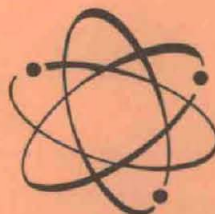




# ARMY RESEARCH AND DEVELOPMENT



MONTHLY NEWSMAGAZINE OF THE OFFICE OF THE CHIEF, RESEARCH AND DEVELOPMENT  
Vol. 3, No. 11 November 1962 • HEADQUARTERS, DEPARTMENT OF THE ARMY • Washington 25, D.C.

## 23 Army Task Units Spur Development of Program On Technical Information

Delineation of a comprehensive Scientific and Technical Information Program for Army research and development requirement is receiving high priority attention to meet a Department of Defense Dec. 17 deadline.

Deputy Secretary of Defense Roswell L. Gilpatric issued instructions in a multiple addressee letter to all governmental R&D agencies to prepare corresponding programs by Dec. 17. Responses are to be consolidated by Jan. 1.

Objective of the intensive overall effort is the formulation of an integrated DOD scientific and technical information program designed to minimize deficiencies compounding from the worldwide "scientific explosion."

Criticism has concentrated in recent months in hearings conducted by the Senate Subcommittee on Reorganization and International Organizations, spear-headed by Senator Hubert H. Humphrey, Chairman.

An estimated \$1 billion annually is  
(Continued on page 6)

## Army Announces Incentive Contracts Program To Improve Materiel, Reduce Lead Time, Costs

Multiple benefits in development and production of military materiel are envisioned through Army-wide changeover to incentive-type contracts. Objectives: Reduction in lead time and costs; improvement in performance.

Preparations for the transition from cost-plus-fixed-fee to incentive contracts have been intensive and broad in recent months. Among actions have been 41 two-day seminars conducted at key locations nationwide by the Army Logistical Management Center, Fort Lee, Va, in which 2,000 procurement personnel have received training.



Dr. Ralph G. H. Siu, newly appointed Army representative to the Armed Services Procurement Research Specialists Committee. (For details, see page 5.)

Announcement that the incentive-type contract program now is ready for full-scale implementation was made Oct. 22 at a high-level briefing in the Pentagon at Washington, D.C.

Attendees included Commanding Generals of the U.S. Army Materiel Command and the Combat Developments Command, Assistant Secretary of the Army (R&D) Dr. Finn J. Larsen, Army Chief of Research and Development Lt Gen Dwight E. Beach and his deputy and directors, Deputy Chief of Staff for Logistics Lt Gen R. W. Colglazier, Jr., and Maj

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## Army Researchers Share in Isolating German Measles Virus



Walter Reed Army Institute of Research Medical Corps officers review data amassed in 2-year research project that culminated in the isolation of German measles virus. Left to right are Lt Col Edward L. Buescher, Chief of the Institute's Department of Virus Diseases, and his associates, Capt Paul D. Parkman and Capt Malcolm S. Arntstein. (See story on page 4.)



Vol. 3, No. 11 November 1962

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Published monthly by the Army Research Office, Office of the Chief of Research and Development, Department of the Army, Washington 25, D.C., in coordination with the Technical and Industrial Liaison Office, OCRD. Grateful acknowledgement is made for the valuable assistance of Technical Liaison Offices within the U.S. Army Materiel Command, the U.S. Army Combat Developments Command and the U.S. Continental Army Command. Publication is authorized by AR 310-1, dated 15 May 1956.

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

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**Submission of Material:** All articles submitted for publication must be channeled through the technical liaison or public information officer at installation or command level.

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

**DISTRIBUTION** is made automatically each month based on requirements stated on DA Form 12-4, permitting changes as necessary.

Distribution requirements for the Office of the Secretary of the Army, Under Secretary of the Army, Assistant Secretary of the Army (R&D), Chief of Staff, Chief of Research and Development, and Chief of Information will be submitted by the Office of the Chief of Research and Development.

All other Department of the Army agencies should submit their requirements through channels to the Army Publications Distribution Center servicing them.

Changes in requirements of other Government agencies should be submitted directly to the Army Research Office, OCRD, Department of the Army, Washington 25, D.C., ATTN: Scientific Information Branch.

**SUBSCRIPTIONS.** Public sale of this publication is authorized through the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D. C. Single copies sell for 20 cents. Subscription rates (12 copies annually) are: Domestic (including APO and FPO addresses), \$2.25; Foreign, \$3.00.

## American Education Week

WHEREAS the outstanding accomplishments in the field of science and technology, especially in space exploration, electronics, peaceful use of atomic energy, and medical research, stagger the imagination and clearly and dramatically demonstrate the need for unceasing efforts to improve and expand our educational systems and educational facilities; and

WHEREAS the ever-increasing complexities of modern-day living constantly challenge our ingenuity and compel us to set higher standards of educational achievement to meet that challenge and to assure national progress; and

WHEREAS the efforts of our Nation's schools and colleges to provide the education and leadership required to preserve both freedom and peace, and to assure a full and abundant life for all people should be expressly recognized:

NOW, THEREFORE, I, JOHN F. KENNEDY, President of the United States of America, do hereby designate the period from November 11 through November 17, 1962, as American Education Week. I urge all citizens to give special attention during that week to the aims and purposes of education and the programs and problems of our schools and colleges. We should examine the quality of our educational institutions and assess the degree to which our educational programs and practices serve the interests of the individual and bring vitality and strength to our Nation and its culture. Every American should be fully committed to the advancement of education.

IN WITNESS WHEREOF, I have hereunto set my hand and caused the Seal of the United States of America to be affixed.

DONE at the City of Washington this seventeenth day of September in the year of our Lord nineteen hundred and sixty-two, and of the Independence of the United States of America the one hundred and eighty-seventh.

JOHN F. KENNEDY

*By Order of Secretary of the Army Cyrus R. Vance, Army Chief of Staff General Earle G. Wheeler issued a National Education Week proclamation that stated, in part:*

*"Military training within the Army has been supported and enriched through close cooperation with officials of civilian school systems, colleges, and universities. It is considered appropriate that the Army respond to the President's Proclamation with expressions of appreciation for the support given to Army training through the opportunities offered by civilian educational institutions. . . . It is considered particularly appropriate that the Army's program of General Educational Development be accentuated during this period. . . ."*

## HEW Report Puts Army Educational Level at Peak

U.S. Army officer and enlisted personnel have achieved an all-time high of educational and professional competence, statistics from a U.S. Department of Health, Education and Welfare report indicate.

Responsible for this highly desirable trend, Army leaders believe, are: 1) increased attractiveness of an Army career to higher caliber personnel, and 2) realization of Army personnel that they must constantly improve their educational level and professional competence to keep up with the increasing complexity of modern weapons and materiel.

How improvement of Army manpower through education has kept pace with the improvement of weapons and equipment since the Korean War is shown in these statistics:

- During Fiscal Year 1952, 34.1 percent of Army enlisted men were high school graduates; by FY 1962 this figure was 59.0 percent. The national level of high school graduates is 26.3 percent.

- During the same period, the level of college graduates among Army officers rose from 45.8 percent to 50.2 percent. The national total college graduates is 4.5 percent of the population.

- Almost 20 percent of all Army officers have completed graduate study, as compared to the nationwide total of 2.3 percent.

- During FY 1962 more than 12,000 Army personnel studied on their own time to earn high school credits, and more than 27,000 enlisted men and officers studied at the college level. Their efforts resulted in the award of 547 bachelor's degrees and 232 graduate degrees during the year.

The Army's own school system produces highly trained specialists in subjects ranging from armored vehicles to Nike Zeus missiles, but many soldiers are not content to end their training with graduation. In FY 1962 almost 47,000 soldiers participated in off-duty training aimed at supplementing Army schools and increasing their proficiency.

# Army Announces Program of Incentive-Type R & D Contracts

(Continued from page 1)

Gen James Richardson, Director of Procurement, Office, Assistant Secretary of the Army.

Many other briefings have been held in recent months for Army staff personnel and procurement employees of major Army agencies, including project managers. Under the new U.S. Army Materiel Command concept of operations, project managers are encouraged to seek authority to take whatever action is considered necessary to shorten the research, development and production cycle.

Basic information on the new program is provided in a Department of Defense "Incentive Contracting Guide," which has been widely distributed, and in Department of the Army Circular 715-2-1 dated Apr. 5, 1962. Additional instructions have been issued in a revision of the Armed Services Procurement Regulation and by the Office, Secretary of Defense.

Charged with overall responsibility for implementation of the incentive-type contracts program is Col Wilford D. Gower, who succeeded Col Wilson R. Reed as Chief of the Policy Division, Office of the Chief of Research and Development on Oct. 15.

"Incentive contracting," Col Gower explained at a recent briefing, "embodies the concept of procurement which harnesses the profit motive. Therefore, the incentive contract challenges industry to assume risks in order to earn a higher profit, the environment in which industry operates. Thus, the incentive contract is a challenge to the free enterprise system."

Among objectives outlined are:

- Motivate contractors to perform more economically, efficiently and effectively.
- Provide a means of reward for outstanding performance which meets or exceeds stated targets, as well as providing a basis for penalizing substandard performance which does not meet the established criteria.

- Provide for risk sharing between the contractor and the Government.

The incentive contract, Col Gower said, provides for the identification of the risk, that is, the technical problem areas in which the state-of-the-art and cost estimates are weak. When apprised of the risks, contracting parties are in a position to negotiate a profit factor appropriately weighted for the accomplishment or failure to meet established goals.

In that the system stimulates and improves planning and cost estimating, it appeals most to organizations best prepared for this phase of contracting.

Critical factors in the negotiation of incentive contracts are time, cost and performance. Normally a balance of these factors is involved, with the emphasis on cost, but variable requirements may place a premium on time-saving production or upon particular performance needs.

Contracts for basic research, it is recognized, offer little opportunity for rewards or penalties. Primary areas for application of incentive contracting are in major programs and systems development.

Essential to successful incentive contracting, it was explained in a recent briefing, is a clear conception of goals, that is, as firm an understanding as practicable of the precise conditions covering extra profit or penalty clauses.

Cited by Col Gower was an example of a contract involving factors of performance, reliability, speed, weight, accuracy, production and cost under which a contractor might make \$12 million or lose \$6 million on a \$70 million contract. Another example presented the possibility of a profit of 17.7 percent maximum or 1.7 per-

cent minimum based on actual cost dropping below the target cost, thereby permitting a profit in excess of 15 percent.

By way of an interesting sidelight on the early origins of incentive contracting, he recalled the case of the Wright Brothers contract for development of the first airplane. It provided for a reward or penalty based on 4 miles above or below 40 miles an hour capability. The aircraft attained a speed of 41.5 m.p.m., and the fee of \$28,750 was paid on a \$25,000 contract.

Maintenance of a high degree of scientific and technical competence within Government research and development agencies consequently becomes a prime responsibility to insure that planning and cost estimating do not permit negotiation of incentive clauses that would give contractors exorbitant profits.

As explained by Col Gower, the incentive type contract puts the emphasis on the best possible management practices with Government research, development and procurement personnel—to insure that the Government gets the maximum return for the taxpayer's dollar—and within industry to insure that a fair profit is realized in the production of the type of military materiel that best serves the Nation.

## AMC Insignia Symbolizes Army-Industry Role

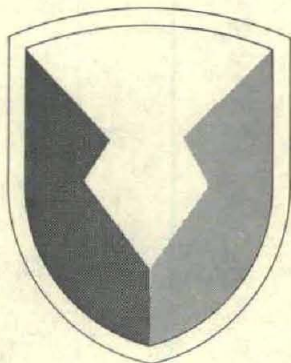
Twenty thousand military personnel of the U.S. Army Materiel Command are authorized to wear a newly adopted shoulder sleeve insignia symbolical of the joint role of the Army and American industry in national defense. Issue to troops and sale

through post exchanges is not expected until 1963.

The red, white and blue shield also will be used by the AMC as a decorative identifying symbol. Its heraldic description is: "On a shield 2½ inches overall in height, divided per pairly (three sections) white, red and blue, a white lozenge in fess (center) point all within a one-eighth inch white border."

The lozenge and the white area represent the command and control elements of the organization, with the red and blue areas used to represent the Army and industry, respectively. The white lozenge also symbolizes the flow of materiel through their combined efforts.

Largest and most complex new element created by the reorganization of the U.S. Army, the AMC consists of a nation-wide network of more than 250 military installations and activities engaged in developing, producing, supplying and maintaining weapons, equipment and other materiel.



■ RED ■ BLUE  
U.S. ARMY MATERIEL COMMAND  
SHOULDER SLEEVE INSIGNIA

## WRAIR, Harvard Scientists Isolate German Measles Virus

Isolation of the causative virus of German measles, making possible accurate diagnosis for the first time, was reported Oct. 24 as a concurrent discovery at Walter Reed Army Institute of Research and Harvard School of Public Health. Development of a vaccine for control is the next objective.

Working independently and using different methods, researchers at the renowned medical institutions published simultaneously appearing reports on their findings. An exchange of specimen cultures established positively their identical nature.

German measles is a serious problem for the military services, at times occurring in epidemic proportions, particularly among recruits, with resultant loss of personnel during intensive training periods. Rubella, its medical term, is distinctively different than ordinary measles, for which a vaccine already has been developed and is now being tested.

Ordinarily causing a rather mild illness, rubella is a much more serious disease for a pregnant woman, often resulting in deafness, blindness or heart disease in the unborn child.

Experiments directed toward isolation of the rubella virus was started by the Walter Reed and Harvard scientists late in 1960 and early in 1961. Reports of findings appeared together in the *Proceedings of the Society of Experimental Biology and Medicine*.

### Army Scientist Recognized for Help on 'The Bacteria'

Dr. Riley D. Housewright, Scientific Director of the U.S. Army Biological Laboratories at Fort Detrick, Md., is among outstanding scientists who have contributed to "The Bacteria," Volume III, "Biosynthesis."

Published recently by the Academic Press of New York and England, Volume 3 covers definitively the present knowledge of biosynthesis in bacteria. Dr. Housewright's article in chapter nine is titled "The Biosynthesis of Homopolymeric Peptides."

Covered in the book is the tremendous growth in understanding of biosynthesis phenomena in recent years based on studies with unicellular organisms. The last two volumes of the 5-volume set are due for early publication.

Scientific Director at Fort Detrick since 1956, Dr. Housewright is to be recognized for his contribution by the presentation of a complete set of "The

Doctors Thomas H. Weller and Franklin A. Neva of the Department of Tropical Public Health at Harvard described detection of the rubella virus by its direct effect upon human cells grown in the test tube.

The article by Doctors Paul D. Parkman, Edward L. Buescher and Malcolm S. Artenstein of Walter Reed Army Institute of Research described an indirect test, in which the virus was grown in monkey cell cultures and used to interfere with the growth of a second unrelated virus.

By adapting their techniques to measure antibodies against rubella virus in blood, both the WRAIR and Harvard groups developed the first specific diagnostic test.

Testing with virus obtained from throat washings of military patients at Walter Reed, researchers found that the virus, while growing in cells obtained from African green monkeys, failed to kill them. Infected cells remained normal in appearance.

When rubella virus infected cells were exposed to ECHO II virus, which usually grows and destroys normal cells, no evidence for destruction of the cells was obtained. This phenomenon, called interference, was used successfully to characterize rubella virus, to determine its significance in German measles in the military population from 1960 to 1962, and to devise a serological technique to identify persons susceptible to it.

Bacteria" for placement in the Fort Detrick technical library.



Dr. Riley D. Housewright

First reported in April 1962 at the meeting of the Federation of American Societies for Experimental Biology in Atlantic City, N.J., techniques of isolating the rubella virus have been confirmed in reproductions by other researchers into the cause of German measles. Among these are:

Dr. Dorothy Horstman, Yale University School of Medicine; Doctors Robert Green, George Mirick and Saul Krugman, New York University School of Medicine; Dr. Maurice Hilleman, Merck Institute of Therapeutic Research; Dr. George Veronely, University of Michigan School of Public Health; Doctors Frederick Robbins and Alfred Heggi, Western Reserve University; Drs. John Sever and Gilbert Schiff, National Institutes of Health, Bethesda, Md.; Drs. David Carver and K. Naficy, working in the laboratory of Dr. John Enders, Children's Hospital, Boston.

In the Boston studies, virus was recovered by inoculation of tissue cultures with the blood or urine of patients with German measles. The virus changes observable under the microscope were different than those caused by any of the known viruses. Further tests showed the change could be blocked by antibodies present in the blood of an individual after recovery from German measles.

That led to collection of blood specimens preserved in a frozen state as far back as 1949 for additional tests. Results showed that past epidemics at places such as St. Mark's School and Exeter Academy were caused by the rubella virus.

### AROD Appoints Dr. Davis To Metals, Ceramics Post

Dr. Henry M. Davis has been named Director of the Metallurgy and Ceramics Division, Army Research Office-Durham, succeeding Dr. Peter R. Kosting.

A native of Sherman, Tex., Dr. Davis received B.S. and M.S. degrees at the University of Oklahoma, and the Ph. D. degree at the University of Minnesota.

Since 1936 Dr. Davis has been a member of the faculty at Pennsylvania State University, serving in late years as professor of chemical metallurgy. He has had extensive experience as a teacher and research worker in the field of metallurgy and ceramics. His main interest is the field of gas-metal relationships, and the behavior of hydrogen in steel.

# Army Research Office Activates Advanced Technology Group

Activation of an Advanced Technology Group of the U.S. Army Research Office, in line with the reorganization plan for the Office of the Chief of Research and Development announced June 30, became effective Nov. 1.

Dr. Paul A. Siple, USARO Scientific Director, has been designated to double as Acting Chief of the new unit, assisted by Gregg H. McClurg, reassigned from the USARO Research Planning Division.

Approximately 10 key consultants will be selected to assist in the functions of the Advanced Technology Group (ATG). Three additional professional personnel will be recruited to supplement the initial staff. Selec-

tion will be based on managerial and organizational capabilities as well as recognized scientific talent.

The stated purpose of the ATG is:

- Provide an independent, objective group of experts to consult, advise, review, analyze, assess, collate, integrate, synthesize, interpret, summarize and report the most advanced scientific and technological state-of-the-art and its probable future capabilities and limitations.

- Publicize, distribute and present information to the Chief of Research and Development and his staff, to other Army staff, and to elements of major and subordinate commands as appears necessary and desirable.

- Catalyze effective interchange of information between the Army, industry, and the academic community (U.S. and overseas).

ATG staff representatives, in achieving the assigned mission, will visit research organizations and scientists throughout the country. The ATG will sponsor small group meetings and symposia and may negotiate small individual grants or contracts for development of a unique idea or approach to a problem, for review articles, or tutorial material needed to

interpret or present scientific ideas to the Army staff.

Activities of the ATG will cover all areas of science and technology which are of interest to the Army. Special attention is to be given to multidisciplinary or interdisciplinary subjects, especially where not covered adequately by major Army Commands.

Plans provide also for special attention to general subjects of particular importance to the feasibility of weaponry: systems engineering and theory, management science, reliability, human engineering, operations research, simulation techniques, etc.

The Group is to be concerned with improving the Army's in-house scientific and technological capabilities, access to scientific information, education and career planning for scientists, organization and facilities.

An accepted concept of ATG operations includes: "Provide general guidelines, information and recommendations for planning an overall Army research effort which will be optimally responsive to the Army's operational needs, present and future, and which will take into account the most advanced scientific and technological capabilities and potentialities."

## AMC's Dr. Siu Succeeds Dr. Weiss of USARO on ASPR Specialists Group

Dr. Ralph G. H. Siu, Scientific Deputy of the Research Division, Research and Development Directorate, U.S. Army Materiel Command, is the newly appointed Army representative to the Armed Services Procurement Research Specialists Committee.

Announcement of the appointment followed closely on the transfer of responsibility for providing the Army representative from the U.S. Army Research Office to the U.S. Army Materiel Command in mid-October.

Chief of Research and Development Lt Gen Dwight E. Beach addressed a letter to Lt Gen Frank S. Besson, Jr., Commanding General of the AMC, proposing the transfer—an unresolved detail of Army reorganization.

The Research Specialists Committee evaluates contractors' independent research and development programs within the provisions of the Armed Services Procurement Regulation (ASPR).

After discussion with other members, the Army representative is responsible for developing a composite evaluation of the programs of contractors for whom the Army is assigned the function of overhead rate negotiations.

Dr. Richard A. Weiss, Deputy and Scientific Director of the U.S. Army Research Office, has served in recent years as the Army representative to the Committee, with Harold Weiler as alternate and special assistant. Mr. Weiler departed recently to serve as Scientific Adviser in the new Regional Science Office, Latin America in Rio de Janeiro, Brazil.

## Federal Association Slates Founding Conference

A Federal Professional Association, open to all Federal administrative as well as technical personnel, and assured of more than 300 charter members, has scheduled a Founding Conference Nov. 28 in Washington, D.C.

The meeting will begin at 9:00 a.m. in the Departmental Auditorium.

Incorporated in the District of Columbia Apr. 30, 1962, the Association has as its stated purpose: "To foster high standards of professional service to the Government, and to promote the welfare of professional personnel in Government."

Vincent E. Jay is chairman of a founding committee that includes 15 prominent professional leaders. As of Nov. 1 the committee reported it had received applications for charter memberships from more than 300 persons in 25 states and overseas.

The Association will seek to achieve its objectives through a Nation-wide public education program designed to improve the image of the Federal Service, a news release stated. It will "sponsor research and develop-

ment of factual data" for distribution and for use in position presentations "to committees of Congress on the needs and desires of professional personnel in the Federal service."

Inquiries regarding the Association may be addressed to 500 Walker Building, 734 15th Street, N.W., Washington 5, D.C.

## Hinman Addresses Educators

W. S. Hinman, Jr., Deputy Assistant Secretary of the Army (R&D), addressed the Engineering Division of the Association of State Universities and Land-Grant Colleges on Nov. 12, in Washington, D.C.

The meeting's general theme was the relationship between the various branches of the Department of Defense and research activities in universities, particularly in engineering schools.

Samuel E. Clements, Office of Defense Research and Engineering and representatives of the Air Force and the Navy also made presentations.

# Starbird Takes Command of Defense Communications Agency

Lt Gen Alfred D. Starbird, new Director of the Defense Communications Agency effective Oct. 29, was promoted to 3-star rank Oct. 30, subject to confirmation when Congress reconvenes. DCA Headquarters is on South Court House Road, Arlington, Virginia.

Reassigned from Commander, Joint Task Force 8, conducting nuclear tests from Johnston Island in the Pacific, General Starbird relieved Rear Admiral William D. Irvin, who had headed DCA since it was established in June 1960. Admiral Irvin now commands the Service Force, Pacific Fleet.

Secretary of Defense Robert S. McNamara ordered General Starbird to his new duties approximately two months ahead of the date originally set. Named to other high DCA posts by Secretary McNamara Oct. 25 are:

Maj Gen J. B. Bestic, U.S. Air Force, Deputy Director, National Military Command System; Rear Admiral Frank Virden, U.S. Navy, Deputy Director, Communications Satellite

Project Office; and Brig Gen George P. Sampson, U.S. Army, Deputy Director, Defense Communications.

Graduated from the United States Military Academy in 1933, General Starbird served in various Corps of Engineer assignments and was a member of the U.S. Olympic Pentathlon Team before World War II.

Assigned to the War Department General Staff early in World War II, he participated in the North African landings with the 1st Division Staff and in the early operations in Normandy with the Fifth Corps. In January 1942 he was assigned to the Third Army and in June 1945 was returned to the Operations Division, WDGS.

Following the war, he was Deputy Chief of Staff with Joint Task Force 7 conducting atomic test operations at Eniwetok Proving Ground. In 1949 he served with the then new Weapons Systems Evaluation Group.

When SHAPE Headquarters was established in Paris in 1951, he was a member of the initial planning



Lt Gen Alfred D. Starbird

group and later became Secretary of the SHAPE staff. Other major assignments include; Director of Military Application, Atomic Energy Commission; Division Engineer, North Pacific Engineer Division, U.S. Army, Portland, Oreg.; and Special Assistant to the Chief of Engineers, Washington, D.C.

## 23 Army Tasks Units Spur Development of Technical Information Program

(Continued from page 1)

being wasted, Senator Humphrey said recently, because of duplication or unnecessary overlapping of R&D activities attributable to inadequate dissemination and utilization of scientific and technical information.

Responsibility for development of a definitive program for the Department of the Army conforming to the DOD requirement is assigned to the U.S. Army Research Office. By direction of the Chief of Research and Development, USARO convened representatives of the Technical Services in April 1962 to establish an Ad Hoc Group on Scientific and Technical Information.

Assistant Secretary of the Army (R&D) Dr. Finn J. Larsen, in an Oct. 24 memorandum to Deputy Secretary of Defense Gilpatric, assigned responsibility for the Army program to USARO and designated Col Andrew A. Aines as Program Director. Col Aines is Chief of the Research Support Division which includes the Scientific Information Branch.

Progress on 23 task studies directed toward development of the Army program was reported Nov. 15-16 at a conference of leaders at the U.S. Army Research Office Headquarters, Arlington, Va. The meeting was a follow-up on assignments made at an Orientation Conference of the Ad Hoc Group, Oct. 1-3.

Between these meetings came a series of high level briefings by Col Aines and his Deputy, Peppino N. Vlannes, on the projected scope of the program. Briefings were given to representatives of the Defense Science Board, the Office of the Director of Defense Research and Engineering, Army staff agencies, and other military services.

Present for the Nov. 15-16 meeting were four members of a special Task Group on Scientific and Technical Instruction designated by the Defense Science Board, namely: William T. Knox, ESSO Research and Engineering; G. S. Simpson, Jr., Battelle Institute of Columbus, Ohio; Charles H. Stevens, Lincoln Laboratory, Massachusetts Institute of Technology; and Klaus Liebold, General Electric-TEMPO, Santa Barbara, Calif.

The 23 task studies cover virtually every known aspect of the overall problem of collection, dissemination and more effective utilization of scientific and technical information. Chairmen of the subgroups will convene Dec. 3 for the final review of findings and recommendations preliminary to drafting of the Army program for submission to the Department of Defense.

In his Oct. 3 letter to all governmental agencies concerned with the scientific and technical information problem, Deputy Secretary of Defense Gilpatric required the Director of De-

fense Research and Engineering to establish, as a full time member of his staff, a Director of Technical Information to provide a DOD focal point for these activities.

Directed by the letter is a thorough review and analysis of scientific and technical information activities at all levels of the Department of Defense and the Military Departments. Pertinent information is to be included in a Five-Year Force Structure and Financial Program and the budget estimates as applicable to FY 1964.

Technical information activities are being catalogued under the major headings as: Primary Production and Distribution; Local Technical Libraries; Major Technical Libraries; Documentation Centers; Information Centers; Technical Journals; Symposia and Technical Meetings; and Research and Development. The latter heading covers experimentation on new methods and techniques for handling scientific-technical information.

Difficulties inherent in integrating and consolidating the efforts of the 34 scientific and technical information office (STINFO) activities currently operational within the Army research and development establishment are well recognized by Col Aines. Nevertheless, he is of the opinion that progress to date has far exceeded expectations, and that the outlook for further gains is good.

## Report Shows Increased Research on Fuel Cells

Research on fuel cells as a power generation source of great potential increased substantially in Federal Government agencies and in industry during 1961, the Army's "Third Status Report on Fuel Cells" indicates.

Estimates place the value of industrial fuel cells research at about \$15 million annually, with governmental agencies funding an additional \$7.3 million in 1961. The previous status report on fuel cells (December 1960) showed the Government spending an estimated \$4.5 million annually.

Covered in the recently published report is all known fuel cell research in the United States which is neither classified nor proprietary. Joint authors are Herbert H. Hunger, Fritz R. Franke and John J. Murphy of the U.S. Army Signal Research and Development Laboratory, Fort Monmouth, N.J. The two earlier status reports were authored by Dr. Bernard Stein and Ernst M. Cohn as U.S. Army Research Office publications.

Army fuel cell research in 1961 totaled \$2.9 million, of which \$1.6 million was sponsored by the Advanced Research Projects Agency (ARPA).

The report shows the Air Force funding \$2.2 million, the Navy \$1.4 million, the National Aeronautics and Space Administration \$300,000, and ARPA \$500,000 on its in-house effort.

The report attributes the growth in fuel cell research to increased interest in liquid hydrocarbon fuel cells, new space projects, and "a far broader basic approach to certain fuel cell problems than previously."

Primary hydrogen-oxygen (air) cells of both the liquid electrolyte and the ion exchange membrane electrolyte type are reported as currently being the most advanced in state of development. The report states:

"These cells are being considered for development into batteries for military use, both for ground and space applications, where present limitations of lifetime, weight, and fuel cost are compatible with the technical requirements." But many problems remain to be solved, it states.

Saturated hydrocarbons in high temperature cells are represented as having produced "relatively good performances," while in low tempera-

ture cells "very low performances have been obtained to date."

Development of alcohol fuel cells is not envisioned in the report for two to three years. Similarly, electrolytically regenerative fuel cell systems thus far have not come close to fulfilling expectations based on theoretical potentialities. Likewise, at this time photochemical and radiochemical regenerative systems are considered unsuitable because of low efficiency and power densities.

The report contains a bibliography of various reports and scientific papers on fuel cell research, a summary of the status of specific investigations by in-house laboratory and industrial contract researchers, and a listing of U.S., British, German and other foreign patents on fuel cells.

Automatic distribution of the report is being made to all Army agencies having a recognized interest in the information. Public sale, as in previous years, is being handled by the Office of Technical Services, U.S. Department of Commerce. OTS is publishing 1,500 copies for sale and the price will be announced when they become available in late December.

## Self-Propelled Howitzer Undergoes Air Drop Tests

The XM124, 105 mm. auxiliary propelled howitzer recently satisfied requirements of air delivery tests conducted by the U.S. Army Airborne, Electronics and Special Warfare Board, Fort Bragg, N.C.

The propulsion system consists of a small gasoline engine, two variable displacement hydraulic pumps, a series of hydraulic lines, a pair of fixed displacement hydraulic motors, and final drive assemblies.

The system provides driving power to the main carriage wheels, enabling the howitzer to propel itself at speeds up to 7 m.p.h. The weapon is also capable of towing its own ammunition trailer, without the requirement for the 3/4-ton prime mover. This permits

a saving of approximately 7,000 pounds and 12 feet of aircraft space for delivery of extra supplies, ammunition or equipment.

Tests showed that the XM124 howitzer, the M416, 1/4-ton trailer, and 10 boxes (20 rounds) of 105 ammunition can be air delivered on a single platform. With the gun crew parachuting immediately behind the load, the weapon can be berthed, moved to a selected firing location, emplaced, and fired in approximately 15 minutes.

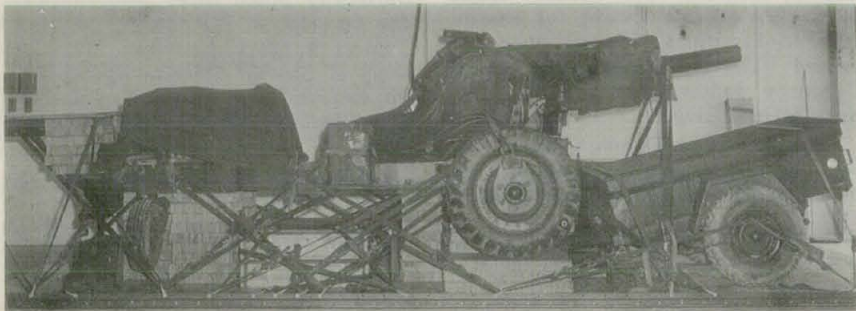
The 155 mm. howitzer (medium, towed) with a similar auxiliary propulsion application was tested by the U.S. Army Airborne, Electronics and Special Warfare Board and found satisfactory earlier this year.

## ARPA Picks Dr. Licklider For Human Factors Research

Dr. J. C. R. Licklider, has been appointed Assistant Director of the Advanced Research Projects Agency for its projects in Behavioral Sciences and Command Control research. He will be responsible for a research program which will include exploratory studies in persuasion and motivation, human performance and communication.

In addition, Dr. Licklider will be responsible for developing and conducting a Command and Control Research Program to include basic studies in computer science and technology, and experimental and model studies relating to prospective future command and control environments.

Prior to his appointment, Dr. Licklider was vice president of Bolt, Beranek and Newman, Cambridge, Mass. He has gained international recognition as a research psychologist and is known particularly for the radio-communication technique called "pre-modulation clipping," a new ("triplex") theory of auditory pitch perception, an acoustic method ("audio analgesia") of suppressing pain in dentistry and research on close interaction ("man-computer symbiosis") between men and computers.



XM124, 105 mm. howitzer and accessories mounted for air-drop delivery.

## Army Medic Patents 'Biological Window'

A patent for a "Biological Window for Internal Observation," awarded to Col Charles S. Gersoni, Commanding Officer of the U.S. Army Personnel Research Office, is believed to have wide potential application to biological research.

Inserted into animals used in laboratory experiments, the window permits observation or photography of internal organs. Used after the administration of drugs, the device is harmless to the animal and is easily removable when observations end.

Lt Gen Dwight E. Beach, Army Chief of Army Research and Development, presented the document of Letters Patent to Col Gersoni at a ceremony Oct. 29. Dr. Finn J. Larsen, Assistant Secretary of the Army for Research and Development, was present to add his congratulations.

Since Col Gersoni was engaged in psychophysiological research at Walter Reed Army Institute of Research when he developed the concept of his device and filed application for patent rights, he has granted the U.S. Government a royalty-free license to use it as desired for military needs.

"While I believe the device has considerable potential for biological research and for demonstration purposes in teaching medical students," Col Gersoni said, "I hesitate at this time to comment on the scope of its use. It remains for other researchers to explore its potential application to the study of disease, the effect of drugs on organs, and the response of organs to various methods of treatment."

The invention consists of two small flanged cylinders, one fitting inside the other, and a glass-topped barrel which screws into the inner cylinder. It can be made of any substance not irritating to the tissues, such as tantalum or plastic.

The window can be inserted into the experimental animal wherever the medical scientist needs to make observations, which can be made for extended periods with the "patient" remaining ambulatory. Previously, incisions made into animals for experimental purposes required restraint of the animal and suturing after each period of observation.

With the barrel removed, the device can also be used to obtain tissue specimens. Likewise, changes in the electric potential of an organ resulting from variations in experimental conditions can be measured by attaching electrodes of recording equipment.



Col Charles S. Gersoni, flanked by Dr. Finn J. Larsen, Assistant Secretary of the Army (R&D), and Lt Gen Dwight E. Beach, Chief of Army Research and Development, after receiving patent for his "Biological Window for Internal Observation." Lt Col R. D. McGovern, Human Factors Research Division, U.S. Army Research Office, is in background.

When the recordings are completed, the electrodes are detached and the barrel replaced in the flanged cylinder, thus "closing the window." When the device is removed, the incision is closed.

Since entering on active duty in 1941, Col Gersoni has served the Army in various assignments as a research scientist and as a research administrator. He received his B.S. and M.S. degrees in 1933 and 1935 at the

## WRAIR Scientists Report on Research Findings

Medical advances growing out of research at Walter Reed Army Institute of Research in Washington, D.C., have been reported on three continents in recent months through conference presentations by WRAIR scientists.

Dr. Donald E. Gregg, Chief of the Department of Cardiorespiratory Diseases, spoke at the 22nd International Congress of Physiological Sciences in Leiden, Holland. The recent winner of the President's Award for Distinguished Federal Civilian Service discussed "The Systolic Component of Coronary Inflow in the Active Unanesthetized Dog."

Capt D. Joseph Demis, Chief of the WRAIR Department of Dermatology, spoke at the same congress. His presentation was "Urinary Excretion of Histamine and 1,4-Methylimidazole Acetic Acid by Patients with Mastocytosis."

Maj Austin D. Potenza, Chief of the Department of Experimental Sur-

University of Virginia and a Ph. D. degree at New York University in 1937.

During World War II, he held a series of responsible positions as administrator of behavioral science activities. From 1947-1951 he served as Chief of the Psychology Branch in the Office of The Surgeon General, and became Chief of the Allied Science Section of the Medical Service Corps.

Two years as head of the Clinical Psychology Branch of Walter Reed Army Hospital were followed by assignment as Chief of the Human Resources Research Branch, Research and Development Div., Office, The Surgeon General, from 1953-1957, and two years in physical standards and psychophysiological research at the Walter Reed Institute of Research.

A 3-year tour of duty as the first commander of the U.S. Army Research Office, Far East, with duty station near Tokyo, Japan, preceded his present assignment to the U.S. Army Personnel Research Office.

A member of the American Psychological Association and a Diplomate of the American Board of Examiners in Psychology, he has served on a number of governmental committees, including the Armed Forces-National Research Council Vision Committee, of which he became Chairman, and the Committee on Hearing and Bioacoustics. He has published a number of articles on research in scientific journals.

gery at WRAIR, took part in round table discussions on hand surgery at the 1st Latin American Congress on Plastic Surgery, North Zone, in Bogota, Colombia. He also read a paper titled "The Healing of Digital Flexor Tendons and Factors Involved in the Formation of Tendon Adhesions."

Attendees at the Brazilian College of Surgeons on Traumatic Shock at Rio De Janeiro heard Col Robert M. Hardaway make three presentations. The Director of WRAIR's Division of Clinical Surgery discussed "The Etiology of Shock," "Mechanism of Tendon Repair," and "Early Excision and Skin Grafting for Third Degree Hand Burns."

Lt Col Stefano Vivona, Acting Director, Division of Communicable Disease and Immunology, lectured on "Preventive Medicine Problems in the Far East" at a meeting of the Armed Forces Pest Control Board at the National Naval Medical Center, Bethesda, Md.



## 'Civil Service Inventors' Cites Army Scientists

Army scientists receive top recognition in part two of "Civil Service Inventors," featured article in the October-December *Civil Service Journal*.

Leading off the article in the official organ of the United States Civil Service Commission is a full page picture of Kenneth W. Woodward, primary inventor of the Army's new artificial heart pump, showing the small pure fluid amplification device which controls its operation.

The *Army Research and Development Newsmagazine* was the first periodical to report on development of the heart pump (see November 1961 issue) and its 3-part series on patenting inventions (December 1961, January, February issues) served to germinate the idea for the *Civil Service Journal* inventions article.

Mr. Woodward, 35, has been an employee of the Army's Diamond Ordnance Fuze Laboratories since 1955. Sharing the spotlight with him in part two of "Civil Service Inventors" are fellow employees Dr. Henry P. Kalmus, Associate Technical Direc-

tor for Advanced Research and Chief Scientist, and Donald J. Belknap, physicist.

Dr. Kalmus is publicized for 24 invention disclosures and 10 patents, including adaptation of the proximity fuze to guided missiles.

The proximity fuze, which has had a profound impact on weaponry development, was invented at the Diamond Ordnance Fuze Laboratories, and W. S. Hinman, Jr., now Deputy Assistant Secretary of the Army (R&D), was its coinventor.

Mr. Belknap, 1961 winner of an Army Exceptional Civilian Service Award, plus a cash award of \$5,000, is cited in the article for his invention of the incandescent microlamp, about as large as a pencil point and hailed as the world's smallest bulb.

Four U.S. Army Signal Research and Development Laboratory employees at Fort Monmouth, N.J., also are recognized in the article for their inventions. Dr. Eduard A. Gerber, Director, Solid State and Frequency Control Division, is listed for his invention of a close frequency control

device. Dr. Armando A. Giardini and John E. Tydings are included for invention of methods of making synthetic diamonds and new forms of many metallic compounds. Pioneering research in developing photographic prints without using chemicals is the basis of Marilyn Levy's mention in the article.

The U.S. Navy representation in the article includes Dr. J. Warren Horton, Technical Director of the Navy Underwater Sound Laboratory, New London, Conn., who holds 56 patents in sonar and electrical communications.

U.S. Air Force inventors mentioned are Henry W. Seeler, for his development of a mouth-to-mask resuscitation kit and methods, and Ylo E. Stahler, an electronics engineer, for his experiments with his passive communications satellite, a sphere containing many lenses.

National Aeronautics and Space Administration employees Richard T. Whitcomb and James S. Albus are acclaimed for developing methods of achieving supersonic flight and a Digital Solar Aspect Sensor for satellites.

The U.S. Department of Agriculture inventor whose work is reviewed in the article is William N. Sullivan, who is credited with starting a "revolution in aerosol packaging."

The Civil Service Commission has announced plans to have the article on "Civil Service Inventors" reproduced in circular form with a 2-color cover for use of Government agencies in recruitment of scientists and engineers, particularly in educational institutions. Announcement will be made soon as to how agencies may obtain copies at a low cost.

### Sergeant Awarded Patent On Rocket Engine Device

Necessity may be invention's mother, but at Yuma Test Station, Ariz., SFC Adolphus Samms may be termed its "father." U.S. Patent No. 3,048,107, the fourth patent granted the "soldier-scientist," was issued recently to cover his invention of an "Air Frame Center Support."

The Army Airborne sergeant describes the invention as a system to eliminate the engines in the second and third stages of a 3- or 4-stage rocket. It is claimed that the device permits use of one engine to power three stages, thereby permitting a heavier payload and alleviating the problem of mass ratio, that is, the ratio of fuel load to total mass.

The low-cost booster is termed a new concept in the development of multi-stage rockets.

## WES Research Seeks Aerial Analysis of Soils

Soils research directed at high-speed aerial analysis of conditions that could be vital to field army operations is combining aerial photography with radar gauging techniques at the U.S. Army Waterways Experiment Station (WES).

Until recently test equipment developed at the Vicksburg, Miss., Mobility Research Center required troops to enter an area to take surface measurements of soil conditions, indicative of vehicles that can be used.

If proved practicable, the system under investigation would enable aircraft to fly over enemy terrain to collect soils information rapidly and accurately, using photography, infrared and radar sounding techniques.

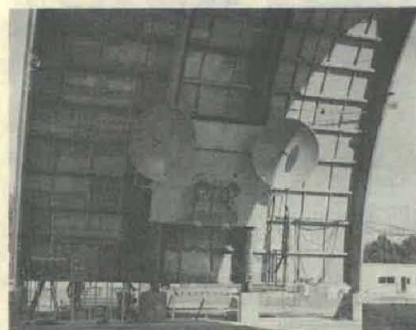
Certain radar bands are being tested to determine if they will penetrate deeply to show soil properties such as moisture and density which relate to soil strength.

To house the radar test apparatus, the WES constructed a building of four laminated wooden arches forming a perfect semicircle on a 50-foot radius. Four radar systems were mounted on a carriage traversing the overhead arc of the building, thus providing proper transmission distance, far-field illumination pattern and angle of incidence for horizontal specimens. The carriage includes electronic equipment for radar bands.

Since metal reflects radar beams and gives erroneous returns, wood was used even in the sample containers for greatest possible accuracy.

Sample of different soils weighing approximately 15 tons, with dimensions of 26x6x12 feet, will be analyzed for density, grain size, moisture content and the effect of vegetation.

Because soils vary from zero to saturation in moisture content, and no one radar band would serve all conditions, it was decided that four bands would be used together: Ka- (to determine surface texture), X- and C- (to determine trafficability conditions for terrains with low moisture contents), and P- (for testing terrain of high moisture contents).



Radar test apparatus housed in wood-arched building at WES, Vicksburg.

## Hansen Succeeds Ghormley as Munitions Command CG



Maj Gen Wm. K. Ghormley

Maj Gen Floyd A. Hansen, a first lieutenant at Picatinny Arsenal 20 years ago, returned to the Dover, N.J., installation Nov. 1 to take over as Commanding General of the U.S. Army Munitions Command.

Appointment was effective upon the retirement of Maj Gen William K. Ghormley, ending 33 years of active duty. The announcement that Maj Gen Hansen would take over was made at the time that General Ghormley became CG of the new Munitions Command, established as a major element of the U.S. Army Materiel Command in April 1962.

Until reassigned, General Hansen



Maj Gen Floyd A. Hansen

was Assistant Deputy Chief of Staff for Logistics, Department of the Army, in Washington, D.C. As head of the Munitions Command, which provides the Army with nuclear and nonnuclear ammunition and chemical and biological agents, he directs the operations of some 50,000 personnel involving an annual budget of about \$1.5 billion.

As a first lieutenant at Picatinny, he served as an Ordnance officer and later became head of the plant engineering group.

(For biographical sketches of Generals Hansen and Ghormley, see the May 1962 issue of this publication.)

## Leaders Discuss Goals Of Munitions Command

Future military requirements and major policies affecting the new Army Munitions Command were discussed in recent high-level talks at a 3-day conference at Picatinny Arsenal, Dover, N.J., attended by more than 100 executives.

Lt Gen Frank S. Besson, Jr., Commanding General, U.S. Army Materiel Command, headed a distinguished group of speakers which included Lt Gen Edward W. Snedeker, Commandant of Marine Corps School, Quantico, Va.; Maj Gen Marshall Stubbs, Office of the Deputy Chief of Staff for Military Operations; and Brig Gen Adam W. Meetze, Deputy Commanding General, Munitions Command.

Maj Gen W. K. Ghormley, Commanding General of the Munitions Command, was the keynote speaker.

Purpose of the meeting was to create a "family viewpoint," by communicating ideas across functional and installation lines and to discuss present and future objectives.

Panel discussions were held on research, engineering and procurement, and on customer requirements and patents. Discussed also were problems of supply and maintenance, product reliability, product/project management, programming, funding.

## Trudeau Slated to Head American Ordnance Assn.

The American Ordnance Association will install as its new president former Chief of Research and Development, Lt Gen Arthur G. Trudeau (USA, Ret.) at an Industrial Readiness Seminar Dec. 5 in New York City.

Upon his retirement June 30, General Trudeau became president of Gulf Research and Development Co., with headquarters near Pittsburgh, Pa.

Director of Army Research Maj Gen C. W. Clark will address the seminar as a featured speaker. His subject is "Man is the Center of Army Research."

Maj Gen Frank H. Britton, Director of Research and Development, U.S. Army Materiel Command, also is programmed for one of the principal addresses. He will discuss recently developed Army weapons systems.



AN EXCEPTIONAL CIVILIAN SERVICE Award, supplemented by a \$1,000 cash award, is pinned on Harold J. Babcock, Chief Metallurgist in Frankford Arsenal's Ammunition Branch, by Maj Gen Wm. K. Ghormley, recently retired CG of the U.S. Army Munitions Command. The Oct. 19 ceremony honored Mr. Babcock for developing a process to use commercial steel in forging artillery shells. The process, it is estimated, has a potential savings in 8-inch shells alone of nearly \$2,500,000 a year in wartime production. Robert M. Coyle (right center) received a \$300 award for work on the same project. Observing is Col Charles Eifer, Commander of Frankford Arsenal.

## USARO Officer Gets Defense Intelligence Post

Lt Col Frank L. Schaf, Jr., will conclude more than three years of staff duty with the U.S. Army Research Office, Arlington, Va., when he begins a new assignment Dec. 3 with the Defense Intelligence Agency, Washington, D.C.

Recommended for promotion to colonel, he is characteristic of Army R&D officers with professional scientific training to meet the Army-civilian scientist team concept of operations. He majored in chemistry at University of Cincinnati before entering the Army a year before World War II.

Since January 1961 he has been Chief of the Technological Forecasting Branch, Research Planning Division. His primary responsibilities have been concerned with developing methods and techniques for projecting 20 years in the future the trends expected in science and technology and their potential military application.

As commander of a field laboratory

operating on Bataan and Corregidor in the Philippines early in World War II, Lt Col Schaf was assigned responsibility for gathering information on characteristics of Japanese weapons and equipment. From 1942-1945 he was a prisoner of the Japanese on Mindanao and Luzon.

Following the war, he served as an instructor in technical intelligence, weapons development and military history at the Chemical Corps School, Army Chemical Center, Md., and as a member of the staff of the 82nd Airborne Division, Fort Bragg, N.C.

Recent assignments include three years as Assistant Military Attache, Paris, France, and CO, 2nd Chemical Weapons Battalion; Chief, Special Projects Office, Technical Directorate, Dugway Proving Ground, Utah; and Chief, Foreign Research Branch, U.S. Army Research Office.

A student of foreign R&D organizations and their military capabilities,



Lt Col Frank L. Schaf, Jr.

Lt Col Schaf has been collecting material for six years for a text on scientific and technical intelligence.

Among his military awards and decorations are the Silver Star, Bronze Star and Purple Heart.

## Army Names Dr. Lemons as IGU Representative

Dr. Hoyt Lemons, Chief of the U.S. Army Research Office Geophysical Sciences Branch, Environmental Sciences Division, has been appointed Army representative to the U.S. National Committee for the International Geographical Union.

The Committee advises the President of the National Academy of Sciences on all matters concerning United States participation in IGU.

In announcing the appointment, Deputy Chief of Research and Development Maj Gen G. W. Power advised the National Academy of Sciences that the Army was "happy to cooperate whenever possible" in NAS international and domestic programs.

Dr. Lemons served in the National Academy of Sciences-National Research Council as Chairman of the Committee on Physical and Biogeography (1949-1950) and on the Screening Committee for Earth Sciences for Fulbright Grants.

Currently he is preparing, by request of the American Geographical Society, a review of "Environmental Health Problems," a U.S. Public Health Service publication. He is scheduled for a presentation on geophysical sciences research and development in the Army at the December meeting of the American Association for the Advancement of Sciences.

One of the key personnel of the U.S. Army Research Office since he joined the staff in July 1958, he has held his present title since September

1959. His responsibilities include staff planning, evaluation and program coordination of all Army geophysical sciences research projects.

Currently he is Army Project Officer on the high-altitude atmospheric research project in Barbados, West Indies Federation, designated Project HARP. (See August 1962 issue.)

Dr. Lemons' assignment to the U.S. Army Research Office staff came soon after he had finished serving as Chairman of the Army Steering Committee during the latter phase of the International Geophysical Year.

From 1952-1955, he was Research Coordinator for the Civil Defense Administration, and from 1955-1957 was Assistant for Research for environmental programs in the Office of the Surgeon General, U.S. Public Health Service. In the latter assignment he was detailed by request to the Office of Defense Mobilization as Staff Assistant to the Health Mobilization Planning Committee.

Presently staff assistant to the Environmental Research Subpanel of the Army Scientific Advisory Panel (ASAP), Dr. Lemons was directed by the Chief of Research and Development at that time, Lt Gen James Gavin, to assist in establishing the subpanel and organizing its activities.

Since 1952 he has served as Lecturer in Climatology (with rank of professor) at the University of Maryland and is a member of its graduate faculty. From 1942-1945 he



Dr. Hoyt Lemons

was a member of the faculty at Washington State College, and then took a leave of absence to serve as a consultant in the Army Quartermaster General's Office. He was on the Oklahoma A&M faculty from 1940-1942.

In the Association of American Geographers he has served as Treasurer and as a member of its Council, Executive Committee, and Editorial Board. He is listed in *American Men of Science*, the *Who's Who in the Southeast*, and the *Director of American Scholars*. Author of more than 30 professional journal articles on geography, meteorology, earth sciences and education, he is known particularly for his climatological research on hail, tornadoes and causes of natural disasters.

Dr. Lemons is a Fellow of the American Geographical Society and a member of Sigma Xi and a number of professional societies.

# Army Develops System for Rapid Unloading of Moving Ships

Moving ships can quickly unload cargo at sea using new techniques developed by the U.S. Army Transportation Research Command, Fort Eustis, Va., a field agency of the U.S. Army Materiel Command.

Elements of the system include helicopters, a 66-foot-long aluminum retractable "wing" extending over the side of the ship, a movable cargo platform capable of holding pallet loads of 9,000 pounds, and a base unit mounted on the deck which permits rotation of the wing.

Contributing to the speed of the unloading operation is an electro-hydraulic winch which can move loads from the end of the wing to a helicopter cargo hold in 30 seconds.

Because the unloading can be accomplished from any ocean transport vessel or ships designed for other cargo carrying conditions, military leaders believe the system offers great potential in limited and nuclear war.

Handling rates of one 2,000-pound load a minute were achieved in tests conducted by the Army. A similar device was tested successfully by the U.S. Navy in replenishment at sea operations.

The original concept was that the system designed by Capt E. Bendl and Richard Black of USATRECOM, would be used for helicopter sling loads. Tests have indicated the feasibility of direct landings on the wing platform, using the OH-23 (Raven)

## General Palmer Accepts Position as Consultant

General Charles D. Palmer (USA, Ret.) has accepted an appointment as consultant to the Research Analysis Corporation of Bethesda, Md. Frank A. Parker, president of RAC, announced the appointment.

An independent, nonprofit organization, RAC applies operations research and systems analysis to the study and solution of global military problems and related political, social and economic questions.

General Palmer was Deputy Commander-in-Chief of U.S. Forces in Europe from 1959 until he retired from the Army in 1962. From 1955 to 1958, he served with the Far East Command.

During the Korean Conflict, General Palmer served with the 1st Cavalry Division. After joining the Division, in 1947, as Artillery Commander, he moved with it from Japan to Korea in mid-1950, and was made Division Commander the following



Army's ability to transfer cargo from a moving vessel equipped with "ships wings" is demonstrated by UH-19 helicopters in a James River, Va., maneuver.

observation helicopter. The platform is being adapted to allow the larger UH-19 (Iroquois) utility helicopter to land and take aboard troops or evacuate the wounded.

The Department of Defense has reported that the system offers application to Naval amphibious operations as an economical method of extending the use of helicopters in vertical envelopment support of cargo ships which do not have the more expensive helicopter platforms installed.

A series of developmental tests of the Army "ship's wings" is scheduled

to evaluate the potential of the method of cargo resupply as well as to study the advantages of using the system for priority personnel moves.

## Transportation Chief Sees \$35 Million Vehicle Saving

Modernization of the Army's administrative vehicle fleet over a 5-year period at an estimated saving of \$35 million is the goal of a program recently announced by Chief of Transportation Maj Gen Rush B. Lincoln, Jr.

The saving is to be realized through purchase of standard American automobiles in place of the more expensive military designed vehicles. Economies will be effected through lower purchase cost per vehicle and lower operating, maintenance and repair parts costs.

The modernization program is being phased over a 5-year period, General Lincoln said, "to avoid mass obsolescence in the future."

## YUH-1D Helicopter Passes 1,000-Hour Logistic Test

The YUH-1D Iroquois helicopter successfully completed its 1,000-hour logistical flight evaluation Nov. 2 at Fort Rucker, Ala., in 108 flying days.

Test operations for the new 13-place turbine-powered Bell helicopter commenced June 11 and 1,020 flight hours were logged by Army aviators attached to the U.S. Army Aviation Test and Evaluation Command.

Six other YUH-1D Iroquois either have completed or are still undergoing additional flight and static tests.



Gen Charles D. Palmer (USA, Ret.)

February. He participated in the first six major campaigns of the conflict.

General Palmer graduated from the U.S. Military Academy in 1924. He later attended the Field Artillery School at Fort Sill, Okla., the Command and General Staff School at Fort Leavenworth, Kans., and has credit for the Army War College.

## Mobility Command Holds Night Vision Seminar

The U.S. Army Mobility Command Research and Development Directorate recently sponsored a Light Intensification and Night Vision Seminar at Detroit Arsenal.

Maj Gen Alden K. Sibley, Commanding General of the Mobility Command (MOCOM), Center Line, Mich., whose Command is charged with responsibility for Army mobility on land, air and sea, was a key speaker.

The 2-day seminar encompassed technical sessions at Detroit Arsenal and a night demonstration under simulated battlefield conditions at the General Motors Corp. Testing Ground, Milford, Mich.

Brig Gen John G. Gramzow, Commanding General of the Army Tank-Automotive Command (ATAC), made the address of welcome. Brig Gen Hallett D. Edson, Deputy Commanding General of MOCOM, spoke of his observations for the necessity of night devices during the Korean War and the need for continued research and development in this area.

Col Rex H. White, Jr., Director, Research and Development, discussed MOCOM's sub-installation research and development relationship, and the need of coordinated research effort.

A team of scientists from the Electrical Department of MOCOM's Research and Development Laboratories at Fort Belvoir, Va., explained the capabilities of near and far infrared systems and image intensification devices. Discussions encompassed operations, phenomena, terminology, status, and programs of future research and development. Dr. Robert

### Army Lists 1,700 Vacancies For Reserves, National Guard

Approximately 1,700 active duty vacancies exist for qualified company-grade Army Reserve and National Guard officers. Requirements exist in all branches, but are heaviest in Infantry, Artillery, Engineer, Ordnance and the Adjutant General Corps.

The voluntary active duty program is part of an overall Army plan to meet its requirement for some 19,400 officers by June 30, 1963. Applicants must be able to complete 20 years of active duty before becoming retirement eligible.

The Army also needs warrant officers in more than 35 different occupational specialties. These requirements will be met by direct appointment of qualified personnel from the enlisted ranks, and by encouraging Reservists to apply for active duty.

S. Wiseman, assisted by Dr. Werner K. Weihe, Chief of the Far Infrared Branch, made the presentation.

Representatives from the Army Tank-Automotive Center discussed the overall aspects of night viewing and vehicle requirements, and the devices being developed, including demonstration of a Panoramic Viewing Device that will give a vehicle driver a 360-degree field of vision for day-time and semi-dark operation.

Representatives of the Mobility

Command's Army Transportation Research Command, Fort Eustis, Va., and the Transportation Materiel Command at St. Louis, Mo., discussed vision devices necessary for night operation of the Army's helicopters and aircraft.

Irving Appelblatt, Acting Deputy Director of MOCOM's Research and Development Directorate, made the closing presentation.

Albert F. Bird, Chief of the Long Range Forecasting Office, Research and Development Directorate, MOCOM, was Seminar Project Officer.

## GIMRADA Testing Radar Photo Rectifier

A new instrument that rectifies side looking radar photographs to permit use in planimetric maps scaled to national accuracy standards is being tested by the U.S. Army Engineer Geodesy, Intelligence and Mapping Research and Development Agency.

The "Side Looking Radar Presentation Restitutor" being developed at the Fort Belvoir, Va., installation is the key part of an advanced radar map compilation system. Complete with a viewing and measuring instrument and an electronic computer, the system is designed to execute planimetric mapping from radar photograph to a scale of 1:250,000.

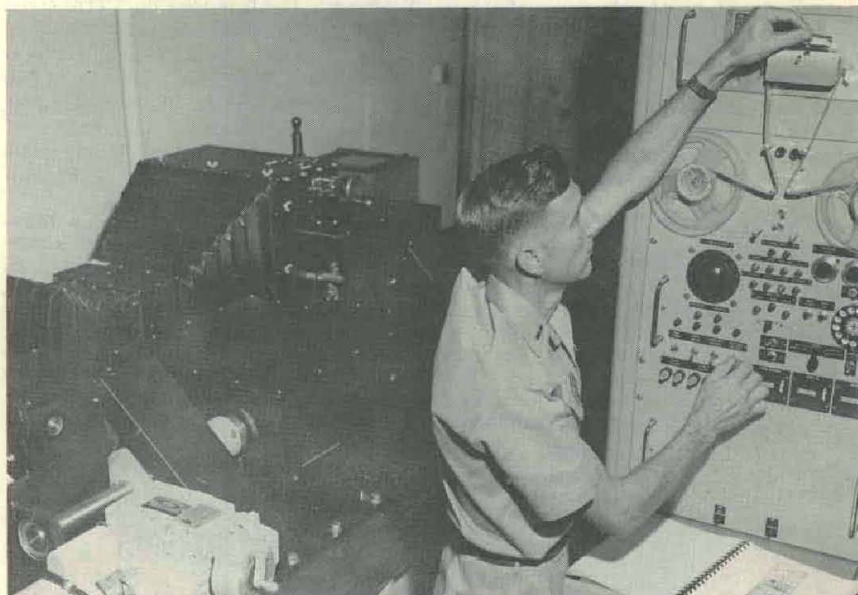
Photographs are processed through the viewing and measuring instrument to obtain conjugate image points in the overlap areas of two transparencies. Measurements to these image points from the indicated flight path on each transparency

indicate the radar measured distance between flight lines.

Together with navigational distances established between and along the flight line, the measured distances form the basis for the flight line network adjustment performed by the computer. Adjusted taped data is then processed through the restitutor simultaneously with the unrestituted film and the airborne auxiliary tapes.

Designed for automatic, semi-automatic and manual operation, the restitutor corrects all imagery with respect for slant range and minor distortions, and repositions the imagery with respect to the adjusted flight line. A moving aperture continually scans the film and, by optical mechanical means, reproduces a geometrically correct radar presentation on another roll of film.

The result is a plan position presentation suitable for planimetric maps.



CWO-3 Alvin Vollmer operates "side-looking radar presentation restitutor" designed to rectify aerial photographs used in making fine scale maps.

## Army Contracts Exceed \$170 Million

Contracts totaling more than \$170 million for development and procurement of military materiel were announced recently by the Department of the Army.

The largest contract was \$61,164,157 to Chrysler Corp., Detroit, Mich., for 720 M60A1 tanks.

The Martin Co., Orlando, Fla., received a \$33,236,680 contract for industrial engineering services on the Pershing missile.

For 720 engines and power pack assemblies for the M60A1 tank, and 252 spare engines and spare parts, Continental Motors Corp., Muskegon, Mich., received a \$16,813,807 contract.

### NASA Ceases Balloon Tests At White Sands Until Spring

Further radar studies of Echo balloons at the White Sands, N. Mex., national missile range will be deferred until next spring, at the earliest, National Aeronautics and Space Administration officials have stated.

Increasingly unfavorable weather and possible modification of the balloon were given as prime reasons for the deferment.

A balloon identical to the Echo I communications satellite, which has been in orbit for the past two years, was launched Oct. 20 as the first of a 2-launch Echo series at White Sands, but it ruptured prematurely.

Officials of NASA's Goddard Space Flight Center, which conducted the launch, said White Sands instrumentation obtained "much valuable information" despite the early end of the balloon's flight.

NASA scientists also had planned to launch an advanced Echo balloon this fall. The WSMR studies were scheduled to determine its reflectivity at various levels of pressures.

Sylvania Electric Products, Inc., a subsidiary of General Telephone and Electronics Corp., New York, N.Y., received a \$13,700,000 contract for production of electronic equipment.

Production of airframes for the Nike Hercules missile is the basis of an estimated \$9,761,439 contract let to Douglas Aircraft Co., Charlotte, North Carolina.

Hercules Powder Co., Wilmington, Del., received a \$9,503,303 contract for rocket motors and propellants.

A \$9,178,465 contract let to Day and Zimmerman, Inc., Philadelphia, Pa., is for 155 mm. cartridge parts.

## Air Force Announces Research Grants, Contracts

The U.S. Air Force announced Oct. 25 that 13 universities and 4 research firms in the United States were awarded basic research grants and contracts for more than \$500,000 during the previous month.

Dr. Knox Millsaps, Executive Director, Office of Scientific Research, said the awards raised this fiscal year's funding to more than \$800,000 for direct support of basic research.

Detailed information about the latest grants follows.

**Chemical Sciences.** University of Wisconsin, Addition and Displacement Reactions with Unsaturated Hydrocarbons, Dr. H. L. Goering, \$10,095; New York University, Forces in Hydrogen-Bonding, Dr. E. S. Campbell, \$46,862.

**Mechanics.** National Academy of Sciences, Conference on Transport Theory, J. S. Coleman, \$10,320.

**Propulsion.** Northwestern University, Gas Viscosities up to 1,000 Atmospheres, Dr. G. Thodos, \$14,340.

**Biological Sciences.** University of Georgia, Chemical and Enzymatic Studies on the Conversion of Chemi-

cal Energy to Light, Dr. G. E. Philbrook, \$15,336; AFOSR European Office, National Institute of Optics, Arcetri-Florence, Italy, Basic Research on Retinal Mechanisms and Responses, Prof. V. Ronchi, \$9,000.

**Behavioral Sciences.** Ohio State University Research Foundation, Value Acts and Situational Variables in Organizational Behavior, Dr. J. E. Hass, \$15,869; New York University, Measurement of Attitude and Attitude Change, S. W. Cook, \$25,409.

**Mathematics.** Hamline University of Minnesota, Study of General Gaussian Processes, Dr. D. E. Varber, \$7,114; Yale University, Research in Differential Equations, Prof. E. Hille, \$27,360.

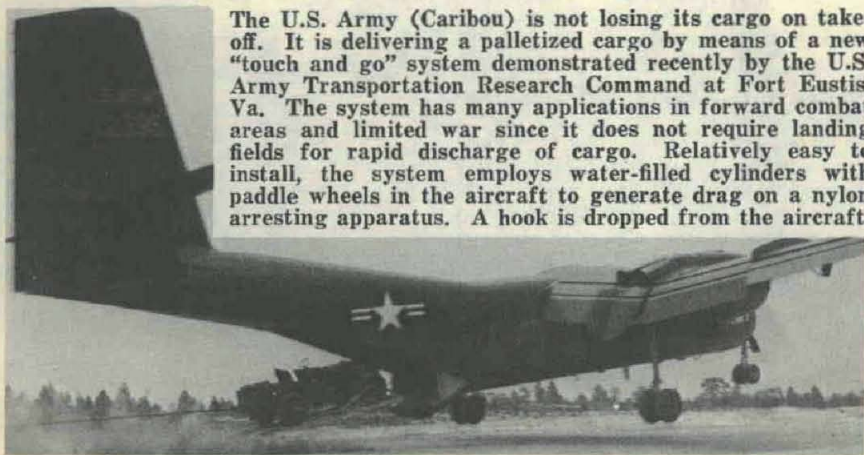
**General Physics.** Mellon Institute, Study of Electronic Collision Cross Section, Dr. E. N. Lassettre, \$197,633.

**Nuclear Physics.** University of Colorado, Quantum Field Theory and Elementary Particles, Dr. A. O. Barut, \$57,621; University of Illinois, The Photoproduction of Mesons in Liquid Hydrogen Bubble Chamber, Prof. E. L. Goldwasser, \$47,050.

**Solid State Sciences.** University of Utah, Recrystallization and Grain Growth in Magnesium and Chromium, Dr. C. H. Pitt, \$33,568.

Information on AFOSR contracts: **Information Sciences.** Documentation, Inc., Bethesda, Md., Studies in Modal Logic, R. M. Jones, \$13,835; University of Pennsylvania, Advisory Services to the Directorate of Information Sciences, AFOSR, F. H. Morgan, \$15,000; Herner & Company, Washington, D.C., Basic Research Resumes, S. Herner, \$13,912.

**Applied Mathematics.** Electronic Communications, Inc. (Advanced Technology Division), Goleta, Calif., Study of the Effects of an Unstable Motion on the Descent Trajectory of Bodies, J. E. Brunk, \$13,833.



The U.S. Army (Caribou) is not losing its cargo on take-off. It is delivering a palletized cargo by means of a new "touch and go" system demonstrated recently by the U.S. Army Transportation Research Command at Fort Eustis, Va. The system has many applications in forward combat areas and limited war since it does not require landing fields for rapid discharge of cargo. Relatively easy to install, the system employs water-filled cylinders with paddle wheels in the aircraft to generate drag on a nylon arresting apparatus. A hook is dropped from the aircraft.



Troops move in from carrier during CDEC "Battalion Tank Operations."

## Combat Developments Command Conducting Major Experiment at Fort Ord

The U.S. Army Combat Developments Command announced plans Oct. 30 for its first major experiment since becoming operational on July 1, 1962.

Conducted by the Combat Developments Experimentation Center at Fort Ord, Calif., a 268,000-acre field laboratory, the current operation is concerned with the capability of the ROAD (Reorganization Objective, Army Division) Infantry Battalion to defend itself against tanks while working alone or supported with tanks.

To assist the research teams of the First Experimental Regiment of the Fort Ord Center, several hundred light and heavy weapons Infantrymen are attached from the First Armored Division, the first to be organized under the ROAD concept, and the First Infantry Division.

ROAD bases its organization and operations on the development of multiple battalion teams as against the former, more cumbersome battle groups under the Pentomic Division concept.

Researchers hope to develop from the current experiment the best anti-tank weapons system for the ROAD

Infantry Battalion, taking into account the material on hand and due within the next two years.

The "Battalion Tank Operations" experiment, extending over several months will provide the five developmental directorates of Headquarters, USACDC, with necessary data on the operational, organizational and materiel requirements of the ROAD unit. Followup experiments are being planned as conceptual studies.

Headed by Lt Gen John P. Daley, with Headquarters for 30 combat development activities at Fort Belvoir, Va., the USACDC is concerned with developing the most advanced Army organization combat equipment concepts, and battlefield techniques. Tactical field maneuvers are designed to meet conditions anticipated 10 to 20 years ahead on a realistic battle basis. Results are scientifically recorded and evaluated.

The Combat Developments Experimentation Center is one of the Combat Developments Command's six subordinate headquarters located in five states. It controls all organic and attached units engaged in war gaming to provide umpires and evaluators with realistic conditions.

The Combat Developments Experimentation Center has an instrumented test area at Hunter-Liggett Military Reservation. Scientific support is furnished by the Stanford Research Institute.

Other subordinate headquarters of the USACDC, each of which is concerned with a special aspect of combat developments, are:

*Special Doctrine and Equipment Group.* Located at Fort Belvoir, this group has the mission to expedite and coordinate all aspects of combat developments relating to special warfare, and operations conducted by the U.S. Army and indigenous forces in special environments such as jungle and arctic areas.

*Office of Special Weapons Development,* Fort Bliss, Tex. Responsible for combat development functions pertaining to the employment of and defense against nuclear weapons by the Army in the field.

*Combined Arms Group,* Fort Leavenworth, Kans. This intermediate level headquarters commands 10 Combat Development Field Agencies.

*Combat Service Support Group,* Fort Lee, Va. This intermediate level headquarters for combat service support elements of the field Army and communications zone commands eight field agencies. These field elements prepare studies of concepts, doctrine, and materiel requirements pertaining to their respective fields of interest.

*Army Institute of Advanced Studies,* Army War College, Carlisle Barracks, Pa. The Institute prepares studies on broad international, national and departmental level matters affecting the requirements of land warfare. It develops both technical and logistical concepts relating to the organization of the theater Army and major subordinate elements above field Army to include combined and joint operations.



Infantryman sights M-79 grenade launcher during experimental exercises conducted by CDEC at Hunter Liggett Military Reservation in Calif.



Combat infantryman checks 3.5 rocket launcher in preparation for anti-tank weapons exercises conducted by Army Combat Developments Command.

## Electronics Command Active in NEREM

The U.S. Army Electronics Command, Fort Monmouth, N.J., was a major participant in the Northeast Electronics Research and Engineering Meeting in Boston, Nov. 5-7.

Maj Gen Stuart S. Hoff, Commanding General, officially opened the meeting and later explained the Command, its responsibilities and its position in the Army structure at a luncheon session open to the press.

In addition, an entire half-day session was devoted to reports and discussions by personnel of the Army Electronics Research and Development Laboratory, a major element of the Electronics Command.

One session was convened at Fort Monmouth, chaired by Dr. Hans K.

Ziegler, Chief Scientist of the Electronics Laboratory. Five papers were presented on recent scientific achievements of the Laboratory, including a device that synthesizes the human voice, theoretical work and experiments with laser light, new radar components, and an investigation of radio transmission through the earth.

Titles of the papers and their authors are: "An Electronically Controlled Formant Synthesizer" by Joseph DeClerk, Douglas Phyfe and Robert Fitch. "Small Signal Laser Amplifier Design Theory" by Dr. Harold Jacobs, Dr. Leonard Hatkin and Frank Brand. "New Laser Technique for Ranging Application" by Robert Benson, 2d Lt Robert God-

win and Michael Mirarchi. "Progress in Microwave Components" by Nathan Lipetz. "Geophysical Factors Affecting Electromagnetic Propagation Through the Lithosphere" by Dr. S. Benedict Levin.

"It is well recognized," Dr. Ziegler stated, "that the tremendous progress in military electronics for the U.S. Army—which, in turn, benefits the progress in electronics at large—is mainly due to the excellent teamwork and close cooperation of United States industry and Government laboratories. Many papers presented throughout this NEREM conference reflect the result of this team effort.

"To keep engineers and scientists at a high level of professional competence, comparable with their industrial counterparts, the Government laboratories necessarily have to perform a significant amount of meaningful in-house work. . . . Much of the result of such in-house work usually represents the basis of future developments then pursued by the effective industry-Government team."

The NEREM conference, sponsored by the Institute of Radio Engineers, is one of the Nation's top scientific meetings in the field of electronics, and was attended by more than 17,000 scientists, engineers and technical leaders from the U.S. and abroad.

## Field Succeeds Kaprelian at Electronics Lab

After 20 years of progressively more responsible assignments at the U.S. Army Electronics Research and Development Laboratories, Fort Monmouth, N.J., Norman J. Field has been appointed Deputy Director of Research. Since the Laboratories' Institute of Exploratory Research was established in 1958, he has served as Assistant Director.

As Deputy to Dr. Harold A. Zahl, an Army career scientist with more than 31 years of distinguished service, Mr. Field succeeds Edward K. Kaprelian. Mr. Kaprelian resigned in June to become Technical Director of the U.S. Army Limited War Laboratory, Aberdeen Proving Ground, Md.

A 1942 cum laude graduate of City College of New York, Mr. Field is known widely for his work in research areas of crystal physics and chemistry, and optical properties of solid materials.

After receiving a master of science degree in physics from Brooklyn Polytechnic Institute in 1959, he continued graduate studies at Rutgers University and the Massachusetts Institute of Technology.

During World War II, he served in Europe with the 63rd Infantry Division. He later taught evening classes in physics at Monmouth College, West Long Branch, N.J.

Currently a member of the Board of Education of Monmouth Regional High School and the New Jersey Education Association, he serves on the executive board of the Monmouth Regional Adult School and the Monmouth County School Board Association. He is also prominent in Civil Defense activities.

As chairman of the executive committee of the regional unit for promotion of the Junior Science and Humanities Symposia Program, Mr. Field has been active in stimulating high school science students to the opportunities of careers in Army science. The Army-industry-educational institution-sponsored JSH Symposia Program is conducted nationwide under the leadership of the U.S. Army Research Office, Durham, N.C., where the concept was originated.

Listed in American Men of Science, Mr. Field is affiliated with the American Physical Society, the American Chemical Society, the American Association of Physics Teachers, the Optical Society of America, the American Crystallographic Association, and the Armed Forces Communications and Electronics Association.

His technical papers have been published widely in national and international scientific journals.



Norman J. Field

## Scientists Report Advance In Nuclear Electric Power

Small-scale direct conversion of nuclear energy into electrical energy is reported by scientists of Battelle Memorial Institute.

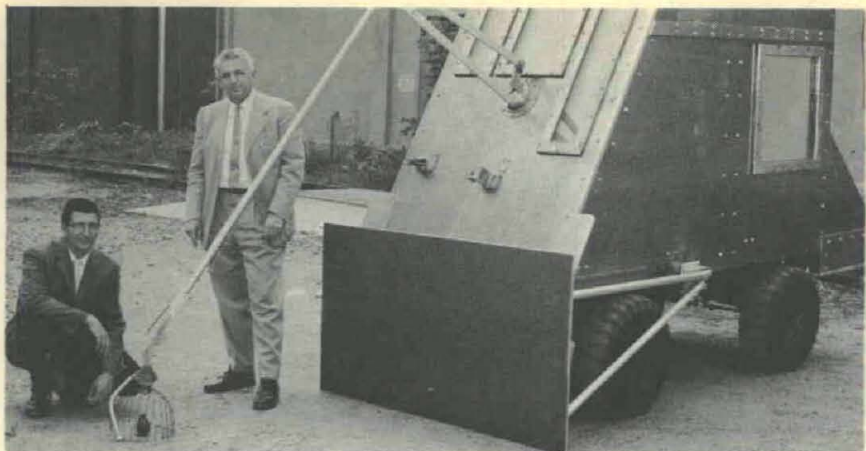
Writing in the October issue of the *Battelle Technical Review*, physicists James N. Anno and Dr. Sherwood L. Fawcett assess their five years of research on the so-called Triode concept. The *Review* reports it "could lead to a revolutionary new means for harnessing the atom."

The research is directed toward a conversion system that eliminates the heat cycle required in conventional nuclear-powered electrical generators.

Voltage buildup obtained thus far in their experiments is "somewhat less than 100 volts." The scientists point out that this is small in comparison to the theoretical potential of millions of volts, but say it is "probably as high as any yet achieved in research on direct conversion of fission energy."

Copies of the Anno-Fawcett article are available upon request to: Publications Office, Battelle Memorial Institute, 505 King Ave., Columbus, O.





Experimenting with a dummy hand grenade are Robert C. Schofield (left) and Walter Szelley, engineering technicians who designed this Cross Country Retriever for the safe recovery of dud munitions.

## Munitions Command Reduces Danger of Dud Analysis

Bisecting hand grenades to determine reasons for malfunction is routine business at Picatinny Arsenal, Dover, N.J., where the Army Munitions Command conducts research directed at developing more dependable firepower.

Recovery of duds is the first if not the most hazardous phase of the malfunction investigation, but development of a new Cross Country Mobile Dud Retriever has minimized risk.

The task of improvising a safer and easier method of recovering duds for analysis was assigned to the Arsenal's

Technical Services Laboratory. Karl G. Ottoson, Chief, discussed the problem with Anthony Gogliucci, Chief of the Experimental Test and Evaluation Section, resulting in assignment of the task to Robert C. Schofield and Walter Szeley.

The retriever designed by these engineering technicians after weeks of study and experimentation consists of a box-shaped aluminum cab mounted on an M274 light infantry weapons carrier known as the "mule."

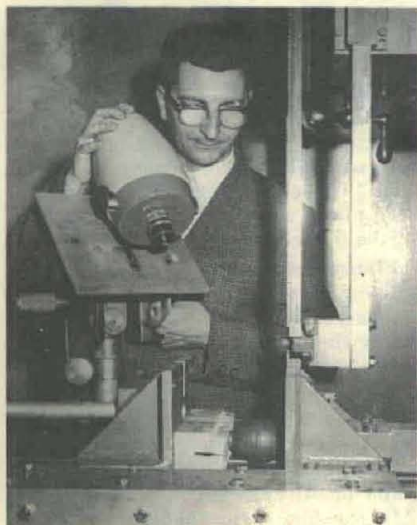
In front of the vehicle is a laminated aluminum protective plate, canted at 60 degrees to deflect fragments in event of an explosion. Recovery is accomplished with a mechanical arm, elevated and retracted by a hand-operated lead-screw drive that enables the operator to control precisely the entire procedure.

Various types of pick-up fingers may be attached to the recovery arm, depending on the configuration of the dud and terrain conditions. A drawing basket fabricated of spring steel wire has proved most suitable for the majority of operations.

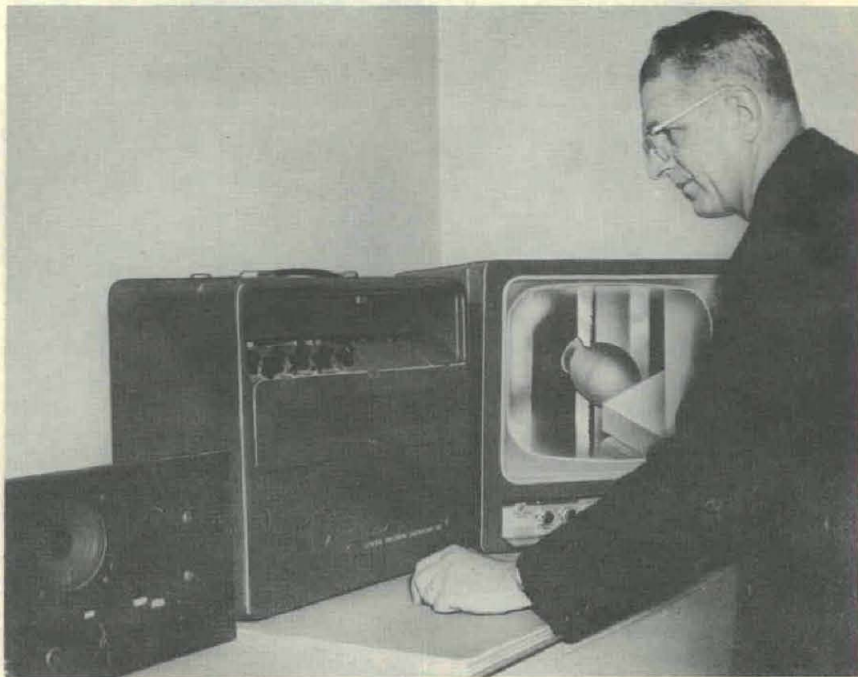
The recovered dud is removed from the test area to an armored car for transport to the laboratory for the analysis and bisection operation, invariably preceded by an X-ray to determine the safest approach.

Schofield and Szeley are now developing a fixed facility for disassembly and sectioning of explosive weapons. When completed next year it will be capable of performing remote machinery operations such as sawing, drilling, milling and core sampling by remote controls housed some 150 feet away. Visual contact with the operation will be maintained by television.

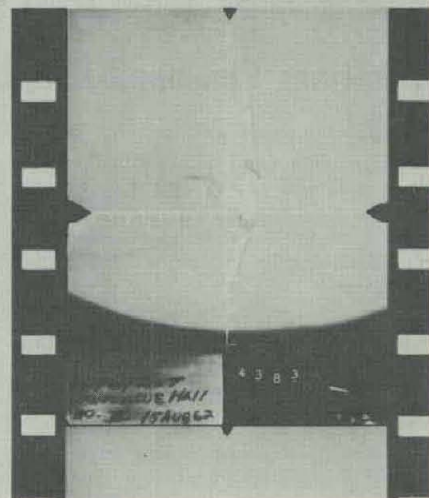
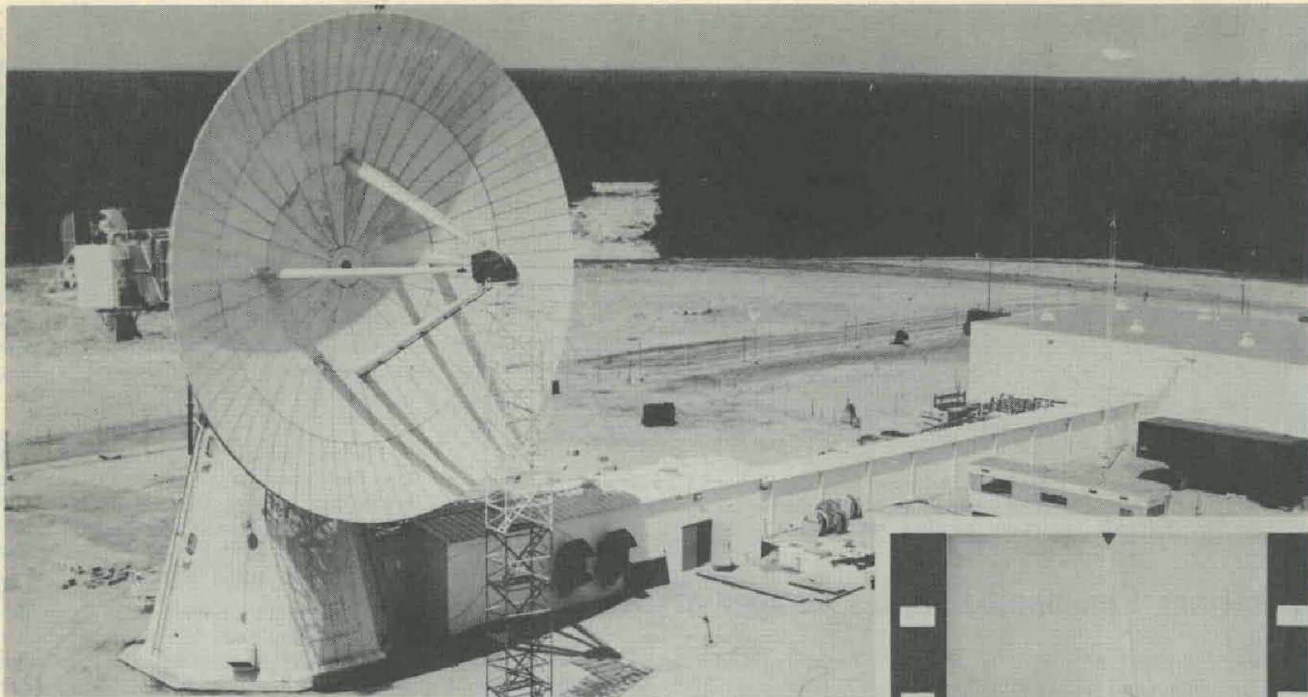
Additional equipment to be installed will permit complete disassembly of a dud without destroying or damaging any of its components.



Robert C. Schofield focuses a remote television camera on a dud hand grenade about to be bisected for examination as to cause of malfunction.



Walter Szelley sees a dud hand grenade using remote controls and a television monitor housed some 150 feet away from the operation.



## 'Fly-By' Testing Series

"Fly-by" testing, the final proof check prior to acceptance of contractor-built communications terminals and systems at the Fort Dix, N.J., U.S. Army SATCOM Agency site, is expected to be completed before the close of 1962. Tests involve the 9-ton "dish" antenna and a twin-engine C-47 plane carrying satellite-simulating equipment.

Flying at 9,000 feet, the plane cruises in a 60-mile circle over the pinebarrens of Central New Jersey. Below the giant parabolic antenna reflector rotates slowly, its precision aim locked on the circling aircraft. Technicians at a control console inside the terminal operations building monitor the tests and control the antenna positions.

In the film strip (above) the plane is shown as it was photographed by a special four frames per second instrumentation camera looking through the tracking axis of the antenna reflector dish. The camera runs

## Army SATCOM Agency Role in DOD Satellite Communications R&D Explained

U.S. Army Satellite Communications Agency responsibilities in advancing the Department of Defense Communications Satellite Program are explained in a recent outline of functional areas in the integrated interservice effort.

Commanded by Brig Gen J. Wilson Johnston, the USA SATCOM Agency has Army-wide authority in satellite communications research and development, and in related operational and logistical considerations.

As the successor to the U.S. Army ADVENT Management Agency, the redesignated organization is the focal point for program planning and implementation, budgeting, funding and accounting, management control and reporting, and providing personnel and training for the operation of the surface communications environment.

General Johnston as project manager reports directly to Lt Gen Frank S. Besson, Jr., Commanding General of the U.S. Army Materiel Command. In discharging his responsibilities, General Johnston exercises full line authority of the CG, AMC.

When the Department of Defense transferred responsibility for the satellite package to the Air Force in May 1962, the Army's role became that of developing and establishing surface communications systems for military satellite communications projects.

USA SATCOM's surface network currently consists of two completely



Brig Gen J. Wilson Johnston

fixed communications terminals at Fort Dix, N.J., and Camp Roberts, Calif., and transportable terminals in the final phase of development. Engineers and scientists at Fort Monmouth, N.J., are managing development and installations of terminals.

One of the air-transportable stations will be assembled for the USA SATCOM Agency at the Lakehurst, N.J., Naval Air Station. In addition, a terminal will test effectiveness of satellite communications from fringe areas at sea and under different atmospheric conditions.

The *USNS Kingsport* seagoing terminal is being provided by the Navy Bureau of Ships as an action agency for the USA SATCOM Agency. Simi-

larly, the U.S. Army Electronics Research and Development Laboratory (USAERDL) is the action agency for development of ground stations.

In the opinion of General Johnston, new systems utilizing satellite relay points in space must be developed to meet military communications needs of the future. Such systems are envisioned as insuring reliable communications almost instantaneously to any point on earth, regardless of causes of interference that hamper radio and cable communications.

Evaluation of the adequacy and degree of effectiveness of satellite communications to satisfy defense requirements is the eventual objective of USA SATCOM Agency R&D tests to be conducted in the Defense Department Communications Satellite Program.

Impressive results have been achieved by SATCOM personnel in precise research and development activity in readying land-sea terminals for the surface environment of the DOD program. The 9-ton, 60-foot parabolic antennas at Fort Dix and Camp Roberts are accurate to within 0.24 degrees at remote distances.

Similarly, the 30-foot parabolic antenna aboard the *USNS Kingsport* is gyro-stabilized on three axes to keep it accurate in sea action. Despite its compact design, the air-transportable system is designed for extreme accuracy and can be flown anywhere in the world for quick assembly and operation.

The National Aeronautics and Space Administration is scheduled to use USA SATCOM facilities in Project SYNCOM early next year. Agency personnel will manage the tests of the surface station communications capabilities, exercising control through the Operations Center at the SATCOM Agency Headquarters, the coordinating activities with other services and governmental agencies.

Functional supervision of the overall Defense Department Communications Satellite Program is the responsibility of the Director, Defense Research and Engineering. The Assistant Secretary of the Army (R&D) will supervise the Army R&D effort through the Director of Special Weapons, Office of the Chief of Research and Development.

The DOD Communications Agency determines performance and schedule specifications, and integrates space and surface elements of communications satellite systems to meet defense requirements.

## oyed to Prove Out Fort Dix SATCOM Facilities

continuously during tests, providing a visual check on antenna tracking relative to the aircraft's position.

Preparations for testing in the fly-by series begin at 7 a.m., when equipment at the station is turned on for warm-up. Visual and electrical checks are completed by 8 a.m., and the antenna "locks" on the tower to allow the technicians to make necessary checks and systems calibrations.

After the air-to-ground communications link is established and the plane is airborne, the 60-foot antenna reflector is aimed for communication with the satellite-simulating equipment. This includes two communications channels for testing voice, teletype and facsimile messages. Built-in attenuators provide the artificial signal loss of a distant satellite.

Then the scan for acquisition on the aircraft beacon signal begins, lock-on occurs, automatic tracking is achieved, and testing commences. Station tech-

nicians follow the aircraft position, first through a radio link, then through antenna tracking. The antenna-mounted camera provides photographs for test analysis and verification of tracking accuracy.

Current tests are determining acceptability of tracking, telemetry, and command subsystem equipment, developed and installed by the Philco Corp., and the communications equipment provided by Bendix Corp.

In all, 87 individual tests must be completed in the fly-by series. These will be conducted at the rate of two or three on each fly-by, in six groups of tests. An integrated fly-by program will conclude the testing series.

Upon completion of the current test series and formal Army acceptance of the facilities, preparation will be made to place the Fort Dix system in service in the Defense Satellite Communications Program and other designated programs linked to military communications requirements.

# DOD Group Studying Management Education, Training Needs

Recommendations on management education and training of military and civilian personnel of the Department of Defense are to be made by a high-level study group in February 1963.

Appointed by Deputy Secretary of Defense Roswell L. Gilpatrick, the group is headed by ASD for Manpower Norman S. Paul. It includes Secretaries of the Military Departments, the Director of Defense Research and Engineering, the Chairman of the Joint Chiefs of Staff, the ASD (Installations and Logistics), the ASD (Comptroller), and the Director of the Defense Supply Agency.

In empowering the group, Mr. Gilpatrick authorized it to obtain, as necessary, the temporary full-time assistance of Defense military and civilian personnel knowledgeable in management, logistics and functional specialties.

No mechanism exists, despite numerous schools and programs, by which overall management training requirements of the Department of Defense can be determined, Mr. Gilpatrick stated. Needed, he said, is a sound basis for decisions as to how these varied requirements can best be satisfied.

Specifically, the group is to investigate and make recommendations on:

- How overall Department of Defense management education and training requirements may be identified and assembled in order to determine how they might most effectively and economically be satisfied. This includes how requirements can be projected into the future, and what joint logistics training requirements will be for the next 5-year period.

- How the effectiveness of existing Defense management and training programs may be assessed. This deals with the questions of whether the balance between in-house and contractual arrangements is proper, to what extent should joint use be made of such capabilities, and what courses and schools are necessary to meet the specialized logistics management training needs of DOD components.

- The feasibility and desirability of establishing a joint logistics management education and training school system.

- The extent, practicality and desirability of adjustments which would be required to make logistics management courses of the three following types suitable for inter-Service use: (a) functional and technical logistics courses (for example, transportation, comptrollership, procurement, distri-

bution, quality control and related fields), (b) short logistics managerial courses of under 16 weeks duration, and (c) logistic courses of 16 weeks or longer.

- The appropriate grade level of students to attend the courses outlined in the preceding paragraph, with emphasis on the qualification of students to attend courses of the long managerial type.

- How management training for

career Civil Service employees may be improved.

- The desirability of developing and publishing a Defense Training Catalogue which would include all logistics management courses offered by DOD components, in-house or by contract.

- The necessity for, and the desirability of, establishing a Board of Visitors for logistics management schools operated by DOD components.

## Missile Command 'Ear' Sounds Secrets of Venus

How hot is the surface of Venus and of what material does it consist are questions an "ear" developed by U.S. Army Missile Command researchers may help Harvard University Observatory astronomers answer.

Hand built by Missile Command Research Laboratory scientists, the "ear" loaned to the Observatory is officially known as a millimeter wave length radiometer, and is believed the only one of its kind in the world.

While the circuitry in the radiometer is common, the grouping of its components makes it a unique instrument for detection of ultra short radiations, such as those sent out by the planet Venus. By analyzing the radiation, scientists believe they can determine how hot it is on the planet and what materials are present on the surface.

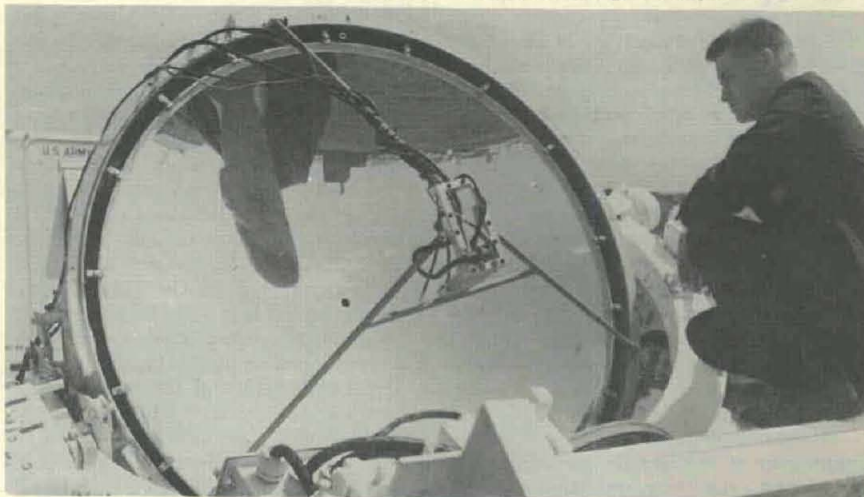
Observations of cloud-shrouded Venus will be made when it approaches some 26 million miles from the earth. The call for loan of the radiometer came from Harvard research associates Dr. Jack Copeland and Dr. Warren Tyler, who developed the original

equipment as Army Missile Command employees.

The Army has used the radiometer in research on the effects of the earth's atmosphere on the ultra short radiations from the sun. The device employs a short piece of copper tubing like a microphone to pick up radiation. A 6-foot diameter mirror of a surplus Army searchlight serves as a lens to focus the sunlight on the copper tubing "microphone."

When Harvard University is finished with the radiometer, the Army Missile Command has other plans for it. Since the instrument can be used as a thermometer, it will be employed to measure heat generated by the Command's new plasma jet research facility.

The plasma jet simulates in a test chamber the re-entry conditions a ballistic missile nosecone experiences in plunging back into the atmosphere. The intense heat that results from air rushing past the nosecone can be measured as radiation by the radiometer. Ronald Easley of the Research Laboratory will operate the radiometer on the plasma jet tests.



Ronald Easley of the Army Missile Command Research Laboratory sees his image reflected in the lens of radiometer equipment which Harvard University astronomers will use to pick up radiation from the planet Venus.

## Experts Consider Computers' Role in Research



Dr. Francis G. Dressel, Army Research Office-Durham (left), Dr. C. V. L. Smith, Atomic Energy Commission (center), and Dr. John H. Giese, Ballistic Research Laboratories, in meeting of Army Working Group on Computers.

What are the current research uses of mathematical computers at Army laboratories? What is the correct perspective concerning the Army's need for computers, or for better computers? What assistance or research in numerical analysis and other branches of mathematics is needed by Army research installations?

These and related questions were discussed by 64 members of the U.S. Army Research Office Working Group on Computers at the Army Research Office-Durham (AROD), N.C., Oct. 31-Nov. 1. The meeting was sponsored by the Army Mathematics Steering Committee, of which Dr. Ivan R. Hershner, U.S. Army Research Office, Arlington, Va., is Chairman.

Col Nils M. Bengtson, AROD Commanding Officer, welcomed the conferees and Dr. John H. Giese, of the Ballistic Research Laboratories, Aberdeen Proving Ground, Md., followed with "Motivational Remarks." One of the Army's top experts on computers, Giese played a leading role in the design of Army's BRLESC computer dedicated at BRL this year.

Key invited speakers included Dr. C. V. L. Smith, Atomic Energy Commission, who discussed "Prospects for the Development of Super-Computers"; John W. Carr, III, professor of mathematics and former director of the Computation Center, University of North Carolina, who spoke on "Computers — Research and Education"; and Dr. Walter R. Guild, Duke University Medical Center, who addressed a dinner session on the subject of DNA Coding.

Dr. Selig Starr, U.S. Army Research Office, reviewed Army regulations governing computers.

The presentations reported on Army use of computers in a number of research areas. Examples are: flight simulation, war gaming, queuing theory, cardiopulmonary disease classification, logistics, statistics, flight trajectories, geodesic coordinate computation, automation of flight data.

The Working Group voted to hold another meeting about a year hence, possibly to include presentations by computer manufacturers on the matter of what the Army would like to have in the way of computers and the possibility of obtaining them.

Dr. Francis G. Dressel of AROD served as secretary for the conference. Dr. Donald P. Wylie, also of AROD, handled local arrangements.

## Memory Unit Doubles MOBIDIC Storage Capacity

Storage capacity of a MOBIDIC computer system is doubled by a mass memory unit delivered recently to the Army's "electronic command post of the future" at Newport Beach, Calif.

The MOBIDIC (mobile digital computer) is the processing heart of the control system at "Operation Central," the prototype post designed to provide Army field commanders with nearly instantaneous display of process intelligence data and reports.

As the first and most powerful of the project "Fielddata Family" of military computers, MOBIDIC receives information from simulated battlefield and headquarters sources, processes and prepares it for visual presentation on maps and display boards.

The new memory unit, developed

## Redstone Hosts Symposium On Calibration Standards

The Primary Standards Laboratory Audit Symposium at Redstone Arsenal, Ala., Oct. 30-31, attracted 75 representatives of Army installations throughout the United States.

As the first Army-wide calibration symposium ever held, the meeting was concerned with standardization of methods used in obtaining intricate measurements as applied to research and development in all U.S. Army primary laboratories.

Military commands or installations represented at the symposium included the U.S. Army Materiel Command, the Electronics Command, the Supply and Maintenance Command, White Sands (N. Mex.) Missile Range, and Pacific Missile Range.

Two National Bureau of Standards representatives from Washington, D.C., made the principal addresses, namely T. R. Young, Chief of the Length Section, and P. E. Pontius, Chief of the Mass Section.

Col Thomas W. Cook, Commanding Officer of the U.S. Army Missile Support Command, gave the welcome.

## OCRD Organization Change

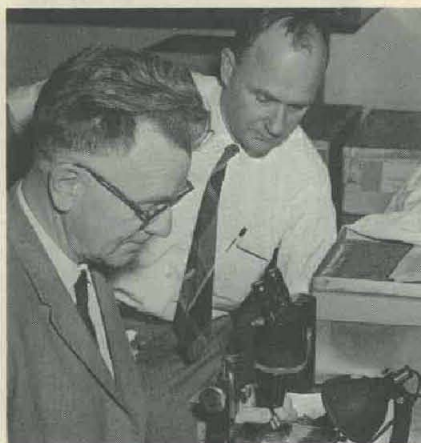
Minor reorganization within the Communications-Electronics Division, Office, Chief of Research and Development has resulted in abolishment of the Combat Surveillance-Avionics and Communications-Electronics Warfare Branches. Newly established are the Combat Surveillance/Electronics Warfare/Avionics Branch headed by Lt Col Charles W. Spann and the Communications Branch under Lt Col William L. Holcomb.

under a \$380,000 contract, gives the system combined memories containing 100 million "bits" of information which, through a binary to alpha-numeric coding process, can be converted into 16.6 million words.

Like MOBIDIC, the memory unit was developed and produced by Sylvania Electric Products, Inc., Waltham, Mass., under technical direction of the U.S. Army Signal Research and Development Laboratory, Fort Monmouth, N.J.

Three other MOBIDIC systems are in use at military installations—at the Seventh Army's Stock Control Center, Zweibrücken, West Germany; the U.S. Army Electronic Proving Ground, Fort Huachuca, Ariz., and Fort Monmouth, N.J. A fifth system is under development.

## 'Share Knowledge' Theme at U.S.-Canadian Defense Symposium



A Canadian scientist and an American entomologist study a specimen in QM R&E Command Laboratory during Joint Defense Development, Production Sharing Symposium tour.



A walking machine, which duplicates 100,000 steps to check stress, strain on key points in shoe construction, is shown to Canadian businessmen.



An experimental, collapsible and disposable cardboard gasoline container with plastic insert is discussed with a Canadian businessman.

Mutual defense interests made "Share the Knowledge" the theme of a recent 2-day United States-Canadian Defense Development, Production Sharing Symposium at Headquarters, U.S. Army Quartermaster Research and Engineering Command.

Eighty representatives of 50 Canadian firms participated at Natick, Mass., in a discussion of research and development interests and programs in progress. The visitors represented 40 communities in six provinces.

"Share the Knowledge" was extended to the fields of clothing, footwear, textiles, paper, plastics, rubber,

cellulose products, food ionization and meteorological research. The visitors were shown numerous types of military materiel in various stages of research, development, test, evaluation.

The U.S. Army's multibillion dollar research complex at Natick, it was stated, conducts basic and applied research in an extremely broad area. The Command has two of the Free World's most impressive research tools—the new \$1.8 million Quartermaster Food Radiation Research Facility, and the Solar Furnace, largest in the Western Hemisphere, to harness the sun's rays for experiments.

## NATO Group Tours U.S. Military Installations

The Structures and Materials Panel of NATO's Advisory Group for Aeronautical Research and Development (AGARD) held its 15th meeting, Oct. 29-Nov. 7, in Washington, D.C.

In addition to participating in sessions held in the Capital, the 29 representatives of the NATO countries made field trips to key research installations, including the Naval Research Laboratory, Anacostia, D.C.; Langley Research Center, NASA, Hampton, Va.; Wright-Patterson Air Force Base, Dayton, Ohio; and Marshall Space Flight Center, NASA, and the U.S. Army Missile Command, Huntsville, Ala.

While touring the laboratories and test facilities, the AGARD members heard briefings on such esoteric topics as aeroelasticity, dynamic loads, fatigue, fracture mechanics and crack propagation.

At the U.S. Army's Redstone Arsenal, Ala., the group toured the Ground Support Equipment and Guidance Control Laboratories and were briefed on the Army materiel programs for missiles. Later they witnessed the test firing of a Saturn missile at the Marshall Space Flight Center.

Briefings by Army personnel concerned "Structural Aspects of Material Research," "Rocket Motors Material Development," "Coating Rockets Nozzles with Tungsten," and "Rapid Stressing of Plastics."

U.S. members of the AGARD panel include Lt Col L. G. Klinker, U.S. Army Research Office, Arlington, Va., Joseph Matulaitis, U.S. Army Materiel Command, Lt Col J. Shipp, U.S. Air Force, Nathan Promisel, U.S. Navy, and Richard Rhode, NASA.

## Inter-American Defense College Established

The Inter-American Defense College located at Fort Lesley J. McNair, Washington, D.C., was formally opened Oct. 9 with an initial class of about 30 officers representative of most of the American Republics.

Secretary of State Dean Rusk turned over the college buildings provided by the U.S. Government, and Maj Gen Thomas F. Van Natta, U.S. Army, Director of the new college, accepted the facilities.

Dr. Jose A. Mora, Secretary General of the Organization of American States, gave the inaugural address to the First American Republics class.

The Inter-American Defense College is a first in Western Hemispheric unity at the academic, college level. The idea for such a college was born in 1957 at the Inter-American Defense Board which meets in Washing-

ton, D.C. Discussions held by member nations of the Organization of American States culminated in official approval of the concept.

The college is an advanced studies institute for senior military officers of the member nations of the Organization of American States. The course of study will last 22 weeks. Officers from different American Republics will have an opportunity to study the Inter-American system and the military, economic, political and social factors that constitute essential defense components.

The college faculty is made up of selected senior military officers from American republic nations. Cost of operation will be borne by all of the participating countries under a formula established by the Pan American Union. FY 1963 budget is \$350,000.

## Cheaper Electrical Power Wins 2 Scientists Awards

More economical generation of electrical power through use of high speed diesel engines, resulting in an estimated saving in excess of \$6 million to the Government, has earned awards for two Army Missile Command employees.

Roy L. Pugh of the Advanced Research Projects Division and Dr. Tanner Link of the Nike Zeus Project Office have been nominated for cash awards of \$1,000 each. If approved at Department of the Army level, \$700 awards will be made to each man in addition to \$300 already given at command level.

When a power complex was needed for Project PRESS (Pacific Range Electromagnetic Signature Study) on Roi Namur Island in the Marshalls, Pugh and Link saw a chance for practical application of their theories. Citing cost and performance figures, they convinced the Advanced Research Projects Agency that high speed diesels would be the best investment for the project.

## CBR Agency Terms Student-Hire Program Successful

An experimental program that provided summer employment as laboratory technicians for three high school science students selected at the 1962 National Science Fair-International has pleased Army sponsors.

Officials of the U.S. Army Chemical - Biological - Radiological Agency, Army Chemical Center, Md., have acclaimed as an unqualified success the pilot program that gave jobs to Raymond C. Roy, John C. Schaefer and Martin E. Walter.

"Potential future Army scientists" is the possibility Agency scientific leaders see in the three youths whose outstanding exhibits at the NSF-I earned the respect of special judges appointed by the Army Chemical Corps. Since then the Corps has been phased into the Munitions Command of the U.S. Army Materiel Command.

Under terms of the summer employment award, the students are assured of vacation jobs for the remainder of their academic careers, based on continued satisfactory performance. Salaries will be scaled to recognize increases in proficiency.

Raymond Roy, 17, of Jacksonville, Fla., was employed in the Biochemistry Division, Chemical Research and Development Laboratories, Army Chemical Center, Md. Assignments included kinetic studies and physical determinations with various chemicals and reagents. Dr. George T. Davis, his supervisor, said employment of

Former plans had called for conventional low speed diesels to furnish electrical power. While adequate for commercial use, these engines give minor voltage fluctuations which show up as false readings on advanced radar screens, Pugh said.

The application for "Special Act or Service" awards for Link and Pugh claims the saving over old type engines by the purchase of seven high speed diesels was more than \$6 million. Performance evaluations, Pugh said, have showed the new engines to be superior to the conventional type.

One of the biggest advantages of the high speed engines, operating at about 900 r.p.m., is the decreased size for comparable horsepower. The old type diesels operated at around 200 r.p.m. The engines operating in a plant for the past year furnish steady state voltage to within one-half of one percent, compared to three percent in old types, and steady state frequency of one-fourth of one percent, compared to one percent in old types.

gifted science students was "highly beneficial to the laboratories as well as to the students."

John Schaefer, 17, of Sheboygan, Wis., worked under Dr. Kenneth R. Bromfield, a plant pathologist, in the Crops Division of the Biological Laboratories, investigating fungal spores. Dr. Bromfield commented:

"Other supervisors noted Schaefer's grasp of instructions, industry and his high motivation, and expressed the opinion that programs on which he worked would benefit by having more assistants of this caliber."

Martin Walter, 17, of San Jacinto, Calif., worked in the Chemical Division, Army Proving Ground, Dugway, Utah. Assigned to work with log-normal curves and other mathematics involved in quality control and statistics, he was under the direction of Dr. Howard E. Thompson, Senior Scientist, who said:

"The procurement of highly able technical personnel is a must in this nuclear age. Contacting such potential leaders at an early age, through such a plan as has been started with these award winners, is conceded to be one of the most promising approaches to date."

The three students said they "definitely" would like to return to their Army jobs next summer, and their supervisors said they "definitely" want them back.

## Col Cerar Takes Command At Dugway Proving Ground

Col Paul R. Cerar became Commanding Officer of Dugway Proving Ground, Dugway Utah, when Col David Armitage retired on Oct. 25.

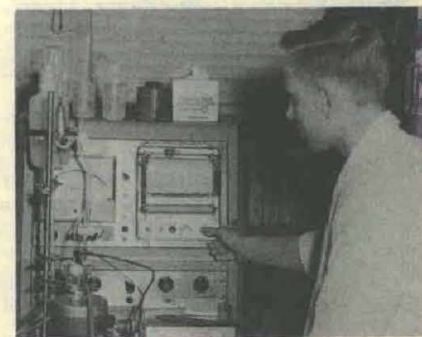
Prior to assignment to the Army's desert installation for chemical and biological research and development, Col Cerar served as Nuclear Effects Adviser to the Army's Chief Chemical Office in Washington, D.C.

Other recent assignments include: Chief, Munitions Branch, Chemical Warfare Laboratories, Army Chemical Center, Md.; Training and Chemical Staff Officer, NATO Staff Headquarters, Allied Forces Southern Europe, Naples, Italy; and Instructor, Radiological Defense, U.S. Army Chemical Corps School, Army Chemical Center.

A graduate of the U.S. Military Academy (1942), he holds a master's degree in physics from Columbia University. During his career he has attended various high-level military service schools, including the Air Command and Staff College and the Industrial College of the Armed Forces.



High school science student John Schaefer and supervisor Dr. K. R. Bromfield at work in U.S. Army Biological Laboratories, Ft. Detrick, Md.



Raymond Roy, summer science student at work in the U.S. Army Chemical Research and Development Laboratories, Army Chemical Center, Md.

# Pershing, Sergeant Missiles Score Gains

Two impressive advances in U.S. Army weapons development occurred recently within the span of two days.

The Pershing was fired successfully from unprepared sandy ground at Cape Canaveral on Oct. 22. It was the first time a ballistic missile has been launched except from the concrete and steel pads built to provide a smooth and stable takeoff surface.

The first firing of a Sergeant ballistic missile by a tactical unit of the U.S. Army was conducted successfully Oct. 24 at the White Sands Missile Range, New Mexico.

The Pershing was fired from its erector launcher, as it would be in a tactical situation, after airlift by helicopter to an unprepared site. Col O. M. Hirsch, Pershing Project Manager at the Army Missile Command, reported the firing.

The tactical ground support equipment performed the countdown with all power supplied by the tactical primary power pack. The countdown was monitored from the blockhouse.

The Pershing and its ground support equipment were positioned on a slight slope to the left of the concrete

pad where the missile had been launched in previous research and development firings.

Flares ejected from the missile's warhead after powered flight ended, aided in tracking the nosecone as it streaked over the Atlantic on a long-range mission. Preliminary data, available immediately after the nosecone impacted in the preselected target area, indicated that test objectives had been met.

All equipment to transport, prepare for and to fire the Pershing can be carried on four lightweight fully tracked vehicles. The system is also transportable by helicopter or assault-type aircraft.

About 300 United States and NATO military leaders, Government officials, contractors and national press representatives observed the tactical-type firing of the Sergeant missile from its mobile erector launcher.

All test objectives were met in the firing conducted by troops of Battery A, Third Missile Battalion (Sergeant), 38th Artillery from Fort Sill, Okla., commanded by Lt Col Fredrick C. Spann.

## WSMR Honors Missile Pioneer for Achievement

Guenter Hintze, a German-born missile pioneer who came to the United States in 1945 with Dr. Werner von Braun and his group of technicians, is the recipient of the first White Sands Missile Range "Achievement Award for Research and Development."

As the prime developer and Chief of the Flight Simulation Laboratory, Test and Evaluation Directorate at WSMR, Hintze often is called "Mr. Flight Simulation," in respect to his contribution to the development of techniques of non-destructive evaluation of missile and rocket systems.

White Sands Missile Range made its first effort to recognize him for "saving the Government untold millions of dollars" by nominating him for an Army Research and Development Achievement Award in April 1962. The special honorary award presented to him in mid-October by WSMR Chief of Staff Col Martin Cunningham carried a citation which stated, in part:

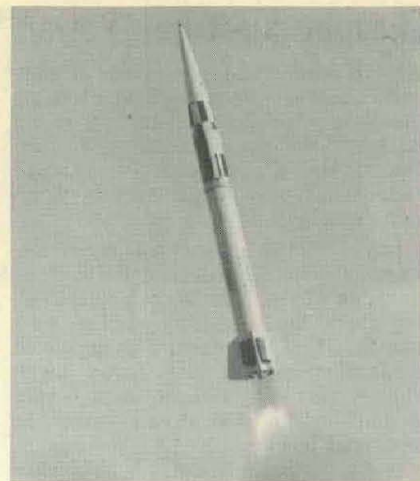
"... For his significant contributions to the science of testing and evaluating missiles and missile-systems that have resulted in more meaningful tests and improved analysis techniques and procedures; for imaginative and progressive leader-

ship; for important personal contributions to the concept underlying mathematical simulation and modeling, and the development of those concepts into practical and useful purposes. . . ."

In the Flight Simulation Laboratory, under Mr. Hintze's leadership, more than 100 employees use advanced electronic equipment to "fire missiles on paper" at a fraction of the cost of firing a real missile. Their techniques also are credited with speeding up the development cycle.

Upon his arrival at White Sands Missile Range, N. Mex., late in 1945, Hintze supervised reconstruction of prelaunching checking facilities for the first testing of missiles in the U.S. He had served with Dr. von Braun's group at Peenemuende, Germany, in development of the V-2 missile control and electronics systems, after 10 years in industry.

In 1950 he moved to Redstone Arsenal, Ala., to work with the von Braun group and served as Chief of the Systems Analysis Laboratory until he was reassigned to WSMR in March 1952. That same year he began his campaign for the establishment of the Flight Simulation Laboratory, which was placed in operation in 1957.



**SERGEANT** ballistic missile seen in first firing by U.S. Army tactical unit at White Sands Missile Range.

To demonstrate the mobility of the supersonic missile system in a field exercise, troops handled it through a complete operation. The wheeled leader-erector-launcher, on which the missile is assembled and from which it is fired, also was taken through a simulated airlift exhibition.

The field exercise was part of a program saluting the Army's 260,000 sergeants, after whom the missile was named.

Designed to meet the Army's concept of "shoot and scoot," the Sergeant can propel a nuclear warhead about 75 miles. It is a 34-foot-long solid fuel replacement for the surface-to-surface Corporal missile, which has been overseas for several years. The rugged Sergeant can be assembled, aimed and fired much more rapidly than the liquid-fuel Corporal.

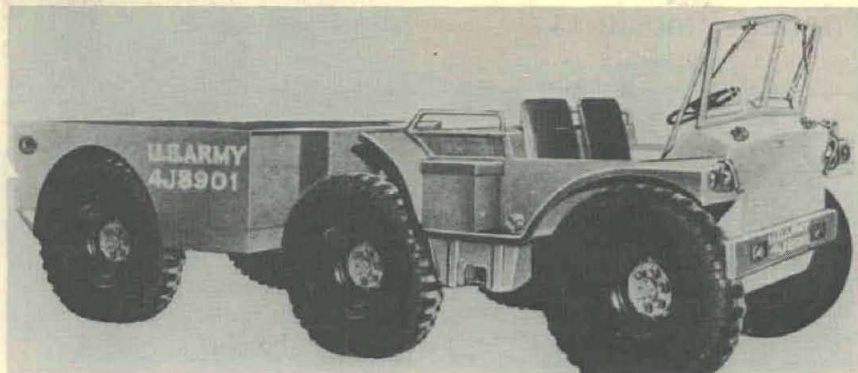
Designed for offensive support of Army troops, the Sergeant system can be set up and launched by a small crew of men in minutes. After firing, the crew can be up and on the road before the missile impacts. The system was unveiled to the public in 1958, and is scheduled for deployment in early 1963 with the first units slated for Europe.

## WSMR Aids Small Business

Approximately 80 percent of the 4,000 firms from which equipment, supplies and services are supplied through Government contracts at White Sands Missile Range, N. Mex., are classified as small business firms, that is, having not more than 500 employees. In FY 1962 they were awarded contracts totaling more than \$6 million, a large portion of it for electronic missile testing equipment.



## Contractor Selected for Missile B & XM561 Truck



XM561, 1 1/4-ton cargo truck, designed for rough terrain and inland waters, scheduled for production by Ling-Temco-Vought, Inc., Dallas, Tex.

Two of the U.S. Army's priority developmental materiel items, Missile B and the XM561 1 1/4-ton truck, have advanced through the final program definition phase and entered the negotiation of production contracts.

Winner of prime contracts expected to exceed \$100 million is the Chance Vought Division of Ling-Temco-Vought, Dallas, Tex, which with Chrysler Corp. survived the first phase of the definition proposals involving eight firms.

Selection of the winner of the Missile B concept proposal competition was announced Nov. 1 by the Department of the Army. The developmental and initial production contract currently being negotiated is expect-

ed to be roughly \$100 million, with the XM561 truck contract accounting for another \$2.5 million.

Planned as a simple, low-cost, rugged, and reliable weapon system to complement both nuclear and non-nuclear artillery fire in combat, Missile B will use a new guidance concept developed by U.S. Army Missile Command engineers at Redstone Arsenal, Ala., an element of the U.S. Army Materiel Command. It will be the first Army missile using pre-packaged liquid fuel for its propulsion system.

Missile B is one of several Army missile programs selected for specialized management by the U.S. Army Materiel Command, and Col W. W.

## Canada Delivers 1st XM571 Utility Carrier to U.S. Under Joint Effort

Completion of the first of 10 articulated XM571 utility carriers to be delivered under the provisions of the United States-Canada Weapons Sharing Program was announced recently by the U.S. Army Tank-Automotive Command (ATAC).

Although Canadian development of the XM571 is under the technical supervision of ATAC, completion of the first vehicle under the developmental program was accomplished in 10 months with "less than two hours of technical effort by the U.S. project engineers."

Trial runs of the prototype vehicle indicate that its design, weight and performance are well within U.S. Army specifications. Distinguished by its unconventional configuration and new engineering principles, the XM571 is described as "providing a new dimension in trafficability in extreme climatic conditions"—jungles, swamps and far north environments.

The system consists of a prime mover and a disconnectable, articulated, powered trailer. Carrying a

2,000-pound payload at a gross vehicle weight of 7,000 pounds and a ground pressure of less than two p.s.i., it is 56 inches high, 20 feet long and 5 feet wide.

Air transportable by U.S. Army medium helicopters, the XM571 has an inherent swimming capability. The carrier provides for installation of personnel heaters, arctic enclosures

Holmes, stationed with his staff at the Arsenal, is Project Manager.

The Warren Ordnance Plant located in the Detroit area has been selected as the site for the new work. A U.S. Army owned facility, the Warren plant has been used in the past for the development and production of major Army weapons systems.

The XM561 truck will be a 6-wheeled vehicle which can "swim" inland waters and traverse rough terrain with an agility unmatched by other wheeled vehicles, Army transportation leaders believe. The initial contract will call for development and construction of several prototypes.

The basis of development will be a vehicle called the "Gamma Goat," developed by Chance Vought on its own initiative, which has demonstrated exceptional mobility over numerous rugged military test courses both in the United States and in Europe.

The XM561 will derive its mobility from two lightweight units working together in combination—a 4-wheeled tractor unit and a 2-wheeled carrier linked to provide power to all six wheels, with pivotal control providing unusual flexibility. An articulation system will keep all six wheels on the ground at all times, regardless of terrain.

The Army expects that most of the major assemblies for the vehicle will be obtained from the automotive centers of Michigan. Of approximately 50 companies solicited for XM561 proposals, six entered the competition.



XM571 utility carrier produced by Canada under joint development program.

## Army Developing Ideographic Composing Machine Expected to Revolutionize Printing Procedures

An electronic composing machine being developed for the U.S. Army may revolutionize mass production of publications in Chinese and related ideographic languages.

The machine is expected to eliminate manual type-setting methods required to date in ideographic language publications. Written Chinese characters can be reproduced rapidly on film and converted into lithographic plates for offset printing.

The process is expected to function at about the same speed and efficiency as modern composing machines used for the alphabetical languages.

Developmental work on the machine is being done under a U.S. Army Quartermaster Research and Engineering Command contract with Radio Corporation of America, under overall control of the U.S. Army Materiel Command.

Work on the machine has been in progress several years. An electro-mechanical model was built in 1959 by the Graphic Arts Foundation, Cambridge, Mass., under contract with the Quartermaster Corps and the Air Force. Utility of this device was confirmed by the Army in tests at Natick, Mass., and Fort Bragg, N.C., providing the springboard for work on the much faster electronic machine.

The ideograph machine was originally conceived for use of U.S. Armed Forces in producing training publications, orientation literature, information leaflets and other printed materials required in our relationships

### Brig Gen Hurst Retires After 24 Years Service

Brig Gen Richard M. Hurst, former Deputy Commander for Ballistic Missiles at the Army Missile Command, Redstone Arsenal, Huntsville, Ala., recently retired from the Army after more than 24 years of service.

General Hurst's assignments in recent years included Deputy Commander, Ordnance Tank-Automotive Command, 1959-1960; Commanding Officer, Watertown Arsenal, 1956-1959; and Assistant Commander of Ordnance Weapons Command, Rock Island, Ill., 1955-1956.

Born in Macy, Ind., General Hurst was graduated from Purdue University in 1930 and subsequently did post-graduate work at Northwestern University. He holds a B.S. in electrical engineering, a master's in business administration and earned a Ph. D. in industrial management.

with the military forces of other nations, under both peace and wartime conditions. Interest expressed in the machine indicates its use in worldwide civilian publishing fields may well outweigh its military applications.

A study undertaken several years ago at the Harvard-Yenching Institute provided the basis for reproducing the Chinese characters by machine. Scholars analyzed the characters for selection of basic strokes and a basic vocabulary. They found that the standard sequence of strokes used to form a Chinese ideograph is unvarying, as every Chinese normally writes a given character with a fixed order of strokes, comparable in the English language to spelling. With relatively few exceptions all the characters are "spelled" uniquely.

Text to be composed enters the machine by way of an electric typewriter keyboard which converts the basic strokes revealed by the study as capable of constructing all characters

## Missile Command Using New Documentation System

A new concept in documentation that will catalogue for the first time all common-use type Army missile parts in a small, readily accessible package will be put into effect early in January by the Army Missile Command at Redstone Arsenal, Ala.

The system is expected to save more than \$3 million per year through increased efficiency of design and production engineers. It is also expected to increase standardization of parts.

The new system will give contractors a comprehensive file on Army missile parts, assisting them in designing new missiles or components using parts already in use in other Army missiles. It will reduce duplication in missile design through documentation of the parts in each Army missile and by use of a rapid retrieval system.

Developed by Information Handling Services of Denver, Colo., the rapid retrieval system groups photographs of components and their specifications on reels of microfilm. One 4 x 4 inch cartridge will hold as much material as two file drawers of engineering drawings. The microfilm files will be updated monthly to keep drawings current with advances in design.

To use the system, the engineer will consult a catalogue that lists the names of all Army missile parts and identifies the reel of microfilm that contains the drawings and descrip-



Optical tunnel of the first Chinese typesetting machine is shown being checked at the Applied Research Activity at Camden, N.J. The tunnel sorts out the proper symbols of the 10,000 characters of the ancient language for reproduction on film and conversion into lithographic plates.

in the machine's vocabulary. The keyboard also contains additional keys representing numerals, punctuation marks, and subgrouping of strokes, for a total of 52 keys.

tions. The reel is then placed on a viewing machine to select the part best suited for the job without having to design a new component.

The Missile Command is a major field agency of the U.S. Army Materiel Command, Washington, D.C.



TOGETHERNESS, S/Sgt Howard Settles tightens a screw on a Nike Zeus anti-missile missile while his son, Sp/4 Howard Settles, records the event at White Sands Missile Range, N. Mex. The sergeant is an assembler with the Nike Zeus Warheads Section. His son is a motion picture photographer for the Electronic Research and Development Activity Pictorial Division.

## Dr. Eklund, Polar Authority, Dies of Heart Attack

Dr. Carl R. Eklund, 53, renowned polar explorer, scientist, lecturer and authority on bird life in the Antarctic, died of a heart attack Nov. 3 in Philadelphia, Pa. He lectured there Nov. 2 at the Museum of Natural Sciences.

Chief of the Polar and Arctic Branch, U.S. Army Research Office at the time of his death, Dr. Eklund joined the USARO staff in 1958 after serving 18 months in Antarctica during the International Geophysical Year (IGY).

The professional prestige of Dr. Eklund was firmly based in his research and exploratory successes on numerous sojourns in the Arctic and Antarctic since he first accompanied the Byrd Expedition to the Antarctic in 1939.

In recent years Dr. Eklund's services as a lecturer increased rapidly in demand, nationally and internationally. Recently he had returned from Paris, France, where he presented a paper before the International Symposium on Antarctic Biology and attended the World Health Organization Conference at Geneva, Switzerland. Shortly thereafter he took a 10-day vacation to make 11 lectures on a cross-country tour.

Research on the Antarctic skua and the Emperor and Adelie penguins during his spare time while he was Leader at Wilkes Station in the Antarctic during the IGY earned him widespread recognition. He devised a delicately ingenious telemetering technique which gave him the answer to the question of how the penguin can incubate eggs when the temperature drops to 77° below zero. Recordings showed the eggs remained at about 10 degrees below the body temperature of the penguin.

Another research area that intrigued Dr. Eklund, and in which he succeeded in arousing international interest, was in the banding of birds in the Antarctic to study how migrations to distant areas, that is, other continents, and return may contribute to spread of diseases dangerous to mankind.

While on the Byrd Expedition, he made one of history's major Antarctic dogsled treks, traveling 1,264 miles in 84 days and charting 350 miles of coastline. The Eklund Islands in King George VI Sound honor that feat.

From 1933 to 1936 he was employed as a conservationist with the U.S. National Park Service. Except for service with the Byrd Expedition and with the Arctic-Desert-Tropic Branch of

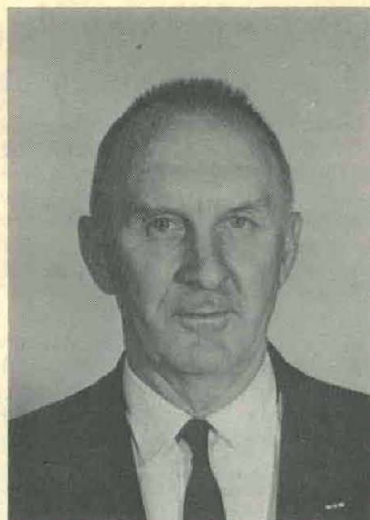
the Air Force from 1943-1946, most of his duty was with the U.S. Fish and Wildlife Service as a research biologist until 1956. His last assignment was Assistant Regional Director at Atlanta, Ga.

In 1949 the Arctic Institute of North America made a \$2,500 grant to Dr. Eklund for a waterfowl survey of the Ungava Peninsula in Northern Canada—a survey that covered 6,700 square miles from an airplane flying 150 feet above the ground. He later discovered that he had come within 20 miles of finding the now famous Chubb Crater, caused by a meteorite.

Born in Tomahawk, Wis., he was graduated from Carleton College in Minnesota and in 1938 earned his master's degree at Oregon State College. After 11 years of night school study, he received his doctorate degree from the University of Maryland in 1959. His thesis was titled "Life History Studies of the South Polar Skua."

Professional society affiliations of Dr. Eklund included the Arctic Institute of North America, the American Polar Society, the Wildlife Society, the Polar Research Committee of the National Academy of Sciences, and the National Academy of Sciences Panel on Biology and Medical Science.

Full military funeral services were



Dr. Carl R. Eklund

conducted from the Fort Myer chapel, with Chief of Research and Development Lt Gen Dwight E. Beach, Director of Army Research Maj Gen C. W. Clark and numerous high-ranking officials of Army research and development activities in attendance. Interment was in Arlington National Cemetery, approximately 100 yards from the chapel.

Survivors include his widow, the former Harriet San Giovanni of White Plains, N.Y., and two teenage daughters, Linda and Signe.

## SCIENTIFIC CALENDAR

American Society of Mechanical Engineers, N.Y.C., Nov. 25-30.

Annual Meeting of the Radiological Society of North America, Chicago, Nov. 25-30.

Conference on Atomic Industrial Forum, Washington, D.C., Nov. 26-28.

Annual Clinical Meeting of Atomic Industrial Forum, Los Angeles, Nov. 26-28.

Medical Conference, sponsored by NATO, Paris, France, Nov. 27-28.

Annual Meeting of the Human Factors Society, N.Y.C., Nov. 28-30.

11th Annual Wire & Cable Symposium, Asbury Park, N.J., Nov. 28-30.

Symposium on Ultrasonics Engineering, sponsored by IRE, N.Y.C., Nov. 28-30.

International Symposium on Radiation Induced Polymerization & Graft Copolymerization sponsored by the Battelle Memorial Institute and AEC, Columbus, Ohio, Nov. 29-30.

Symposium on Biomedical Aspects of the Space Sciences, sponsored by UCLA and AFOSR, Los Angeles, Nov. (date undetermined).

Conference on Technical & Economics Information in the Field of Communications, Warsaw, Poland, (date undetermined).

Interamerican Symposium on Aeronautics and Investigations of Space, Buenos Aires, Argentina, Dec. (date undetermined).

International Conference on Satellite Communication, London, England, Dec. 3-4.

Conference of Hydraulics and Fluid Mechanics, Perth, Australia, Dec. 3-13.

Role of Substructure in the Mechanical Behavior of Metals, Orlando, Fla., Dec. 5-7.

International Congress on Visual Communications, Philadelphia, Dec. 7-11.

Symposium on Environmental Physiology and Psychology in Arid Conditions, Lucknow, India, Dec. 7-12.

Symposium on Neutron Detection, Dosimetry & Standardization, Harwell, England, Dec. 10-14.

Fall Joint Computer Conference, sponsored by the American Federation of Information Processing Societies, Philadelphia, Dec. 11-14.

Conference on Space Physics, sponsored by the American Rocket Society, Philadelphia, Dec. 26-31.

29th Annual Symposium on American Chemical Society, sponsored by ACC, Houston, Tex., Dec. 27-28.

International Conference on Radiation Research, sponsored by the U.S.A. Natick Labs and NAS, Natick, Mass., Jan. 14-16.

9th National Symposium on Reliability & Quality Control, sponsored by the American Society for Quality Control, IRE and AIEE, San Francisco, Jan. 21-24.

4th Winter Convention of Military Electronics, sponsored by IRE, Los Angeles, Jan. 30-Feb. 1.

## DOD Assigns Army Responsibility to Establish Defense Language Institute, Monitor Program

Responsibility for establishment of a Defense Language Institute (DLI), and for technical direction and monitoring of all Department of Defense language training outside the service academies, is assigned to the Department of the Army by a new DOD Directive.

DOD Directive 5160.41 is based on an Army language training plan prepared under instructions from the Deputy Secretary of Defense. Provisions apply to full and part-time language instruction in the military services.

When established, the DLI will set academic standards and supervise classes and facilities for foreign language instruction in the United States and overseas, and for English language training of foreign military personnel in the United States. The DLI staff will include civilian and military linguistic experts.

No immediate change is planned in language programs at existing centers such as the Army Language School at Monterey, Calif., or at civilian universities.

An instruction facility in the Washington, D.C., area will be maintained

by DLI, using as a nucleus the Language Department of the Naval Intelligence School at the U.S. Naval Station.

While the above schools will be conducted by the Department of the Army, the Air Force will continue to operate its English Language School at Lackland Air Force Base, Tex. Its curriculum, methods and standards will be under the technical control of the DLI.

Agreements and contracts with the State Department's Foreign Service Institute, civilian universities and commercial language schools will supplement these facilities.

Among the benefits to be expected from creation of the DLI are:

- All Defense language requirements can be assembled and studied in one place to determine the best way of meeting them.

- Greater economy and efficiency are anticipated in conducting those language programs which lend themselves to Defense Department-wide treatment. Some consolidation or other changes may take place later in language instruction facilities to increase efficiency and economy.

## USC&GS Oceanographic Research Program Outlined

Expanding oceanic underwater research objectives of the U.S. Coast and Geodetic Survey were outlined recently to Scientific Research Society of America members at the Army Chemical Research and Development Laboratories.

The Nation's first research ship of full-ocean range, a 303-foot, 3,800-ton "Oceanographer," is to be launched in May 1964. Theodore V. Ryan of the Survey Director's staff told members of the Edgewood, Md., RESA unit. Expansion plans call for eight modern new units to be added to the present fleet of 15 research vessels by 1970.

The "Oceanographer," he said, will be a "dream research vessel" designed to go anywhere in the world and remain as long as desired on surveys. U.S. Coast and Geodetic hydrographic research interests now range to many parts of the world and are being pursued in cooperation with various scientific organizations. Among current projects are:

- A long-range ocean-wide survey.
- A continuing coastal measurement and in-shore studies of currents, depths and tides.
- A one-third completed Indian Ocean expedition in cooperation with

other scientific agencies.

- A fisheries investigative expedition of the tropical Atlantic Ocean under the United Nations Educational, Social and Cultural Organization in which 14 countries are taking part.

Advances in instrumentation and modification of shipboard laboratories of the Survey's fleet are broadening the scope of hydrographic research, Mr. Ryan said. Three-dimensional aerial photo-mapping of the coastal sea bottom is considered an important new technique.

## ASTIA Planning Relocation At Cameron Station in 1963

Bids for the conversion of Building No. 5 at Cameron Station, Alexandria, Va., for use of the Armed Services Technical Information Agency have been received by the Corps of Army Engineers. ASTIA is scheduled to occupy the building next spring.

Draft copies of an ASTIA proposed standard form for abstracting instructions are being field tested. This form includes provisions for reporting descriptive cataloguing data, release statements, recommended ASTIA descriptors, and a summary.



By Dr. Ralph G. H. Siu

### JUMPING AT CONCLUSIONS.

The wise man, we are told, learns from the experience of other people as well as his own. The experience of Lord Lyndhurst may be of some value in this context. As recorded by Judge Bernard Sheintag, it goes like this:

We are told that on the Bench, Lord Lyndhurst's lips would often be seen to move, but no sound proceeding from them would be heard by the Bar. The registrar writing beneath him could tell another tale. He could hear his Lordship mutter in the course of an argument.

"What a fool that man is!"

Then, after an interval,

"Eh, not such a fool as I thought."

Then, after another interval,

"Egad, it is I that was the fool."

**FORCE and FINESSE.** Some of our good R&D confreres have confided their discouragements to me about blunting their executive wits against the Washington bullocks. I deeply sympathize with their plight. But all I can offer at this time is what Prince Huei's cook said about his technique.

"Although I have had this chopper for nineteen years and have cut up many thousand bullocks, its edge is as if fresh from the whetstone. For at the joints there are always interstices, and the edge of a chopper being without thickness, it remains only to insert that which is without thickness into such an interstice. Indeed there is plenty of room for the blade to move about.

"Nevertheless, when I come upon a knotty part which is difficult to handle, I am all caution. Fixing my eye upon it, I stay . . . my blade, until with a *hwah* the part yields like earth crumbling to the ground. Then . . . wiping my chopper, I put it carefully away."

**DON'T CHECK THE ROOTS, PLEASE.** There is something worthwhile for our review-and-analysis associates in what the Honorable Dean Acheson is reputed to have said:

"If you want a plant to grow, don't go pulling it up every day to see how the root system is doing."

## HFE Parley Focuses on Infantry Needs

The eighth annual U.S. Army Human Factors Engineering Conference, Oct. 16-19, at Fort Benning, Ga., was attended by 225 representatives from the military services, universities and industry, including delegates from the United Kingdom and Canada.

Home of the U.S. Army Infantry Center and the U.S. Army Infantry School, Fort Benning was selected as an appropriate locale for a meeting which focused on the relationship of human factors research and the infantryman's role on the battlefield.

Maj Gen Ben Harrell, CG, of both the Infantry Center and Infantry School, welcomed the conferees and delivered the dinner address. Lt Gen

### Metallurgy Meet Centers On Reliability, Quality

Reliability and quality assurance of powdered metal parts was the theme of the meeting of the Powder Metallurgy Section of the American Ordnance Association, Oct. 17-18, at Springfield, Mass.

Col C. P. L. Medinnis, Commander of the Springfield Armory, welcomed the group. Army speakers included:

- Lt Col L. G. Klinker, Physical Sciences Division, U.S. Army Research Office, Arlington, Va., "Long Range Planning of Army Materials Research and Development Based on Technological Forecasts of Weapons Systems."

- Frank Zaleski, Pittman Dunn Laboratories, Frankford Arsenal, Philadelphia, Pa., "Long Range Planning in Weapons Systems Involving Powder Metallurgy and Closely Related Fields."

### Army Nuclear Defense Lab Acquires Betatron

The U.S. Army Nuclear Defense Laboratory (NDL) at Edgewood, Md., has acquired a 24 MeV betatron through the Office of Naval Research from the University of Pennsylvania.

The machine will be used in support of NDL projects such as investigations of neutron angular distribution and energy spectrum from ( $\gamma$ , n) reactions, photo fission and cross-section work.

Neutron production in heavy metals by ( $\gamma$ , n) reactions can be used as a pulsed neutron source, yielding neutrons of wide energy spread for further experimentation.

The betatron is a charged-particle accelerator in which electrons injected into a toroidal vacuum tube (donut) are accelerated in an electric field circulating in a changing magnetic flux.

The donut is located between the

John P. Daley, CG, U.S. Army Combat Developments Command, Fort Belvoir, Va., was the keynote speaker.

Other general officers participating included Director of Army Research Maj Gen C. W. Clark; Brig Gen John E. Kelly, Deputy CG, U.S. Army Infantry Center; Brig Gen Royal Reynolds, Jr., Deputy CG, U.S. Army Infantry School; Brig Gen John G. Zierdt, Deputy Director R&D Hq, U.S. Army Materiel Command; and Brig Gen C. B. DeGavre, Deputy Chief of Staff, Personnel, USCON-ARC.

Infantry School demonstrations were given in ranger activities, airborne training, river crossing operations, leadership, ground mobility and weapons instructions.

More than 25 research papers were presented at the sessions based on the themes, "Design for the Infantryman," "Design for Combat Support," "Human Factors and the Infantryman" and "Tactical Aspects of Sound."

Dr. Lynn E. Baker, Scientific Adviser, Human Factors Research Division, U.S. Army Research Office, served as general chairman.

Because in recent years the conference program has expanded beyond human factors engineering to include research in personnel, leadership and training methods, the 1963 meeting will be designated as the U.S. Army Human Factors Research and Development Conference.

Scheduled for autumn 1963, the conference will be held at the Walter Reed Army Institute of Research, Walter Reed Army Medical Center, Washington, D.C.

pole faces of an electromagnet. Proper design of pole face shape and gap width allows stabilizing of the electron beam in an orbital path as well as acceleration.

In the NDL betatron the magnetic flux changes at a rate of 180 cycles per second. Acceleration of the electrons takes place in the first quarter cycle, when the field rises from zero to peak energy. Injection of the electrons takes place shortly after the field passes through zero.

The orbiting electrons are then expanded by a perturbation of the magnetic field and forced to strike a metal target inside the vacuum chamber, thus generating an X-ray pulse (bremsstrahlung) with energies up to peak electron energy.

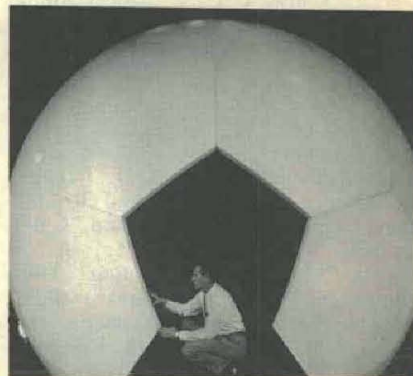
On the NDL betatron, manufactured by Allis Chalmers Co., Milwau-

### 23 Personnel Complete Course In PERT, CPM at Fort Belvoir

Twenty-three civilian and military personnel recently completed a course in Program Evaluation and Review Techniques (PERT) and Critical Path Method (CPM) at the Army Engineer R&D Laboratories, Fort Belvoir, Va.

Col Philip G. Krueger, Deputy Commander of the Laboratories, presented completion certificates to 21 civilian employees of the Army Mobility Command's Engineer Research and Development Laboratories and the Army Engineer Geodesy, Intelligence and Mapping Research and Development Agency. The class also included two officers from the Army Engineer School.

Designed to provide enrollees with a knowledge of the principles and fundamentals of sound project planning, the course was conducted by representatives from the Ordnance Management Training Agency, Rock Island, Ill.



When the U.S. Army Engineering and Research Laboratories, Fort Belvoir, Va., received three awards from the Society of the Plastics Industries for developing the "Buildings in Barrels" concept (see April 1962 issue, p. 22), judges enthusiastically predicted civilian industrial adaptation of the Army technique. An example of its potential is the first successfully operated rigidized foam radome made in the U.S. Built of 31 hexagonal and pentagonal polyurethane foam panels bonded together, the sphere provides wind and weather protection for airport surface detection equipment used to control ground traffic at major airports. Goodyear Aircraft Corp., Akron, Ohio, built the 17-foot diameter, 890-pound structure.

kee, Wis., the peak energy can be varied from 2 MeV up to 24 MeV. The intensity of the bremsstrahlung at 1 meter from the target is 100 roentgens per minute with a repetition rate of 180 pulses per second.

## Mobile Lab Tests Vehicles in Desert

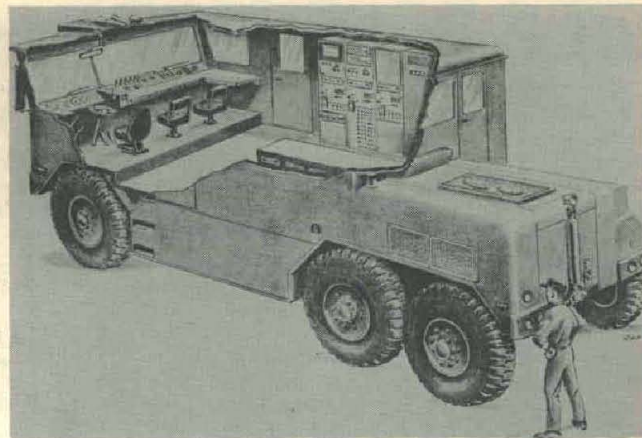
Electronically gauged vehicle tests can be made in air-conditioned comfort across the desert where the temperature reaches 120° F. with a mobile laboratory delivered recently to Yuma Test Station, Ariz.

Designed for use by the Ordnance Testing Activity, the "dynamometer truck" is 32 feet long, 12 feet high, is powered by a 750-horsepower Diesel engine, and has an intricate complex of electronic equipment.

The Data Recording System, for example, can measure and record as many as 160 temperature readings, as well as indicate the speed of flow of fuels and coolants. Electronic devices also record vital statistics about many other important qualities of the vehicle under test.

The testing laboratory is equipped with radios, an intercom, a public address system, work benches, tables, desks and fluorescent lighting. It is designed to be towed or to tow the vehicle being tested.

Final acceptance tests prior to delivery of the dynamometer truck to Yuma Test Station were made by the FMC Corp. at San Jose, Calif.



Artist's concept of Dynamometer Truck showing spacious interior of the mobile air-conditioned laboratory.

## Sergeant Project Leader Announces Key Personnel

Personnel changes within the Sergeant Project Office at the U.S. Army Missile Command, Redstone, Ala., were announced Nov. 5 by Col John E. Aber, Project Manager.

Major appointments are Lt Col George Chow, Deputy Project Manager; Alton H. Hooker, Chief, Quality Assurance Division, and John E. Stair, Deputy Chief, Program Management Office.

Other new key personnel include E. C. Roberts, Chief, System Engineering Division; James H. Draughon, Chief, Procurement and Production Division; John F. Hand, Chief, System Test Division; Maj A. A. Hord, Chief, System Support Division; Maj Robert D. Funke, Chief, Program Management Office; Maj Richard M. Brunson, Chief, Field Office at Salt Lake City, Utah; and Alan M. Lederman, Chief, Operations Office.

Lt Col Chow came to Redstone Arsenal in 1960, following duty with a

Military Assistance Advisory Group in Taiwan, Formosa. Assigned as project officer of the Weapons System project office in the Army Ballistic Missile Agency, he later was senior Weapons System project officer and in 1961 was moved to Orlando, Fla., as the Technical Operations Officer, Pershing Project.

Alton Hooker graduated from Davis-Elkins College, at Elkins, W. Va., and did graduate work at Texas A&M College at College Station, Tex. He entered military service in 1942 and attended wartime service schools at Harvard, MIT, the Naval Research Laboratories and Bell Telephone Laboratories. A former Naval Commander, his last assignment was with a Patrol Bombing Squadron. He is a member of the American Institute of Engineers and the American Radio Relay League.

John Stair began work at Redstone Arsenal in 1958 and has been in the general field of programming.

## Dr. Enthoven Assumes DOD Systems Analysis Post

Dr. Alain C. Enthoven took office as Deputy Assistant Secretary of Defense (Comptroller) on Oct. 18. He had served since May 1961 as Deputy Comptroller for Systems Analysis (Programming).

In his new position, he will remain in the field of Systems Analysis, with responsibility for analyzing cost and effectiveness of defense programs.

Prior to joining the Department of Defense, Dr. Enthoven was an economist with the Rand Corp., Santa Monica, Calif., working on various aspects of strategic air warfare. He also has served as a consultant to the Brookings Inst., Washington, D.C.

A native of Seattle, Wash., he holds a B.A. degree from Stanford University (1952); a B.Phil. degree from Oxford University, England, earned as a Rhodes Scholar; and a Ph. D., degree in economics from the Massachusetts Institute of Technology.

## Assigned to Weapons Evaluation

Secretary of the Army Cyrus R. Vance recently announced the reassignment of Maj Gen John F. Ruggles, Commanding General, 1st Infantry Division, Fort Riley, Kans., to the Office of the Secretary of Defense for duty as Senior Army Member, Weapons System Evaluation Group, Washington, D.C., effective in January.

## Statisticians Consider Design of Experiments

Nearly 200 mathematical statisticians attended the Eighth Conference on the Design of Experiments in Army Research, Development and Testing at Walter Reed Army Institute of Research (WRAIR) in Washington, D.C., Oct. 24-26.

Scientific presentations reflected a wide range of application of mathematical techniques to research problems. Topics included: "Estimation of Service Life from Fatigue Testing Results on Full Scale Specimens," "Statistical Procedures for the Evaluation of Thrust Curves," and "How to Design War Games to Answer Research Questions."

The meeting was sponsored by the Army Mathematics Steering Committee, with the U.S. Army Research Office-Durham (AROD), N.C., serving as secretariat in conjunction with WRAIR. Persons desiring copies of proceedings should write to Dr. Francis Dressel at AROD. Distribution will be made in mid-1963. Dr. Dressel also is responsible for invitations to the 1963 conference next fall.

Brochures distributed at the meeting gave information on orientation lectures in mathematics and in-service educational opportunities open to Army military and civilian employees at the Mathematics Research Center (MRC), U.S. Army, on the University of Wisconsin campus in Madison.

A questionnaire also was circulated to determine educational and professional qualifications and research activities of the statisticians present. The purpose is to gather information helpful in planning in-service educational programs, and all replies are held confidential. Statisticians desiring to fill out the questionnaire should write to Dr. Marvin Zeller at MRC.

## World Health Unit Plans Publication of Monograph Authored by Army Chemist

A technical monograph written by an Army chemist on "Biological Control of Medically Important Insects" has been accepted for publication by the World Health Organization.

Dale Wilson Jenkins, now employed by the National Aeronautics and Space Administration in Washington, D.C., prepared his lengthy report while engaged in research at the Army Biological Laboratories, Fort Detrick, Md.

In the introduction to his treatise, Mr. Jenkins explains that his work attempts to compile and catalogue the pathogens, parasites and predators of the medically important arthropods. It does not include arthropods of strictly veterinary importance or of minor importance to man.

The author has made a special effort to survey the pathogens and parasites since they appear to offer the greatest potential for practical control. Some 610 different pathogens and parasites are included among organisms known to cause pathological damage or mortality. Unfortunately, he says, this information is either unknown or not reported for many of the organisms. Most of the species occur in the protozoa and 191 differ-

ent protozoa-insect host relationships are recorded.

The field of biological control of medically important arthropods, according to the author, involves over a thousand species of pathogens, parasites and predators from the entire animal kingdom and part of the plant kingdom, and over a thousand species of medically important arthropods. To prevent a hit-or-miss random approach to biological control, he considers it necessary to compile, catalogue and evaluate this scattered, fragmentary mass of uncoordinated information.

Jenkins says he hopes that his publication will stimulate additional critical literature review of special areas and groups, and serve to initiate or increase field and laboratory research and observations on reported organisms. He expects that interest in this area will "undoubtedly" produce more new and unknown pathogens, parasites and predators with even greater biological control potential than presently known.

The author has received assistance from Dr. Marshall Laird in the preparation and editing of his manuscript. Various sections have been reviewed by specialists, and the scientific names have been brought up to date with corrected synonymy. This is considered of great importance since the data were taken from reports from most countries of the world and some publications dating to 100 years ago.

## Machinist Simplifies Work By Exercising Ingenuity

Ingenuity is still paying off for Milton A. Frank, Sr., a machinist with a flair for improvising devices to simplify his work at the U.S. Army Biological Laboratories, Fort Detrick, Maryland.

A feature article in the September 1961 issue of this publication told of his adaptation of an ordinary kitchen blender into a leak-proof apparatus for fluidizing diseased tissues. Used now in other biological laboratories, the device eliminates one of the hazards of the fluidizing procedure.

Mr. Frank recently received a \$100 final invention award and a \$50 initial invention award for two more highly useful devices.

The final award was for an invention titled, "Method and Device for Drilling Precision Holes." This device can feed a drill of two or three microns (thousandth of a millimeter), well within the most exacting tolerances in precision work.



Milton A. Frank, Sr.

The \$50 award was for his invention of a tool-holder and mount that facilitates the use of facing and turning tools in a lathe. Work can be set up rapidly for boring, cutting or threading. A valuable feature of this device is that work can be centered quickly with great precision.

## MOCOM Studies Methods Of Image Intensification

New methods of image intensification are being investigated as part of the U.S. Army Mobility Command (MOCOM) long-range program to provide the soldier with night viewers requiring only starlight, moonlight or skylight for a visible image.

Needing no artificial radiation, such viewers cannot be detected readily by the enemy, enabling advance units to operate in darkness with speed and security.

Under development are special vacuum tubes which amplify extremely low levels of light and picture a target in the eyepiece of the viewer. MOCOM also is studying the possibility of using solid blocks of semiconductor and other materials which might be cheaper and more reliable.

Including development and testing of appropriate structures as well as material investigations, the current study of various methods will serve to select the most promising for further research and development.

Under a \$70,970 contract with MOCOM's Engineering Research and Development Laboratories, Fort Belvoir, Va., the Electro-Optical Systems, Inc., Pasadena, Calif., is conducting the research in solid-state, non-vacuum tube image intensification. MOCOM is a major subcommand of the Army Materiel Command.

## WRAIR Seminar Considers Report on Leptospirosis

"An Analysis of 483 Human Cases of Leptospirosis in the United States" was discussed at the October staff seminar of the Walter Reed Army Institute of Research, Washington, D.C.

The principal speaker was Dr. A. D. Alexander of the World Health Organization. He is Chief of the Food and Agricultural Organization, Leptospirosis Reference Laboratory, Department of Veterinary Microbiology, Division of Veterinary Medicine.

The discussion covered the cases which were confirmed or diagnosed on the basis of serological or bacteriological tests conducted over a period of 13 years at WRAIR and the Communicable Disease Center, Atlanta, Ga.

Dr. Alexander described the methods developed to machine process medical data compiled over the years, and noted particularly that the data disclosed clinical misconceptions of leptospirosis and its confusion with a wide variety of diseases.

Dr. Ross L. Gould, Director of the WRAIR Division of Preventive Medicine, presided over the discussion following the presentation.

# Report Cites Human Factors Research Benefits for FY 1962

Army human factors research and engineering during FY 1962 saved the Government many millions of dollars, significantly improved important items of military materiel, and resulted in better use of manpower.

The basis for these claims is a report prepared by the Human Factors Research Division, U.S. Army Research Office, Office of the Chief of Research and Development.

Under the guidance of Col George J. Bayerle, the HFR Division has the assigned responsibility of monitoring, supervising, coordinating and giving impetus to the entire human factors research and engineering programs for the Department of the Army.

Major operational elements funded and monitored through the HFR Division include the Human Resources Research Office (HumRRO) of George Washington University, the Special Operations Research Office (SORO) of the American University, and the U.S. Army Personnel Research Office (APRO), all in Washington, D.C.

Human engineering activities formerly spread throughout the Technical Services now are concentrated under the Human Engineering Laboratories (HEL) at Aberdeen Proving Ground, Md., an element of the Test and Evaluation Command, U.S. Army Materiel Command. The U.S. Army Research Office continues to exercise funding and monitoring responsibilities over HEL.

Selected Human Factors Research accomplishments during FY 1962 are listed below for each operational element:

## HUMAN RESOURCES RESEARCH OFFICE.

Task OFFTRAIN — a 16-hour course in leadership for junior officers, now in use in 250 Army Reserve Officer Training Corps programs.

Task NCO—a 2-week NCO leadership preparatory course to fill a pressing need at seven training centers during the Army buildup of 1961-62.

Task LIFT—procedures for objective grading of helicopter pilot performance during check rides.

Task UNIT—a miniature battlefield developed along with miniature vehicles as one solution to tank commander training problems adapted to limited terrain.

Task NICORD—a systematic method for determining training objectives which has produced increased efficiency of the Ordnance Nike Tracking Radar Repair Course.

Task TRADER—a handbook deline-

ating how to establish better Army training device requirements.

HumRRO's research staff is mainly in units at Fort Benning, Ga, Fort Knox, Ky., Fort Rucker, Ala., Fort Bliss, Tex., and Fort Ord, Calif. These are joint Continental Army Command—HumRRO units with military and civilian staffs.

## SPECIAL OPERATIONS RESEARCH OFFICE.

*Case Study in Guerrilla Warfare*, a 338-page report pertinent to current limited war requirements.

*A Selected Annotated Bibliography on Unconventional Warfare*, published to aid Army planning for remote area conflicts.

PROPIN — propaganda infiltration studies on China, and on the Chinese Communist Army, covering detailed analysis of word-of-mouth techniques of propaganda operations.

A special SORO study was completed on the legal status of participants in unconventional warfare.

## HUMAN FACTORS ENGINEERING.

Satisfactory firing of the Saturn was materially assisted by the human factors engineering of important aspects of its design. The HFR Division report also states that:

Recommendations on the prototype of the Honest John handling unit cut the crew size from 12 to 6, and decreased reaction time by over 56 percent.

Acceptability, accuracy, portability, and ease of operation of the M79 Light Infantry Assault Weapon are directly attributable to the inclusion of human factors engineering from inception to completion of development.

In excess of \$3 million were saved through early design modifications of the fire control pack of the Pershing Missile System. Operator requirements were also reduced 50 percent.

Redesign of the cab inclosure of the HU-1B aircraft to withstand 56 percent greater loadings resulted from HFE aviation crash-injury studies.

With resultant savings running into millions of dollars, the number of shoe sizes has been reduced from 235 to 113 as a direct result of HFE anthropometric research. Comparable reductions in other garment size tariffs have also been made.

## ARMY PERSONNEL RESEARCH OFFICE.

A method was developed for the optimal assignment of men from basic

combat training to advanced individual training. For a given number of people to be assigned at any one time, this method assures that, for the group as a whole, the men will be assigned to duties they can best perform.

An Officer Evaluation Center for testing newly commissioned officers has been established at Fort McClellan, Ala. There more than 1,000 officers are being tested in a 3-day field performance experiment.

An Army Reserve Officer Training Corps Inventory was developed to be used in selecting advanced ROTC students from 60,000 applicants in 250 colleges.

New forms of the Army Qualification Battery were completed and implemented July 1, 1962.

Women's Selection Tests and Women's Enlistment Screening Tests were made operational by the Army in February 1962.

New forms of the Army Clerical Speed and Automotive Information Test were introduced January 1962 into the Army Classification Battery.

Theoretical mathematical models for describing Army samples on several variables have been developed. These models are to be adapted for assessing manpower requirements arising from new hardware systems.

At USCONARC request, a selection battery was developed for selecting antitank guided missile gunners.

## Contract Covers Security At Nike Hercules Location

Work has begun on design, production and installation of an electronic security system for the Army's Nike Hercules missile program under a \$100,000 contract awarded by the U.S. Army Corps of Engineers, Omaha District.

The contract calls for installation this year of a perimeter security system to help guard an above-ground Nike Hercules site near Offutt Air Base, Nebr.

The RSL-developed security system will operate as a bistatic doppler radar to create an electromagnetic field along the perimeter. Objects entering this field will be detected and central monitoring facilities will be notified electronically.

All design, development and fabrication work under the contract will be done at the Reconnaissance Systems Laboratory, Sylvania Electronic Systems, a subsidiary of General Telephone and Electronics Corp.



# Human Engineering Concept Applied to Armored Vehicle Design

Human factors design approach to armored squad carrier design is reflected in a new concept announced by the U.S. Army Human Engineering Laboratories (HEL), Aberdeen Proving Ground, Md.

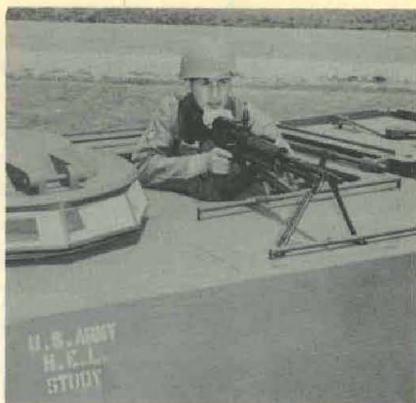
The experimental vehicle is the result of about two years of applied research by HEL in cooperation with the U.S. Army Tank-Automotive Command at Detroit, Mich., to improve habitability of armored personnel carriers. As explained by one of the officials on the developmental team:

"The necessity of transporting troops to a battle area in effective fighting condition is not a new requirement. It has been a primary concern throughout history. Vehicles have been developed for this purpose based on man-drawn and horse-drawn concepts through halting motorized vehicles of World War I to trucks and half-tracks of World War II.

"Each vehicle has been an attempt, with varying success, to deliver the combat infantryman to battle areas through mobility or armor, or a combination thereof, with as few casualties as possible and with the utmost fighting capability retained.

"The problems involved to achieve this capability on the future mobile atomic battlefield become even more serious when one considers the added requirement for living in the personnel carriers for long periods of time—24 hours or longer—without being able to dismount."

With the confinement problem up-



Sp/4 Bernard Sinigalli demonstrates firing position from rear hatch of armored squad carrier undergoing tests at HEL, Aberdeen Proving Ground, Md.

permost in mind, the HEL initiated studies in which squads of armored infantrymen were required to remain in the vehicle for long periods of time (as much as 24 hours) to determine effect of such conditions on fighting ability of these personnel after dismounting.

Studies indicated that more attention should be given to such operating features as personnel equipment stowage, squad seating, vision, condensation, inter-communication capability, fire-on-the-move capability, and housekeeping requirements such as eating, sleeping, elimination of human waste, etc.

Having isolated the type and degree of human factor habitability

problems, the HEL researchers worked with vehicle designers from ATAC to develop a squad carrier concept which would largely obviate these problems. Advanced System Concept personnel now will compare and evaluate the operational effectiveness of the new concept with existing armored squad carriers.

The wooden mock-up test vehicle is being used for continued tests in which a 12-man squad is confined for periods ranging from 4 to 24 hours. Upon release from the vehicle, the soldiers are put through an obstacle course, rail walk, grenade throw and firing tests to determine effect of the confinement upon their combat capabilities.

Consideration also is being given to application of the concept for secondary uses such as command post, ambulance, cargo carrying and communications center vehicles. The studies, one of the research team leaders stated, clearly indicate it is becoming increasingly important to give human factors design requirements more consideration, prior to the initiation of military equipment development.

Detailed information regarding the new armored squad carrier concept may be obtained by requesting a copy of HEL Technical Memorandum No. 20-62 from the U.S. Army Human Engineering Laboratories, Aberdeen Proving Ground, Md.

## Engineer R&D Labs Support Civilian Defense Training

A civilian-sponsored radiological defense course in Fairfax County, Va., recently received the backing of the Army's Mobility Command Engineer Research and Development Laboratories at Fort Belvoir, Va.

The Belvoir installation conducted a special class on environmental radiological monitoring and laboratory procedures in connection with the local Health Department's course.

Conducted by the Sanitary Sciences Branch of the Laboratories, the class was one phase of a 12-hour course sponsored by the Health Department for war supply personnel, sanitarians and sanitary engineers.

Designed to teach radiological monitoring techniques and to serve as an orientation to further training, the course included orientation to peacetime environmental monitoring in the metropolitan area where there are nuclear reactors and wide use of radioisotopes in research, development.



HEL Army personnel try out seating arrangements of the mockup armored squad carrier. Observing is Robert MacNeill, engineering design technician.

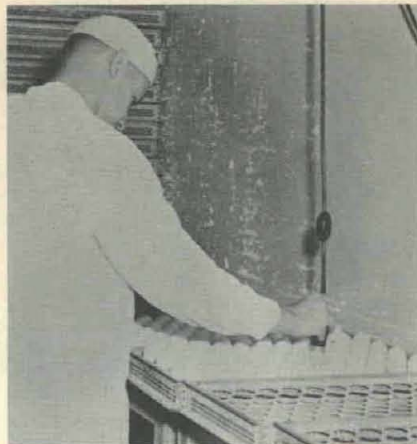
# Army Biological Laboratories 'Egged On' to R&D Effort

If investigators at the U.S. Army Biological Laboratories tried to put all their eggs in one basket, it would take a pretty big basket—large enough for more than 800,000 eggs used each year in research at Fort Detrick, Md. It is estimated that of all the agencies in the Philadelphia, Baltimore, Washington area using eggs for biological research, Fort Detrick purchases 20 percent of the total output.

These eggs are not just ordinary eggs such as a housewife would purchase in a grocery store. These are supplied to the laboratories under strict specifications set up by contract. These are fertile, embryonated eggs that have been incubated from 4 to 11 days. There are many other criteria that must be met which make the problem more complicated and the eggs more expensive.

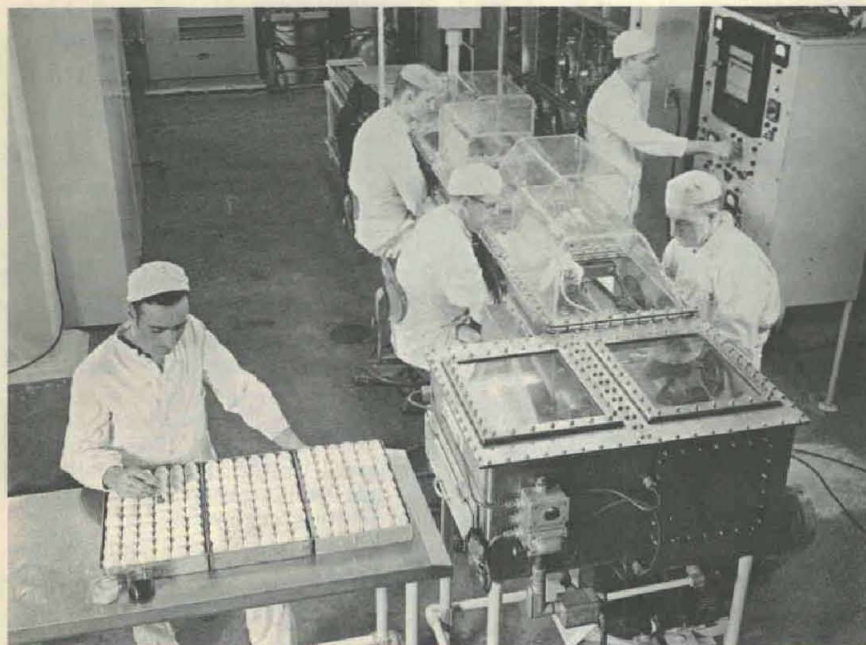
First, you might ask why Fort Detrick would use 800,000 eggs annually in its laboratories? Biologists have investigated the hen and its product, the egg for years. Hippocrates (460-377 B.C.) used the developing chick embryo to verify his teaching of human embryology. Harvey (1578-1657) used the chicken embryo in his research on blood circulation.

In modern medicine, Dr. W. Smith (1935) studied the behavior of influenza virus in embryonated eggs.



Lt Dwight G. Bennett, Jr., technical project officer, candles a tray of embryonated eggs supplied under strict specifications to Fort Detrick.

This began a new era in the field of microbiology and poultry science. Today, the use of chicken embryos for propagation of microorganism, especially viruses, is a well-established technique. By this method, important diagnostic antigens and vaccines are obtained and biological assay of numerous therapeutic agents are accomplished. Chicken eggs are also used for other medical research purposes, such as, for cultural media, serology, and the well-known use for vaccine production.



Technicians at U.S. Army Biological Laboratories, Fort Detrick, Md., operate egg inoculation cabinets. Lower left, preparing eggs for inoculation; center, inoculating living embryo; upper right, control system for cabinets.

To surmount the problems connected with the procurement of adequate supplies of either fertile eggs or "started" embryos of the quality needed to produce desired results, Fort Detrick established a technical projects officer. A veterinarian, he serves as a professional consultant to contracting and procurement personnel on the matter of obtaining the proper quality eggs to be used in the laboratories.

The purchase of suitable embryonated eggs is not as simple as buying an egg for breakfast. It soon became apparent to the suppliers that just any egg could not be used in the laboratories. The labs, in turn, soon realized that they could not increase or decrease their orders on a moment's notice. It would, for example, be impossible to obtain an 11-day-old embryo in 10 days. Since certain criteria have been established to improve and maintain the quality of the eggs used, it is now possible to receive 98 percent of the total containing living embryos at the time of delivery.

In achieving this high degree of fertility in these eggs, the projects officer works closely with the contractors in three areas, namely, (1) the supplying flocks, (2) the eggs, and (3) the hatchery.

Flocks from which the eggs are obtained must have not less than 1,000 healthy birds. They must be housed in a most sanitary manner and must not be fed foods that contain antibiotic supplements or sulfa drugs, as these may have a detrimental effect on the growth of rickettsial or other organism in the eggs.

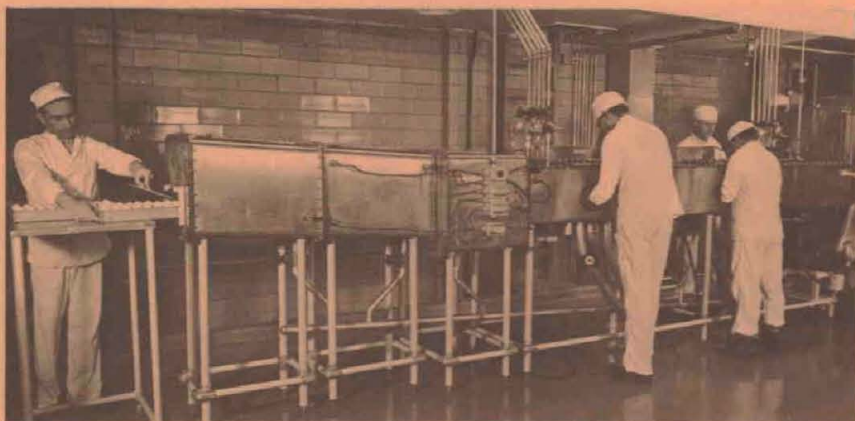
The eggs must be free from blemishes, cracks and dirt, but may not be washed, buffed or cleaned in any manner. They must be kept in a mechanically cooled egg room and placed in incubators as soon as possible.

The hatchery which incubates the eggs to the specified embryonic age must handle only eggs from flocks that have an official state rating equivalent to "U.S. Pullorum-Typhoid Clean." The eggs must be individually candled just prior to delivery. The contractor is required to maintain fertility and viability records on each lot of eggs from all flocks. The results of official blood tests performed on the flocks must be made available on demand to the contracting officer.

Because of the special handling and requirements to produce eggs to these specifications, they do not come as

cheap as those purchased in grocery stores. The cost of the regular white eggs has varied through the years from 9½ to 11½ cents per egg. Brown ones have cost a minimum of 15 cents each.

Fort Detrick has made some outstanding contributions in the study of agents that produce disease in man and animals. The successful production of vaccines for many of these diseases was made possible by the ability of the causative agents to multiply in embryonated eggs. Cooperation between the technical project officer from the Biological Laboratories and the hatcheries that contract to supply the eggs has made possible many experimental studies that otherwise could not have been achieved.



U.S. Army Biological Laboratories technicians harvest inoculated eggs for propagation of viruses in class 3 system for development of many vaccines.

## Quartermaster R&E Command Sponsoring Worldwide Survey of Insects

By Carl W. Ross, Geographer  
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Insects and other species of arthropods that are known to be directly injurious to man, either because they are involved in disease transmission or are annoying pests, are being listed for all countries of the world under a project which Cornell University is conducting for the Quartermaster Research and Engineering Center, Natick, Mass.

In addition to listing these species, the project is abstracting and consolidating data from the world literature on geographical range, months of activity, breeding habitat, disease relationships, and other biogeographical information for each species.

When the project is completed for the entire world, it will be possible to learn within minutes what insect species are troublesome in any area.

To process the enormous amount of world literature, a classifying and coding system was developed, and a punch card was designed for recording the various categories of information. A draft of a technical report has been completed by the Earth Sciences Division, Quartermaster Research and Engineering Command, for publication, describing this system.

To date, information from more than 40,000 articles in the scientific literature has been punched on individual cards. For ease of retrieval of these data, the card file which is currently located at Cornell University is arranged in two groups: one is organized by country or geographical area, and the other is filed according to arthropod group, such as mosquitoes, mites and ticks.

If one needs to know what species are present in a particular country,

or if he wishes to know if a certain species occurs in X country, the card files will quickly yield this information, as well as other facts about the insect.

The card files also serve other important functions. They not only show what work on insects has already been accomplished, but they also indicate what species in any country need to be investigated further. Moreover, they point out the need for better reporting of field investigations of insects and for international cooperation in this respect.

In addition to the cards, with their detailed information on particular species, a summary report, which lists the species, is being prepared for each country. This report also contains information on geographical range, seasonal activity, breeding habitats, whether or not the insect is a disease vector or only a pest, and the authority and date for the information.

Reports have been prepared in manuscript for all countries in Africa, North America, South America, and for Australia, Southeast Asia, Portugal, Spain, and islands in the Indian and Pacific Oceans. Many tabulations for reports for other countries are in script at Cornell, which is currently processing the literature for the card file and summary reports for the Soviet Union.

Although military necessity, as demonstrated by experiences in World War II and the Korean War, motivated the initiation of this project, its usefulness applies also to civilian agencies, such as the U.S. Public Health Service and the World Health Organization.

During the course of the study, information on insects in a number

of world areas has already been supplied to several military and civilian organizations. It is hoped that this work will be completed for all countries within two or three years, and that financial support will be found to publish the final results to make them more readily available to groups working on the insect problem.

According to the survey of the literature so far, Brazil, with over 300 separate species of mosquitoes, seems to have the world's largest number of insects injurious to man. For most countries, mosquitoes and horse flies are the two largest groups, while mites and ticks appear to represent the third largest number of individual species.

## Heredity Viewed as Factor In Microorganism Survival

Laboratory studies by a Chemical Corps scientist indicate that heredity rather than growth environment may give some microorganisms the ability to survive unfavorable conditions.

Studies conducted at the Army Biological Laboratories, Fort Detrick, Md., demonstrated "significant differences in the aerosol stability of selected strains of bacteria." Since bacteria were grown under identical laboratory conditions, results indicated that environment had little or nothing to do with survival traits.

Dr. Harold A. Neufeld, Chief of the Chemistry Branch, Physical Sciences Division, concluded that "inherited characteristics were present in these bacteria which differentiated the strains with respect to their ability to survive environmental stress. Our studies also indicated that there may be some correlation between bacterial virulence and aerosol stability."

# Waterways Experiment Station Builds Dynamic Load Generator

Dynamic loads simulating forces produced by full-scale nuclear explosions will test various types of structures and structural components in a new facility at the U.S. Army Waterways Experiment Station, Vicksburg, Miss.

The dynamic load machine, largest of the many pieces of test equipment developed at WES, has been under study and design for the past several years, and is believed the only one of its kind in the world. Construction is complete and the contractor presently is proof-testing the facility, expected to be operational next year.

The test equipment consists of a blast load generator and a central reaction station. Constructed of four 2-inch-thick, 3-foot-high steel rings stacked one atop the other, the generator is a "pressure cooker" type device in which the structures under test are placed. Soil occupying a volume of 150 cubic yards is filled to a height of 10 feet inside the structure.

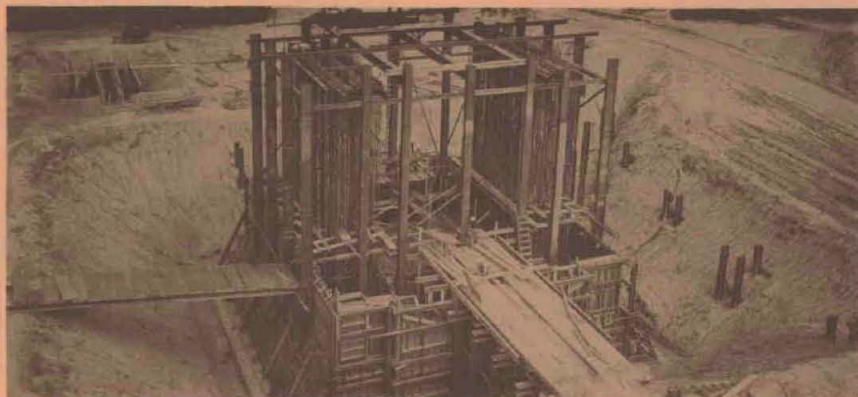
Located in the top ring is a parallel array of cylindrical high-strength steel tubes, 12 feet 1 inch and 16 feet 11 inches long. Each tube has approximately 3,000 holes (one inch center to center) drilled throughout its length to permit escape of the gases generated by fast-burning chemicals used to develop the desired pressure buildup within the test chamber. The system is capable of producing peak pressures up to 500 pounds per square inch.

As each ring is filled with soil and/or structural specimens, it is stacked on a flatbed platform 25 by 24½ feet constructed of wide flange members and concrete-filled plates. The "platen" is on wheels that ride on standard railroad rails. The assembled cylindrical test chamber is 23 feet in diameter and 12 feet high. Weight of the chamber and platen is about 350 tons.

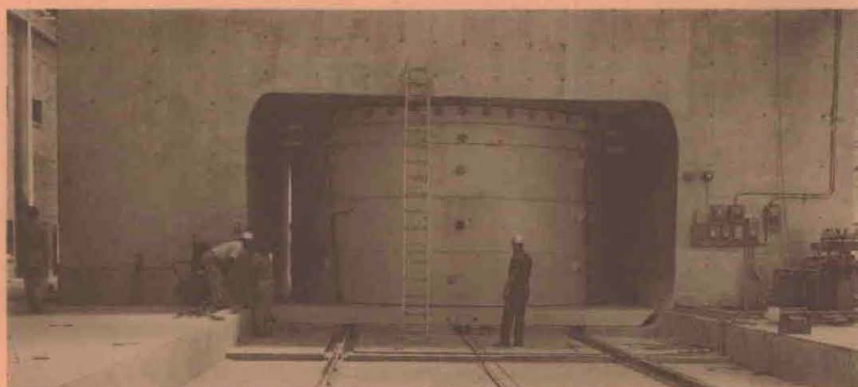
The central firing station is a massive, prestressed, post-tensioned concrete structure. Rectangular in shape, with a large rectangular opening in the center, its function is to act as a clamp or restrainer for the test chamber when subjected to short-duration high pressures.

To eliminate cold joints, concrete was poured continuously in two separate pours: 2,000 cubic yards of concrete for the 26-foot-deep floor, 1,000 cubic yards for the 11-foot-thick walls and 15-foot-thick roof.

Anchored to the station, and reaching down to bedrock are 272 steel



Construction stage of blast load generator showing central firing station.



Blast load generator constructed to permit testing of structures under dynamic loads which simulate forces produced by full-scale nuclear explosions.

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piles serving as tension anchors to react against the tremendous upward force which exists during the time it takes for the pressure to be transmitted through the soil to the bottom of the container.

Rods and cables were used for the prestressing operation. Cables with a total weight of 60 tons were draped from the top of the roof in one leg, under the floor, and up through the other leg of the roof. Rods weighing 175 tons (1,800 rods of 1¼" diameter) were placed horizontally in the floor and roof and also placed vertically in each leg, the bottom of the rod being anchored to the piles that extended into the floor. Forty-five tons of bearing plates also went into the structures.

To ready the system for firing, the prepared test chamber on the platen is rolled into the central reaction station. Once inside, the platen bottom is mated firmly with the floor by dropping the rails on which it rides. The top ring is then jacked up to seat firmly against the ceiling.

Fast-burning chemicals are ignited

and the gases produced escape from the firing tubes located in the top of the steel container. The amount of gas generated controls the magnitude of the load. The manner of opening release valves controls the decay of the load. After the test, the chamber is moved from the station and disassembled.

Test components are inclosed in a modern, steel truss building 250 by 134 feet, which also houses offices and other appurtenant equipment. A large soils processing facility to be located next to the generator will transport processed soil to the blast load generator by means of a conveyor.

Calibration tests will be made first to ascertain the reliability of pressure inputs, to determine how to program a desired pressure input for the system, to determine the pressure distribution across the ground surface, and to conduct other experiments.

Verification tests later will compare the response of structures or elements tested in the blast load generator with the response of similar elements tested in full-scale nuclear tests.