army Numerical Analysis Conference, sponsored by ARO–D, Washington, D.C., Apr. 24–25.

1969 International Conference on Thin Films-Structure Sensitive Properties, sponsored by ARO–D, Boston, Mass., Apr. 28–May 2.

15th National Symposium, sponsored by SAMPE, Los Angeles, Calif., Apr. 29–May 1.

Natick Earth Sciences Laboratory Reports Southeast Asia Environmental Research

By Dr. William C. Robison

Five studies to increase knowledge of the environment of Southeast Asia, conducted by the Earth Sciencies Laboratory (ESL) at Natick, Mass., are nearing completion under Project PROVOST (Priority Research Objective for Vietnam Operational Support).

Funded substantially by the Office of the Chief of Research and Development, HQ DA, the studies follow precedents established in previous work by the ESL, such as the *Climatic Atlas of Southeast Asia*, published in December 1965, and the *Clothing Almanac for Southeast Asia*, published in January 1966.

Results of the first of the PROVOST studies were published recently as Technical Report 68–39–ES under the title, *The Food Geography of Mainland Southeast Asia*. Based largely on research accomplished by Dr. Jacques May, under contract with the Army, findings of this study were first reported in *The Ecology of Malnutrition in the Near and Far East*, published by Hafner and Co., New York. This was one of a series of studies conducted by Dr. May, a world authority on food geography and the ecology of malnutrition.

In the new technical report, Dr. May's findings were updated and supplemented by the published research of other scholars in this field. Results offer tentative answers to such questions as: How much food is available in the various countries of mainland Southeast Asia? What is the typical diet of the indigenous people? Are starvation and malnutrition widespread? Is sufficient surplus food produced in any of these countries to provide a source for military forces or must all food for such forces be imported?

Findings of the study are presented in a concise text, tables and a series of maps showing the agricultural regions and distribution of the principal crops in the various countries of Southeast Asia.

Conclusions of previous contract studies on the distribution of medically important insects and other arthropods in Southeast Asia have similarly been drawn upon in another recent publication, Technical Report 69–28–ES. This report concentrates attention on the environmental conditions that affect the distribution of various disease vectors and other troublesome insects.

Designed primarily for nonspecialists, the report deals with the type of vectors that may be found in particular parts of Southeast Asia and with the protective measures required against them.

Individual species of disease vectors are commonly associated with particular types of habitat—villages or towns where there are concentrations of population; rice fields where there is standing water; or forested mountains where there are few people. Each species is likely to have a distinctive environment where it is prevalent.

Technical Report 69–28–ES shows the relationship among harmful insects, ticks and other arthropods; also, the distribution of the habitats in which each is found. Relationships are highlighted by a series of physiographic diagrams showing, in a semi-pictorial way, where such habitats are found along a series of cross-sections through mainland Southeast Asia.

A third study nearing completion under Project PROVOST is a series of thematic maps, showing relationships between environmental conditions and selected military activities. The first of two general types of maps relates environmental conditions quantitatively to the capabilities of soldiers who are subjected to various types of stress in the field.

For example, drinking water requirements under given conditions—as determined by physiological studies

Army Unit Equipped With Rome Plows for Vietnam

Fantastic land-clearing feats of the legendary Paul Bunyan, the gigantic lumberjack, and of Babe, his mammoth blue ox—progressively embellished in tall tales told by woodsmen to while away winter nights in pioneering times—may be rivalled by a new Army unit equipped with 30 Rome KG Plows.

Known as the Engineer Land Clearing Company, the recently organized unit is being established under a Table of Organization and Equipment prepared by the Engineer Agency, U.S. Army Combat Developments Command, Fort Belvoir, Va. It will be activated in Vietnam from other units presently stationed there.

Huge trees topple quickly under the assault of the Rome Plow, named after the Georgia city where it is built. Mounted on a crawler tractor, the plow has a special blade armed with a "stinger," or protruding metal spike, with which the operator splits large trees.

Using this rail-splitting technique —inching the tractor forward as the stinger drives in more deeply—the operator makes several splits until the tree is weakened enough to be sheared off at ground level.

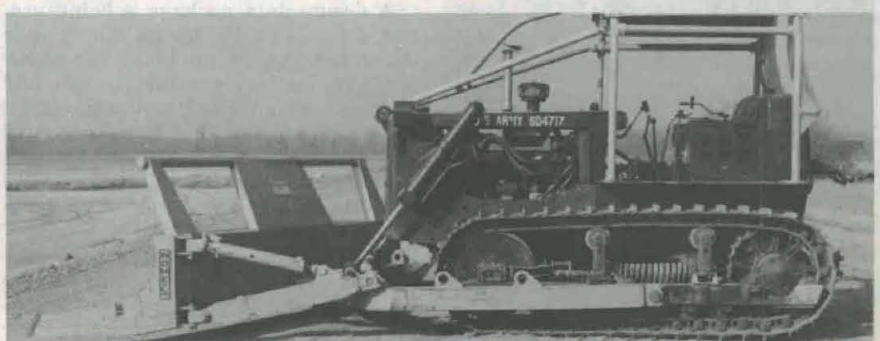
The tractor operator is protected by a steel cab. A guide bar helps direct the direction of the fall of the tree for further protection of the operator. Each plow is capable of leveling from one to two acres an hour, depending on the density of the jungle.

For lighter growth a chain is attached between two tractors, acting like a giant scythe leveling 300 feet swaths of growth as they move forward. In clearing operations, a heavy disc harrow is used to retard regrowth.

The company is organized with three platoons and two shifts of tractor operators are used during daylight clearing operations. It is also equipped with a retriever to move disabled tractors, and 12 tracked carrier vehicles for transporting men and equipment.

One of the advantages of the Rome Plow is that it leaves no holes, or mounds of dirt for the enemy to use as cover and concealment in carrying out its mission of clearing or destroying jungle-like growth.

Clearing of jungle in areas near friendly installations improves security by providing observations and fields of fire, and reduces ambush probability along lines of communication.



Rome Plow With 'Stinger' protruding at lower left of the blade.

in the Army Research Institute of Environmental Medicine at Natick—were applied to known conditions of temperature and humidity during the hottest month in Southeast Asia to produce a map of estimated drinking water requirements for troops.

Other maps in this category show daylight assault tolerance times predicted to the point of given percentages of heat casualties in the most stressful month, and the number of months with expectancy of conditions for promoting severe microbiological deterioration of materiel.

The second category of thematic maps depicts the distribution of various types of environmental conditions that have an importance to military activities, but which are not readily converted to quantitative terms. These maps treat such themes as population density, distribution of minority groups, distribution of ethnolinguistic groups, distribution of various regimes of rice growing, and the relationship between vegetation and visibility.

All maps in this second folio are experimental. They are designed to explore the possibility of depicting significant environmental information in new ways.

The folio is not intended as a comprehensive treatment of the environment of Southeast Asia. Rather it suggests a number of approaches to the portrayal of environmental information in ways that are meaningful to military users—some in terms of the limiting effect on a military activity.

The fourth area of study has to do with determination of regions of climatic analogy within Southeast Asia; also, among the various parts of Southeast Asia and other areas used for tropical testing of materiel.

Earlier studies of climatic analogs, conducted in the Earth Sciences Laboratory in cooperation with the Corps of Engineers under the MEGA Project (Military Evaluation of Geographic Areas), were based primarily on the occurrence of mean values of various climatic parameters during the most stressful month.

The current study carries such comparisons a step or two further by analyzing the probability and frequency of occurrence of extreme levels of temperature and rainfall intensity.

Analysis of these conditions, both in Southeast Asia and in the test areas of the Canal Zone in Panama, is expected to make available more precise information on Southeast Asia. Determinations should aid in the evaluation of Army Tropical Test Center efforts.

Finally, a quantitative study of landforms in Southeast Asia has been conducted to provide a contribution toward eventual delimitation of parameters used for specifying design criteria of materiel.

A start was made toward establishing a methodology for such delimitation and obtaining some basic quantitative data, by field surveys conducted in five different landform types in Thailand.

Field measurements are being tabulated and profiles of the traverses have been plotted for publication later in FY 1969. Field photographs will complement quantitative and descriptive material in the report.

These five studies have in common their regional focus on Southeast Asia; also, their concern with the acquisition of environmental information and its application to the needs of military users.

This responsiveness to current and long-range military needs has been the Earth Sciences Laboratory (ESL) mission since its inception during World War II as the Environmental Protection Section in the Office of the Quartermaster General.

The use of geographic data and techniques in establishing realistic requirements for the design, testing and issue of equipment has been developed as a unique capability within the ESL and its predecessor organizations. Since 1964 the ESL has continued as an Army Materiel Command element.

Dr. William C. Robison is Chief, Geography Division, Earth Sciences Laboratory, U.S. Army Natick Laboratories, where he has been employed since 1953, except for an appointment (1962–1964) as a lecturer in geography, University of New England, Armidale, New South Wales, Australia.

U.S. Government agencies where he formerly was employed include Economics, Department of Agriculture, and the Research and Development Field Office, Office of The Quartermaster General, Cameron Station, Va. He also worked with the Pacific-Alaska division of Pan-American World Airways. A veteran of World War II, he served in Australia and New Guinea.

Dr. Robison received an AB degree from the University of California at Los Angeles, MA degree from the University of California at Berkeley, and his doctorate at Boston University.

Author of numerous published reports and papers, he is a member of the American Geographic Society, the Association of American Geographers, and the Scientific Research Society of America (SRSA).

Dr. William C. Robison

Lt Col Baldwin Assigned as MERDC Deputy CO

Lt Col Jess E. Baldwin has been assigned as deputy commanding officer to the U.S. Army Mobility Equipment R&D Center (MERDC), Fort Belvoir, Va.

A recent graduate of the Armed Forces Staff College, he began his military career in 1953, was commissioned through Officer Candidate School at Fort Belvoir in 1954 and was integrated into the Regular Army in 1956 after serving two years at the Army Engineer School.

He received a BS degree in civil engineering from the University of Texas in 1953 and earned an MS degree from Iowa State University in 1962. He attended the Army Aviation School in 1957. In 1953, he completed the Engineer Officer Career Course at Fort Belvoir, and the Aviation and Missile Safety Course, University of Southern California.

Lt Col Jess E. Baldwin

Major assignments have included service at the U.S. Army Engineer District, Far East, Taegu, Korea (1963–64); Federal Aviation Agency (1964–67); 173d Assault Helicopter Company in Vietnam (January-April 1967) and HQ U.S. Army in Vietnam (April 1967-January 1968). He was assistant chief of staff for Force Development, HQ DA, from February to July 1968.

Lt Col Baldwin's awards include the Legion of Merit, Air Medal with Oak Leaf Cluster with "V" Device, Army Commendation Medal with Oak Leaf Cluster, Good Conduct Medal, National Defense Service Medal with Oak Leaf Cluster, and Vietnam Campaign Ribbons.

USATACOM Heat Pipe Research Points to Military Applications

By Capt Philip B. Scheps

Transfer of heat is an efficiency factor of continual concern to automotive systems designers. Any process that involves the transformation or transportation of energy is subject to nature's conspiracy against total efficiency; an energy tax must be payed in the process.

Frequently, the result is unwanted heat, dispersion of which becomes an important consideration. Military vehicles are expected to operate reliably in high- and low-temperature extremes—a requirement that can be met only by extracting or delivering heat to the key areas of a power plant, weapons system and crew area.

Furthermore, electronic equipment must be ventilated; cylinder heads must be cooled; transmission heat must be dumped; gun-tube temperature must be uniform from top to bottom, and so on. The list is as long as the number of vehicle subsystems. The search for methods of moving and controlling heat is important theoretically and practically in vehicle engineering.

The Physical Science Laboratory at the U.S. Army Tank-Automotive Command (USATACOM) is studying a device that combines well-understood physical phenomena to accomplish highly efficient transfer of heat. Early in the investigation it became apparent that the potential application of this device, known as the "heat pipe," was great in the areas of interest to military planners and problem-solvers.

Demonstrated capabilities of the device are impressive. It can operate with an effective thermal conductivity of several hundred times that of the best solid heat conductors. Furthermore, it seems to be dependable, rugged and simple. Heat transfer can be in magnitudes up to 10,000 watts.

The heat pipe is depicted in Figure 1 in cylindrical form, although various shapes have been designed and tested. The device is an evacuated pipe, the inside surface of which is covered with a capillary structure. This structure, or wick, may be a screen wire, fiberglass, woven cloth, longitudinal grooves or another one of the growing list of possible structures chosen for its compatibility with the other elements of the pipe and for maximum pumping capability.

The capillary wick is saturated with a working fluid before the pipe is sealed. Working fluid is evaporated from the inside surface of the wick, driven to the condenser by the internally developed pressure differential and condensed to a liquid form. Once the fluid is reabsorbed by the wick, it is pushed by capillary action back to the evaporator, completing the cycle.

Basically a gravity-independent reflux condenser, the heat pipe achieves its thermal transport capability by making use of the heat of vaporization of the working fluid. But in a heat pipe, there is an additional element—the capillary action of the wick performs as a pump to return the condensate, and it will cause the fluid to move against gravity.

One of the key characteristics of the heat pipe is its ability to operate isothermally. The fluid absorbs energy at the temperature at which it vaporizes, and delivers it at this temperature. This accounts for the high values of effective thermal conductivity, since large quantities of heat may be transferred without the great temperature difference needed to drive heat through solid materials.

Separation of evaporation and condensation activities also gives the heat pipe a transformer action, whereby heat may be accepted at a large energy density and delivered at a smaller energy density by controlling the evaporator and condenser areas.

CAPT PHILIP B. SCHEPS is serving a 2-year tour of duty as a physicist at the U.S. Army Tank-Automotive Command, Warren, Mich. He received a bachelor's degree in physics from Tulane University and an MA degree from the University of Texas.

The working fluid and the wick material are the elements whose properties influence most the over-all behavior and efficiency of the pipe. The fluid should be of low viscosity to minimize drag, and low density to reduce gravity effects. The latent heat must be large since this will determine the amount of heat that the material will accept on vaporization.

Surface tension and vapor pressure are important design parameters. Surface tension determines the pressure available for capillary pumping, and the vapor pressure characteristics determine the degree of isothermal operation that can be achieved. Walls of the pipe obviously should be thin and highly conductive.

Interest of engineers in heat transfer within military vehicles stems partially from the requirement that these vehicles operate reliably in tropic as well as arctic regions. Failures in Southeast Asia due to overheating attest to the fact that this is a key area for further research. Moreover, many unsolved problems exist in vehicle winterization and crew comfort.

Investigations at USATACOM have taken the approach of finding a problem to fit a solution. Winterization was selected as the area most suited to a heat-pipe system because the problem frequently boils down to one of heat distribution. Heat is normally available in the form of gasoline or multifuel heaters, but delivering it to target areas usually re-

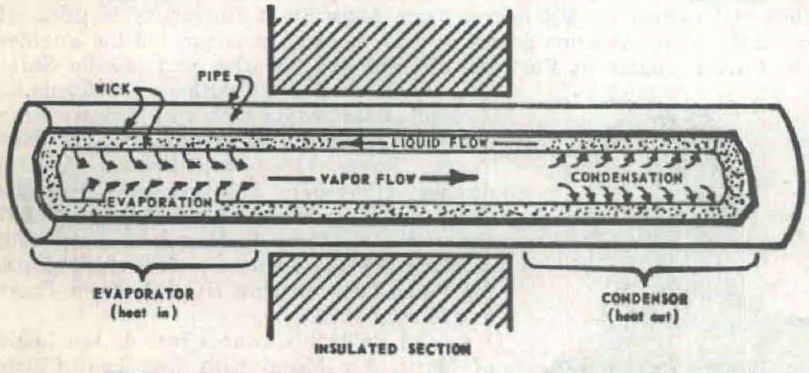


Figure 1. THE HEAT PIPE is basically a gravity-independent reflux condenser with a capillary structure or wick to provide return of the working fluid to the evaporator. This device can exhibit an effective thermal conductivity 500 times that of the best solid-heat conductors, tests to date show.

quires several stages of heat exchangers and ducts, resulting in inherent heat losses. The heat pipe is ideally suited for delivering heat to inaccessible, isolated areas.

The cold-weather starting problem begins at the battery, whose capacity to accept and deliver energy is virtually zero at arctic temperatures. A weakened battery, coupled with a cold engine with its sluggish lubrication, makes some form of preheating a necessity.

Present schemes at least partially successful make use of the stand-by heating or the quick-heating methods. Applied to liquid-cooled vehicles only, the stand-by method uses a heater for the engine's coolant and continually circulates it through the power plant and beneath the battery in a heat-exchanger pad. This method works well for keeping a vehicle in a ready-to-start condition for short durations, but cannot efficiently heat an initially cold vehicle.

The object of the quick-heating method is to bring a cold-soaked vehicle from −65° F. to a temperature at which it will start. Normally, one hour of preheating is the maximum allowable. Several quick-heating procedures have been tried. One of these, known as the "external" method, involves ducting heated fresh air to key battery and power plant areas.

Other techniques have been used for quick heating of batteries, including the use of electric cartridge heaters (and even steam pipes) in the sediment space below the plates; alternating current passing through the electrolyte; and electrical filaments incased in the rubber battery case.

These "internal" methods were successful from the standpoint that each could outheat the external or hot-air approach. Adversely, each required a source of power other than the heaters already available on board.

Figure 2 compares typical internal and external heating of the battery electrolyte. It can be seen that the hard rubber battery case is an excellent insulator. The heat pipe offers a means of short-circuiting the high thermal resistance of the battery case, and delivering the energy internally without the use of an extra power source.

Figure 3 shows a heat pipe mounted in the sediment space of a battery and thermally connected by a fin arrangement to the heated airstream. It should be emphasized that the heat pipe conducts heat along its own length with high efficiency. But the problem of getting the heat into and out of the pipe is a classical one, and can be the limiting factor in the thermal path in some situations.

Adaptability to military needs requires the heat pipe to satisfy several important requirements, not the least of which is that it be relatively inexpensive. The materials are potentially as inexpensive as a piece of pipe, a piece of screen, and a small amount of working fluid, which can be water in many practical situations. (The choice of the working fluid, is determined by the temperatures of the source and sink.)

Construction of the device, however, is still rather expensive, due to the extreme cleanliness required to prevent impurity gases from participating in the heat transfer cycle. These impurities tend to build up in the condenser, thus effectively limiting the area available for heat transfer.

Dependability of the pipe is well documented. Some have operated for as long as 20,000 hours with no degradation. Total elimination of noncondensible gases is the prerequisite for long life. On board a vehicle, severe vibration might be experienced, yet tests have indicated that the heat pipe transfer capability is increased rather than hindered by vibration. The pipe is fully enclosed and requires no energy source other than the thermal energy it transfers.

With increased understanding of the mechanisms involved in the heat-pipe cycle and a greater inventory of compatible fluids, wicks and containers, applications of the device to automotive systems will surely multiply. The research activities of many organizations, both government and industrial, are continually opening up new paths for potential uses. Further utilization of the versatile heat pipe depends upon the creative imagination of the design engineers.

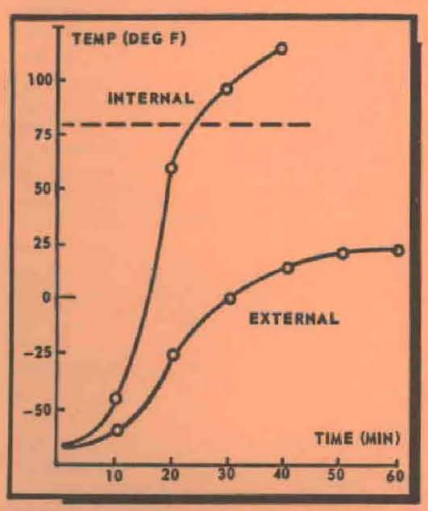


Figure 2. INTERNAL HEATING of storage battery electrolyte can substantially increase operational efficiency for quick starting. In the USATACOM experiments the heating was accomplished electrically with a 100-watt cartridge. The external heater was a stream of heated air from a heater rated at 17,000 watts. Dashed line represents optimal heat.

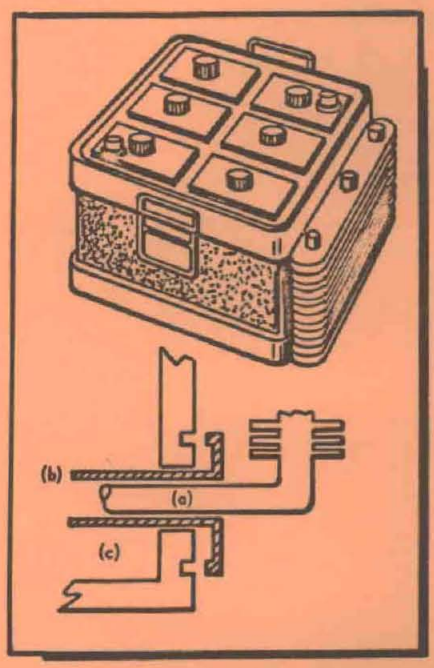


Figure 3. STORAGE BATTERY HEATING is accomplished by mounting a finned, L-shaped heat pipe (a) in a lead-sheathed cartridge (b) which is located in the sediment space (c).

OH–6A 'Copters Oil Tanks Get Self-Sealing Protective Coat

Bullet holes in 1,000 of the U.S. Army's OH–6A helicopter oil tanks should become self-sealing in the future with the installation of a coating material designed to help more pilots return from missions.

Vithane synthetic rubber, developed by the Goodyear Tire and Rubber Co., is described as highly tear-resistant, self-sealing when punctured by small-arms fire, and a strengthening factor that helps to prevent oil tanks from rupturing under the impact of a projectile.

Vithane also is used in the manufacture of rubber fuel tanks and as a ballistic-protection coating for aircraft fuel lines and metal fuel tanks.

Application of the protective material to the oil tanks of the 1,000 Hughes-manufactured OH–6A helicopters is being done in Litchfield Park, Ariz. Lack of oil caused by a bullet hole in the tank can put a helicopter out of commission in minutes.

Army Tests UHF/SHF Experimental Ground Terminals With TACSAT I Satellite in Joint Services Program

(See story on p. 11)

Four Army terminal configurations are incorporated in the UHF/SHF network used by the military services, along with the TACSAT 1 satellite, in evaluating a tactical satellite communications system intended to satisfy a critical need of U.S. combat forces.

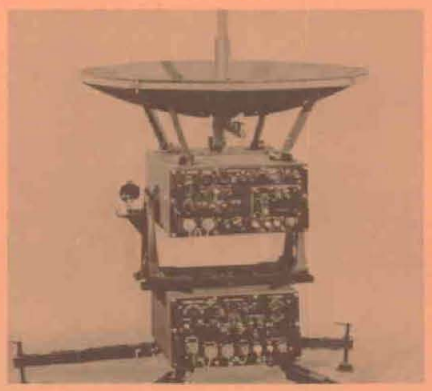
Shown on this page are the manpack devices for receiving only, terminals that break down into packages for backpack by teams, jeep-mounted terminals, and ground shelters that are transported by truck or aircraft.

AN/TRR–32 (UHF) "receive-only" terminal is the Army's newest and smallest satellite communications terminal. The antenna, receiver and alert-message demodulator are housed in a case 8 inches wide, 17 inches long and 2 inches high.

AN/TRC–157 (UHF) ¼-ton truck-mounted terminal currently under test provides for voice, teletype and alert-message-receive capability. The 7-foot short-back-fire antenna is stowed away out of sight in transit.

AN/TRC–156 5-foot short-back-fire antenna, receiver-transmitter, alert receiver and battery power source.

AN/TRR–30 (SHF) "receive-only" terminal, plus batteries, weighs only 35 pounds. The subsystems are housed in a case 15½ inches wide, 16½ inches long and 10 inches high.



AN/TSC–79 "team pack" terminal showing 3-foot parabolic antenna and SHF transceiver and battery.

AN/MSC–57 (SHF) equipment provides for voice and teletype plus an alert message capability. The 3-foot parabola antenna, with hand-operated controls for elevation and azimuth adjustment and MSC–57 equipment, is jeep-mounted; engine generator and fuel are transported in trailer.

AN/TSC–80 ¼-ton truck-mounted terminal can be off-loaded and is air-transportable. SHF equipment provides voice and teletype communications plus an alert message capability. The antenna is a 4-foot parabola, with hand-operated controls for elevation and azimuth adjustment.

AN/MSC–58 terminal provides UHF communications capabilities. The 7-foot short-back-fire antenna is stowed out of sight during transport.

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