ARMY RESEARCH AND DEVELOPMENT

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Army Announces 19 Selections for R&D Achievement Awards

New Fuel Cell Regarded as Significant Advance

Fuel cell electric power research achieved a major advance as a result of an Army concept when the General Electric Research Laboratory announced Apr. 28 that an experimental cell efficiently uses inexpensive fuels.

Based on a theoretical approach suggested by scientists at the U.S. Army Research and Development Laboratories, Fort Belvoir, Va., originally funded under an Army contract and jointly financed with the Advanced Research Projects Agency since mid-1961, the new cell uses hydrocarbon fuels.

Propane, for example, has achieved in experiments efficiency as high as 40 to 50 percent, with further gains anticipated, as compared to about 25 percent efficiency for diesel type engines and 12 to 15 percent for the average gasoline combustion engine.

Drs. Thomas Grubb and Leonard W. Niedrach, chemists at the GE Research Laboratory, Schenectady, N.Y., demonstrated the new cell to representatives of the Department of Defense and the press Apr. 23. It operates at atmospheric pressure and in the moderate temperature range of 250-400° F.

While the laboratory cell operates "to a surprising degree" on gasoline and diesel oil, its best efficiency to

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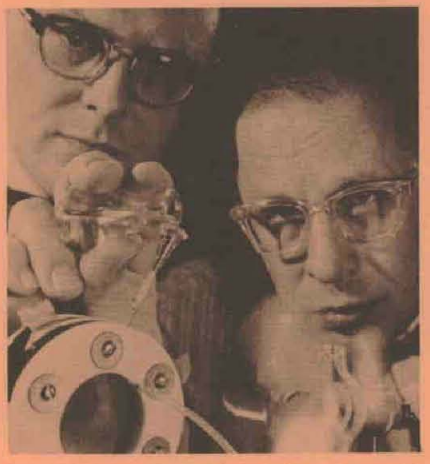

Dr. Thomas Grubb and Dr. Leonard Niedrach (left) prime new General Electric fuel cell with purified diesel oil combined with air to generate electricity to power motor at right.

Keen Competition Among 23 Nominees Give Four Judges Difficult Elimination Task

Creative, analytical, advisory and administrative scientific capabilities within the Army research and development in-house laboratories are recognized in selection of 19 winners of 1963 Army R&D Achievement Awards.

Initiated in 1961 by former Chief of Research and Development Lt Gen Arthur G. Trudeau, since retired, the Achievement Awards recognize noteworthy scientific and engineering accomplishments of Army civilians.

Lt Gen Dwight E. Beach, Trudeau's successor, will make the presentation of awards to Washington area winners. Winners in more remote areas will be honored at ceremonies scheduled in behalf of General Beach by the commanding officer concerned. Dates of the respective ceremonies were not available at press time.

Judges making the final selection May 7 at the U.S. Army Research Office Headquarters in Arlington, Va., encountered the same difficulty they had in 1962, only to a greater degree.

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Featured in This Issue . . .

Martell Heads JFK's Scientific Information Group

Vice Adm Charles B. Martell

Vice Adm Charles B. Martell, Deputy Director of Defense Research and Engineering (Administration and Management), has been appointed Chairman of the President's Committee on Scientific Information.

Composed of senior agency officials with information responsibilities, the Committee was established as a mechanism for inter-agency coordination, development of Government-wide standards, and compatibility between systems.

The Committee also is charged with examining findings and recommendations of various task groups studying the interrelations of existing information services, with the objectives of developing an articulated but

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Army R&D Newsmagazine

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

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

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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 and Technical Information Division.

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Army R&D Expenditures, Industry Planning

By Maj Gen C. W. Clark, Director of Army Research

NOTE: Since attendees at the National Security Industrial Association conference in Washington, D.C., listened to Maj Gen Clark discuss Army-Industry R&D interrelationships, favorable response has included demands that the address be more widely disseminated. Except for introductory paragraphs devoted largely to levity with respect to the proliferating of scientific conferences and symposia, the complete presentation follows:

Most of you gentlemen gathered here today representing industry probably share three interests in common. *First* and foremost, is how you can contribute to the national security effort; *second*, is how to plan to minimize your financial risk while doing it; and *third*, is to determine how military R&D can be adapted to the service of the civilian economy. If you're *not* concerned with these three questions, you have probably registered at the wrong symposium, and that is fairly easy to do nowadays.

Somewhat over 100 years ago, a French man of letters wrote, "Plus ca change, plus c'est la meme chose." One of the safest statements one can still make at any time, is that everything is always changing. During recent years, our American society has adapted to the impact of big government, big business, big labor, big budget, big bullying and brinksmanship—the last needs no adjective.

All of these have presented a massive challenge to man and the world, and have required complex and costly responses. In meeting the demands of the changing world, a most precious resource of the U.S. has proven to be its burgeoning R&D capability.

All of us should legitimately be concerned with the impact of this governmental role on our traditions of individualism and free enterprise. There is no doubt that business practices *have* changed with world events and forces. But national defense remains our paramount and indispensable mission today.

Paraphrasing the Commander-in-Chief, there is no discount on defense.

While the Federal Government finances the bulk of R&D efforts in the U.S., private industry performs and manages most of this scientific and engineering work. This extensive participation requires planning on industry's part. And for the intelligent planning of defense R&D, you must have guidance from the military services. The Army knows that the present communication system is not ideal and that a vast gap has resulted—a gap heretofore filled mostly by the cement of experience, sometimes bitter and costly.

This communication gap between defense buying and selling is taken seriously in the Army and we want to be as helpful as we can. It is most undesirable for you in industry to charge down a road only to find that you have misjudged the direction or miscalculated the extent of national defense requirements. The Army appreciates your need for appropriate guidance and will continue to try to provide it.

Informing industry of long-range military requirements is essential for the prevention of abortive mobilization and for the achievement of maximum defense at minimum cost. If you know our thinking on future problems, you can make a better allocation of your resources, and a better job of national defense is the inevitable result. You in industry want to and must work with the Government in defense matters. The fact that you are members of NSIA and are here today attests to this desire. The problem still remains as to the best manner in which this cooperation is to be accomplished.

The financial resources under Government stewardship have enabled it to underwrite projects which have exceeded the capacity of any one entire industry in America. Vast new technologies have sprung from the Government-sponsored research you industrialists have undertaken for the defense of the free world. We look for more technical benefits to come out of the many continuing and future projects related to our national security.

Still, this advancing new technology has presented many problems. I've heard economists raise many arguments about defense spending. For instance, it is said that military R&D does not accelerate economic growth in the private sector in the same proportion as do nonmilitary efforts, or that the "spin-off" theory is an exaggerated political myth. We also recurrently hear that it is economic waste, preparing for a war that nobody wants.

These are not points I'd like to pursue here. I would like to remind you that the Army's expenditures have to be made above all on the basis of national defense needs, *not* for—as some have alleged—other worthy national purposes, such as support for depressed areas, the allevation of unemployment, the stimulation of technically deprived regions, the betterment of mankind, the achievement of rapid economic growth, or general welfare ends.

The U. S. Constitution delegates to the Federal Government the power to provide for the common defense. For Army R&D, this means to develop the best materiel for our soldiers, within the available time and at the lowest

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New Fuel Cell Regarded as Significant Electric Power Advance

(Continued from page 1)

date has been achieved with propane. Hexane and octane also appear to react completely in the cell, forming harmless carbon dioxide and water as byproducts.

Army and other Department of Defense leaders present at the demonstration indicated general agreement that the development should result in far-reaching benefits for military ground forces whose mobility depends on the useful energy obtained from hydrocarbon fuels.

While elated about the achievement, Army scientists at Fort Belvoir took what was termed a realistic view of the advanced developmental problems. They estimated that three to five years will pass before practical application of the operating principle of the cell is accomplished.

Contract supervision of the research which led to the laboratory model of the cell has been exercised by the U.S. Army Engineer Research and Development Laboratories. Donald J. Looft, Chief of the Electric Power Branch, initiated the USAERDL hydrocarbon-air fuel cell program in 1957 and has aggressively pursued it despite skepticism of some leading fuel cell researchers. Bipin C. Almaula is currently Project Leader of the program.

Feasibility studies are currently being pursued, Mr. Almaula said, as the next important phase of the developmental program on the cell.

Broad application of fuel cells cannot be visualized, stated Col John H. Kerkering, USAERDL commander, until they can use the ordinary saturated hydrocarbon bulk fuel on which land vehicles and other military equipment operate.

Dr. Guy Suits, GE Vice President and Director of Research, in announcing discovery of the feasibility of hydrocarbon fuel cells, noted that both the efficiency and operating life of the cell are reduced by the presence in these fuels of certain complex ingredients and additives. "Undoubtably," he said, "fuels particularly suited . . . can be designed."

Describing the operating principle of the GE cell, Dr. Suits termed it a "remarkably simple device that should be a major step toward the development of fuel cells as portable power generators for a wide range of military and industrial applications."

A novel feature of the cell is its electrode structure, incorporating platinum, and a liquid electrolyte. Excellent results with a phosphoric-acid electrolyte have been achieved and other electrolytes show promise.

Another important technical gain, with respect to long life and faster start-ups, is the low temperature at which the cell operates—roughly 20 percent as high as the 1000-2000° F. range of experimental hydrocarbon fuel cells tested by GE late in 1962.

Hydrogren and other highly reactive fuels, all much more expensive and less convenient than ordinary hydrocarbon fuels, previously have been necessary to achieve low temperature operation.

"From a scientific viewpoint, Dr. Suits said, "the most remarkable facts about the new cell are that measurements indicate an apparent 100 percent oxidation of straight-chain hydrocarbon fuels—the reaction with oxygen from air going all the way to carbon dioxide and water—and that good performance has been achieved with a large number and variety of these fuels.

"Chemically speaking, this means that Drs. Niedrach and Grubb have solved several of the most difficult problems in the area of fuel cell research. . . . The Army and ARPA have had an important role in seeking and supporting key research programs, and this recent fuel cell achievement reflects excellent cooperation between Government and industry."

In the opinon of Walter C. O'Connell, manager of GE's Direct Energy Conversion Operation at Lynn, Mass., hydrocarbon fuel cells for the powering of some military systems can now be projected, based on performance levels already demonstrated at the GE Research Laboratory. He said:

"It now seems reasonable to predict the eventual use of fuel cells for powering military vehicles, and success in this endeavor may also suggest a variety of civilian uses, including transportation.

"Such a by-product of military-industrial teamwork would be an example of great tangible benefits for the economy in general that may come from research and development based on military requirements."

Fort Monmouth Experimenting on New Type TV Tube

Army scientists have developed a "trap door" electronic picture tube that allows them to take improved photos of a video display while keeping the face of the tube in clear view.

Designed by the U.S. Army Electronics Research and Development Laboratroy at Fort Monmouth, N.J., and the General Dynamics Corp., the experimental tube is used to record and analyze oscilloscope patterns.

A modified version of a standard cathode ray picture tube, it is similar to the types used in home TV sets, radar scopes and laboratory oscilloscopes. A 2-inch transparent porthole in the normally opaque rear section of the tube allows a camera to take photos of the electronic display from the back while the operator views the screen from the front.

Previously, all such pictures were taken from the front, with the camera placed over the face of the tube. The operator had to watch the display through a small viewing port.

In addition to easier and more efficient operation, the image from the back is two to three times brighter than from the front, and fine details of the picture show up more clearly. A signal appears on the display as an electronic pulse, which on careful analysis gives information on the frequency and character of the signal.

In the experimental installation, the camera is mounted above and behind the tube, operates automatically.

Thomas Baird peers through rear-view porthole of "trap-door" picture tube designed for military needs by Army Electronics R&D Laboratory.

Martell Heads JFK's Scientific Information Group

(Continued from page 1)

decentralized Federal information system.

Presently consisting of 14 members, five alternates and five observers, the Committee includes representatives of: Office of the Secretary of Defense, Atomic Energy Commission, Department of State, Department of Health, Education and Welfare, Office of the Director of Defense Research and Engineering, National Aeronautics and Space Administration, Department of Agriculture, Bureau of the Budget, Veterans Administration, Federal Aviation Agency, Department of Commerce, Department of the Interior, and the Executive Office of the President.

The Post Office Department and the Small Business Administration have observer status.

Involved with military scientific research and development programs since 1959, when he was assigned to the Office of the Chief of Naval Operations (CNO), Admiral Martell served as Director of a Special Planning Group concerned with the merger of the Bureaus of Aeronautics and Ordnance into Bureau of Weapons.

Following this major Navy Department management reorganization, he was named Assistant Chief of Naval Operations (Development). In that capacity he was responsible for CNO management of the research and development organization, and he monitored progress of new weapons systems to completion of operational evaluation. He was promoted to his present rank and selected for his present post in March 1961.

Admiral Martell began his career upon graduation with distinction in 1930 from the U.S. Naval Academy, Annapolis, Md. In the decade preceding Pearl Harbor, he served as gunnery officer aboard several ships and earned an M.S. degree in metallurgy from Carnegie Institute of Technology, Pittsburgh, Pa.

During World War II he was awarded the Legion of Merit for service in the Readiness Division of the Headquarters of the Commander in Chief, U.S. Fleet.

Other assignments have included Assistant Director of the Atomic Energy Division, Office of the CNO; Fleet Operations Officer, on the staff of the Commander in Chief, U.S. Pacific Fleet; CO of the *USS Mississippi* which made operation evaluation of the Terrier missile; CO, *USS Boston*, world's first guided missile cruiser; Deputy Director of Naval Intelligence for Security, Office of the CNO; and Commander Cruiser Division FOUR.

6 New Members Appointed To Defense Science Board

Six newly appointed members of the Defense Science Board, chartered as the senior public advisory board in the office of the Director of Defense Research and Engineering, were announced Apr. 19 by the Department of Defense.

Composed of members selected by the Secretary of Defense for their achievements in industry and education, the Board advises top level Defense officials on technical matters. Some of the nation's foremost leaders in science, engineering, education and management serve on the Board.

New members are: Dr. Daniel Alpert, Professor of Physics, University of Illinois; Patrick E. Haggerty, President, Texas Instruments, Inc.; Dr. Wayne E. Kuhn, General Manager, Research and Technical Department, Texaco, Inc.; Dr. William G. McMillan, Chairman, Department of Chemistry, University of California at Los Angeles; Dr. Thomas L. Phillips, Executive Vice President, Ratheon Co.; and Dr. Ernst Weber, President, Polytechnic Institute of Brooklyn.

Dr. Weber recently accepted appointment as Chairman of the Advisory Council of the Junior Science and Humanities Symposium Program, Department of the Army.

Army Transportation Materiel Command Renamed

What until Apr. 18 was the Army Transportation Materiel Command at St. Louis, Mo., is now the U.S. Army Aviation and Surface Materiel Command (AVSCOM), but no change in organization or the number of employees is involved.

Brig Gen David B. Parker, commander, announced that the change emphasizes the role and mission of the command in the Army's vital aviation program, and is a result of the recent Army reorganization, in which commodity commands were substituted for the Technical Services in the field of logistics.

Aviation, representing roughly 90 percent of AVSCOM's effort, is a commodity title; the former Transportation was a functional title.

The agency employees 3,000 persons, has an annual payroll exceeding $2,000,000, and is one of the few in the Army that has a complete logistic operation under one roof. It controls procurement, engineering, cataloging, storage, maintenance, materiel requirement and technical assistance programs for the Army's aircraft, rail and marine equipment.

In ten years the command has changed names four times. When established in St. Louis in 1953, it was known as the Transportation Corps Army Aviation Field Service Office. In 1955 it became the Transportation Supply and Maintenance Command. In 1960 it was shortened to Transportation Materiel Command.

O. P. Cleaver, left, Chief of the Electrical Department, and Dr. Robert S. Wiseman, Chief of the Warfare Vision Branch, flank Col J. H. Kerkering, CO, U.S. Army Engineer Research and Development Laboratories, Fort Belvoir, Va., who presented them with Army Outstanding rating certificates. This was the eleventh such award for Cleaver who has been with the Laboratories since 1942. Dr. Wiseman joined the Labs in 1954 and was honored for his support.

CRD to Sponsor Tripartite Operations Research Conference in Washington

Critical evaluation of the status of Army operational research with a view to identifying areas warranting more intensive effort is the objective of the Eighth Tripartite Conference, scheduled June 17-29 in Washington.

Australia may participate for the first time since being admitted in 1962 as a full member of the American-British-Canadian operations research organization founded nearly 15 years ago. Word of acceptance of an invitation had not been received at press time.

Rotated among the member nations, the Conference is being sponsored this year by the Chief of Research and Development, U.S. Army, Lt Gen Dwight E. Beach. Arrangements are in charge of the Research Analysis Corp. (RAC), the U.S. Army's major contract operations research agency.

Sessions will be conducted at the Industrial College of the Armed Forces, Fort Lesley J. McNair, where the first Tripartite Conference sponsored by the United States was held in 1950. About 50 delegates and 150 or more observers are expected.

Senior Delegate to the Conference Dr. Richard A. Weiss, Deputy and Scientific Director of the U.S. Army Research Office, Office of the Chief of Research and Development, will preside as Permanent Chairman. Director of Army Research Maj Gen C. W. Clark will preside at the opening.

U.S. Department of Defense speakers will be headed by Dr. Charles Hitch, Secretary of Defense (Comptroller), a distinguished operations analyst formerly with RAND Corp. Assistant Secretary of the Army (R&D) Dr. Finn J. Larsen is programed for the welcoming address, following greetings from Maj Gen Tom R. Stoughton, Deputy Commandant of the Industrial College.

Major operations research addresses are on the agenda for Dr. Eric Holmberg, Director of Operational Science and Research, British War Office; Henry H. Watson, Director of the Canadian Army Operational Research Establishment; and, for the United States, Dr. Lynn H. Rumbaugh, Director of Combat Systems for the Research Analysis Corp.

Discussions will deal with current and long-range military problems on which operations research techniques may be most urgently needed, including such areas as Land/Air Combat Between Major Forces — post 1966; Limited War in Southeast Asia; and Allocation of Resources.

Entertainment of delegates will include a banquet at which the U.S. Army will be host, a dinner party given by President Frank Parker of RAC, a boat trip along the Potomac River to Mount Vernon, and for foreign visitors a trip to Gettysburg to view a shrine of American history.

Meteorological R&D Group Discusses CBR Operations

The Eighth Semiannual Conference of the Army Meteorological Research and Development Coordinating Committee was held at Dugway (Utah) Proving Ground, Apr. 16-18, to hear presentations on meteorological aspects of chemical and biological operations.

Formed in 1959 to coordinate meteorological research among various Army agencies, the Committee is composed of 32 representatives from research boards and installations.

John A. Copeland, Chief of the Atmospheric Sciences Section, U.S. Army Materiel Command, Washington, D.C., presided over the meeting. Dugway Commander Col Paul R. Cerar briefed delegates on the mission and operations of the base.

Paul A. Carlsen, Chief of Dugway's Meteorological Division, presented Dugway's meteorological program and demonstrated some of the unique equipment that provides accurate microweather information over much of the ground's 1,000,000 acre area.

The group also participated in a field demonstration of artillery delivered chemical agents and tested, first hand, the effects of the Army's newest riot control agent.

The group's next scheduled meeting is to be held in October at the Ballistics Research Laboratories, Aberdeen Proving Ground, Md.

Swamp Fox II Research Team Reports on Medical Findings

Preliminary findings by a medical research team that participated in Project Swamp Fox II in the Panamanian jungle indicate that a significant change in the flora of the skin occurs after arrival in the tropics.

Members of the Department of Dermatology, Walter Reed Army Institute of Research, last autumn joined with civilian medical college researchers in a study of the men testing Transportation Corps vehicles in the Chepo region of the Republic of Panama (Sept. 1962 issue, page 10).

The purpose of the study was an evaluation of skin disease under field conditions in a group of soldiers brought from a temperate to a tropical environment.

Initial baseline studies, including cultures, skin pH measurements and ultraviolet fluorescence examinations, were obtained at Fort Eustis, Va., and compared with measurements made later in Panama.

Dr. Parmenter Joins USARO Staff as Geographer

Dr. Guy N. Parmenter joined the U.S. Army Research Office staff in April as a geographer in the Environmental Sciences Division, succeeding Dr. Leo Alpert, newly assigned as Chief, Research Division, U.S. Army R&D Office in Panama.

Dr. Guy N. Parmenter

After earning a B.A. in geography and political science at Nebraska Wesleyan University, Lincoln, Nebr., Dr. Parmenter entered the U.S. Army Air Corps in 1942. Throughout World War II he served in the European Theater as a fighter squadron instrument specialist.

Following the war he earned M.A. and Ph. D. degrees in geography from Clark University, Worcester, Mass., then served on the faculty of the University of Kentucky before joining the Intelligence Division, U.S. Army General Staff.

Since 1950, except for a period used to complete academic studies, he has been with the U.S. Army Map Service on area analysis intelligence assignments. Positions he has held include: Section Chief in the Engineer Strategic Intelligence Division, Coordinator for Physical Geography, and Branch Chief in the Department of Engineer Intelligence.

ARTS Material Instructions Require Submission by July 31

Instructions for submission of material for the Army Research Task Summary (ARTS), mailed this month to all Army R&D activities, require summaries of the status of all research tasks as of a May 31 cutoff date. Reports are to be sent to the Chief, Scientific and Technical Information, U.S. Army Research Office to arrive by July 31.

Many months of consideration of the overall problem of achieving more comprehensive information in much more readily usable form are reflected in the massive instruction document.

Suggestions for improvement were developed by an ad hoc study group in coordinated effort with the Office of the Defense Director of Technical Information, the Science Information Exchange of the Smithsonian Institution, the Defense Documentation Center (formerly ASTIA), Air Force and the Navy.

Expected to come off the press for distribution in the second quarter of FY 1964, the new version of the ARTS will vary little in appearance from previous editions. But there will be a difference—a major one.

For example, for the first time since the ARTS was initiated in 1956, information will be provided on subtasks in a data bank automatic processing card system. As in previous years, the ARTS will report on more than 3,000 major tasks, involving an estimated annual expenditure of about $200 million, and will contain in excess of 3,000 pages of highly condensed information.

The new data preparation system, employing a 3-page Form 1309-R and 80-column punch cards, incorporates rearrangements of the information on each task and subtask to facilitate forwarding of data to the Science Information Exchange and the Defense Documentation Center.

The system is designed to give the user current information on almost any conceivable field of interest related to the ARTS. Requests for specific types of information will be filled rapidly with printouts from the data cards, using processing equipment to be located at the U.S. Army Research Office, Arlington, Va.

Another important change is that of continuously updating information by requiring submission of a new Form 1309-R within 30 days of any reportable development or change. A semiannual review and analysis will be accomplished by the originating agency and Army Research Office.

Long-range planning of development goals will be facilitated by the improvements in the ARTS which will make it possible for programing officials to determine quickly what is being done and what needs to be done to achieve time-frame objectives.

The 1963 ARTS will follow the pattern of the 1961 edition in that six volumes, each with a classified supplement, will be used to separate tasks according to scientific disciplines and a separate cross-referenced index volume will be prepared.

Changes in the ARTS forms and types of information to be included on the 80-column punch cards came as the climax to the work of Task Group 2 of the Army Ad Hoc Group on Scientific and Technical Information.

Paul Olejar headed the Task Group and the ARTS study was made by a subgroup chaired by Gerald Beveridge of the CBR Agency, U.S. Army Munitions Command. Glenn Bryce, Robert Brown, Eugene Logue and Lt James Nance of the CBR Agency also worked on the problem. Walter Galson of the U.S. Army Research Office was the project officer.

In 1961 automatic distribution of the ARTS was made to more than 175 Government agencies and R&D activities; several hundred copies were used to fill requests from private institutions, schools, libraries, Congress and foreign governments. More than 3,300 volumes were sold through the Superintendent of Documents, U.S. Government Printing Office.

Troops Participate in Firing Of Pershing at Cape Canaveral

U.S. Army troops participated for the first time in a firing of the 2-stage Pershing ballistic missile Apr. 12 at Cape Canaveral, Fla.

The firing integrated certain service test missions with development evaluation. Service tests usually are performed upon completion of developmental firings.

Col O. M. Hirsch, Pershing Project Manager, said the dummy warhead section of the missile impacted in a preselected target area after being fired on a medium-range mission down the Atlantic Missile Range.

Firing the missile from a helicopter transportable erector-launcher were soldiers from "A" Battery, 2nd Missile Battalion (Pershing), 44th Artillery, Fort Sill, Okla. They are under the Artillery and Missile Center commanded by Maj Gen Lewis S. Griffing.

Termed the "shoot and scoot" missile, Pershing is being designed to move overland on tracked vehicles, in helicopters, or in fixed wing aircraft as a selective range weapon for field army support.

Frankford Chemist Wins Award of SA Fellowship

Maurice Codell

Maurice Codell, chemist in the Pitman-Dunn Laboratories of the Army Research and Development Group at Frankford Arsenal, Philadelphia, left for Japan Apr. 26 under a Secretary of the Army Research and Study Fellowship.

In the one-year study, he will be associated with Dr. Shizuo Fujiwara at the University of Tokyo in research and studies concerned with the interaction of high energy radiation with matter.

Codell is a graduate of Temple University and has completed specialized studies at the Illinois Institute of Technology and the Oak Ridge Institute of Nuclear Studies.

Author of 38 scientific papers in leading scientific journals and a book published in 1959, he recently wrote a section of another forthcoming book. He has two patents, both of which are in commercial use.

In the U.S. Army from 1931 to 1934, he was employed at the Quartermaster Depot from 1934 to 1941. Then he left to work at Frankford Arsenal, a key research and engineering installation of the U.S. Army Munitions Command.

Army Food Radiation Research Authority Accepts 2-Year Assignment in Rome With United Nations

International influence of Army research in food irradiation and processing is recognized in the appointment of Dr. Harry E. Goresline to serve two years in Rome, Italy, as a consultant to the United Nations.

Secretary of the Army Cyrus R. Vance approved the temporary assignment of Dr. Goresline, Assistant Technical Director of the Armed Forces Food and Container Institute, as requested by the Atomic Energy Branch of the UN Food and Agriculture Organization.

Recognized worldwide as an authority in food microbiology and food preservation technology, Dr. Goresline is a veteran of 33 years of Government service and the recipient of numerous achievement awards.

Scheduled to depart for Rome in August, he will assist in the United Nations FAO program to promote international cooperation in development of food irradiation as a means of preserving foods.

One of his duties will be to advise the International Expert Committee on the Technical Basis for Legislation on the Wholesomeness and Microbiological Safety of Irradiated Foods. He will assist in planning an International Technical Meeting on Progress in Food Irradiation and a similar conference on the microbiology of irradiated foods.

As the Department of the Army coordinator in the technical development of food for storage in Civil Defense shelters, Dr. Goresline visited six European nations in the fall of 1962 to discuss CD food programs.

International cooperation in dealing with food preservation problems began for Dr. Goresline in June 1936 when he represented the U.S. Department of Agriculture at the Second International Congress of Microbiology in London. In 1939 he was chairman of the American delegation to the Sixth International Chemical and Technical Congress for Agricultural Industries, Budapest, Hungary.

During World War II he served as Chief Food Technologist, Poultry Branch, Food Distribution Administration, and as technical assistant to the Director. He joined the Armed Forces Food and Container Institute staff in 1952 and in October 1954 became Associate Director for Research of the Food Laboratories.

In 1957 Dr. Goresline was the recipient of a National Civil Service League Merit Citation, only a year after he was awarded a research achievement award by the Poultry and Egg National Board. The U.S. Department of Agriculture recognized him with a Certificate of Merit for research on food plant sanitation.

Dr. Harry E. Goresline

Author of more than 90 publications on food technology, he was a founding member of the Institute of Food Technologists in 1939.

A native of Gardner, Kans., he received a bachelor of science degree in chemical engineering from Oregon State College in 1926. M.S. and Ph. D. degrees in sanitary bacteriology from Iowa State College followed in 1928 and 1931.

Professional affiliations include: American Chemical Society; Association of Official Agricultural Chemists; World's Poultry Science Association; Fellow of the American Public Health Association; American Society for Microbiology; U.S. representative, Committee for the Permanent Section for Food Microbiology and Hygiene of the International Association of Microbiological Societies.

WRAIR Medics Get Patent on Diagnostic Aid Device

A newly patented device for sampling intestinal juice of patients as a diagnostic aid is the invention of two staff members of the Walter Reed Army Institute of Research (WRAIR), Washington, D.C.

Col William H. Crosby, Director, Division of Medicine, and Chief, Department of Hematology, and Heinz W. Kugler, Division of Instrumentation, recently received a patent award presented by Col William D. Tigertt, WRAIR Director and Commandant.

The Intestinal Cup, consisting of two tubes fastened to a cup-shaped bubble trap, is swallowed by the patient. Juice aspirated into one of the tubes is removed by allowing air to flow into the tube below the juice while suction is maintained above.

By means of the second tube, air is let in through the bubble trap. Samples less than 0.5 milliliter in volume can be delivered immediately through as much as 5 meters of tubing. Sampling may be continuous or intermittent from any level of the small intenstine or stomach.

The device is in use in many military and civilian hospitals.

PATENT for new method of sampling intestinal juice is presented to Col William H. Crosby (left) and Heinz W. Kugler by Col William D. Tigertt, Research Director and Commandant, Walter Reed Army Institute of Research.

Mathematical Sciences Manpower Problems Discussed

Sponsored by the Conference Board of the Mathematical Sciences, a discussion of "Manpower Problems in the Mathematical Sciences" was held Apr. 16-17 in Washington, D.C.

Impetus for the conference was provided by the Gilleland Report, issued in December 1962 by the President's Scientific Advisory Committee. Analyzing the Nation's needs for engineers, physical scientists and mathematicians, the report states that by 1970 American universities should produce annually 7,500 Ph. D.'s in these fields.

Although current annual production of Ph. D.'s in these areas is 3,000, the report notes that the pressing need for highly trained personnel for university, industry and Government positions, coupled with a true potential among the country's students, makes feasible the 7,500 goal.

The conferees considered ways in which this requirement could be met for the mathematical sciences. Leading mathematicians from industry, all levels of the academic world, and Government civilian and military agencies discussed all facets.

Representing the U.S. Army Research Office, Dr. Ivan R. Hershner, Chief, Physical Sciences Division, reported on the number of investigators in the Army mathematics program. The Army is assisting in overcoming the mathematics manpower problem through its research programs, he stated. At several universities pre-Ph. D.'s — graduate assistants — are working with principal investigators to perform military oriented research. Reports on the research may be used concurrently for doctoral studies.

Foreign Military Attaches Briefed on Army Research

Representatives of 18 foreign nations, the U.S. Department of State and the U.S. Army Assistant Chief of Staff for Intelligence were oriented recently on U.S. Army Research Office responsibilities and activities.

Director of Army Research Maj Gen C. W. Clark welcomed military attaches representing most of the NATO nations, the Philippines, New Zealand, China, Japan and Korea at a briefing held Apr. 18 at Army Research Office Headquarters, Arlington, Va. Chief of Research and Development Lt Gen Dwight E. Beach followed with remarks on the Army R&D Program.

Other attaches in attendance represented France, West Germany, Italy, Greece, Portugal, The Netherlands, Norway, Sweden and Denmark.

Present were Dr. R. Rollefson, Director of the Office of International Scientific Affairs, Department of State, and Maj Gen C. F. Leonard, Jr., Deputy ACSI. Army Research Office Division Chiefs explained the scope of activities they monitored at home and abroad, including Army research in 14 NATO nations, Japan, Latin America and the Republic of Panama.

Thirty-four representatives attended the Apr. 18 meeting. A separate briefing was given to 16 officials of Great Britain, Canada and Australia representing the Quadripartite Coordination Committee, including those engaged in weapons standardization.

Belvoir Officer Honored For Work on Atlas Bases

Col Woodrow W. Wilson, Chief of Staff at Fort Belvoir, Va., since July 1962, was awarded the Air Force Legion of Honor, the second highest decoration for meritorious service, in an Apr. 9 ceremony.

The veteran of almost 24 years of active military service was cited for his outstanding accomplishment in the role of Director of Construction of Atlas "F" bases. He was then assigned to the Army Corps of Engineers Ballistic Missile Construction Office with the Air Force, headquartered at Los Angeles, Calif.

A 1939 graduate of the U.S. Military Academy, he has an M.S. in civil engineering from Texas A&M.

Maj Gen William F. Cassidy, CG, USAEC and Ft. Belvoir, presents Air Force Legion of Merit to Col Woodrow Wilson, Ft. Belvoir Chief of Staff.

Army Supports Conference On Soldiers' Water Needs

A conference on "Thirst in the Regulation of Body Water," supported by the Division of Life Sciences, U.S. Army Research Office, Arlington, Va., was held May 1-3 at the Florida State University, Tallahassee, Fla.

The extension of military activities into the extreme environments of the globe has heightened Army interest in the area covered by the conference.

Questions of particular interest to the Army are: What is the minimum amount of water required by the active soldier for subsistence? How is amount affected by different environments? What is the best way to allocate available water; in several small drinks, in a single large drink?

Chaired by Dr. Matthew Wayner, of the Department of Psychology of the host university, the conference dealt with physiological, psychological and clinical implications.

Representatives of private university research installations, civilian governmental agencies and military research institutes presenting 30 papers, included international experts P. J. Morgane, Brain Research Unit, Mexico City, Mexico; and Bengt Anderson and Charles Gale, Veterinarhogskolan, Stockholm, Sweden.

WRAMC Names New Executive

Col Dale L. Thompson has been reassigned as Executive Officer at Walter Reed Army Medical Center (WRAMC), a post he previously held from 1955 to 1959. He succeeds Col Stephen G. Asbill.

Since 1959 Col Thompson has served in the Office of the Army Surgeon General as Executive Officer, Personnel and Training Directorate, and for a short time was Chief of the Medical Service Corps.

Earlier assignments include Executive Officer, Landstuhl Army Medical Center, Germany; Office of the Army Deputy Chief of Staff for Logistics, Washington, D.C.; Chief of Administration, Medical Field Service School, Fort Sam Houston, Tex.; and Adjutant General, U.S. Army Forces in the Middle East.

U.S. Army Studies Human Factors Research Cooperation With Australia

Intent on determining the potential for cooperation in human factors research between nations represented on the Tripartite Research Coordination Committee, the U.S. Army's Chief Psychologist is in Australia on a survey trip.

Dr. Lynn Baker, a member of the professional staff of the Office of the Chief of Research and Development since 1954, and assigned to the U.S. Army Research Office since 1958, arrived in Australia May 7 for an intensive series of conferences over a 2-week period.

He will meet with Australian leaders in human factors research, military research and development, and major Army commands to discuss problems of selection, classification and utilization of military personnel. Great Britain, Canada, Australia and the United States are in the program.

Information will be exchanged on research problems linked to personnel training, motivation, morale and leadership factors; engineering to assure a high degree of man-machine compatibility; and special operations involving counterinsurgency, guerrilla and psychological warfare. Military operations research also will be considered.

Dr. Baker termed his visit a "preliminary exploration regarding plans and capabilities for effective cooperation and coordination of effort." In preparation for the discussions, U.S. Army Human Factors R&D Work Programs were sent to Australian leaders prior to his visit, as a basis for inquiry.

Included in Dr. Baker's itinerary is a visit to the Australian University Anthropological Research Unit which has been making a study of unique human factors conditions prevailing among the Papuans in New Guinea, over which Australia exercises a trust territory responsibility.

Among leaders with whom he will meet are Prof. O. A. Oeser of the University of Melbourne, Dr. W. S. Radford of the Australian Council for Educational Research, Prof. W. M. O'Neil of the University of Sydney Department of Psychology, Prof. J. F. Clark of the University of South Wales, and Prof. G. Naylor, Department of Psychology, University of Queensland.

Graduated from the University of Wisconsin with a B.A. degree in 1933, Dr. Baker remained there until 1940,

Dr. Lynn Baker

serving as an instructor in a variety of psychology courses. Two years each with the Bureau of the Census and the Federal Housing Administration preceded his transfer to the Foreign Economic Administration. In 1945 he transferred to the Office of War Information as a management specialist.

Following three years as a systems and management analyst with the U.S. Department of Agriculture and later the United Nations Relief and Rehabilitation Administration, Dr. Baker became a private management consultant until he was employed in 1949 as a social psychologist by the U.S. Air Force. In 1951 he became Director of Manpower Research, U.S. Air Force Human Resources Research Institute, serving until he accepted Army employment in 1953.

USAERDL Develops GEM Mine Detector System

Rapid detection of land mines to improve U.S. Army mobility in combat is the goal of a new method being investigated by the U.S. Army Mobility Command Engineer Research and Development Laboratories at Fort Belvoir, Va.

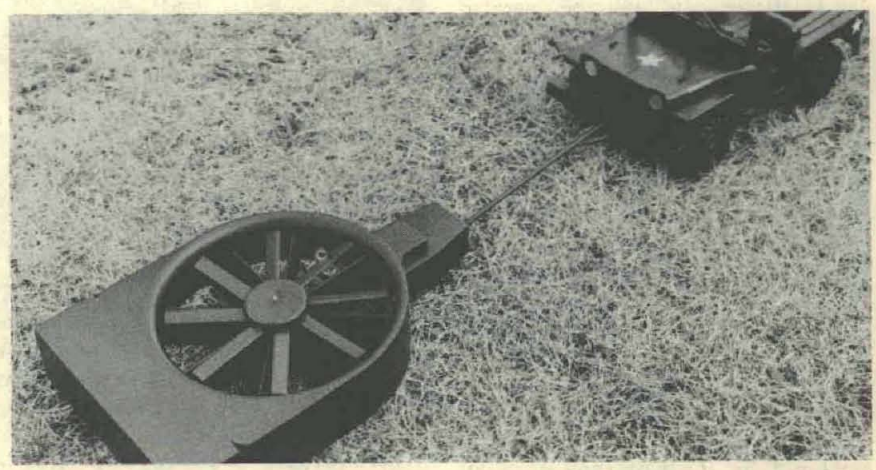
Known for development of hand-carried and vehicle-mounted mine detectors, the Laboratories are probing a concept of mounting a detector on a Ground Effects Machine (GEM) carrier. It is believed the first application of a GEM "floating platform" to the problem of speedier detection of land mines.

Development of an experimental carrier is involved in a contract awarded by the U.S. Army Transportation Research Command, Fort Eustis, Va., to the Frost Engineering Development Corp., Englewood, Colo.

Eight feet in diameter, the device will use a multi-blade fan to support the entire detector assembly at least six inches above the ground. It will be attached in front of a truck, jeep or other vehicle by means of a 20-foot hinged boom to permit free vertical movement, pitch, and roll of the carrier.

The search-head carrier will be constructed of aluminum and plastic. Including the boom, it will weigh less than 300 pounds. The lifting fan will use a 72 horsepower engine.

The GEM mine detector system is to be designed for on-road and a cross-country search capability.



GEM FLOATING PLATFORM mine detection system (model) under investigation by the U.S. Army Mobility Command Engineer R&D Labs, Fort Belvoir.

ASAP Member Advocates R&D Tours for Reserves

In the opinion of Brig Gen John E. Vance, learning about rapidly changing technological developments within Army research and development is the valuable result of brief active duty training tours for Reserve officers.

As a mobilization designee Assistant to the Chief of Research and Development, General Vance served two weeks in April on active duty at the Army Research Office, Arlington, Va.

Professor of chemistry at New York University, he has served as a member of the Army Science Advisory Panel since 1956. In previous Reserve tours he has served as R&D Coordinator and Staff Officer, Office, Assistant Chief of Staff, G-4; and as Assistant Chief for Guided Missiles, Special Weapons Branch.

In an interview with a *Newsmagazine* staff member, the general noted that the current pace of R&D activities may leave civilian consultants inadequately informed in such areas as basic Army organizational structure so that the significance of points during Army briefings may be lost.

Even a short tour in an Army R&D activity can help overcome this problem by reacquainting the Reservist with current organizational programs and goals, and enabling him to meet the full-time professionals responsible for major programs. In turn, he may take this new perspective back to his local R&D unit to communicate essential information to the men who have been termed "strength in depth."

General Vance earned his Ph. D. degree in 1926 from Yale University. He taught there prior to going to Copenhagen, Denmark, as Sterling Fellow for one year. He served, as a civilian, in the Office of Scientific Research and Development, 1941-42, and during World War II was an officer assigned to scientific activities.

Brig Gen John E. Vance

Following a tour with the Department of State, he joined the staff of New York University as Chairman, Department of Chemistry, and headed the department's graduate school. From 1953-55 he served as Chief Scientist and Deputy Chief, R&D, Office Chief of Staff, Department of Army.

A member of the Chemical Society and Faraday Society and a Fellow of the New York Acadamy, he is listed in *American Men of Science* and *Who's Who in American Science.*

Newsmagazine Seeking to Fill 2 Staff Vacancies

Two writer-editor positions on the staff of the *Army Research and Development Newsmagazine* will be vacated during coming weeks—one by a reassignment, the other by completion of a 2-year tour of military duty.

Applicants will be considered for a GS-11 Civil Service appointment as an associate editor whose primary responsibilities will be as a special assignment and rewrite staff member. Preferably, applicants should have a minimum of three to five years of full-time experience as newspaper or magazine writers and a degree in journalism.

A position as an editorial assistant filled for nearly two years by Sp/4 Jerold Roschwalb will be vacated when he is discharged to return to his career as a university English instructor. Another enlisted man with his capabilities, diligence, devotion to duty and disposition would be a most welcome find, but admittedly he will be difficult to replace.

In case another soldier does not show up to meet the editorial assistant requirement, the position may be converted to a Civil Service GS-7 rating. Journalism graduates fresh out of college or universities will be considered if they are desirous of starting as trainees and working up.

All applicants must meet Civil Service qualifications and be presently employed by the Government in an editorial capacity or within reach on a Civil Service register.

Applicants may contact the Department of the Army Staff Civilian Personnel Division, Room 1E 417, the Pentagon, Washington 25, D.C. The telephone number is Code 11 or OXford, Extension 54260.

PICTURE OF WIVES WHO CONTRIBUTE to the success of their distinguished Army husbands are seldom published in this periodical, except when their spouses are receiving awards or promotions. An occasion deemed to warrant an exception to the general rule was the recent coffee hour, held at the Army Navy Country Club in Arlington, Va., at which Army R&D ladies entertained Mrs. Earle G. Wheeler, wife of the Army Chief of Staff. Mrs. Wheeler (left) is shown with Mrs. Dwight E. Beach, wife of the Chief of Research and Development. Mrs. George W. Power, wife of the Deputy CRD, and Mrs. C. W. Clark, wife of the Director of Army Research participated.

DoD Officials Participate in Eighth Institute on Research Administration

Key officials from the Department of Defense participated in the Eighth Institute on Research Administration, sponsored by the American University's Center for Technology and Administration in Washington, D.C., Apr. 22-26.

Focused on "Operational Problems in Government-Sponsored Research and Development," the Institute was directed by Maurice Apstein, Associate Technical Director of the Harry Diamond Laboratories.

Adam Yarmolinsky, Special Assistant to the Secretary of Defense, presented the keynote address. A panel discussion on the Bell Report as pertains to improving in-house laboratory capabilities in the Department of Defense was chaired by Willis B. Foster, Deputy Assistant Director (Research), Office of the Secretary of Defense (DDRE).

C. Robert Woodside, Assistant for Programs, Office of the Assistant Secretary of the Army (R&D), presented the Army progress report on Bell Report recommendations as effected by provisions of Army Regulation 705-55, dated Oct. 11, 1962, including allocation of $10 million in FY 1963 to stimulate creative research in Army laboratories. (See October 1962 issue, page 1.)

A panel on Contractor Evaluation was chaired by Albert C. Lazure, Office of the General Counsel, U.S. Army Materiel Command. Featured were an "Evaluation of Competitive Research and Development Proposals" by Mr. Apstein and an "Evaluation of Contractor Performance" by Robert S. Tucker, Assistant Director (Engineering Management), Office of the Secretary of Defense (DDRE).

Parallel reports on the different panels were presented by representatives of the Navy and Air Force. Industry and university contributions and philosophy were propounded by Helge Holst, Treasurer and Corporate Counsel, Arthur D. Little, Inc., and General James McCormack, Vice President, Massachusetts Institute of Technology.

The institute was one of a series being conducted by American University on such subjects as information storage and retrieval, data transmission, records management and electronic display systems. The series will conclude with the Institute on Documentation and Copyright Law, May 20-24.

WSMR Reports Major Gain In Telemetry Data System

A fully automatic telemetry tracker in the new narrow band microwave frequencies has been developed by the Army Electronics Research and Development Activity at White Sands Missile Range, N. Mex.

The "no hands" tracker was developed to meet future needs of this national missile range when all telemetry frequencies will be in the region of 2,200 megacycles and higher. It tracks telemetry packages radiating in the region from 2,200 to 2,300 megacycles.

Contained in a mobile van operable anywhere on the range, the device "locks on" electrically to telemetry packages in supersonic missiles and gathers data sent from them at full signal intensity.

Early telemetry ground receiving stations used a crude "helix" spiral antenna manually operated with a pair of wooden paddle type handles. The amount and quality of telemetry data gathered depended on the dexterity and eyesight of the operator.

The new system is completely automatic and bypasses any human error. Tracking is so positive that a plot of missile trajectory is obtained as well as telemetry data, a scientist said.

Army Saves by Industrial Development of Tractors

One hundred heavy duty tractors, representatives of the end product of industrial research and development at no cost to the Government, have been put in the Army supply system.

Developed from specifications prepared by the U.S. Army Mobility Command, Engineer Research and Development Laboratories, Fort Belvoir, Va., the new tractor is expected to prove one of the military's most versatile and productive items of construction equipment.

Specifications for the 4-wheel drive, rubber-tired tractor resulted from Army tests of three prototypes of advanced design machines provided in 1960, at no cost, by three major manufacturers of construction equipment. Other manufacturers also coordinated the final specifications.

Early in 1962 Caterpillar Corp., as low bidder in competitively negotiated procurement, was awarded the contract for 400 of the medium-size tractors. With delivery of the first 100 production models in December 1962, an Army requirement had been filled in three years.

The articulated tractor with hydraulic steering is powered by a 6-cylinder diesel engine. It can ford three feet of water without modification, can be equipped with a dozer and winch, pull a scraper or trailer, or be fitted with a snowplow or compactor wheels. Powerful enough to handle tough earth-moving assignments, it can also maintain convoy road speeds, even while pulling a heavily loaded trailer.

Weighing approximately 26 tons, the tractor has a 140-inch wheelbase, is 124 inches wide and 136 inches high. Despite its size, it can be manueuvered easily and air lifted.

"Twisting" tractor undergoes tests prior to entering Army supply system.

Picatinny Arsenal Improves Combustible Shell Case

That "complacency is the cancer of research progress" has been demonstrated again at Picatinny Arsenal, Dover, N.J., by major improvements in materials and the manufacturing process for combustible cartridge cases.

When development of the combustible case as the culmination of more than five years of intensive research was reported (see January 1961 issue, page 17), it was hailed as a breakthrough of exciting significance.

The combustible case, at that time designed primarily for tank ammunition, replaced the need for brass and steel casings, effecting substantial reduction in manufacturing costs. More important, it eliminated the litter of hot spent cases and reduced accumulation of noxious gas inside.

The process in the manufacture of the combustible case was an adaption of a commercial technique successfully used in the production of speaker cones, egg crates, and luggage. The process is known technically as felting with a resin add-on.

Fibrous materials such as cellulose and its derivatives are felted on special dies to conform to the final article. These forms are then dried, dipped in a toluene alcohol solution of a suitable adhesive and redried.

The improved combustible casings not only minimize gases released from the fired ammunition; no residue remains in the gun tube which could cause premature detonation of the succeeding rounds.

The combustible cartridge case was acclaimed as an important achievement, but the manufacturing process required a long sequence of relatively complex operations. Picatinny Arsenal were not content. They were determined to improve the composition and, most important, the process.

Both goals have been accomplished. The manufacture of the combustible case is almost a one-step operation.

The entire process, according to Dr. Jean P. Picard, Deputy Chief for Propellant Research, is conducted in a water slurry, making operation less costly and hazardous.

It is based upon the "judicious choice" of chemical ingredients capable of forming the proper molecular bonds necessary to assure adequate strength and elasticity in the finished case to withstand rough handling in transport and combat.

Reported by researchers "well beyond the experimental stage," the process is expected to reduce considerably the capital investment for manufacturing facilities and material cost.

The new composition and manufacturing process have been developed by a military-civilian team of scientists consisting of Lieutenant Roger P. Kiley of Jersey City, N.J., Pfc Christian Stephens of Woodside, Queens, N.Y., and James Veltman of Long Valley, N.J.

Lt Roger P. Kiley and James Veltman, Picatinny Arsenal scientists, compare standard metal case with new combustible cartridge case.

Six Picatinny Arsenal men were nominated for 1963 Army Research and Development Awards for their part in the development of the combustible cartridge case, now part of several Army weapon systems.

Members of the Arsenal development team recognized are Sydney Axelrod, George Demitrack, Vladimir Mirko, Isadore Nadel, Edward Wurtzel, and Theodore Zimmerman. The team is credited with primary development without sacrificing safety, reliability, ruggedness or accuracy.

Dr. Fitz Joins ARPA as Chief Of Penetration Aids Branch

Dr. C. Dudley Fitz became Chief, Penetration Aids Branch, Directorate for Ballistic Missile Defense, Advanced Research Projects Agency (ARPA), late in April. He will be responsible for conducting all penetration aids research programs under Project DEFENDER.

Formerly employed by the Vitro Corp., he was Head of the Physics and Space Sciences Department at the West Orange (N.J.) Laboratory. He was earlier principal scientist for General Mills, Inc. Concurrently he was a lecturer at the University of Minnesota where, in 1954, he received his Ph. D. degree in mechanical engineering and physics.

Winter Tests Planned at APG Arctic Conference

Plans were drawn at the Tenth Annual Arctic Test Conference at Aberdeen Proving Ground, Md., Apr. 2-5, for the 1963-1964 winter test season in Alaska. Activities to test Army materiel and men under severe environmental conditions are scheduled to begin in October.

Col Henry E. Davidson, Jr.

Commanding General (Maj Gen) William F. Ryan of the U.S. Army Test and Evaluation Command was host to the conference, at which a prominent role was taken by Col Henry E. Davidson, Jr., President of the U.S. Army Test Board, Fort Greely, Alaska.

Representatives from installations of the U.S. Army Test and Evaluation Command, each of the Army Test Boards, commodity and development commands conferred with Col Davidson and other ATB staff members.

Following the conference, the Arctic Test Board contingent visited other test boards, arsenals, test centers and contractors to exchange technical information for winter test season activities.

The conference was the first of its kind held at Aberdeen Proving Ground, resulting from the Army reorganization last year. Previous Arctic Test Conferences were held at the U.S. Continental Army Command, Fort Monroe, Va., headquarters.

Joint Research Effort Results in New Nerve Graft Technique

Ability to restore function of certain severed human nerves has climaxed seven years of research supported jointly by the United Cerebral Palsy Research and Educational Foundation, Inc., and the U.S. Army Medical R&D Command. Since 1958 the National Institutes of Health, U.S. Public Health Service also contributed to the research.

Dr. James B. Campbell, associate professor of neurological surgery at New York University Medical Center, reported on the process Apr. 18 in a paper presented before the Harvey Cushing Society in Philadelphia.

Experiments performed at the Center and with Dr. C. Andrew L. Bassett, associate professor of orthopedic surgery at Columbia University College of Physicians and Surgeons, have restored muscle function and sensation in human beings by bridging irreducible gaps in severed nerves.

Using frozen-irradiated nerve grafts from recently deceased donors, shielded by a thin porous plastic sheath, the researchers proved the technique successful when surgery was performed as long as three years after an injury. Grafts of varying lengths were successful — one 5.3 inches long.

Dr. Campbell said irradiation used in sterilizing grafts modified them at the same time to make them acceptable to the body of the recipient without setting up inflammatory reaction.

Nerve tissues used in the experiments and in the clinical application of the method were exposed to two million units of radiation by the Van de Graaff accelerator at the High Voltage Research Laboratory, Department of Engineering, Massachusetts Institute of Technology.

Previously, it was stated, transplantation of nerves from one human to another had failed because the grafts reacted as a foreign body. The frozen-irradiated nerve tissue serves a mechanical function of providing a pathway for regenerating nerve fibers. Once the regeneration is complete, the graft tissue does not in itself survive.

The porous plastic sheath, Dr. Campbell said, serves as a shield against scar tissue invasion of the grafted area and is considered valuable in orienting the pattern of regeneration, in that its pores permit passage of body fluids for nutrition.

Research productive of the new technique was started in 1956 at Columbia University College of Physicians and Surgeons under grants from the U.S. Army Medical R&D Command, Office of The Surgeon General, and the United Cerebral Palsy Research and Educational Foundation, Inc. In 1958 the National Institute of Neurological Diseases and Blindness, NIH, U.S. Public Health Service joined in supporting the program.

In presenting his Apr. 18 report Dr. Campbell said:

"I would like to emphasize that this is a preliminary report of successful employment in man of millipore-shielded, frozen-irradiated homografts in repairing transected peripheral nerves with irreducible gaps. Much remains to be learned concerning the potential of the technique. The method has not yet been successful with the central nervous system (spinal cord) or in nerves destroyed by disease."

Preceding the grafts on humans, experiments were made on several hundred animals. Drs. Campbell and Bassett were recognized in 1961 for outstanding medical achievement when they were presented the United Cerebral Palsy-Max Weinstein Award. Actually, Dr. Campbell had started studies dating back to 1953 on "Visceral Innervation" supported by the UCPA which stimulated interest in further regeneration research.

Success of the recent experiments, Dr. Campbell said, indicates that establishment of nerve banks at points throughout the country, to be available to neurosurgeons who can use the new method, will be vital to further development of the program.

OCRD Assistant Executive, ASAP Secretary Named

Lt Col William H. Tucker, Jr., Assistant Executive in the Office of the Chief of Research and Development since Apr. 1, succeeds Lt Col Jack F. Riggins, reassigned to the U.S. Army Element, MAAG, Vietnam.

A veteran of five campaigns in Korea (1950-52) with the 2d Infantry Division, Lt Col Tucker served most recently as Chief, Plans and Requirements Branch, G-3 Division, Headquarters, U.S. Army Southern European Task Force, Verona, Italy.

From 1953-1956 he served in OCRD as Administrative Assistant to the Chief of Research and Development, branch chief in the International Division and staff officer in the Programs and Budget Division. He holds a B.S. degree in military science from the University of Maryland and has completed two years of graduate work in nuclear physics and nuclear engineering at the University of Virginia.

LT COL KENNETH R. BULL joined the OCRD staff recently. He will succeed Lt Col P. D. MacGarvey as Secretary of the Army Scientific Advisory Panel. Previously he served as the Senior Military Adviser, 4th Military Region, MAAG, Laos, and was awarded the Legion of Merit.

He holds degrees in business administration from The Citadel and the University of South Carolina and has served as an instructor in personnel management at the Infantry School, Fort Benning, Ga.

Other recent assignments include Deputy Group Commander, 187th Airborne Group, 101st Airborne Division; and Deputy Chief of Staff, 101st Airborne Division.

Lt Col William H. Tucker, Jr.

Lt Col Kenneth R. Bull

National JSH Symposium Hailed as Notable Success

Arousing the interest of gifted high high school science students in careers in Government research and development was one of the Army objectives in sponsoring the First National Junior Science and Humanities Symposium, Apr. 3, at the U.S. Military Academy.

From that viewpoint, reaction of the 125 selected students who participated was satisfying evidence of unqualified success. Attendees were enthusiastic in their acclaim of the program arranged by the U.S. Army Research Office in Durham, N.C., and the Academy staff, aided by USARO Headquarters.

Sharon Overhold (left) and Carol Jean Meyers view radiation testing equipment during 3-day Army-sponsored National JSH Symposium at Military Academy. On the right is Cadet Fred W. Schaum, Class of 1963.

Many of the Nation's distinguished leaders in science gave stimulating addresses, including United Nations representatives. Dr. Edward Teller, renowned nuclear physicist, was the keynote speaker. Dr. Edward Weber, President of Brooklyn Polytechnic Institute and Chairman of the JSHS Advisory Council, also participated.

Army leaders were headed by Assistant Secretary of the Army (R&D) Dr. Finn J. Larsen, who spoke on "Research in Progress—Science in the Making," Chief of Research and Development Lt Gen Dwight E. Beach, whose subject was "Prospects for the Future," Director of Army Research Maj Gen C. W. Clark and Maj Gen W. C. Westmoreland, Academy Superintendent.

A memorable climax was a visit to United Nations Headquarters in New York City, followed by field trips to laboratories of the International Business Machines Corp., Yorktown Heights, N.Y., and Texaco Refinery at Beacon, N.Y.

(For a complete listing of the program for the Symposium, including all speakers, session chairmen and discussion topics, see March issue.)

Chief of Research and Development Lt Gen Dwight E. Beach addresses 125 top high school science students at National JHS Symposium.

35 Years Service Proves Man-Machine Durability

Still going strong after more than 35 years of service at the U.S. Army Mobility Command's Engineer Research and Development Laboratories, Fort Belvoir, Va., is Thomas Richard Simpson, 65, a machine operator.

One of the oldest employees in point of continuous service, Simpson is "wearing about as well" as the welding machine purchased and placed in use shortly after he began his career in April 1927. Fort Belvoir then was known as Camp Humphreys and the Engineer Board was the forerunner of the present day Laboratories.

Thomas R. Simpson

"Our first machine was a 300-ampere, 3-phase, DC current welding machine," he said. "A few months later, a 500-ampere machine was purchased. Both have been in continuous use since 1927. I have replaced the brushes three or four times but, otherwise, the machines have had no overhauling."

Simpson received welding training when he was a machinist's apprentice with the Southern Railway. For a number of years he used the welding machines himself, but now is supervisor of the welding section in the Machine Shop at the Laboratories.

Simpson said he will miss his many friends and coworkers when he retires in a few years, but after more than 35 years of service he probably also will miss the feel of a face-protecting mask and the welding machines.

CSC Official Stresses Need For Top Quality Scientists

Federal laboratories must compete more effectively for scientific manpower is the thesis of an article in the April-June 1963 issue of the *Civil Service Journal*, authored by Harold H. Leich, Chief of the Program Planning Division, U.S. Civil Service Commission.

The article falls in the rather select category of those the *Army Research and Development Newsmagazine* editor would feel privileged to carry in its entirety, since it reports on progress and prospects of Federal laboratories in competing for scientific manpower.

Cited in the article are quoted paragraphs from "The Competition for Quality," a report published by the Federal Council for Science and Technology and endorsed by President Kennedy in 1962 with the statement:

"All practicable action should be taken to implement these recommendations."

Among the recommendations of the report, prepared by a panel of scientists under the chairmanship of Dr. Allen V. Astin, Director of the National Bureau of Standards, are continued progress in pay reform, enhancement of educational opportunities for professional development, and liberalized annual vacation leave for scientists whose first Federal employment is at senior level.

Review copies of the April-June issue of the *Civil Service Journal* are at each Civilian Personnel Office.

NATO Countries Metallurgists to Gather at AGARD Conference in Norway

Metallurgists and materials scientists representatives of NATO countries will gather at Oslo, Norway, June 23-26, for an AGARD Conference on the Science and Technology of Refractory Metals.

Oslo University is sponsoring the meeting for AGARD (Advisory Group Air Research and Development) to consider the state-of-the-art with respect to tungsten, tantalum, molybdenum, niobium (columbium) and their alloys.

Many of the world's leading metallurgists will take part in discussing problems and new approaches to their solutions with respect to materials requirements in weapons and other military materiel.

Although the AGARD structures and materials operation deals basically with requirements pertinent to aircraft and missiles, the Conference will cover refractory metal technology more broadly. Six sessions will consider alloys and alloying, properties and engineering application, deterioration and protection, analysis and testing, primary fabrication, and secondary fabrication.

Lt Col Louis G. Klinker, U.S. Army Research Office staff officer designated as the Army member of AGARD, has been arranging through Headquarters, U.S. Army Materiel Command, and Army Research Office-Durham (N.C.) for Army participation in the Conference.

The Army has broad interests in refractory metals, he said, a principal one being their application to small arms and cannon gun liners, vents and valves for recoilless rifles, and similar weapon parts. Earl Abbe of of Springfield Army will attend to probe these relations and assess the value of the meeting specific to this technical area.

Vernon Nieberlein of the U.S. Army Missiles Command has been assigned to analyze the papers and related discussion for refractory metals technology pertinent to missile parts operating at high temperatures and under corrosive or erosive conditions.

Another major area of Army interest is in materials for gas turbine and other high temperature engine parts in aircraft, surface vehicles and stationary equipment. Fuel element cans and piping for heat exchangers are typical present or contemplated uses of refractory metals in Army nuclear power reactors.

Hot metal working tools and dies, and high temperature thermocouple tubes made from refractory metals appear promising for prototype weapon production in Army arsenals. Stuart Arnold of the Army Materials Research Agency, U.S. Army Mobility Command, will follow Conference proceedings dealing with those areas.

Dr. Peter Kosting, Chief of the Materials Branch, Headquarters Army Materiel Command, will attend to assure administrative support to actions that may be advisable in the interests of the Army after the Conference. He will also cover, from a technical standpoint, those sessions concerned with application in thermionic and thermoelectric direct power conversion devices, biomechanical prosthetic applications, and alloys for superconducting devices.

Dr. H. M. Davis, Chief of the Metallurgy and Ceramics Division, Army Research Office-Durham, will participate to coordinate Army domestic and European basic research programs pertinent to NATO materials activities.

The Conference is the first of its kind since the Chief of Research and Development decided that the Army would become more actively engaged in AGARD programs.

Texas A&M President Joins RAC Board of Trustees

Dr. James Earl Rudder, President of Texas A&M College and an Army Reserve major general, has replaced John T. Connor as a member of the Board of Trustees of the Research Analysis Corporation (RAC). Connor resigned in January.

A Texan who manages successfully to combine several careers—educator, administrator, soldier and public official—Rudder commands the 90th Infantry Division in the Reserves.

World War II combat experience included command of the famed Second Ranger Battalion during the Normandy invasion, including a D-Day mission to scale the 100-foot cliffs at the shore of Pointe du Hoe.

Said General Omar Bradley, then Commander of the U.S. Ground Forces, Europe: "No soldier in my command has ever been wished a more difficult task than that which befell the 34-year-old commander of this provisional ranger force."

Following VE Day, Rudder served for eight months as a colonel on special War Department missions before reverting to civilian status.

After serving as mayor of Brady, Tex., he was employed by the Brady Aviation Co., and later was appointed Commissioner of the Texas General Land Office. He is a trustee of the Southwest Research Institute and a member of the Board of Directors of the Texas United Fund.

Maj Gen James Earl Rudder

Cornell Periodical Features Army CRD Progress Report

Featured as the lead article in the latest edition of *Perspective*, a publication of the Cornell Aeronautical Laboratory, Inc., of Cornell University, is a "Progress Report" on Army research and development by Lt Gen Dwight E. Beach.

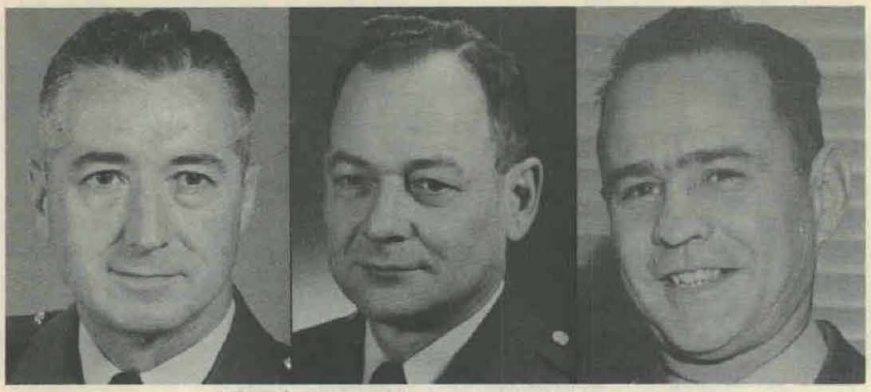
The Chief of Research and Development notes that the Army's current R&D mission includes about 4,500 projects, tasks and investigations performed by more than 35,000 military and civilian scientists, engineers and supporting personnel.

This work is being carried on at 52 Army installations and 550 industrial concerns, colleges, universities and nonprofit institutions at a cost of $1.3 billion—approximately 10 percent of the Army budget for FY 1963.

The Cornell Aeronautical Laboratory is an example of the latter type of institution, having an important segment of its technical staff engaged in more than 20 diverse research programs for the Army.

Placing his subject in the basic perspective of the primary weapons system, the combat division, General Beach outlines the goals sought by research teams. These range from deceptively simple articles of clothing to electronic communications systems.

Redstone Arsenal Announces Key Personnel Changes



Lt Col Henry H. Hewett | Col Daniel F. Shepherd | Lt Col Willis H. Clark

Col Daniel F. Shepherd, a veteran Army missileman, has been named Director of Research and Development at the Army Missile Command, Redstone Arsenal, Ala.

Col R. W. Burkett, his predecessor, was recently transferred to the Army Weapons Command. Col Shepherd has headed the Missile Command's Target Missiles and Multi-system Test Equipment Commodity office since his arrival at Redstone Arsenal last October.

Two other key personnel changes were announced at the Missile Command at the same time. Lt Col Henry H. Hewett, formerly Chief of the Missile Technical Division, is now executive officer of the R&D Directorate, succeeding Lt Col Henry E. Attaya, Jr., who recently retired. Lt Col Willis H. Clark moved from the Mauler Project Manager's Office into the position vacated by Col Shepherd.

The Missile Command's R&D Directorate includes eight laboratories and eight offices and divisions which employ more than 1,000 people. The responsibilities in the Directorate cover research, developing, testing and evaluation of the Army's missile system, projecting the current needs and providing the technical ability for managing development of future Army missile systems.

COL SHEPHERD, a mechanical engineering graduate of the Massachusetts Institute of Technology, was first stationed at Redstone in 1956. Assigned to the Army Ballistic Missile Agency, he returned for his second tour after duty at Picatinny Arsenal.

LT COL HEWETT is graduate of Jackson College, Honolulu, Hawaii, and has attended the University of Virginia. He came to the Missile Command last October following several Quartermaster assignments.

LT COL CLARK, graduate of the United States Military Academy, arrived at the Missile Command last July from a 2-year tour as Launch Vehicle Officer with the U.S. Army Advent Management Agency at Fort Monmouth, N.J.

Maj Culbert Assigned ROIC At Green River Test Facility

Maj Vincent J. Culbert is the new resident-officer in-charge of the off-range missile test facility at Green River, Utah.

Maj Gen J. Frederick Thorlin, commander of White Sands Missile Range, N.Mex., announced the assignment Apr. 18 and said construction of facilities is well underway for test firings scheduled to begin in August. An Air Force project programed over a 2-year period involves firing of missiles from the Green River site to impact on the White Sands range.

Maj Culbert came to the missile range in March from the Ordnance Plant in Mainz, Germany, for his third assignment at White Sands since 1946. As an enlisted man he served until 1951 as firing officer with the German V-2 missile program. He returned in 1957 and for two years was administrative officer for Systems Test Division, Army Missile Test and Evaluation Directorate.

Sergeant Missile Gets Lightweight Air Conditioner

A new 18,000 B.t.u. hour air conditioner for the Sergeant missile system is half the size and weight of the current military standard but has almost twice its cooling capacity.

Developed by the U.S. Army Mobility Command, Engineer Research and Development Laboratories, Fort Belvoir, Va., the unit is used in ground support equipment for the solid-propellant, tactical missile.

Weighing 180 pounds, it is 17 inches wide, 19 inches deep and 45½ inches high, representing a 70 percent reduction in weight and a 57 percent reduction in size. Cooling capacity has been increased 47 percent over that of the standard unit.

Reduction in weight and size to meet the semitrailer-mounted missile's mobility requirements was achieved by employing highly efficient plate-fin heat exchangers, frameless aluminum wrapper construction, and other lightweight components. A further weight reduction to about 140 pounds is expected with the incorporation of a lightweight compressor now under development.

The unit uses Refrigerant-22 and is capable of operation against external evaporator air pressures up to 1-inch water gauge. It is capable of supplying 22,000 B.t.u. hour sensible cooling, and has air intake openings for either outside ventilation or for connection to a collective protection filter. It also is capable of supplying approximately 13,000 B.t.u. hour of heat for cold temperature application.

The unit uses a hot gas bypass system to prevent cycling of the major air conditioner electrical components, eliminating excessive electrical transients during operation.

Base mounted and self contained, it is operable at outside temperatures in excess of +115° F., and in excess of 95 percent relative humidity.

Manufactured by the Trane Co., La-Crosse, Wis., under contract with the Laboratories, the unit is presently in limited production.

The U.S. Army Mobility Command, Center Line, Mich., is a major subcommand of the Materiel Command.

Control box of 18,000 B.t.u./hr. air conditioner is inspected at USAERDL.

Army Announces Contracts Totaling More Than $150 Million

Contracts for research, development and procurement of military materiel and services aggregating more than $150 million were announced recently by the Department of the Army.

The largest contract, $18,667,746, was awarded to Magnavox Co., Fort Wayne, Ind., for vehicular radio sets. For portable and aircraft radio sets, Collins Radio Co., Dallas, Tex., received contracts totaling $4,101,018.

Two contracts aggregating $18,334,179 let to Western Electric Co., New York, N.Y., call for improved modification kits for the Nike Hercules missile system and research and development on the Sprint missile.

A $9,366,655 contract awarded to General Electric Co., Syracuse, N.Y., is for high-power radar and retrofit kits for the Nike Hercules system.

AVCO Corp., Richmond, Ind., received an $8,274,911 contract for ammunition. Other contracts for ammunition components included: Scovill Manufacturing Co., Waterbury, Conn., $7,589,630; Remington Arms Co., Inc., two contracts totaling $3,928,582; Sperry Rand Corp., New York, N.Y., $3,814,045; National Lead Co., Toledo, Ohio, $3,776,358; Day & Zimmerman, Inc., Philadelphia, Pa., $2,814,160;

Mason & Hanger-Silas Mason Co., Inc., New York, N.Y., $2,303,472; Holston Defense Corp., Kingsport, Tenn., $2,285,051; Collins Radio Co., Cedar Rapids, Iowa, $1,999,618; Harvey Aluminum Sales, Inc., Torrance, Calif., $1,591,109; and Philco Corp., Philadelphia, Pa., $1,032,000.

Production of solid propellants and loading of Pershing missiles is the basis of a $6,452,500 contract let to Thiokol Chemical Corp., Bristol, Pa. Thiokol also received a $5,597,220 contract for Sergeant missile motors and renovation of hand-held flares.

One-year study contracts totaling nearly $6 million were given to three industrial firms for work on a revolutionary system of tactical communications in forward combat areas. Contracts awarded are: Motorola Inc., Chicago, Ill., $1,986,350; Radio Corporation of America, Camden, N.J., $1,947,000; and the Martin-Marietta Corp., $1,967,120.

Each of the firms will provide the Army with system design plans for a random access discrete address system (RADAS) by March 1964. RADAS is expected to replace the current area communications centers, switchboards, telephones, wires and cable, and a large part of the radio equipment from the division down to the company level.

Aerojet-General Corp., Downey, Calif., received a $5,000,000 contract for an SD-2 drone system. Also let to Aerojet is a $4,409,384 contract specifying production of rocket motors for the Hawk missile system.

A $4,127,123 classified contract was awarded to Firestone Tire and Rubber Co., Akron, Ohio.

Three vehicle contracts included Ford Motor Co., Dearborn, Mich., $3,701,873 for 1,939 cargo pickup and 614 carryall trucks; Willys Motor Co., Inc., Toledo, Ohio, $2,677,585 for ¼-ton trucks; and Diamond T Motor Truck Co., Chicago, Ill., $1,177,856 for 121 5-ton trucks.

Electronic equipment is ordered in two contracts totaling $3,000,000 awarded to Control Data Corp., Minneapolis, Minn. For parts for the T-114 armored reconnissance vehicle and the 105 mm. and 155 mm. self-propelled howitzers, Cadillac Motor Car Division, GMC, Cleveland, Ohio, received contracts for $3,801,158.

Hughes Aircraft Co., Fullerton, Calif., received a $2,544,112 contract for training equipment for air defense system. For seven 60-ton amphibious lighters, Western Gear Corp., Seattle, Wash., is to receive $2,375,802.

A $2,283,840 contract awarded to Goodyear Tire & Rubber Co., Akron, Ohio, is for 48,000 tires. Spools of barbed wire are ordered in a $1,827,920 contract and a $1,217,200 contract let respectively to U.S. Steel Corp., and Public Steel Corp., of Chicago.

For rebuilding 420 tank engines, Continental Motors Corp., Muskegon, Ill., received a $1,448,310 contract. A $1,400,000 contract for electronics research was awarded to the University of Illinois, Urbana, Ill. Minneapolis Honeywell Regulator Co., Hopkins, Minn., was awarded a $1,113,824 contract for Sergeant missile adaption kits and practice warheads.

Wolcott Heads New RAC Engineering Directorate

Fred W. Wolcott heads a new Systems Engineering Directorate established at the Research Analysis Corporation (RAC), Bethesda, Md.

Under an Army contract to apply advanced scientific thinking to military and Government operations research problems, the RAC directorate will engage in systems engineering and technical analysis of military equipment in use and in development.

Army Chief of Research and Development Lt Gen Dwight E. Beach has stressed that escalating costs and time demands are forcing the military services to seek improved concepts and methods of testing and evaluation. The Army expects valuable results from the new directorate's studies, seeking potential applications of advanced technology to weapons.

Born in New York in 1916, Wolcott graduated from the University of Michigan (1939) with a B.S. degree in aeronautical engineering. He was employed for 20 years by Douglas Aircraft Corp., and was responsible for initial design and development of several Army and Navy transports and other aircraft as well as for preliminary design of several Air Force aircraft weapons systems.

In 1959 he became Special Assistant to the Director of Defense Research and Engineering (DDRE) and later Assistant Director of Defense Research and Engineering for Tactical Weapons. He still serves as a consultant to the DDRE.

Fred W. Wolcott

In 1961 he directed the U.S. scientific team conducting a long-term scientific study for NATO, then joined the Aeronutronic Division of the Ford Motor Co., as a special projects manager. He is an Associate Fellow of the American Institute of Aeronautics and Astronautics and a member of Operations Research Society.

Dr. Ralph E. Lincoln
Army Biological Labs
Fort Detrick, Md.

Dr. Francis N. Craig
Army Chemical R&D Labs
Edgewood Arsenal, Md.

Alan M. Moss
Picatinny Arsenal
Dover, N.J.

Edward C. Hecht
Picatinny Arsenal
Dover, N.J.

Army Selects 19 Award Winners for Achievement in Research, Development

(Continued from page 1)

Competition was exceedingly close among 23 candidates nominated by major R&D commands, and the judges eliminated four reluctantly.

Actually, 25 individuals are recognized in the 19 awards, since one 5-man and two 2-man teams are involved. In 1962 judges had planned to narrow selections to 10 awards, but finally settled on 15 honoring 28 men.

Conducted under the provisions of AR 672-304, the Army R&D Achievement Awards Program is open to any civilian scientist or engineer or groups of such employees of the Department of the Army paid from appropriated funds.

The basic selection criteria is that an "achievement will be regarded as significant when it establishes a scientific basis for subsequent technical improvement of military importance, and/or materially improves the Army's technical capability, and/or contributes materially to national welfare."

Final approval authority for the 1963 awards was exercised by General Beach, based on recommendations made by four judges from the U.S. Army Research Office key scientists staff, namely:

Dr. Richard A. Weiss, Deputy and Scientific Director; Dr. Lester W. Trueblood, Chief, Regional Branch, Environmental Sciences Division; Dr. Robert B. Watson, Chief, Physics and Engineering Branch, Physical Sciences Division; and Dr. Francis W. Morthland, Scientific Analysis Branch, Life Sciences Division. Lt Col Woodrow W. Wiltse, Policy Division, OCRD, served as recording secretary.

Award winners and the achievements which won recognition are:

DR. RALPH GOLDMAN, Army Research Institute of Environmental Medicine, Natick, Mass. Served as research team leader and as a recognized scientific authority on applied research in the field of environmental physiology. In this capacity, Dr. Goldman contributed extensive consultation, special field research and experimental design in a study of energy expenditure by soldiers in actual vigorous simulated combat activities.

DR. RALPH E. LINCOLN, Army Biological Laboratories, Fort Detrick, Md. Directed a program of research on anthrax using experimental animals which has contributed materially to the basic knowledge of the pathogenesis of anthrax to the course of the disease, and to its early detection and possible cure.

DR. FRANCIS N. CRAIG, Army Chemical Research and Development Laboratories, Edgewood Arsenal, Md. Concluded a program of research on the volumes of air breathed by men while masked under conditions simulating those of the battlefield, on the actions upon men in various environmental situations of doses of atropine, of 2-PAM and of mixtures of atropine and 2-PAM, and on the influence of environmental factors on the percutaneous toxicity of VX.

LETCHER A. LOFGREN, Harry Diamond Laboratories, Washington, D.C. Engineered the modification of a standard proximity fuze with a resultant savings in excess of one million dollars.

WILLIAM FISHBEIN, U.S. Army Electronics Research and Development Laboratories, Fort Monmouth, N.J. Conceived the initial concept, conducted the design study and speci-

Jimmy H. Williams
Rock Island Arsenal
Rock Island, Ill.

Lloyd O. Gilbert
Rock Island Arsenal
Rock Island, Ill.

Vernon A. Nieberlein
Army Missile Command
Redstone Arsenal

Edward Lieblein
Electronics R&D Lab
Fort Monmouth, N.J.

Bernard J. Alley
Army Missile Command
Redstone Arsenal

David C. Hardison
Ballistics Research Labs
Aberdeen Proving Ground

Robert T. Gschwind
Human Engineering Labs
Aberdeen Proving Ground

Richard Kramer
Human Engineering Labs
Aberdeen Proving Ground

Dr. Kurt Ikrath
Electronics R&D Lab
Fort Monmouth, N.J.

fied the parameters of the basic components of the Lightweight Local Security Radar Sensor, AN/PPS-7.

DR. KURT IKRATH, U.S. Army Electronics Research and Development Laboratory, Fort Monmouth. Originated and experimentally tested the fiberglass tube antenna which will significantly improve the directivity of the helix antenna.

MORTIMER H. ZINN, Sol Schneider, George W. Taylor, Anthony J. Buffa, Raymond W. Brower, U.S. Army Electronics Research and Development Laboratory, Fort Monmouth. As a team effort, developed an electronic "crowbar" for use in connection with the NIKE ZEUS program.

DR. JACK A. KOHN, Arthur Tauber, U.S. Army Electronics Research and Development Laboratory, Fort Monmouth. Developed a technique for synthesizing large pure structurally perfect single crystals of a large family of magnetic crystals called hexagonal ferrites and for careful structural measurements which have revealed a most complex layer type structure.

ROBERT T. GSCHWIND, Richard Kramer, U.S. Army Human Engineering Laboratories, Aberdeen Proving Ground, Md. Jointly provided a system for evaluating the complex man-machine dynamics encountered in a firing environment of lightweight, portable-mobile antitank weapons.

ABRAHAM GOLUB, Army Ballistic Research Laboratories, Aberdeen Proving Ground. Conducted evaluation and cost-effectiveness studies which led to important improvements in the Army's and NATO's technical capability.

DR. FRITZ K. SAUTTER, Watervliet Arsenal, Watervliet, N.Y. Developed the technique and the isolation of the mechanism which contributed to the electro-disposition of dispersion hardened alloys.

JAMES L. HELFRICH, Frankford Arsenal, Philadelphia, Pa. Conducted the fundamental research proving the feasibility of applying the Faraday effect to "Q-switching" of lasers which established a scientific basis for subsequent important improvements.

WILLIAM E. HEIDEL, JR., Rock Island Arsenal, Rock Island, Ill. Exercised technical supervision over the development and application of auxiliary propulsion systems for the standard 105 mm. and 155 mm. towed howitzers. Is now engaged in applying the same type of system to the new lightweight 105 mm. howitzer, XM 102.

DR. WILLIAM C. McCORKLE, JR., U.S. Army Missile Command, Redstone Arsenal, Ala. Made outstanding contributions to missile guidance technology in the areas of physical mechanics, aerodynamics and thermodynamics. Particularly, is inventor or coinventor of the Automatic Meteorological Compensation System (AUTOMET), Prespin Automatic Dynamic Alignment System (PADA) and many others.

ALAN M. MOSS, Picatinny Arsenal, Dover, N.J. Was directly responsible for design and development of the Sergeant missile warhead section which consists of initiation, safing, arming and fuzing subsystems, and internal power supply subsystem.

EDWARD C. HECHT, Picatinny Arsenal. Evolved a new technique for the evaluation of kill probabilities of nuclear weapon systems.

DAVID C. HARDISON, U.S. Army Ballistics Research Laboratories, Aberdeen Proving Ground. Effectuated a modus operandi in the field of armored weapon systems which has effectively contributed to the essential coordination existing within R&D organizations and between R&D and "user" agencies.

DR. JOSEPH ZEIDNER, U.S. Army Personnel Research Office, Washington, D.C. Conceived and directed a unique method of accomplishing Image Interpretation by utilizing the peculiar and unique talents of a diversified team of experts on a most complex research task dealing with image interpreter performance.

LLOYD O. GILBERT, Rock Island Arsenal. Developed a positive training program in principles of corrosion prevention for engineers, inspectors, maintenance personnel and key civilians in both military and industry which has reduced maintenance and increased reliability and storage life of many of the Army's missiles.

Other nominees in the final judging included:

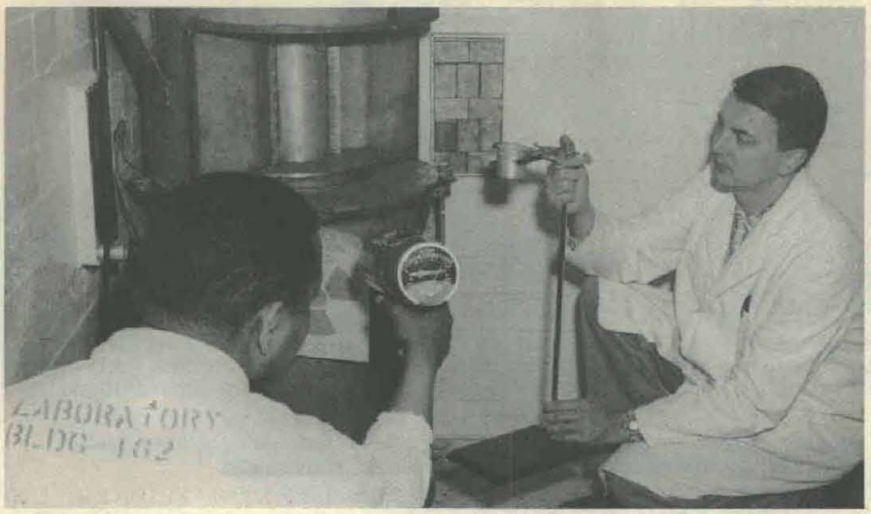
EDWARD LIEBLEIN, U.S. Army Electronics Research and Development Laboratory, Fort Monmouth. Directed the development of BASIC-PAC and Informer, two medium capacity FIELDATA computers, in such a manner that a significant reduction in lead time was achieved.

JIMMY H. WILLIAMS, Rock Island Arsenal. Contributed major portion of effort in the origination and development of a design that increases the flexibility, reduces the weight, complexity, and cost of gun carriages.

VERNON A. NIEBERLEIN, U.S. Army Missile Command, Redstone Arsenal. Devised a means of vapor plating the blast tube in the hot gas system of the NIKE ZEUS based on the reduction of tungsten hexafluoride with hydrogen.

BERNARD J. ALLEY, Army Missile Command, Redstone Arsenal. Conceived and developed the original concept and procedures for X-ray fluorescence analysis of propellants.

Picatinny Arsenal Tests Munitions With 7-Inch 'Giant'



Picatinny Arsenal research chemist James McCahill (right) readies aluminum container holding specimen of explosives for isolated exposure to intensive gamma rays to be released from the cobalt-60 isotope. Charles White, radio chemist, keeps guard check with radiation monitor.

A protective cell with walls four feet thick has been built at Picatinny Arsenal, Dover, N.J., to harness for experimental purposes the awesome power of a giant seven inches tall.

A captive, "Cobalt-60," can strike with devastating speed. Its deadly gamma rays are kept rigidly inoperative except to test the effects of direct radiation on munitions materials at the Feltman Research Laboratories (FRL).

Isolated within an impenetrable 9-inch-thick lead chamber bedded deep in a massive, 5-foot cylindrical tank, Cobalt-60's 12,000 curies of radioactive intensity can be blasted at materials to be tested within the 7-foot insulated cell.

From an outside control panel, technicians direct exposure of gamma rays whose maximum radiation exceeds one million roentgens per hour.

The new high-level irradiation research facility was built by Arensal plant engineering and maintenance division, with design assistance of the FRL engineers and scientists.

The cobalt source enables Picatinny scientists and testing engineers to probe effects of radiation on explosives, propellants, pyrotechnics, bulk materials and related reactive materials. The object is to pre-determine weaknesses and strengths of munitions materials to nuclear blasts.

Designed primarily to support FRL programs, the research facility contains two additional gamma sources; a 3,000-curie cobalt-60, a 250- curie cesium-137 and a plutonium-beryllium fast neutron source with a maximum output capability of one million neutrons per second. Facilities are available to all Arsenal research groups.

Possibility of an accidental exposure to personnel is virtually eliminated by an intricate pattern of safety devices, interlocking mechanisms and radiation warning indicators.

The Honorable A. Tyler Port (center) Deputy Assistant Secretary of the Army for Logistics, examines Davy Crockett projectile during recent briefing at Picatinny Arsenal and Munitions Command Headquarters. With him are Maj Gen F. A. Hansen, Commanding General of the Munitions Command, and Col Lee S. Kaufman, Deputy Commander of Picatinny Arsenal, Dover, N.J.

Technical Paper Creates Wide Demand for Reprint

A technical paper presented to the 1962 biennial Army Science Conference at the United States Military Academy, June 20-22, has stimulated widespread demands for reprints from the U.S., England and Australia.

Titled "Investigation and Evaluation of Available Hypersonic Probe Materials," the paper was authored by Dominick Molella, a metallurgist in the Technical Services Laboratory at Picatinny Arsenal, Dover, N.J.

Reprints of the paper, published in the proceedings of the Conference, were distributed by the Armed Services Technical Information Agency (recently redesignated the Defense Documentation Center) to military installations, Government agencies, and contractors on Government work.

The Office of Technical Services, Department of Commerce, Washington, D.C., has reprints of the article for public sale at $3.60, PB 162699.

'Demoted' Without Loss in Pay

In announcing the appointment of Col LeRoy D. Brummitt to head the U.S. Army R&D Advisory Group, the *Newsmagazine* last month inadvertently referred to him as "Lt Col."

Col Brummitt joined the staff of the Office of the Chief of Research and Development in July 1961 and was promoted to his present rank June 20, 1962.

We are grateful to readers for calling this error to attention.

BioLabs Technical Information Center Lauded for Progress

Army Technical Information Center directors trying to cope with the problem of achieving effective retrieval and dissemination of the mounting flood of technical reports may find it useful to learn about progress at the U.S. Biological Laboratories, Fort Detrick, Md.

Under contract with the Chemical R&D Laboratories at Dugway Proving Grounds, Utah, to make a study of information retrieval systems, the John I. Thompson Company (JITCO), Washington, D.C., recently commended results being achieved at the Detrick installation. The progress report stated:

"The visit to BioLabs gave JITCO personnel the opportunity to see a Technical Information Center that is methodically moving toward consolidation of all information functions."

That report amounted to a commendation of the leadership of Gerald Beveridge, Chief of the Technical Information Division, for what other leaders at the BioLabs already had termed "significant initial steps toward the solution of the hitherto seemingly unsolvable problem." The report also said:

"Mr. Beveridge now has responsibility for the BioLab's field printing plant, editing services, graphic arts, photo lab, technical library, security review of outgoing journal articles, duplicating and reproducing facilities, and informal information briefings and discussions.

"This complex of enabling mechanisms has provided increased product quality, and increased efficiency to information users and generators."

The transition from manual operations to computer processing at the BioLabs is proceeding at an accelerated rate. The value of punched tape is being stressed to reduce repetitious manual operations and to broaden the services provided by the Technical Information Center.

Simultaneous typing of card and punching of paper tape allows for efficient production of selective dissemination lists, abstract bulletins, catalog cards with permuted entries and other bibliographic aids.

Tapes will also provide machine-readable input to the new UNIVAC-SS 90 Model II computer recently installed in BioLabs new biomathematics building. Exchange of duplicate tapes with other Technical Information Centers will provide interchange of document information on a current basis.

The policy of adding scientists and engineers to a staff already consisting of librarians, bacteriologists, editors, artists and writers provides a discipline mix rivaling that of operations research groups and further broadens and deepens the total capability of the information center.

For example, a pilot program with the Institute of Contemporary Russian Studies, Fordham University, and Dr. Robert Pollitzer, internationally famed epidemiologist, provides state-of-the-art summaries of Russian literature.

Areas of prime significance that should be considered in designing information systems in an Army R&D economy, in the opinion of Mr. Beveridge, are 1) the response of the supply-demand cycle as related to user/producer, and 2) the development of operational mechanisms, e.g., organizational structures and equipment complexes to efficiently and effectively manage the information flow.

Experience has shown the need for 1) the further development of the information commodity concept, and 2) the requirement to organize science information centers with specialized competence in fields of intensive interest while maintaining machinable media exchange agreements with the developing nationwide networks.

Dr. William W. Dorrell, BioLabs' Director of Technical Services, including the Technical Information Division, commented:

"We in Tech Services realize the tremendous distance yet to go in providing optimum information services. It is my belief that the gradual and methodical introduction of new methods and techniques being introduced here is preferable to complete upheaval and installation of radical new systems.

"Further, I am greatly encouraged by the increased attention and recognition being given to technical information programs at all levels of Army and DoD management."

Dr. Riley D. Housewright, Scientific Director of BioLabs, stated that the present-day bench scientist cannot possibly keep up with information in his field and do research at the same time unless technical information service is improved.

Bench scientists at BioLabs, he believes, are fully appreciative of the great advantages to be offered by the new services and will make full use of the vast amount of resource material made available to them through the new retrieval system.

Gerald Beveridge, Chief of the Technical Information Division, explains operation of new UNIVAC computer to Dr. Riley D. Housewright, Scientific Director of the U.S. Army Biological Laboratories at Fort Detrick.

Detrick Scientists Broaden Junior Science Activities

Plans for broadened participation in junior science activities, to point to career opportunities in biological sciences, were discussed by Fort Detrick, Md., Army scientists at a recent meeting of the Maryland Branch of the American Society for Microbiology.

Dr. Philip S. Brachman, Chief, Investigations Unit, Epidemiology Branch of the Communicable Disease Center, Atlanta, Ga., was the guest lecturer on "The Epidemiology of Hospital-Acquired Infections."

Dr. Harold N. Glassman, Assistant Scientific Director, U.S. Army Biological Laboratories, is president of the Maryland Chapter. Committee members from Fort Detrick include Dr. James T. Duff, Dr. Richard D. Costlow, Dr. Sydney J. Silverman, Dr. Dudley P. Glick, Dr. Riley D. Housewright and Dr. Arthur N. Gorelick.

A list of Branch members will be provided to supervisors of Junior and Senior High School science programs for selection as qualified judges for science fairs. "A Career in Bacteriology" film will be made available to school science supervisors upon request for showing in Baltimore City and County Schools, the speakers will be provided for school assemblies.

Awards will be made annually to a high school investigator whose project within the field of microbiology is worthy of merit. Outstanding teachers of biological sciences will be selected annually for awards.

2 TRECOM Inventors Recognized by Awards

Gene C. Moen and Patrick J. Shea, former employees of the U.S. Army Transportation Research Command (USATRECOM), Fort Eustis, Va., recently received $100 cash incentive awards for patents on inventions.

Moen was given full rights and title for his patent with a free license to the Government. Shea's invention resulted from his assigned duties, giving patent rights to the Government. Both inventions were made while the men were with USATRECOM.

Moen patented a calculator for determining helicopter payloads. The circular slide rule type of device enables the pilot or crew chief to take known factors such as helicopter power, fuel and barometric pressure, and determine an accurately safe payload in 20 to 40 percent of the time formerly required.

Now employed with the Army Transportation Board at Fort Eustis, Shea received his patent on a cable connector device for use on an aerial tramway. Most tramways use continuous cables but at Fort Eustis the cables had to be in short lengths due to the problem of transportation, handling and storage.

Shea developed a cable connector which was strong enough, could be connected by relatively unskilled personnel, and was designed so that the cable car wheels could run smoothly over the joints.

Top right: Col N. A. Gage, Jr., Commanding Officer, USATRECOM, congratulates Gene C. Moen upon receipt of cash incentive award and commendation for calculator patent. Below: Patrick J. Shea displays commendation received along with cash award for his patent on cable connector.

RAC Announces 8 Additions to Professional Staff

The Research Analysis Corporation (RAC), an independent nonprofit organization engaged in military operations research and systems analysis, recently announced eight new members of the professional staff at Bethesda, Md.

DELBERT L. SCHROEDER, a graduate of the Georgetown University Foreign Service School and of the resident and correspondence courses at the Industrial College of the Armed Forces, joined the Logistics Simulation Division. He served most recently as a Navy Department civilian analyst at the Air Force Intelligence Center.

EDWARD RATTNER, assigned to the Economics and Costing Division, has authored or coauthored several technical papers involving economic concepts. He received a B.A. degree in economics from New York University, pursued graduate work at Columbia University, and attended George Washington University and the Case Institute of Technology.

JAMES BERCOS, assigned to the Operational Logistics Division, was formerly an operations research scientist in the Analysis and Evaluation Branch of the System Development Corp. He received a B.B.A. degree in economic statistics and an M.S. in financial statistics from the University of Georgia, a B.S. degree in mathematics from the University of Illinois, and pursued graduate studies at the University of Illinois and Columbia College.

JERRY A. ORR and Richard W. Parker, Jr., have been appointed to the Weapons Systems Division of RAC. Orr, a mechanical engineer, was formerly a senior research engineer at the Jet Propulsion Laboratory, California Institute of Technology. Parker, an aeronautical engineer, transferred to RAC from a position as aerosystems engineer with General Dynamics.

HOWARD C. OLSON, Roderick C. Dennehy and Harley H. McAdams, Jr., were appointed operations analysts in the Information and Control Division. Olson until recently was research associate to the senior scientist at the Fort Knox field office of the Human Resources Research Office. He received a B.S. degree in agricultural entomology from North Dakota State College, and is the author of publications on psychological and military manpower studies.

A graduate of the U.S. Naval Academy, Dennehy received his M.S. degree from the U.S. Naval Postgraduate School. Utnil recently retired from the U.S. Navy, he was military assistant to the Assistant Director of Defense Research and Engineering. He holds the Air Medal, the Commendation Ribbon, and the Navy Unit Citation.

McAdams received a B.S. degree in physics from Texas A&M and an M.S. from the University of Illinois. He was employed as a physicist at the U.S. Naval Ordnance Laboratories in 1959 and 1960 and in 1961 and 1962 held a National Institutes of Health fellowship in biophysics.

MoCom Scientist Assisting Junior Science Activities

One week in April was a busy time for an Army scientist deeply interested in promoting science education at the secondary school level.

"What Colors Do We Really See?" was discussed by Dr. Z. V. Harvalik at an Apr. 13 Frontiers of Science program held at Howard University, sponsored by the Washington Academy of Sciences and the Joint Board of Science Education.

Two days later he discussed and demonstrated glass blowing at the U.S. Army Junior Science and Humanities Symposium conducted at Georgetown University. On Apr. 20 he lectured at the Junior Science Symposium in Iowa City, Iowa.

Chief of the Basic Research Group, Engineering Research and Development Laboratories, U.S. Army Mobility Command, Fort Belvoir, Va., Dr. Harvalik is in demand for his lectures on a variety of scientific subjects.

Recently he served as chairman of the advisory committee which produced five films on basic research for secondary schools, under a National Science Foundation grant.

Army Nurse Corps Appoints New Chiefs

Lt Col Mildred I. Clark, Chief Nurse in the Surgeon's Office, Headquarters, Sixth U.S. Army, San Francisco, Calif., will assume a 4-year appointment as Chief of the Army Nurse Corps, effective in September.

Succeeding Col Margaret Harper, she will become the 12th Chief of the Corps, concurrent with her promotion to the rank of colonel. Graduated with a B.S. degree in nursing education from the University of Minnesota, she began her career in 1936 upon graduating from the Baker Sanitarium School of Nursing, Lumberton, N.C.

With the Army Nurse Corps, she has served in both professional and administrative positions, including Chief of the Nursing Service, General Headquarters, Far East Command; Chief Nurse of the 98th General Hospital; and director of the personnel procurement programs for Army Nurse Corps and Army Medical Specialist Corps officers in the Office of the Army Surgeon General.

Lt Col Anna Mae McCabe Hays, Nursing Supervisor, Walter Reed General Hospital, Washington, D.C., has been named Assistant Chief of the Army Nurse Corps. She succeeds Lt Col Harriet A. Dawley who has been assigned to U.S. Army Tripler General Hospital, Hawaii.

Completing her second decade in the Army Nurse Corps, Lt Col Hays served in the China-Burma-India theater of operations during World War II. She has returned to the Far East twice, serving in Korea and Japan during the Korean War and for 16 months in Korea prior to assignment to Walter Reed in 1960.

Metabolism of Iron Discussed at WRAIR Seminar

"The Absorption and Metabolism of Iron" was discussed at a recent staff seminar at the Walter Reed Army Institute of Research (WRAIR).

Col William H. Crosby, Chief, Department of Hematology and Director, Division of Medicine, made the leading presentation. He stated that for the past 25 years it has been accepted generally that there is no excretory mechanism for iron and therefore the iron balance in the body is controlled by limiting absorption. This concept is termed "mucosal block."

Several lines of evidence indicate that mucosal block is insufficient to explain the meticulous control which is maintained over the total amount of accumulated iron. Recent studies, he said, point to an excretory mechanism of limited capacity.

Although mucosal block plays an important part in rejecting available iron, the excretory mechanism behaves as a "fine tuning device" which prevents accumulation of iron escaping through the mucosal block.

Dr. Charles Roth, professor of medicine, Georgetown University Medical School and Director of Hematology and Blood Bank, Georgetown University Hospital, presided.

2 Belvoir Employees Invent 'Smogo' Device for Vehicles

A device called the "Smogo," designed to help eliminate air pollution from vehicle exhaust gases, has been invented by two employees of the U.S. Army Mobility Comand Engineer Research and Development Laboratories, Fort Belvoir, Va.

The device, a perforated cylinder containing two chemicals with a catalyst, can be inserted into the tail pipe or exhaust system of any internal combustion engine.

The inventors, Richard G. Robinson and William E. Avery, claim it will eliminate a high percentage of the hydrocarbons that pollute the air and contribute to smog problems in many sections of the country.

Employed in the Mechanical Engineering Branch of the Laboratories, Robinson said the model weighs one pound and can be used on passenger cars and light vehicles. A bigger device will be made for trucks and large vehicles.

Col J. H. Kerkering, commander of the Laboratories, presented Robinson and Avery, the latter an employee of the Evaluation Branch, with an initial cash award of $25 each for disclosure of their invention. They will be eligible for additional monetary awards if a patent application is granted.

ASTM Symposium Scheduled For Atlantic City, June 25

Chemical and physical effects of high energy radiation on inorganic substances will be discussed at a June 25 symposium programed for the annual meeting of the American Society for Testing and Materials in Atlantic City, N.J.

Dr. Eli S. Freeman, Chief, Pyrotechnics Basic Chemical Unit at the Army's Picatinny Arsenal, Dover, N.J., will serve as symposium chairman. With coworkers Clement Campbell and David A. Anderson, he will present a paper on "Radiation Induced Changes in the Chemical Reactivity of Ammonium Perchlorate and Magnesium."

Other Picatinny participants include Dr. V. R. Pai-Verneker and P. Marinkas, Explosives and Propellants Laboratory, who will present a paper on "Electron Spin Resonance of Radiation Induced Paramagnetic Centers in Hydrazoic Acid and Some Inorganic Azides."

Founded in 1898, the ASTM is a national technical society for the promotion of knowledge of the materials of engineering and the standardization of specifications and testing.

The society is preparing standard procedures for testing the chemical and physical properties of irradiated inorganic substances which it will publish as internationally recommended procedures.

1,000 Communications Experts Told Of Engineering Methods in Field

Harry F. Vincent, Project Director of the Directorate of Research and Development at Redstone Arsenal, Ala., recently discussed "Engineering Methods in Communication" at one of the largest gatherings of communications experts in the Nation.

He spoke on a Seminar workshop sponsored by the Technifax Corp., Apr. 23-25 in Holyoke, Mass., to consider topics in the visual communication field.

About 1,000 representatives from the Armed Services, Government agencies, private industrial concerns and 20 nations participated.

Vincent received a B.S. degree in electrical engineering from Washington University in St. Louis, Mo., and has been with the Directorate of Research and Development since 1951.

Harry F. Vincent

CRDL Veteran Ends Career Started in Mexican War

A military career that began with the Missouri National Guard in 1916 in the Mexican campaign against Pancho Villa, was interrupted by 25 years of business experience between three wars, and climaxed by eight years as a Federal Government employee, ended Apr. 27 for Arthur W. (Hap) Talbot.

Employed as Chief Administrative Officer of the U.S. Army Chemical Research and Development Laboratories, Edgewood Arsenal, Md., at the time of his retirement, Lt Col (USA, Ret.) Talbot had served in similar capacities during three tours at Edgewood while in uniform.

With General (Black Jack) Pershing in the Mexican War, Talbot rose from private to sergeant. In World War I he served in France with the 140th Infantry, 35th Division, where he came into contact with Capt Harry S. Truman, later President of the United States.

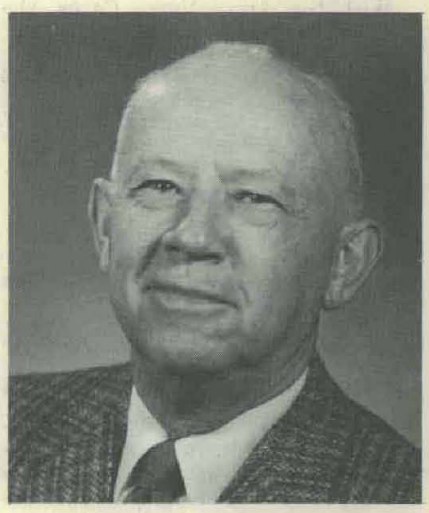
Lt Ralph Truman, Capt Truman's first cousin, was an officer in Talbot's machinegun company and in World War II, as Maj Gen Truman, commanded the 35th Division. He and "Hap" remained close friends until the general died recently.

Discharged from the Army in 1920, Talbot studied commercial law and business administration at Central College in Kansas City. For the next two decades he was president of Talbot-Woods Butter Co., Kansas City. Following World War II, he spent five years as sales manager for a uniform firm in Kansas City.

Granted a direct commission in the U.S. Army Chemical Corps in World War II, Capt Talbot served three years as Administrative Officer, Technical Command, Edgewood Arsenal.

By war's end he was a lieutenant colonel, the rank in which he was again recalled to active duty in the Korean War as Chief, Technical Services Division, Chemical and Radiological Laboratories at Edgewood. When discharged in 1955 he remained as a civilian employee in the R&D Laboratories.

Mr. Talbot and his wife Edie plan to move from their home in Bel Air, Md., to Fort Lauderdale, Fla., where they have a new waterfront home.



Arthur W. (Hap) Talbot

Tireless Employees Save Time-$ at Picatinny

Six workers at the Army's Picatinny Arsenal, Dover, N.J., are so fast their bosses have trouble keeping them busy. They obediently follow orders, never argue about instructions and are practically tireless.

The employees with these highly desirable qualities are six automated metalworking machines used to produce test components for the Arsenal's ammunition research activities. They complete one assignment almost before another can be given to them.

Among them are drilling machines, milling and turning lathes and boring and turning machines. Thousands of dollars and hundreds of man-hours are being saved because of them.

With the push of a button, one of Picatinny Arsenal's six automated metal-working machines operates through tape-fed electronic system.

The secret behind the machines' uncanny abilities is their electronic control system. They take their orders from a computer "boss." Instructions are punched on inch-wide paper tape, then fed into their "brains" or control systems. When the switch is thrown on, they go to work drilling, routing, milling, boring and grinding.

When the control systems can't understand the language of a certain computer boss, an "interpreter," another electronic machine, translates instructions into "machine talk."

Distinct advantages accrue to the Army and the taxpayer in that items are produced at a considerable savings over those made on manually operated equipment.

For instance, a 37 mm. cartridge case costs about $10.50 when machined on conventional equipment. Automated equipment lowers the price to about $2.79. Thus, the savings on a recent order for 20,000 cartridge cases should total over $154,000, with a corresponding saving in production time.

Since automated equipment leaves no room for human error, virtually no rejections are made because of machining mistakes.

Human operators on certain machines spent less than 30 percent of their time actually operating the equipment. The remainder of their time was spent laying out their work and making calculations while the expensive equipment was idle. Operation time is now up to 80 percent.

News Report Article Features Foreign Engineering Students

"Challenges to American Graduate Education Created by Foreign Engineering Students" is the featured article of a recent *News Report*, the bimonthly publication of the National Academy of Sciences-National Research Council.

Authored by Richard C. Jordan, Chairman, Division of Engineering and Industrial Research, the article graphically illustrates implications of a growing number of applications and admissions to American graduate engineering schools of students from every part of the globe.

The problems of providing the foreign student with his particular educational needs, and still maintaining a single standard of excellence represented by awarded degrees, is discussed. Considered also are the effects of properly meeting these problems as part of the greater area of future trends of the cold war.

APRO Commander Cited for Achievement in Japan

Col Charles S. Gersoni, commanding the U.S. Army Personnel Research Office, Washington, D.C., has been cited for distinguished service as commander, U.S. Army Research and Development Group, Japan, from May 1959 to July 1962.

Lt Gen Dwight E. Beach, Chief of the Office of Research and Development, presented him a Department of the Army Certificate of Achievement in mid-April.

The citation credited Col Gersoni with making his Japan office "an example of outstanding efficiency, setting a standard for overseas offices copied but never exceeded by other offices," and noted his success in establishing "friendly and productive relations with Japanese research scientists."

Col Charles S. Gersoni

A behavioral scientists with a Ph.D. degree in psychology, and a Diplomate of the American Board of Examiners in Psychology, he was able to establish a mutuality of interests with Japanese scientists which contributed to the success of Army R&D activities he initiated.

The United States Army Personnel Research Office (USAPRO) which he currently heads is doing human factors research in personnel measurement and personnel utilization. Since before World War II, it has been engaged in the tests and measurements field for the better selection and classification of personnel.

With the increasing complexity of Army operations and equipment in recent years, it has been concerned with systems research, investigating the relationship of human factors to man-machine compatibility, and environmental studies directed to improving individual and group performance.

On active duty with the Army since 1941, he has held a series of responsible positions as administrator of behavioral science activities. He was with the Office of the Surgeon General as Chief of the Psychology Branch from 1947-51 and Chief of the Human Resources Research Branch, Research and Development Division, from 1953 to 1957.

From 1957 to 1959 he was involved in physical standards and psychophysiological research at the Walter Reed Institute of Research. During this period he invented a "Biological Window for Internal Observation," recently given a Letters Patent by the U.S. Patent Office. (See November 1962 issue, page 8.)

Delmore Presented Award for Service in Vietnam

The Legion of Merit, approved by the President of the United States, was awarded in mid-April to Brig Gen Fred J. Delmore, for his work last year as technical adviser to the U.S. Military Assistance Command, Vietnam.

Maj Gen Floyd A. Hansen, Commanding General of the U.S. Army Munitions Command at Dover, N.J., presented the medal. General Delmore heads the Chemical-Biological-Radiological Agency at Edgewood, Md., an element of the Command.

The citation stated in part:

"General Delmore skillfully planned and supervised military operations conducted by the armed forces of the Republic of Vietnam. In this extremely difficult assignment he displayed rare foresight, initiative and professional competence.

"By his untiring personal effort, unique technical ability and persuasiveness, he successfully integrated the efforts of the U.S. Advisory Team and the armed forces of the Republic of Vietnam into a coordinated operation."

LEGION OF MERIT is presented to Brig Gen Fred J. Delmore, CG, CBR Agency, by Maj Gen Floyd A. Hansen, CG, U.S. Army Munitions Command.

Dr. Fisk Named Successor To Dr. Berry in DoD Post

Dr. Shirley Carter Fisk was recently appointed Deputy Assistant Secretary of Defense (Health and Medical), effective June 1, 1963. He will succeed Dr. Frank B. Berry who will remain in a consultant status.

Presently he is Associate Clinical Professor of Medicine at the College of Physicians and Surgeons and Associate Attending Physician at Presbyterian Hospital in New York. After receiving his B.A. degree at Yale University in 1931 and an M.D. degree from the College of Physicians and Surgeons, Columbia University in 1935, he served his internship and residency at Columbia Presbyterian Hospital in New York.

Commissioned a captain in the Army Medical Reserve in 1941, he served on the staff of the 23rd Station Hospital, an affiliate of Columbia Presbyterian General Hospital No. 2, from 1942 to 1945. His unit served in Leopoldville, Oran, Italy, Southern France and Germany at one of the hospitals in the Communications Zone behind the Seventh Army.

Dr. Fisk is a Diplomate of the American Board of Internal Medicine, a member of the New York County Medical Society, the New York Academy of Medicine, and the Century Association in New York.

Watertown Arsenal Seeks Materials to Meet Mobility Needs

Mobility requirements of the modern Army are being served effiectively by materials research and development at the U.S. Army Materials Research Agency, Watertown Arsenal, Watertown, Mass. Goal: Less weight, more payload.

Investigations into the high strength to density materials are probing the potential of numerous metals and nonferrous alloys and special processing techniques to enhance the natural characteristics.

Remote area warfare requirements and the necessity of keeping a modern army on wheels have placed a premium on equipment that is ruggedly dependable, highly maneuverable and transportable by air.

Mobility, however, is not confined to vehicles with respect to military materiel. Increasingly important is weight reduction in missiles, armament, cannons and a great number of items essential to frontline troops.

For example, decreasing the weight of missile components, such as the motor case and fore and aft closures, results in a proportionate increase in payload, either propellant or warhead.

Watertown Arsenal research in recent years has been directed toward obtaining materials with a strength to density ration in excess of one million inches. To achieve this objective, research is being conducted on ferrous, nonferrous, organic and inorganic nonmetallic materials.

Aluminum is a nonferrous metal which to date has been produced in mill products with strengths ranging up to 75,000 p.s.i. Research at Watertown Arsenal is pointed toward a mill product with a yield strength to density ratio of one and one-quarter million inches, a yield strength of 125,000 p.s.i., and a minimum elongation of two percent.

Because brittle materials are susceptible to rapid crack propagation, it has been found necessary to set minimum limits on ductility. Computer technology is being used in narrowing candidate compositions that would have yield strengths approaching 125,000 p.s.i.

A modification of a zinc-magnesium system was used to obtain experimental compositions. The method used for increasing strength was to precipitate and dispersion harden by use of elements exhibiting high liquid solubility and low solid solubility.

In experiments to date the best dispersoids have proved to be manganese, iron, nickel and chromium. Yield strengths of 110,000 p.s.i. have been produced on a laboratory scale. Yield strength to density ratio of slightly over one million inches has been achieved.

Titanium is another nonferrous material being studied intensively, and yield strengths in the order of 180,000 p.s.i. are attainable for a number of titanium alloys. Development of an alpha-beta type of titanium with a yield strength in excess of 200,000 p.s.i. is an objective.

Experiments with various alloys to determine their properties produced yield strengths as high as 240,000 p.s.i. However, elongation, reduction of area and impact values were below minimum requirements.

Further research is being carried on to vary elements such as aluminum and oxygen in an effort to improve ductility and toughness of the alloy. Researchers report there is "every indication" that a titanium alloy will be developed which will increase significantly the strength to density ratio over the currently available alloys.

Missile case materials are receiving considerable attention at Watertown Arsenal. To increase strength to density ratio, one fabricator is cyrogenically stretch-forming ultra-high-strength rocket cases.

In the process he is developing, pressure vessels made of 301 stainless steel by conventional roll and weld techniques are stretched to final size and shape by internal pressurization with liquid nitrogen at a temperature 320 degrees below zero F.

Maximum nominal ultimate strength of 284,000 p.s.i. at room temperature was achieved in one missile case. In others, a strength level of 260,000 p.s.i. was readily achieved. Strength to density ratio in these cases approached the desired level of one million inches.

Being scaled-up to provide full-size missile cases for static and flight testing, the process also provides close dimensional control of cylindrical cases by stretch-forming in a die.

Further development of lightweight motor cases consists of producing monolithic cases by deep-draw methods, including blanking, pancaking, hot cupping, six cold draws and heading.

Various alloys have been processed into cases. Among these are Ladish D6AC, Titanium B12OVCA, Tricent steel, and 18 and 20 percent nickel steels. Several cases fabricated of Tricent steel have been hydrotested.

Data from the test program indicate that a yield strength of 290,000 p.s.i. was achieved with the Tricent steel material, and that a strength to density ration approached the desired one million inches. Further scale-up of the process to produce full-size

PROPERTIES OF SOME PRESENTLY AVAILABLE STRUCTURAL MATERIALS

	Glass Fiber–Resin Filament Wound	Steel	Titanium
Density(lb./in^3)	0.075 0.080	0.285	0.163
T.Y.S., psi	250,000 (Undirectional) 225,000	220,000	150,000
Strength/Density in. x 10^4	193 160	78	92
Modulus of Elasticity, psi x 10^6	5 8.5	30	16

Strength Levels of Currently Available and Experimental Filament Wound Composites

Pershing cases is in progress.

Filament winding to attain specific qualities of materials is a technique receiving considerable attention by Army researchers. Filament-wound recoilless rifles, air frame structures and various other components are under study.

Commercial E glass is the type of filament generally employed in the process. It has a tensile strength of 300,000 p.s.i. and values of strength to density ration are in excess of them is insurmountable.

The Army is conducting a feasibility study of the applicability of filament winding to the Pershing missiles. Although a number of problems are associated with the process, researchers believe that none of them is insurmountable.

Motor case preform (left) shown with cryogenically stretched case.

Railroad Car Serving at WSMR as Lab-Classroom

A railroad car converted to provide two laboratories will be used at White Sands (N. Mex.) Missile Range to teach military and civilian personnel the latest developments in electronics, transistors and infrared.

Classes will be open to personnel with jobs in the related fields, said W. E. Sharfenberg of Employee Development Branch, Civilian Personnel Office.

Two instructors are from Frankford Arsenal, Philadelphia, Pa., where the railroad car was equipped. WSMR will be the first to use the railroad classroom. After several months it will be moved to its next assignment.

Courses offered will be in electronics, basic and advanced transistors, and basic and advanced infrared. Many requests have been received from both military and civilian personnel for the courses, offered at no cost to WSMR except cost of transporting the car from the Frankford Arsenal.

The classroom and laboratories in a railroad car save on the cost of providing facilities wherever the instruction team is assigned. Problems are cut to a minimum since the mobile training unit is self-contained and can be transported easily across country with a minimum of packaging and transportation problems.

The only problem in bringing the car from the railhead to WSMR was that a short set of tracks had to be laid for it to reach its location.

Col E. W. Niles, Chief of White Sands Missile Range post engineers, drives last spike to hold tracks for railroad classroom. Also participating in the ceremony are John Owen (left), S. R. Norvell from post engineers, and Roy Autry, Chief of the White Sands Missile Range Civilian Personnel Office.

Watervliet Arsenal Plans Sesquicentennial Program

Watervliet Arsenal, the U.S. Army's upstate New York cannon design center, will celebrate the 150th anniversary of its founding June 15 with a Sesquicentennial Open House.

The Arsenal on the Hudson River just above Albany is arranging the open house to climax a week-long observance marked by an employees picnic and a Recognition Day when two Arsenal buildings will be memorialized in honor of past commanding officers. Lt Gen Frank S. Besson, Commanding General of AMC will be the guest of honor at a banquet.

Col Keith T. O'Keefe, Arsenal commanding officer, said the open house will provide opportunity to observe actual weapons design and manufacturing operations. Visitors may also inspect many special displays of weapons and military equipment imported for the occasion.

A special feature of Sesquicentennial Year will be a display of documents, weapons and military materiel linked to the Arsenal's service to the fighting men of seven wars.

Program events will include a "dry run" exhibition by an Army Nike-Hercules unit, firing demonstrations by North-South skirmish groups, and displays of equipment provided by industry and the Armed Forces.

Established in 1813 as a munitions depot for troops fighting the War of 1812, Watervliet soon became a manufacturing arsenal, producing materiel ranging from cartridge boxes to gun carriages. In 1883, by Act of Congress, it was designated the "Army Gun Factory."

Since then as the Army's "cannon headquarters," Watervliet has designed and developed such notable weapons as the first 16-inch gun, the "Long Tom" of World War II, and the Army's first atomic weapon, the 280 mm. cannon.

Watervliet's mission was reaffirmed and enlarged in 1962 when it became a unit of the Army Weapons Command, and was given "concept to hardware" responsibility for all cannon, mortars and recoilless rifles.

Today the Arsenal's 3,200 employees are engaged in research, engineering, design and prototype production activity encompassing the spectrum of orthodox armament from the 35-pound 90 mm. recoilless rifle to the 175 mm. gun, the Army's largest conventional weapon.

R&D Leaders Pay Tribute to HumRRO at Dedication

Formal dedication Apr. 10 of the new home of the Human Resources Research Office at 300 N. Washington Street, Alexandria, Va., provided the setting for Assistant Secretary of the Army (R&D) Dr. Finn J. Larsen and other military dignitaries to pay tribute to HumRRO achievements.

Chief of Research and Development Lt Gen Dwight E. Beach, Maj Gen R. J. Meyer, Deputy Chief of Staff for Individual Training for the U.S. Continental Army Command, and Director of Army Research Maj Gen C. W. Clark were among military leaders who joined in the ceremonies.

HumRRO Director Dr. Meredith P. Crawford made the introductory remarks and Dr. Thomas Carroll, President of George Washington University, welcomed guests on behalf of the University. HumRRO had been located on the University campus since it was founded in 1951.

Among the many distinguished guests was Dr. Leonard Carmichael, Director of the Smithsonian Institution of Washington, D.C. Col Jack M. Duncan, Chief of the Human Factors and Operations Research Division, U.S. Army Research Office, headed the representatives of Army human factors research activities.

HumRRO functions as an Army contract agency in research and analysis associated with personnel training problems, methods of utilizing Army personnel for maximum effectiveness, and the design of military materiel with due consideration to man-machine compatibility requirements. Although physically relocated, it continues to function as an element of George Washington University.

(For a picture of the new HumRRO building, see June 1962 issue, p. 12.)

Bids Call for Construction Of Redstone Propellant Plant

Construction of a rocket propellant mixer facility at Redstone Arsenal, Ala., is planned for use by the Rohm and Haas Chemical Co. in contract work for the Army Missile Command.

Specifications in a call for bids require clearing and grading an acre of land; building a bunker-type earth-mounded reinforced concrete structure, with a specially designed blow-out wall; erecting a small prefabricated metal utility building; constructing an asphalt access road and apron; providing utilities including water, steam and air; electrical work; and grassing and fencing.

USAERDL Men Present Paper On 'Basic Rare Earth Azides'

Two employees at the U.S. Army Mobility Command's Engineer Research and Development Laboratories, Fort Belvoir, coauthored a technical paper presented at the Third Rare Earth Conference.

Hyman Rosenwasser gave the paper, "Basic Rare Earth Azides," at the Apr. 21-24 Conference in Clearwater, Fla. Dr. James L. Bryant was coauthor. They are scientists in the Basic Research Group.

Infrared Device Procured To Serve Troops at Night

A transistorized, battery-powered version of the metascope, an infrared device to aid troops in night operations, has been introduced into the U.S. Army supply system.

Developed by the U.S. Army Mobility Command's Engineer Research and Development Laboratories, the smaller, lighter monocular viewer is equipped with an image converter tube to convert near infrared radiation into visible light.

Used principally to detect enemy infrared sources, the device also has its own infrared source, enabling troops to read maps and road signs in the dark. The earlier metascope employed a hand-cranked generator.

The new model features an adjustable optical system. When not in use, it is carried in a case suitable for attachment to the standard pistol or rifle belt. With carrying case it weighs about three pounds.

Thirty-four hundred units have been purchased under the first procurement contract held by Varo, Inc.

Infrared viewer developed by USAERDL enables troops to see at night.

SCIENTIFIC CALENDAR

International Conference on the Operating Experience and Future Development of Power Reactors and Radioisotopes, Montreal, Canada, May 27-29.

17th Annual Frequency Control Symposium, Atlantic City, N.J., May 27-29.

Meeting of Experts on Antarctic Communications, Washington, D.C., May (date undetermined).

International Conference on the Sub-Cellular Radiobiology, San Francisco, May (date undetermined).

8th Nuclear Congress, N.Y.C., May (date undetermined).

International Union of Testing and Research Laboratories for Materials and Structures, Palermo, Italy, May, June or Sept. (date undetermined).

International Society of Soil Science, Commission I, 2nd Soil Structure Working Party Meeting, Paris, France, spring (date undetermined).

International Geographical Union, Commission on Periglacial Morphology, Madison, Wis., spring (date undetermined).

1st European Symposium on Vacuum Engineering, Frankfurt am Main, Germany, June 5-6.

1st Annual Seminar in Documentation Research, Bangalore, India, June 5-10.

Symposium on Exploration of Mars, sponsored by NASA, American Astronomical Society and the American Institute of Biological Sciences, June 6-7.

3rd Technical Conference on Hurricanes and Tropical Meteorology, Mexico, D.F., June 6-12.

Symposium on Motor and Premotor Areas, Atlantic City, N.J., June 10-12.

Theory and Analysis in Function Spaces, sponsored by AFOSR and MIT, Cambridge, Mass., June 10114.

18th Symposium on Molecular Structure and Spectroscopy, Columbus, Ohio, June 10-14.

Symposium on Alumnium in Structural Engineering, London, England, June 11-12.

International Plastics Exhibition and Convention, London, England, June 12-22.

International Conference on State of Stress in the Earth's Crust, Santa Monica, Calif., June 13-14.

Great Lakes Navy R&D Clinic, Columbus, Ohio, June 13-15.

COINS Symposium, Learning, Adaptation and Control in Information Systems, Evanston, Ill., June 17-18.

8th International Congress on Nuclear Energy, Rome, Italy, June 17-23.

12th International Astrophysical Symposium, Liege, Belgium, June 24-26.

International Conference on Nuclear Structure, sponsored by AFOSR, AEC, ONR and NSF, Stanford, Calif., June 24-27.

Dynamic Loads Problems Associated with Helicopter and V/STOL Aircraft, Buffalo, N.Y., spring or summer (date undetermined).

Structure and Functions in Macromolecules, sponsored by AFOSR and Long Island Biological Association, Cold Spring Harbor, N.Y., date undetermined.

Summer Seminar on Space Mathematics, sponsored by AFOSR, NSF, ARO, ONR, AEC and NASA, Ithaca, N.Y., July 1-Aug. 9.

6th International Symposium on Free Radicals, sponsored by AFOSR and the University of Cambridge, Cambridge, England, July 2-5.

Symposium on Quality Control in Metal Finishing, London, England, July 3-4.

Round Table on the Fluid Dynamic Aspects of Space Flight and Their Representation on the Ground, sponsored by NATO and Advisory Group for Aeronautical R&D, Athens, Greece, July 8-9.

Unimolecular Reactions in the Mass Spectrometer and Related Topics, Salt Lake City, Utah, July 8-10.

Pershing Launch Chief's Life Like '3-Ring Circus'

Under the best of conditions, life at the Atlantic Missile Range, is something like a 3-ring circus—spectacular, gaudy, exciting and demanding.

For the modest man from Redstone Arsenal, Ala., who directs firing operations of the Army's Pershing ballistic missile system, it is a job of manifold decisions. James F. (Jim) Conner is Chief of Pershing Firing Operations, Army Missile Command.

Although assigned to Redstone Arsenal, Conner directs a sweeping activity at the gantry-studded first wonder of the missile world—Cape Canaveral, Fla. Largely as a result of his detailed prelaunch checkout, the Pershing has a success record unsurpassed at the Range or any other known launch site in the Free World.

Development firings at the Cape were climaxed with the last of four production missile service tests on Apr. 24. Subsequent firings will be conducted on a reduced scale.

Conner's day is apt to begin calmly enough with a leisurely stroll to his field activity office. It may climax with a whirlwind of calculations, evaluations—and ultimately the decision of whether or not everything is "go" for another Pershing launch.

Behind his instrument-laden console at the Army's launch Complex 30, he controls firing operations. Broadly speaking, he has technical direction of the Pershing test program.

As the countdown nears that "press the button" time, he monitors input from three information sources—firing squad personnel, the Superintendent of Range Operations, and of course, the weatherman.

A multitude of decisions is involved in evaluating facts from these informative sources. Hazy weather, for example, has blinded one of the many down-range tracking cameras since the countdown began. Informed by radio, Conner's job is to determine if that particular camera is in a critical position to plot the flight or descent of the inertially guided missile.

PERSHING TEST PLANNER James F. Conner and Lt Col Melvin Clark, Chief of Atlantic Missile Range Army Field Office, direct firing operations from Army's Pershing launch pad blockhouse at Cape Canaveral, Fla.

Three alternatives are launch, hold and hope the weather lifts, or scrub the shot altogether and reschedule it at a later date. Sometimes he has minutes but frequently he has only seconds to decide.

While Conner has several advisors standing at his side aiding him in the evaluation of information, it is sometimes a pretty fast transition from "go" to "hold."

But the Georgia Institute of Technology graduate is no newcomer to transitions. He formerly worked for the U.S. Navy in underwater mine countermeasures — and shifted to Army missiles in July 1960.

From Complex 30 blockhouse, Conner races back to his Army Operations Building and writes reports on success for transmittal to the Pershing Project Manager's Office.

"It's usually 3 or 4 a.m. by the time we finish our work here at the Cape on a shot night," he said.

But Conner's work begins long before he gives the "go" signal to fire the missile. He performs an exacting preflight checkout of the missile's components soon after it arrives at Cape Canaveral from the Martin plant in Orlando.

Conner's checkout procedure has been widely recognized as one of the most efficient in the missile business. His recommendations are frequently incorporated into the Martin Co. production lines.

While working for the Navy, Conner was with the Mine Defense Laboratory at Panama City, Fla., and has worked for the U.S. Army Security Agency in Washington, D.C., as a design engineer in electronics.

'Dodo Bird' Tries Missiles for Size at Redstone

The U.S. Army Missile Command at Redstone Arsenal, Ala., uses a variety of planes in its hemispherical operations, and one of the most important is a "dodo bird" that hasn't been off the ground since 1956.

The C-124 Globemaster looks from the outside as if ready to take to the air like any other C-124, but it stays a half-mile from a runway and its insides have had more surgery than a medical school dummy.

Missile engineers with a goal of designing nearly everything from radars to missile systems for air transportability use the aircraft for loading tests.

In time its cavernous hull has been jammed with Jupiters, Redstones, Sergeants, Pershings and pretty soon a Lance, tracked vehicle and all, will be rolled through its gaping doors.

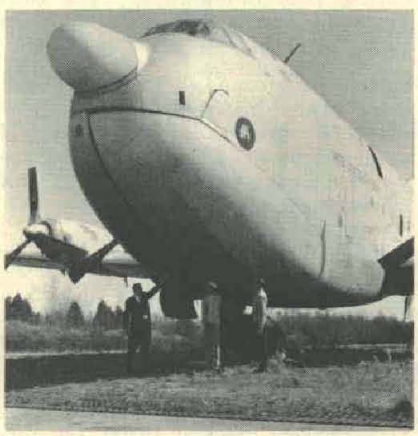
The Jupiter C that put the Free World's first satellite in orbit may have been tried for size in the plane before it went to Cape Canaveral.

Obtained from the Air Force, which built it as an experimental model, it has four turbo-prop engines which makes it unique among C-124s. Much of the flight equipment was removed and put to use by R&D laboratories.

When missile builders at Redstone Arsenal want to get an idea of how their systems would fit in a smaller plane, they just build temporary partitions inside the C-124.

William Watson, Chief of the Research and Development Directorate's Ground Support Equipment Laboratory which stuffs and unstuffs the plane, estimates a ground-built mock-up for loading purposes would probably cost $100,000.

The value of the plane, however, because of its age and nonflight condition, is recorded on property books as "less than $200."



C-124 Globemaster at the U.S. Army Missile Command looks skyward, but hasn't been off the ground since 1956. The plane is used at Redstone Arsenal by missile engineers seeking to make products air-transportable.

EM Calls Himself 'Luckiest Ever'

Soldier Engineer Assigned to Pershing Missile Duty

Sp/4 David Derry enjoys being the only U.S. Army enlisted man on extended temporary duty at the Pershing Firing Operations Headquarters, Cape Canaveral, Fla.

Since July 1962 he has served at the Cape, where the Army's powerful 2-stage ballistic missile is now in late stages of development. He considers his job "about the luckiest assignment any soldier ever had."

Although assigned to the U.S. Army Missile Command, Redstone Arsenal, Ala., he is detailed to Central Control at the Cape. There he watches the Pershing on tests along the Atlantic Missile Range.

Like many others in the missile-minded Cape Canaveral area, Derry spends many of his nights gazing into the sky — watching missiles streak along on a pillar of flames.

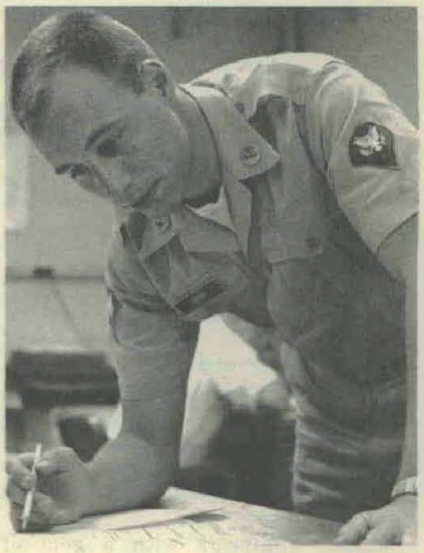
The crew-cut Iowan is charged with writing post-firing reports and ramrodding them through military-contractor channels in the required time. Reports containing a staggering amount of technical data generally are filed within a few hours.

Often on firing nights Derry works in the launch pad blockhouse, giving official visitors a play-by-play description of the intricate firing process.

While that's an oversimplification of Derry's job, he's a stickler for detail—a trait common to Pershing's crew, and one which accounts, in part, for the missile's remarkable record of being the most successful ever fired from Cape Canaveral.

In a more technical sense, Derry is concerned with the acquisition, reduction, evaluation and dissemination of flight test, environmental and other data evolving from a missile firing.

The Iowa State University graduate received his bachelor of science degree in industrial engineering after graduating from Graceland College in his home town of Lamoni, Iowa.



Sp/4 David Derry

From Dams to Missiles Career Followed by Soldier

Pfc Herbert Wise used to build dams for the Army when he was a civilian. Now he "shoots the stars" to tell where Army missiles are going.

Wise is one of the many soldiers whose civilian occupations have been given a strange twist to make them useful in a missile-age Army. He works in the Army Missile Command's Directorate of Research and Development Test and Evaluation Laboratory at Redstone Arsenal, Ala.

The Waynesburg, Pa., civil engineer has a considerable knowledge of precise measuring devices such as the transit and theodolite. A theodolite is an optical instrument which can "practically measure the distance between a man's eyes a mile away."

Wise shoots the stars to establish an exact reference line for missile flights. In drawing this line down a missile range, the most stable thing to get a bead on is one of the heavenly bodies that is so regular you can set your watch by it.

Not every star will do. He usually uses Polaris — the so-called North Star. By measuring how far the missile veers from the reference line, engineers can determine accuracy of the missile's guidance system. If the system were perfect, the missile would never leave the line.

The theodolite may allow lines to be cut off two inches in three miles, but he takes several shots of the star and averages them. Polaris is only in the best position for shooting during two 12-minute periods each 24 hours and he can only take his sights at night.

Measuring a missile's flight against a reference line gets even trickier when the missile is tied down and never leaves the ground. In this case you don't measure where it went, but where it might have gone.

Why worry where missiles go that never leave the ground? Because the guidance instruments put aboard a missile are so delicate that they detect the rotation of the earth and think the missile is veering off course.

The guidance system corrects for this apparent error by tilting the missile. The reference line which Wise lays down is used to determine how much correction the system made.

Wise worked for the Corps of Engineers before entering the Army.

Pfc Herbert Wise

Battelle Publication Stresses Improved Management of R&D

"Where Are We Now in Research and Development?" is the title of a brief discussion published by Battelle Memorial Institute, Columbus, Ohio, in a new folder offered to business, industry and interested agencies.

The premise is that as research and development increase in importance in corporate finance and planning, more effective financial management is needed to insure that the R&D dollar achieves the maximum in productivity. New concepts must be applied, the publication contends, to attain efficient use of manpower and facilities.

Copies of the statement are available from Battelle Memorial Institute, 505 King Ave., Columbus 1, Ohio.

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practicable cost. This is the Army's predominant responsibility. Nevertheless, the same clause of the Constitution also empowers the Federal Govment to promote the general welfare. If national policy seeks to achieve defense, with some regard to welfare goals, thru DoD spending, there are no constitutional barriers to this. The joint consideration of the common defense and general welfare clauses evolves into the broader concept of national security, which is more comprehensive and ultimately more realistic than defense alone. The statutory safeguards established by Congress for small businesses are an example of this.

The Army however concentrates, in its R&D job, on national defense. What indirectly spins off into the civilian economy and advances the general welfare is also of interest, but can only be of secondary importance to the Army. Perhaps the Administration's Civilian Industrial Technology Program, under the Department of Commerce, will help to redress any imbalance between defense spending and the expected spinoff to the civilian economy.

Regardless of skepticism, the phenomenon of spinoff, fallout, spillover, transference—or whatever you term it—of military R&D to the civilian economy is real! Business firms often do select defense R&D projects with an eye to potential spinoff. Hence, it is relevant to industry planning. While the second session will be more concerned with these points, I would like to touch on how the Army's R&D effort has incidentally or inadvertently spawned many civilian benefits.

In 1798 Eli Whitney, discouraged by experience with the cotton gin, accepted a contract with the U.S. Govment to develop a system of manufacturing interchangeable parts for the production of firearms by Army arsenals. The results of this work were fundamental to the developing industrial revolution. Eli Whitney did keep his cotton-pickin' Yankee hands off the gin long enough finally to finish his Army contract and thus contribute to the development of the mass production concept.

These civilian benefits would have come sooner or later, of course, but they came *sooner* because of an Army need and direct Army support.

Throughout the last 160 years of American history, many civilian products and techniques have likewise resulted in the form and the time they did from military needs and funding. You are probably aware of many contributions Army R&D has made to all the sciences—the life, environmental, physical and social sciences—and the ultimate applications of these to society at large. Some Army firsts are less well known, such as the aerosol which dispenses your shave cream, or the anti-icer you spray on your car's windshield,—even Metrecal.

A "first" I want to tell you about is the electronic digital computer which scientists now wonder how they ever got along without. As is so true of the many firsts along the road of scientific and technological progress, the stimulus that produced and sustained the crucial effort was provided by the extraordinary demands of war. The problems of war are seldom essentially new problems. What is different in wartime is the concentrated marshaling of available talent —both Government and private—to meet old challenges that have come to assume life or death proportions.

Such an old challenge was the omni-present Army problem of the computation of firing and bombing tables for the Artillery and the Air Corps. This job had been the responsibility of a handful of skilled civilians at the Ballistic Research Laboratory at Aberdeen Proving Ground, Md. The job was then time-consuming and undoubtedly would become immense in the event of America's involvement in war with the Axis powers.

Many avenue of potential improvement were explored from 1940 on, but the first positive step was taken in 1942, with the proposal of a contract to the Moore School of Electrical Engineering of the University of Pennsylvania.

The original $61,700 contract called for six months of "research and development of an electronic numerical integrator and computer," which coined the acronym of the final products, ENIAC. The original contract called for a report only, but nine supplementary contracts and a grand total of $486,804.22 produced a working pilot model of an electronic digital computer by 1946.

By today's standards for electronic computers the ENIAC was an awkward monster. Its 30 separate units, plus power supply and forced-air cooling, weighed over 30 tons. Its 19,000 vacuum tubes, 1,500 relays, and hundreds of thousands of resistors, capacitors, and inductors consumed almost 200 kilowatts.

But ENIAC was the prototype from which most other modern computers evolved. The Army's original $400,000 plus investment has had a pay-off to the civilian economy so large that one would need a modern high speed computer to calculate it. We do know

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By Ralph G. H. Siu

SMOKING AND PRAYING. There seems to be a goodly number of surveys checking into the "health" of our in-house laboratories—often with volatile and inconsistent findings.

In this connection my Master reminded me of the story of the two priests arguing whether it was proper to smoke and to pray at the same time. To settle the disagreement they decided to write the Archbishop. Two weeks later they met again, each claiming support from the same high authority. After some perplexity, one finally asked the other, "What *did* you ask the Archbishop?"

The second priest replied, "I asked whether it was proper to smoke while praying; and the Archbishop answered, 'Certainly not, praying is a holy affair and tolerates no frivolous distractions.' And what did *you* ask?"

"Well," said the other, "I asked whether it was proper to pray while smoking, and the Archbishop answered, 'Certainly, prayer is always in order.' "

BETTING ODDS. The continued funding of an unproductive laboratory reminds my Master, so he admonishes me, of the gambler who keeps returning to the same joint saying, "I know the game is crooked but it's the only one in town."

GRASSHOPPERS UNDER A FERN. After analyzing an extensive survey that had been made some years ago, a group of us had a difficult time ascertaining the morale of the laboratories involved. The report had not accurately weighed the origin of the complaints. Edmund Burke in *Reflections on the Revolution in France, 1790* commented on the danger of such an omission some years ago as follows:

Because half-a-dozen grasshoppers under a fern make the field ring with importunate chink, whilst thousands of great cattle, reposed beneath the shadow of the British oak, chew the cud and are silent, pray do not imagine that those who make the noise are the only inhabitants of the field; that of course there are many in number; or that, after all, they are other than the little shrivelled, meagre, hopping, though loud and troublesome insects of the hour.

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that the present computer industry is a direct descendant of Army-sponsored research and we are proud of this. Parts of the original ENIAC were placed in the Smithsonian recently, to commemorate the Army's electronic marvel that became, thanks to the genius of our public-private partnership in research, an antique in 15 short years.

In a similar manner, the Army has made significant contributions to educational progress in the U.S. The U.S. Military Academy was the first and for many years, was the *only* engineering school in the country. The story of its many graduates who became professors and presidents of our universities is a most interesting one. In modern times, many Ph.D's wrote their dissertations on Army sponsored research projects, and countless former soldiers are now working in private industry at the skills they learned in the Army.

This, too, is spin-off! Certainly, these spin-offs are good. It would be of great help to industrial planners if there were some way to pinpoint future ones. You may have some ideas on this, even though the process may bear resemblance to scheduling breakthroughs in basic research.

We agree that your planners must know as much as feasible about our future requirements. The problem is —How do we do this? Let's look at the anatomy of the Army's planning process in this over-simplified way: it includes stated Army objectives, plans to meet the objectives, and programs to implement the plans.

Army objectives are derived from total defense objectives, which were derived in turn from the broad national objectives as declared by the President: "To develop the military strength which this Nation requires as a solid foundation for its foreign policy."

The Army process is basically uncomplicated: We plan some 20 years ahead to meet Army objectives, then launch 5-year programs in accord with our available resources. The annual budget is the actual manifestation of the program—a tiny arc of a much larger one.

All the documents involved in the Army planning process are of a classified nature, except the budget. I'm pleased to inform you industrialists that no security clearance or a need-to-know is required for that latter bit of information, since clearances have never been required for your enrollment in the U.S. Tax-Corps.

Seriously, the security consideration, which some critics have charged is a ruse to keep an "in" group in and the "out" group out, is not being perverted. Yet security could conceivably be distorted in such a way. The Army is really forced into a dilemma here. Surely, we cannot tell all to everyone. Neither should the Army tell all to only a few in industry, nor tell only a little to every large and small business.

We must find what our clever staff members call a "minimax solution" to this common planning problem between the requirements of the military and the needs of industry. Again we invite your suggestions on how you would like to see this serious communications gap closed.

Let's look more closely at the various levels at which we could give your information that would help your planning and at the inherent advantages and disadvantages these have. I mentioned three levels: objectives—broadest; plans—more detailed; programs—most detailed.

Broadly stated, the Army's uncompromising objective in any conflict is to impose our will on the enemy and stand unharmed in his presence. This is obviously too broad for any planning purposes—either industry's or the Army's. But this broad goal can be broken down to specific objectives, such as this paraphrased objective: "Banish enemy tanks from the battlefield by 1980."

Perhaps this is pretty broad, but the advantage of *not* specifying how the Army would plan to achieve this, or any other specific objective, is a maximization of creative ideas from industry. The disadvantage is that the objective is so overwhelmingly broad that few companies would care to cope with it. It's like saying, "All we want is everything." And this, of course, gives us nothing.

Since objectives stated broadly, or even specifically, may prove useless to your planners, the plans of the Army on how to meet the objective could be of more value. In the plan we break down the objective into related pieces that can be meaningfully communicated.

In dealing with the tank problem, for example, the pieces are detection and attack. Let us say that our plan envisions detection devices accurate out to 5,000 meters, able to penetrate all masks or decoys, secure against countermeasures, under all conditions of visibility, day or night. After finding the enemy tank, we must attack and render it ineffective, within two minutes, 99 percent of the time.

Naturally, there are competing possible approaches to each aspect of the plan. These are time-phased according to achieved or anticipated advances in the state-of-the-art. For example, by 1968 we may have foolproof detection capability out to 1,000 meters with the use of improved radar. We could decide at this point to push this approach or hold off till 1971 to wait for developments, as predicted by our technological forecasts, in infra red, ultra violet, gravity, laser, or other phenomena. Then in 1972 we decide to go along with one approach and discard the others. This choice gives us our program for the next five years.

The advantage of giving industry detailed plans is that the problem is broken down into wieldly segments. More firms, large and small, can become interested and get into the picture. We have more ideas and selectivity from proponent contractors.

The great disadvantage, however, is that industry then adheres too closely to what the Army has planned, thus inhibiting other approaches. We figuratively paint the contractor into a corner. It would not do to channel thoughts too narrowly or to bridle

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Stochastic Models Parley Slated for June at MRC

Leading mathematicians and scientists from the United States and Europe will speak at the Symposium on Stochastic Models in Medicine and Biology, June 12-14, at the University of Wisconsin.

Sponsored by the U.S. Army Mathematics Research Center, the meeting will present stochastic models as conceived and developed relative to a variety of investigations. An opportunity for comparisons and discussions will be directed toward a recognition of potential for further work.

The theory of stochastic processes and the development of stochastic biological models in recent years have given great impetus to certain areas of research in medicine and biology. Mathematicians agree generally that such models can be useful aids to prediction and as guides to investigation in diverse theoretical studies.

Among 15 prominent professors who will speak are Norbert Wiener, Massachusetts Institute of Technology; H. Cramer, University of Stockholm; Jerzy Neyman, University of California; J. O. Irwin, London School of Hygiene and Tropical Medicine; and N. Arley, Norsk Hydro's Institute for Cancer Research, Norway.

The Symposium will be followed by a Central Region meeting of the Institute of Mathematical Statistics.

Requests for a Symposium program and all inquiries should be addressed to Prof. John Gurland, Mathematics Research Center, U.S. Army, University of Wisconsin, Madison, Wisc.

Kudos

Two Army Missile Command scientists at Redstone Arsenal, Ala., recently were awarded Certificates of Achievement, one for R&D, the second for public service.

William F. Otto, an electronic engineer in the Missile Command Electromagnetics Laboratory, R&D Directorate, was cited for establishing the feasibility of automatic command guidance for infantry type antitank weapons. His development has been forwarded for consideration for an Army R&D Achievement Award.

Horace R. Lowers was nominated for the Rockefeller Public Service Award. As Chief Engineer for the Army Missile Command, he advised the commanding general in developing programs of outstanding difficulty, responsibility and national significance in the missile and rocket fields.

Employees of the U.S. Army Engineer Geodesy, Intelligence and Mapping Research and Development Agency, Fort Belvoir, Va., who received awards recently include Sharon L. Barnett, Photogrammetry Division, $150 for Outstanding and Sustained Superior Performance; Q. C. DeAngelis and Abraham Anson, each $100 Special Act and Service Award, in recognition of articles published in *Photogrammetric Engineering* magazine titled "Dual Aircraft Mapping System," and "An Automatic Mosaicking System."

Outstanding ratings were awarded to Edward R. DeMeter and Robert E. Dudley, Photogrammetry Division; Robbins G. Hickson, Chief of the Tactical Systems Office; Charles R. Manor, Assistant Chief of the Surveying and Geodesy Division; and B. J. Bodnar, Assistant Chief of the Research and Analysis Division.

Honors accorded employees of the Engineer Research and Development Laboratories, U.S. Army Mobility Command, Fort Belvoir, Va., include:

Outstanding ratings and Sustained Superior performance awards—Mrs. Dorothy Wilson, Office of the Technical Director, $150; Roland E. Rodgers, Supply and Property Accounting Branch, $150; Albert A. Chabert, Chief of the Facilities Planning and Maintenance Branch, $250; Cleveland P. Deane, Engineering Services Branch, $200; James I. Boyer, Equipment Maintenance Branch, $200; Charles A. Edelman, supervisory mechanical engineer in the Heating and Air Conditioning Branch, $250; and Edward P. Leland, Demolitions and Fortifications Branch, $250.

Sustained Superior Performance awards — James J. Kenney, Supply and Property Accounting Branch, $150; Mrs. Helen N. Thomas, Office of the Director of Engineering, $150; Chester W. Hughes, Petroleum Equipment Branch, $200; and Joseph C. Russell, Equipment Maintenance Branch, $100.

Outstanding ratings—John A. Caldwell, Assistant Chief of the Mechanical Department; Donald J. Looft, Chief of the Electrical Power Branch; and Mrs. Jean Baker, Office of the Deputy Commander.

Special Act and Service Awards included: Dr. James I. Bryant, Basic Research Group, $100 for an article, "Infrared Spectra of the Azide Ion in Alkali-Halide Lattices" in the *Journal of Chemical Physics.* Dr. Bryant also received a $25 award, as did Hyman Rosenwasser, for coauthoring "Preparation of Hydrazoic Acid by Ion Exchange Techniques," published in the *Journal of Chemical Education.*

Dr. Georg H. Hass, Basic Research Group, $100 for coauthoring "Preparation and Measurement of Reflecting Coatings for the Vacuum Ultra violet," published in the *Journal of Quantitative Spectroscopy and Radiative Transfer.*

Frederick Carlson, Robert McMillan and Gerald King, all of the Basic Research Group, shared a $50 award for coauthoring "Temperature Dependence of the Electron Spin Resonance in Collodial Sodium," published in the *Journal of Physics and Chemistry of Solids.*

Solomon Goldfein, Materials Branch, $100 for authoring "Theory for Mechanical-Chemical Equation of State Parameters for Creep and Rupture Stresses in Metals and Plastics," published in *Materials Research and Standards.* Goldfein also received two $50 awards for two inventions, one pertaining to processes for shipping flexible and rigid polyurethane foam. Emil York, also of the Materials Branch, received a $50 award for inventing an organic stripper for the removal of paint and enamel.

Nobel Prize Winners Observe Fort Detrick Research

Two Nobel Prize winning scientists visited Fort Detrick's Biological Laboratories early in April to observe and discuss laboratory techniques.

Dr. Donald A. Glaser, Professor of Physics at the University of California, Berkeley, and Dr. James D. Watson, Professor of Biology at Harvard University, met with Dr. Riley D. Housewright, Scientific Director of the bio-labs, and other leading Fort Detrick scientists.

Winner of the Nobel award in Physics in 1960, Dr. Glaser currently is interested in molecular biology and microbial genetics. He is a consultant to the Institute for Defense Analysis, a top level advisory group to the Nation's Defense leaders.

Dr. Watson, in conjunction with Great Britain's Dr. Francis Crick, originated the theory of the structure of DNA (deoxyribonuclier acid). The concept of DNA has helped explain many aspects of genetics and has served as a basis for a tremendous amount of advancement in that field.

Drs. Watson and Crick, cowinners of the 1962 Nobel Prize in Medicine and Physiology, were featured in *LIFE's* magazine series, "Inside a Human Cell," the March 29 issue. Dr. Watson is a member of the President's Scientific Advisory Committee.

NOBEL PRIZE WINNERS Dr. James D. Watson (second from right) and Dr. Donald A. Glaser (center) visit at Fort Detrick Biological Labs with Lt Col Martin F. Massoglia, CO; Dr. Harold N. Glassman, Assistant Scientific Director; and Dr. Riley D. Housewright (far right), Scientific Director.

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creativity in attempting to solve Army problems.

The 5-year program may also be more frustrating for the imaginative in industry. Here, we specify projects and tasks to meet the elements of the plan, or outline "crash" supporting research to fill in what we don't know. There is no basis here for industry planning.

The advantages of informing industry at this point are: The Army requirements are more easily defined; there is the least amount of risk in achieving the goals; and,. in this smaller scientific area, it is easier for us to find firms with adequate scientific capability.

The disadvantages of getting industry into the act so late are that significant breakthroughs are least likely to occur and that unconventional solutions are seldom considered by industry or the Army. In essence, industry becomes just an order-taker rather than a colleague.

We frankly are not sure at what level of Army planning—the objective, the plan or the program state, or in combinations of these—that industry could optimally contribute to the Army effort. Telling everybody all would maximize support from industry, but it would also maximize the danger of security problems. Again, let me solicit your advice and comments on this.

We have a number of devices to inform industry what we want. Let me run over these quite briefly. First, we participate, with the other Services in the National Inventors Council, and list our problems in their publication, "Inventions Wanted by the Armed Forces."

The Problems Guides were formerly issued by the Technical Services and the Office of the Chief of Research and Development. We also had the Army Study Requirements, used by the Chemical Corps, and the Qualitative Development Requirements Infortion (QDRI), favored by Ordnance. In addition, there was an Unfunded Studies Program started by CRD in 1960, to handle important unsolicited proposals from industry.

With R&D activities of the former Technical Services now under the direction of the Army Materiel Command, we have the opportunity to pull together our efforts to inform industry, into a more effective and coherent program. This is now underway.

Our contribution to the National Inventors Council will continue, but we'll have a more critical look at the problems we submit. We plan to continue the Unfunded Studies Program. The major effort will look like, and may even be called, the QDRI program. It will try to selectively channel information on our known and anticipated needs to those firms, large and small, who have the known or potential scientific, technical or engineering capability to help us.

Such a program should pretty well meet the criterion of fairness to all business organizations who can help us solve our problems, will be properly mindful of security requirements, and won't over-burden you with a mass of information unsuited to your capabilities.

It has the possible disadvantage of presenting to you problems that are pretty current—say in a 5-year time frame. As the planning in the AMC evolves longer-range plans, in a form suitable to communicate to you, these too will be put out on the same selective basis, thus making available an input for your longer range planning.

We have had a problem too of having so many good ideas come to us, that we haven't been able to extend financial support as soon as we would like to. That may have to be another input to your planning; it is related to R&D expenditures, in a negative sort of way. We may be able partially to overcome this deficiency as we get our programs sorted out into the categories established by the DoD.

Scientists have often claimed that they feel frustrated by the attitude that the Army alone knows what it needs to fight a war; and that the job of the scientists is merely to tell the military how these needs can be fulfilled. But this view is far from a correct assessment. Of course, we planners in the Army conceptualize future requirements, partially based on Army idealizations, tempered with experience.

Our requirements are based to a large extent on the future courses the conflict will take, but we must also be aware of technical forecasts made by realistic scientists, both in the Army and out. It is difficult to say which element precedes which.

For example, no one gave the scientists a requirement for a 20-kiloton bomb in 1939. Nor were specific Army requirements given scientists for lasers or for fuel cells, both important developments in military materiel concepts. Science and industry came up with these ideas and again showed us that technology must at times lead tactics and military plans.

Let me stress that the military departments can never do R&D planning for industry. Alert companies or industrial associations must parallel the planning procedure of the Army. You must consider the threat beyond the way it is presently defined and speculate which deterrents are the best to meet the anticipated threat. You then have a public responsibility to be honest with yourselves and the taxpayers.

The Army, as well as industry, has occasionally favored concepts or development items from intuition rather than proven soundness. Nowadays, however, this approach is as dangerous as it is expensive. Any selfish parochialism must give way to sincere patriotism if our defense and security goals are to be achieved. We in the Defense establishment and you in industry must always maintain a critical awareness of motivations and behavior in defense R&D or in weapons system acquisition.

Your planning in industry must take proper account of the risk and opportunities of forecasting not only technological progress and the currents of science, but also world events. This requires more than just a knowledge of the hard sciences; it must take into account the less exact sciences, such as economics, political science and psychology. I don't have to remind you that forecasting is one of the oldest of professions and that soothsayers enjoy about the same reputation of what is regarded by historians as *the* oldest profession. Still, we must hazard our best guesses.

If this were the best of all possible worlds, it would be ideal to have less secrecy regarding military R&D. Wider participation of scientific minds from industry, not only in the development of new weapons but also in the open discussion of political and military strategy, dictated by the existence or threat of these weapons, is desirable and mutually advantageous. Is this possible? If so, then how do we do it? We genuinely welcome your advice.

Even though military technology is but a small segment of the national scientific effort as a whole, the military must be interested in the broad spectrum of scientific endeavor. As Director of Army Research, I am particularly interested in the "R" of R&D. Research presents new opportunities to industry which can be exploited in the advance of science, the civilian economy, and defense effort.

Military technology flourishes best when science also flourishes. We therefore contribute our share to basic research. True, we hope to derive eventual benefits for the Army first, but we recognize full well that scientific achievements *can* work also for the peaceful interests of the Nation and of mankind generally.

I make the same plea for academically motivated basic research as was made recently by my former colleague from Berkeley, Glenn Seaborg. In his words: "Science must be a pure search for deeper understanding of the universe and of the living and inorganic phenomena within it."

All echelons of the Army's R&D organization must maintain an aware-

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Watervliet Impact Fatigue Testing Reduces Weapons Development Time Lag

A laboratory serves as a "proving ground" at Watervliet (N.Y.) Arsenal where an impact fatigue testing program simulates actual firing conditions for cannon components at a cost about one percent that of equivalent field tests.

Impressive savings registered by "pile driver" technique of impact fatigue testing were noted by Col Keith T. O'Keefe, commanding officer, as he announced installation of an improved machine which will test gun breech assemblies at thrust levels of up to 2,500,000 pounds, and chamber pressures up to 75,000 p.s.i.

Primary purpose of the program developed by the Experimental Mechanics Laboratory at Watervliet, a cannon design center, is to speed the "debugging" of modern lightweight designs of traditionally heavy breech assemblies—reducing the time between drawing board and end product.

Supplemented by field firing in the design engineering stage, impact fatigue testing has reduced Watervliet weapon lead time by several months in many instances and more than a year in others. By providing rapid evaluation of alternate designs, the technique has given the designer increased flexibility in his task of developing dependable, mobile weapons.

While achieving this basic objective, and attaining reliability assurance as well, impact testing of components ranging from 155 mm. breeches to mortar baseplates has racked up substantial dollar savings by eliminating the need for repetitive full-scale firing tests.

In emphasizing economies resulting from impact fatgue testing, Col

Supervisory technician sets up impact fatigue tester in preparation for testing 155 mm. breech ring at the Watervliet Arsenal Experimental Mechanics Laboratory, Watervliet, N.Y.

O'Keefe said five 90 mm. tank gun breeches were cycled for nearly 300,000 simulated rounds at a cost of just 25 cents a round. Had an equivalent number of rounds been fired in the field, the ammunition cost would have been $35 per round.

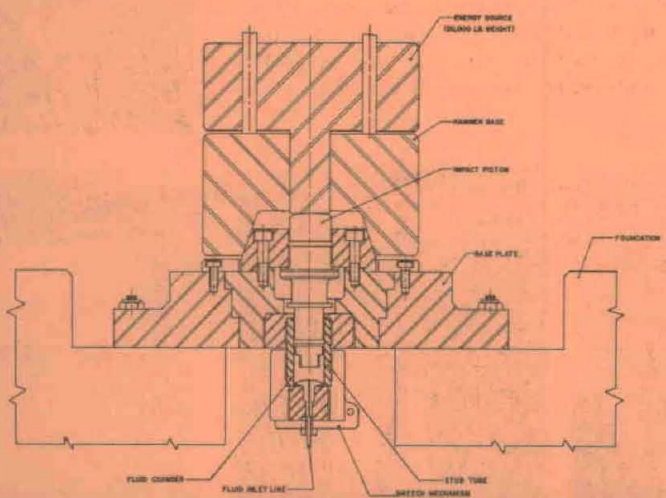
In another test sequence, it was stated, more than 120,000 simulated rounds were applied to a series of howitzer breeches to achieve results which if obtained by field testing would have cost $10,000,000 for ammunition alone.

The new machine being installed at Watervliet consists of an energy source, a pulse shaper, a baseplate and a foundation. The energy source is a steam-driven pile hammer with a ram weighing 20,000 pounds and a gravity drop height adjustable to a maximum of 36 inches. It may be cycled at a rate of 60 simulated firings per minute.

The pulse shaper, formed between the ram impacted piston and the breech components, is a fluid chamber with volume and bulk modulus which may be adjusted to control the pulse rise time.

The baseplate is a thick, flat plate into which the shortened (stub) gun tube is threaded. The foundation, equivalent in volume to a 14-foot cube and mounted on shock isolation pads, has a "manway" beneath the lab floor from which components may be changed without dismantling the entire apparatus.

The impact fatigue testing program was inaugurated at Watervliet in 1951 by the former chief of the Experimental Mechanics Laboratory, C. Wiley Egan who retired in 1960. Headed by John Purtell, the present lab staff includes Ralph Laselle as project engineer, John Barrett as chief of instrumentation, and Arthur Doty as supervisory technician.



Impact fatigue tester designed to test gun breech assemblies at thrust levels up to 2,500,000 pounds, and chamber pressures to 75,000 pounds p.s.i.

Army R&D Expenditures

(Continued from page 34)

ness of the progress of basic research conducted in-house and in the scientific and technical community.

You in industry have a further public responsibility to disseminate your new ideas and knowledge. The results of your research and your planning may be useful to the military, hopefully eventuating in a weapon system or deterrent. This outcome is good! Nevertheless, the impact of your research can also be felt in the development of profitable civilian industries,—and in humanitarian ways, such as in bringing underdeveloped countries along and improving relations between nations.

Let me leave you with these final thoughts. Whether or not we arrive at other solutions here, we invite your scientists to come and discuss sticky technical and planning problems. We know full well that we have a similar standing invitation with you. This exchange of personal visits can be most constructive in significantly shrinking the communication gap between the Army and defense industries.

Succeeding in this, we can look toward a Nation made stronger by yet another evidence of public and private partnership in matters of defense.

Army Announces Winners of R&D Achievement Awards

(For explanation of achievements which earned honorary citations for these men and others, turn to pages 1, 18, 19.)

Sixteen of the 24 winners of 1963 Army R&D Achievement Awards are shown here. For other winners and information, see story beginning on page 1. (1) William Fishbein, U.S. Army Electronics Research and Development Laboratories, Fort Monmouth, N.J. (2) Left to right (front), Mortimer H. Zinn, Sol Schneider; (rear), Anthony J. Buffa, Raymond W. Brower, George W. Taylor, U.S. Army Electronics Research and Development Laboratories, Fort Monmouth, N.J. (3) Dr. Ralph Goldman, U.S. Army Research Institute of Environmental Medicine, Natick, Mass. (4) William E. Heidel, Jr., Rock Island Arsenal, Rock Island, Ill. (5) Letcher A. Lofgren, Harry Diamond Laboratories, Washington, D.C. (6) Abraham Golub, Army Ballistic Research Laboratories, Aberdeen Proving Ground, Md. (7) Dr. Joseph Zeidner, U.S. Army Personnel Research Office, Washington, D.C. (8) James L. Helfrich, Frankford Arsenal, Philadelphia, Pa. (9) Dr. Jack A. Kohn and Arthur Tauber, U.S. Army Electronics Research and Development Laboratories, Fort Monmouth, N.J. (10) Dr. William C. McCorkle, Jr., U.S. Army Missile Command, Redstone Arsenal, Ala. (11) Dr. Fritz K. Sautter, Watervliet Arsenal, Watervliet, N.Y.