ARMY RESEARCH AND DEVELOPMENT

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Basic Research Practical Relevancy Slated as ASC Topic

Army Nominates Seven For Rockefeller Awards

Rockefeller Public Service Award nominees submitted by the Department of the Army Incentive Awards Board in mid-April include three candidates in the administrative category and four in research and development. Cash prizes of $10,000 will reward winners (one each) in five categories. Secretary of the Army Stanley R. Resor has approved the nominations.

Army nominees in the administrative field are Charles L. Poor, Deputy Assistant Secretary of the Army (Research and Development); D. Kenneth Chacey, chief, Transportation Engineering Office, Directorate of Transportation, Office of the Deputy Chief of Staff for Logistics; and James A. Robbins, deputy chief, United States Audit Agency.

(*Continued on page 6*)

Panel of 8 Distinguished Men to Exchange Views Regarding Sound Programing of Scientific Studies

Controversial aspects of a major problem of continuing concern to Congress and the national scientific community, "Basic Research and Practical Relevancy," will be discussed by a panel of eight distinguished men at the Army Science Conference, June 14–17.

As an innovation, the panel discussion from 8:30 a.m. to 12:30 noon on June 16 at the United States Military Academy, West Point, N. Y., will present the most impressive array of high-level scientific leadership since the conference was inaugurated in 1957.

Dr. Frederic Holloway

Composed of men whose achievements have gained international recognition, the panel is representative of academic institutions, industry, Federal Government and the general public. Discussion will deal with the complexities of programing basic research to meet the Nation's need for technological advances for defense and continued economic growth.

Dr. Frederic Ancrum Lord Holloway, president of ESSO Research and Engineering Co., has accepted an invitation to preside as chairman. Representative of the "man in the street" viewpoint will be Earl Ubell, Science Editor of the *New York*

(*Continued on page 3*)

Gribble Succeeds Betts as Deputy CRD

U.S. Army Materiel Command Director of Research and Development Maj Gen William C. Gribble, Jr., vacated that position Apr. 4 to step up as Deputy Chief of Research and Development, Department of the Army.

General Gribble moved into the responsibility held for nearly two years by Lt Gen Austin W. Betts, Jr. General Betts was raised to 3-star rank as Chief of Research and Development when Lt Gen William W. Dick,

(*Continued on page 4*)

Maj Gen W. C. Gribble, Jr.

Dawalt Becomes DCRD (IP) As Brig Gen Ryder Retires

Brig Gen William T. (Bill) Ryder retired Apr. 30 after 30 years of Army service and will be succeeded, effective June 1, by Brig Gen Kenneth F. Dawalt as Deputy Chief of Research and Development for International Programs.

After a 4-year tenure in the office of the Chief of Research and Development, Department of the Army, General Ryder retired to accept a position with the International Executive Service Corps (IESC), headquartered in New York City, as Director of National Representatives.

The IESC is a private nonprofit corporation which provides executive

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Army R&D Newsmagazine

Vol. 7, No. 5 May 1966

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

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DDC Administrator Reviews Progress

By Dr. Robert B. Stegmaier, Jr.

The Defense Documentation Center (DDC) became an activity of the Defense Supply Agency on Nov. 1, 1963. The Center and its predecessor organization, the Army Services Technical Information Agency, had previously been under the operational control of the U.S. Air Force. Coinciding with the change in operational control, Dr. Robert B. Stegmaier, Jr., became Administrator of the Center, after serving as staff assistant to the Director of Defense Technical Information. In this article, he reports on progress in improving services of the Center.

Dr. R. B. Stegmaier, Jr.

Changes which have occurred at the Defense Documentation Center (DDC) since November 1963 are important to all personnel involved in the Defense scientific and technical information program. These changes affect all aspects of DDC operations from procedures used in registering for service to the types of products provided.

The DDC is a major field activity of the Defense Supply Agency (DSA) and is the central facility of the Department of Defense for the secondary distribution of scientific and technical documents of research and development. The Center's many services are made available, without charge, to DoD and other Federal activities, their contractors, subcontractors, grantees and to potential Defense contractors.

Using DDC products, a researcher can save his organization thousands or even millions of dollars by determining quickly whether all or part of a particular project has already been accomplished by another research group. Or, if he determines that his project is not being duplicated, he may learn about various recorded experiments and experiences that will serve as valuable time-saving guides.

Changes since November 1963 include:

- An increase in scope of the DDC user registration systems.
- A computer-produced announcement publication with a companion volume of five different indexes.
- Computer-printed bibliographies which replace the library-type catalog cards.
- Microfiche (sheet film) in lieu of microfilm (roll film) for storage and producing microform copies of documents.

(*Continued on page 20*)

Growth of DDC Services

DOCUMENT ANNOUNCEMENTS		DOCUMENT REQUESTS		BIBLIOGRAPHY REQUESTS	
FISCAL YEAR	ANNOUNCEMENTS	FISCAL YEAR	REQUESTS	FISCAL YEAR	REQUESTS
1953	7,568	1953	138,188	1959	1,326
1954	13,729	1954	209,801	1960	1,890
1955	26,720	1955	295,814	1961	3,735
1956	34,399	1956	383,647	1962	4,166
1957	21,015	1957	454,000	1963	5,953
1958	18,657	1958	322,000	1964	7,603
1959	31,076	1959	395,058	1965	10,079
1960	30,061	1960	547,993		
1961	26,443	1961	700,100		
1962	23,897	1962	827,876		
1963	30,613	1963	1,026,834		
1964	44,919	1964	1,171,259		
1965	*50,603	1965	1,486,882		

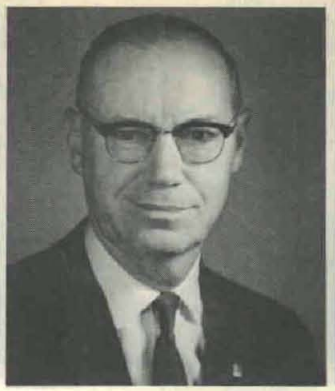
• Excludes 8,635 documents announced in supplements to TAB 64-5.

The average RDT&E document in the DDC collection is between 60 and 70 pages.

Providing bibliographies of RDT&E documents pertinent to particular research projects or problems is DDC's fastest growing service. Output of bibliographies for FY 1966 is expected to to exceed 17,000 requests.

Basic Research Practical Relevancy Slated as ASC Topic

Dr. William O. Baker



Dr. L. R. Hafstad

Dr. Ralph E. Gibson

Dr. Francis D. Moore

(*Continued from page 1*)

Herald Tribune and a renowned radio and television science commentator.

Bell Telephone Laboratories Vice President for Research Dr. William Oliver Baker, named in 1954 as one of the top 10 scientists in U.S. industry, and Dr. Lawrence Randolph Hafstad, General Motors Corp. Vice President and Director of GM Research Laboratories, will represent the industrial community.

The role of the university, both in the search for pure knowledge where practical utility may be a minor consideration, and in programed research where objectives are more specific, will be discussed by Dr. Francis Daniels Moore and Dr. Edward Gibson.

Dr. Gibson has served since 1948 as Director of the Applied Physics Laboratory, Johns Hopkins University, Baltimore, Md., an internationally famed research organization. Dr. Moore is the Moseley Professor of Surgery and Surgeon-in-Chief at Peter Bent Brigham Hospital, Harvard Medical School, a position he has held since 1948.

Federal Government consideration of the problem of "Basic Research and Practical Relevancy" will be discussed by Dr. Randal M. Robertson, Associate Director (Research) of the National Science Foundation, Washington, D.C., and Dr. Chalmers W. Sherwin, Deputy Director of Defense Research and Engineering (Research and Technology).

The panel discussion, introduced this year as a successor to the former practice of inviting four top scientists to make guest presentations, will be open to the press. Interest in the importance of the problem throughout the scientific community is expected to attract a large representation from scientific and

Dr. R. M. Robertson

Dr. C. W. Sherwin

Earl Ubell

professional journals as well as from other news media.

The press also is invited to attend the afternoon technical sessions on June 16, which will be unclassified, the banquet in the evening, and the awards ceremony on the morning of June 17. Secretary of the Army Stanley R. Resor will present cash honorariums and Certificates of Achievement to authors of prize-winning technical papers.

Defense Director of Research and Engineering Dr. John S. Foster, Jr., has accepted an invitation to make the banquet address.

Dr. Harold M. Agnew, chairman of the Army Scientific Advisory Panel, has been invited to be the keynoter at the opening general session June 15. Dr. Ralph G. Siu, Army Materiel Command Deputy Director of Development, will be the toastmaster, a role he has filled for each Army Science Conference.

Approximately 500 conferees are expected to assemble at the Military Academy. Conferees will be selected representatives of Army research and development activities, the Air Force, Navy and other Federal agencies, as well as top-ranking R&D officials of the British, Canadian, Australian and New Zealand defense establishments.

Ninety-six technical papers are programed in four concurrent sessions, organized according to scientific disciplines. Because of the full schedule for the 3-day meeting, one of the technical sessions will be held at night for the first time.

Lt Gen Austin W. Betts, Chief of Research and Development, is scheduled for the address of welcome as the sponsor of the conference. Academy Superintendent Maj Gen Donald V. Bennett, the host, also will make welcoming remarks.

Deputy and Scientific Director of Army Research Dr. Richard A. Weiss, general chairman, will call the conference to order and introduce Dr. Harold C. Weber, chief scientific adviser, Office of the Chief of Research and Development, as the presiding chairman.

Biographical information on members of the panel for discussion of "Basic Research and Practical Relevancy" is as follows:

(*Continued on page 4*)

Panel to Air Basic Research Views at ASC

(*Continued from page 3*)

DR. HOLLOWAY became president of the ESSO Research and Engineering Co. in 1962 after 23 years of service with the organization. Born in Lumberton, N. C., he was graduated from Georgia Institute of Technology in 1935 with a BS degree in chemical engineering and earned an ScD degree from Massachusetts Institute of Technology in 1939. He is a member of the American Institute of Chemical Engineers, American Chemical Society and the American Petroleum Institute.

DR. BAKER joined the Bell Telephone Laboratories staff to take charge of polymer research and development in 1948 and has served since 1955 as Vice President for Research. Born in Chestertown, Md., he was graduated from Washington College in 1935 with a BS degree and in 1957 was awarded an honorary ScD degree by that institution. He earned a PhD in chemistry from Princeton in 1938 and has honorary degrees from Goergetown University and Stevens Institute of Technology.

A former member of the President's Advisory Committee, Dr. Baker served on numerous advisory and study groups for the Federal Government, National Science Foundation, and the National Aeronautics and Space Administration. He is a member of a long list of professional societies, including the Scientific Research Society of America, the Industrial Research Institute, American Chemical Society, and the American Physical Society.

DR. GIBSON's long tenure as Applied Physics Laboratory Director at Johns Hopkins University has been highlighted by numerous honors recognizing his research and leadership. In 1948, he won the Presidential Certificate of Merit, followed by the Navy Distinguished Public Service Award in 1958, the Captain David Dexter Conrad Award in 1960, and the Honorary Commander of the Most Excellent Order of the British Empire (CBE) in 1965.

Born in Kings Lynn, Norfolk, England, Dr. Gibson came to the United States in 1924 and was naturalized in 1940. He received a BS degree from the University of Edinburgh in 1922, a PhD in 1924 and was awarded a Carnegie Research Fellowship. Dr. Gibson has served as a member of the National Defense Research Committee and is an Associate Fellow of the Institute of Aeronautical Sciences. He is a member of the American Ordnance Association, American Geophysical Union, American Chemical Society and American Physical Society.

DR. HAFSTAD joined the General Motors Corp. as Vice President and Director of GM Research Laboratories in 1955 after a distinguished career with Northwestern Bell Telephone Co. (1920–28), Carnegie Institute of Washington, D.C. (1928–42), Director of Research at the Applied Physics Laboratory, John Hopkins University (1945–47), Director of the Institute of Cooperative Research (1947–49), and first director, Reac-

Gribble Succeeds Betts As Deputy Chief of R&D

(*Continued from page 1*)

Jr., became CG of Allied Land Forces, S.E. Europe.

Like General Betts, General Gribble takes into his new assignment a long background of highly specialized scientific training and academic qualifications, supplemented by progressively responsible research and development experience.

Prior to his AMC assignment as Director of R&D, General Gribble served tours as: chief, Development Division, R&D Directorate, AMC; division engineer, North Central Engineer Division and deputy director, Military Construction, Office of the Chief of Engineers.

From 1953 to 1956 he was deputy assistant director, Reactor Development Division, U.S. Atomic Energy Commission. In 1957 he received the Legion of Merit for developing technical specifications for design, construction and test operation of the Army's first nuclear power plant at Fort Belvoir, Va.

In 1960, after a 4-year assignment with the Alaska Engineer District, he completed the National War College course. He is also a graduate from the Command and General Staff College, Fort Leavenworth, Kans.

Born in 1917 at Ironwood, Mich., General Gribble attended the Michigan College of Mining and Technology for three years before he entered the United States Military Academy at West Point, N.Y.

Commissioned in 1941, he was assigned to the 18th Engineer Regiment. Later, with the 340th Engineers, he was regimental supply officer and company commander during construction of the Alaskan Highway. Then came engineer officer assignments in the Pacific Theater during World War II.

Two years at the University of Chicago were climaxed by an MS degree in physical science (1948), after which he served until 1952 as a metallurgical engineer with the Los Alamos (N. Mex.) Scientific Laboratory.

NORAD Colonel Assigned as ECOM Chief of Staff

Col Warren R. King has been named chief of staff of the U.S. Army Electronics Command at Fort Monmouth, N.J. Col George A. Kurkjian, who has been serving as deputy and acting chief since early this year, will continue as deputy. Col King reported to Fort Monmouth following an assignment as assistant director for operational evaluation, North American Air Defense Command, Colorado Springs, Colo.

With NORAD he was one of the five original senior controllers named in 1962, when the command established its around-the-clock decision-maker post at the continental aerospace defense network's vital nerve center in Colorado. Prior to the NORAD appointment. Col King completed a tour in Iran as a member of Field Advisory Team #6, U.S. Military Assistance Group. From 1959–61 he served as commander of the 30th Artillery Group (Air Defense) and as executive officer of the 40th Artillery Brigade in California.

A 1938 graduate of Iowa State College (chemical technology), Col King was commissioned a Reserve officer in Field Artillery from ROTC. He entered the Regular Army in 1940 while serving as a Thomason Act officer with the 80th Field Artillery Battalion.

Col Warren R. King

Major assignments have included staff service and command of various Field Artillery Battalions in the United States, Canal Zone, Pacific Theater and Germany. He has served as assistant professor of military tactics and science at the University of Nebraska and as executive officer, Indiana Military District, Fort Benjamin Harrison, Ind.

Col King is a graduate of the Command and General Staff College; field officers courses at Fort Sill, Okla.; Special Weapons Course (atomic), Fort Leavenworth, Kans.; and the Army War College. He also completed studies at the Military Assistance Institute in Washington.

tor Development Division, Atomic Energy Commission (1949–55).

Graduated from the University of Minnesota with a BS degree in 1926, Dr. Hafstad received a PhD from Johns Hopkins University in 1933. Among honors bestowed upon him are: AAS Award for R&D on 1,000,000-volt vacuum tube (with M.A. Tuve), 1931: Medal for Merit from the Secretary of the Navy, 1946; King's Medal in Defense of Freedom, British Government, 1946; Proctor Prize, Scientific Research Society, 1946. He has served as a consultant, adviser or member of numerous Department of Defense groups, the Atomic Energy Commission, and the Advisory Council Fund for Peaceful Atomic Development.

DR. MOORE was graduated from Harvard University with an AB degree in 1935 and an MD in 1939. Except for internship and residency in surgery at Massachusetts General Hospital (1939–43), his service at Harvard has been continuous since he was graduated. In 1961 he was awarded an MCh honorary degree by the University of Ireland.

Dr. Moore has served as Harvey lecturer and consultant to The Surgeon General, as chairman of the Surgery Study Section of the U.S. Public Health Service, chairman of the subcommittee on Metabolism in Trauma (Office of The Surgeon General), and chairman of the Committee on Pre and Postoperative Care, American College of Surgeons. He is a Diplomate of the American Board of Surgery and a member of the American Academy of Arts and Sciences, American Surgeons Association, Society for Clinical Surgery, International Surgical Society and the Society of Surgeons.

DR. ROBERTSON joined the National Science Foundation as Assistant Director for Mathematical, Physical and Engineering Sciences in 1958 and became Associate Director (Research) in 1961. Born in Tampa, Fla., he earned an MA degree from the University of Glasgow, Scotland, in 1932 and was awarded a PhD from Massachusetts Institute of Technology in 1936.

After five years with the Norton Co. in Worcester, Mass., he served from 1942–46 on the staff of the Radiation Laboratory at M.I.T. He joined the Office of Naval Research, Washington, D.C., in 1946 as head of the Mechanics and Materials Branch, became director of the Science Division in 1948, and was elevated to science director in 1952. Dr. Robertson is a Fellow of the American Physical Society, the American Association for the Advancement of Science, and Washington Academy of Sciences.

DR. SHERWIN accepted appointment as Deputy Director of Defense Research and Engineering (Research and Technology) in March 1963. He has served as a consultant to various Federal agencies and was Air Force Chief Scientist in 1954–55. Born in Two Harbors, Minn., he was graduated from Wheaton College in Illinois with a BS degree in 1937, and earned his PhD at the University of Chicago in 1940.

After a year as assistant in physics at the University of Chicago, Dr. Sherwin joined the Radiation Laboratory staff at M.I.T. in 1941, remained there four years, served a year in the Physics Department at Columbia University, and moved to the University of Illinois in 1947. He became an associate professor in 1948, professor in 1951 and associate director, Coordinated Sciences Laboratory in 1959. In 1960 he joined the staff of the Aerospace Corp. in Los Angeles and remained until he became DDDRE (Research and Technology).

EARL UBELL started his career with the *New York Herald Tribune* in 1943 as a messenger, became secretary to the managing editor, worked 10 years as a reporter, and was promoted to science editor in 1953. Since 1956 he has been a syndicated columnist on science, and for eight years has been a special science editor in radio and television in New York City.

Much honored in his profession, Mr. Ubell is a member of the American Academy for the Advancement of Science, the American Geophysical Union, the American Crystallographic Association, and Phi Beta Kappa. He was president of the National Association of Scientic Writers in 1960, vice president of the Nuclear Energy Writers Association, and since 1961 has been president of the Council for Advancement of Science Writing.

Among the awards he has received are the Mental Health Bell Award of the New York State Society of Mental Health (1957), the Albert Lasker Medical Journalist Award (1958), the National Association of Mental Health Radio Award (1962), the New York State Empire Medical Writing Award, (1963), and Westinghouse Science Award (1961).

ARO Briefs New Attache On Research in Far East

Before leaving for duty as U.S. scientific attache for Japan and the Far East, State Department physicist Dr. Robert T. Webber was briefed on activities of the U.S. Army Research and Development Group, Far East.

The briefing was given at the Headquarters of the U.S. Army Research Office, Arlington, Va., which monitors programs of the U.S. Army R&D Group, Far East.

Col Tyron E. Huber, chief of the Life Sciences Division and acting assistant director of Army Research at the time of the briefing, presided over the round-table discussion. Army research program monitors and representatives of the U.S. Air Force Office of Aerospace Research participated. Invited Office of the Secretary of Defense and Navy research scientists were unable to attend.

Dr. Webber was science attache for Israel from 1962 to 1965 and served previously as chief scientist, National Science Foundation office, Tokyo. He will be stationed at the U.S. Embassy, Tokyo.

Industry Executive Joins DDRE as Assistant for C-E

E. Grogan Shelor, Jr., has joined the Department of Defense as Assistant Director of Defense Research and Engineering for Communications and Electronics. The 38-year-old former Bendix Corp. executive succeeds Thomas F. Rogers, who became Deputy Director of Defense Research and Engineering (Electronics and Information Systems).

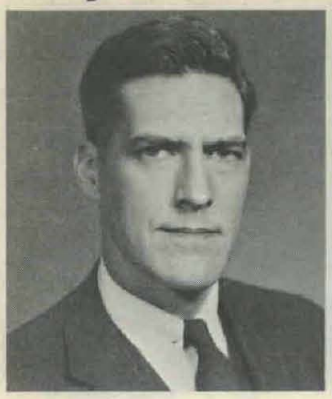
E. Grogan Shelor, Jr.

Mr. Shelor, a 1949 graduate in electrical engineering from the University of Florida, served with Bendix for 15 years. Prior to entering Federal service he was assistant manager of the Government Products Group of the Bendix Radio Division.

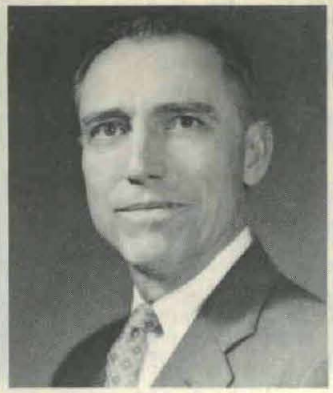
During his tenure with Bendix he served also as manager of communications and navigation engineering, manager of advanced products development and director of engineering.

Mr. Shelor also attended the Georgia Institute of Technology in Atlanta for graduate study in 1950. Between college years, he worked as an engineer-announcer with radio station WTAL, Tallahassee, Fla.

Army Board Nominates 7 for Rockefeller Public Service Awards



Charles L. Poor



Kenneth Chacey

James A. Robbins

Elson B. Helwig

(*Continued from page 1*)

All four nominees in science, technology and engineering are winners of the Department of the Army's highest honor for civilian employees, the Exceptional Civilian Service Award. They are Dr. Elson B. Helwig, Dr. Ralph G. H. Siu, Harry B. Zackrison, Sr., and Victor Lindner.

Dr. Helwig also has been nominated for the President's Award for Distinguished Federal Civilian Service, in recognition of his many outstanding achievements as chief, Department of Pathology, and chief, Skin and Gastro-Intestinal Pathology Branch, Armed Forces Institute of Pathology, Washington, D.C. He is a 1965 winner of the Department of Defense Distinguished Civilian Service Award.

Dr. Siu is U.S. Army Materiel Command Deputy Director of Development, and has long been recognized scientists. Known widely for his pioneering efforts in developing the Army Food Irradiation Preservation Program, and numerous other major research activities, he is renowned also for his humor. This quality explains his continued service since 1957 as master of ceremonies for each of the Army Science Conference banquets at the Military Academy.

Harry B. Zackrison, Sr., a 33-year Army career Civil Service employee, is chief of the Engineering Division, Military Construction, Office of the Chief of Engineers, a responsibility he has held since 1952. Currently serving on the International Council for Building Research Studies and Documentation, he is recognized for his research on environmental factors, particularly in the cold regions, related to military construction.

Victor Lindner is a 1965 recipient of the Department of Defense Distinguished Civilian Service Award for his achievements as deputy director, Ammunition Engineering Directorate, Picatinny Arsenal, Dover, N.J. In 1964 he was awarded a Decoration for Exceptional Civilian Service at the Eighth Annual Secretary of the Army Awards Ceremony, in recognition of his leadership in developing "a complete new spectrum of highly efficient munition systems . . . materially strengthening national defense."

Dr. Ralph G. H. Siu

Victor Lindner

Harry B. Zackrison

The Rockefeller Public Service Awards are made annually and the last Army nominee selected for top honors in one of the five categories was Dr. Eugene W. Weber, deputy director, Civil Works for Policy, Corps of Engineers. He won a $5,000 award in 1963. This year the awards were increased to $10,000 each.

Emphasis in selection of Rockefeller Award winners is on giving recognition to long and distinguished careers in public service.

Additional information regarding the nominees and accomplishments cited for consideration for the Rockefeller Public Service Award follows.

CHARLES L. POOR has served as Deputy Assistant Secretary of the Army (Research and Development) since June 1963. His nomination for the Rockefeller Award was entered by ASA (R&D), Willis M. Hawkins, supported by the former ASA (R&D) Dr. Finn J. Larsen, now Principal Assistant Secretary of Defense Research and Engineering, and five other prominent scientists.

As Deputy ASA (R&D), Mr. Poor is backed for his responsibilities by a distinguished military and civilian career since he was graduated from Harvard University in 1942 with a BA degree in aeronautical engineering.

Achievements cited in his nomination fill many pages, with major emphasis on his "pioneering development of supersonic research techniques . . . widely applied in establishing new high-speed aerodynamic research facilities in the United States and abroad."

In 1945, while serving as a lieutenant in the U.S. Navy, he was a member of the Naval Technical mission in Europe and was responsible for exploitation of German R&D in high-speed aerodynamics. He participated in selection of German scientists and supervised dismantling and shipment to the U.S. of components for a one-meter transonic wind tunnel.

On completion of the mission, he was promoted to lieutenant commander and appointed director, U.S. Navy Bureau of Aeronautics, David Taylor Model Basin Project, Washington, D.C.

Released from active duty in the Navy in 1946, Mr. Poor became chief, Supersonic Wind Tunnel Laboratory, Army Ballistic Research Laboratories (BRL), Aberdeen Proving Ground, Md. There he distinguished himself in numerous research activities until he was appointed Special Assistant for Weapons to the Assistant Secretary of the Army (R&D) in 1960. He was promoted to chief of the BRL Exterior Ballistic Laboratory in 1949 and in 1958 became chief, Future Weapons Systems Agency at BRL.

Results of his work at BRL are recognized as providing "much of the framework of the current Ordnance research and development program." He organized, planned and directed "Prospect Study on Technology for Limited War," which has been used extensively by the Defense Science Board, the director of

(*Continued on page 7*)

Defense Research and Engineering, and the Presidential Science Adviser," the citation for his nomination stated.

In his work as Deputy Assistant Secretary of the Army (R&D), Mr. Poor is credited with many key recommendations and decisions in Army programs concerned with air defense, surface-to-surface and surface-to-air missiles, antitank weapons, ground survival devices, combat vehicles, tactical communications, and more conventional field army weapons.

He has served as a consultant to the Atomic Energy Commission, worked on many Department of Defense committees, and represented the Army as an ordnance specialist at a number of tripartite conferences in Great Britain and Canada.

D. KENNETH CHACEY, chief, Transportation Engineering, Director of Transportation, Office of the Deputy Chief of Staff for Logistics, Department of the Army, was nominated by General Frank S. Besson, Jr., CG of the Army Materiel Command (AMC).

General Besson's letter of commendation cites Mr. Chacey for a "key role in the National System of Interstate and Defense Highways . . . and developing procedures to support the Army's portion of the Department of Defense Engineering for Transportability Program."

Working with the Maintenance and Supply Command of AMC, he provided the guidance for transportability field analysis to the AMC commodity commands, and for shipments of sensitive materiel, resulting in "great savings of time to the AMC in urgent shipments." Shipping plans for the Pershing missile system and many other massive weapon systems are credited to his guidance.

(Continued on page 15)

MICOM Checks Lance On Modified Test Stands

Ground testing of Lance, the Army's newest battlefield missile, is underway at Redstone Arsenal, Ala., headquarters of the Missile Command (MICOM). Test stands formerly used for Pershing and Redstone missiles have been modified to accommodate the Lance engine and propulsion system tests.

Col W. E. Mehlinger, Lance project manager, said activation of facilities earlier than planned will enable MICOM to support both the development effort and the qualification tests on propulsion systems. Normally, testing would occur later in the program.

Lance will be subjected to a series of static firing and "torture tests" directed toward final design of the system. Environmental test chambers will simulate the heat of the tropics and the cold of the Arctic. Other tests will use specially devised shock and vibration tables, sand and dust chambers, and a treatment area in which equipment will be submerged in water.

Lance can be armed with either nuclear or conventional warheads. The first Army missile to use prepackaged storable liquid propellant, it will fill the Army's need for a highly mobile weapon system that can be transported easily by plane and air-dropped. Lance will have substantially greater range and accuracy than the Honest John which it will replace.

MRC Slates 5-Nation Math Symposium

Mathematicians from Japan, Sweden, England, Germany and the United States will gather at the University of Wisconsin, May 9–11, for a symposium on Numerical Solution of Nonlinear Differential Equations.

Sponsored by the Mathematics Research Center (MRC), U.S. Army, at Madison, the meeting is part of a continuing MRC program under Director Dr. J. Barkley Rosser to keep Army mathematicians informed of worldwide advances in mathematical research and applications of new techniques to military requirements.

Director of Army Research Col Robert E. Kimball and Chancellor R. W. Fleming of the University of Wisconsin are programed for welcoming remarks.

Other listed speakers for the opening session include: Prof. Milton Lees, Case Institute of Technology, "Remarks on the Numerical Solution of Nonlinear Two-Point Boundary Problems," and Prof. Minoru Urabe, Kyushu (Japan) University, "Galerkin's Procedure for Nonlinear Periodic Systems and Its Extension to Multi-Point Boundary Value Problems for General Nonlinear Systems."

Dr. Stuart Dreyfus, RAND Corp., will speak at the second session on "The Numerical Solution of Optimal Trajectory Problems" and Prof. J. Ben Rosen, MRC, is scheduled to discuss "Solution of Nonlinear Two-Point Boundary Value Problems by Linear Programing."

Featured speakers at the third session are Prof. Germund Dahlquist, Royal Institute of Technology, Stockholm, Sweden; Dr. C. W. Clenshaw, National Physical Laboratory, Teddington, England; and Prof. Lothar Collatz, University of Hamburg, Germany.

Topics they will discuss are "Error Estimation in the Numerical Integration of Strongly Stable Systems of Differential Equations"; "The Solution of Van de Pol's Equation in Chebyshev Series"; and "Application of Half-Orderings in Partial Differential Equations."

Fourth session speakers include: Prof. H. B. Keller, New York University, "Numerical Studies of Steady Viscous Flow Past a Circular Cylinder (presented jointly with Prof. Hideo Takami, New York University); and Dr. W. F. Noh, University of California, Livermore, "The Numerical Solution of the Equations of Hydrodynamics."

Programed for fifth and sixth session presentations are Prof. H. O. Kreiss, University of Uppsala, Sweden, "Difference Approximations for Hyperbolic Differential Equations" and Prof. Garrett Birkhoff, Harvard University, "Numerical Integration of Reactor Dynamics Equations."

Prof. John Cannon, Purdue University, will present "Some Numerical Results for the Continuation of the Solution of the Heat Equation Backwards in Time"; Prof. S. V. Parter, University of Wisconsin, "Elliptic Equations"; and Prof. L. E. Payne, Cornell University, "On Some Non-Well-Posed Problems for Partial Differential Equations."

Session chairmen are Prof. Walter Gautschi, Purdue University; Prof. Herman Karreman, MRC; Prof. Ramon Moore, University of Wisconsin; Prof. Ben Noble, MRC; Prof. R. D. Richtmyer, University of Colorado; and Prof. Wolfgang Wasow, University of Wisconsin.

DoD Orders 3-Year Study of Stress Corrosion Cracks

Stress corrosion cracking, a source of concern to military users of aircraft, ships and submarines, is scheduled for a 3-year study under a $3.9 million contract recently awarded by the Department of Defense.

The Advanced Research Projects Agency (ARPA) selected the Naval Research Laboratory to conduct the research program. NRL subcontracts are with Carnegie Institute of Technology (Pittsburgh, Pa.), $720,000; Lehigh University (Bethlehem, Pa.), $720,000; and The Boeing Co. (Seattle, Wash.), $1.4 million.

Normal stress of a given materiel in military use may become critical when a chemical or corrosive action is combined with the original stress.

Primary aim of this program is to combine the skills of basic and applied scientists and engineers in studying stress corrosion cracking; also, to apply new techniques and equipment which recently have become available to materiels surface chemists and engineers. Most of the work will be conducted in laboratories under controlled conditions.

This is the fourth so-called "coupling program" in this research area initiated by ARPA over the past two years. "Coupling" enables basic and applied research scientists and engineers to work together simultaneously on a common problem. Previous contracts did not include a Government laboratory. They were let to private industry and concerned research in polymer composites, carbon composites and high-energy rate forming.

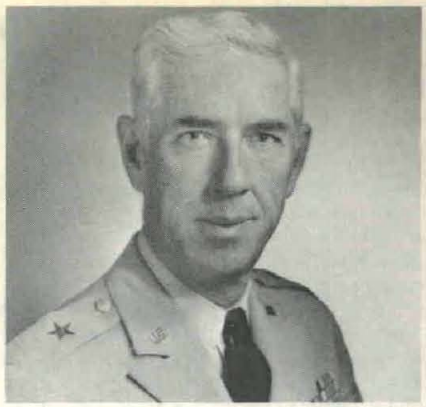
Dawalt Becomes DCRD (IP) As Brig Gen Ryder Retires

(*Continued from page 1*)

and management skills to private enterprise in developing nations. General Ryder will coordinate activities of IESC representatives in major cities throughout the U.S.

From 1956 to 1958, General Ryder was Technical and Industrial Liaison Officer under Lt Gen James M. Gavin, the first Chief of Research and Development, Department of the Army. In 1962 he returned as Director of Special Weapons and was later appointed Deputy Chief of R&D (International Programs).

Widely known throughout the Army as "the first parachutist," General Ryder commanded the First Parachute Test Platoon at Fort Benning in 1940 and, subsequently, the Parachute School when it was established at that place.



Brig Gen W. T. Ryder

Brig Gen K. F. Dawalt

BRIG GEN DAWALT served an earlier tour in Army Research and Development and was deputy director, Operations and Administration, Defense Atomic Support Agency, until given his new assignment. He is a 1936 graduate from the U.S. Military Academy and earlier attended DePauw University for three years.

From 1961 to 1963 he was commanding general of the 30th Artillery Brigade (AD) on Okinawa Island. Upon his return from a 3-year tour with the Defense Element of the U.S. Delegation to NATO in Paris (1957–60), he commanded the 2nd U.S. Army Missile Command at Fort Carson, Colo.

After graduating from the Army War College in 1954, he served a tour as an instructor and department director at the Army Command and General Staff College, Fort Leavenworth, Kans.

General Dawalt was commander, 999th Armored Field Artillery Battalion, 3rd Infantry Division, Fort Benning, Ga., and served with the Division when it was transferred to Korea in August 1950.

In February 1951, he organized and was the first commander of the 1st Republic of Korea Division Artillery (Provisional). He returned to the United States in September 1951 for assignment with the Research and Development Division, Office of Assistant Chief of Staff, G–4, Department of the Army.

Promoted to brigadier general in 1961, he holds the Silver Star, Legion of Merit and the Army Commendation Medal with Oak Leaf Cluster in addition to numerous U.S. and foreign service awards.

Aviation Materiel Labs To Stay at Fort Eustis

On Apr. 18, the Army Aviation Materiel Laboratories (AVLABS), Fort Eustis, Va., issued this announcement regarding a reported plan to relocate at Biggs Air Force Base, Tex.

"The Department of Defense has confirmed that an increased requirement by the Defense Language Institute [now located in Anacostia, Md., near Washington, D.C.] dictates that the majority of the physical resources at Biggs Air Force Base be made available for its expanded operation.

"For this reason, the U.S. Army Aviation Materiel Laboratories now located at Fort Eustis, Va., will remain at that station and will not relocate as previously announced. Further questions should be directed to the Assistant Secretary of Defense, Public Affairs."

Since the April Army Research and Development Newsmagazine *carried the news release regarding the proposed move to Biggs Air Force Base before the change in plans was announced, the editorial staff regrets any inconvenience that the article may have caused AVLABS personnel.*

Stearns Joins DDTI as Staff Assistant to Carlson

John F. Stearns, director of the National Referral Center for Science and Technology, Library of Congress, since it was established in 1962, has joined the staff of the Defense Director of Technical Information.

As staff assistant to Walter M. Carlson, the DDTI, Stearns takes into his new duties more than 13 years of experience in scientific and technical information work with Department of Defense agencies.

From 1958 to 1961 he was deputy director of the Armed Services Technical Information Agency (ASTIA), forerunner of the Defense Documentation Center. Then he was deputy director of the Office of Scientific and Technical Information, National Aeronautics and Space Administration, until he moved to the National Referral Center.

Mr. Stearns was a working newspaperman for 10 years and a magazine editor for several years before he joined the Technical Information and Intelligence Division, Air Research and Development Command, in 1952. He remained in that job until 1958.

President Nominates Maj Gen Bunker for Promotion

President Lyndon B. Johnson announced the nomination of Maj Gen William B. Bunker for promotion to lieutenant general Apr. 18. The nomination is subject to confirmation by the United States Senate.

General Bunker has served since April 1964 as deputy to Army Materiel Commanding General Frank S. Besson, Jr., after serving two years as AMC comptroller and director of programs.

Credited with an important role in developing the Army helicopter program, he was CG of the U.S. Army Transportation Materiel Command, St. Louis, Mo., from September 1955 to May 1962. In that capacity he was responsible for the management of logistical support of Army aviation.

Guthrie Succeeds Cowan as Developments Director

Promotion to brigadier general for John R. Guthrie, Mar. 25, followed closely his assignment as Director of Developments, Office of the Chief of Research and Development. He succeeded Brig Gen Alvin E. Cowan, who departed for service with the U.S. Army Element, Military Advisory Command, Viet Nam.

General Guthrie was prepared for his new responsibilities as a staff officer, Requirements and Development Division, J–5, Office of the Joint Chiefs of Staff in Washington, D.C., since July 1965, and with the Surface-to-Surface Missiles Division and the Missiles and Space Division, OCRD (1956–58).

During the OCRD tour, he was Army staff project officer for the launching of the U.S. and Free World's first artificial earth satellite, Explorer I. His next assignment was in the Office of the Secretary of the Army as military assistant, then as assistant executive for about a year.

Following graduation from the National War College in 1961, he was a staff officer with the Commander-in-Chief, Pacific, until February 1964. Then he was assigned to the 25th Infantry Division, USARPAC, as commanding officer, 25th Infantry Division Artillery, and later as CofS.

Other assignments include: commander, 602nd Field Artillery Battalion; S–3, 3rd Infantry Division Artillery, Far East Command; battery commander and later S–3 of the 39th Field Artillery Battalion at Fort Benning, Ga., and in Japan and Korea; instructor, Artillery and Guided Missile School, Fort Sill, Okla.

General Guthrie was graduated from Command and General Staff College in 1944 and assigned to the Office of the Assistant Chief of Staff/G2, War Department, Washington, D.C. He then served with the Joint Intelligence Center, Pacific

Brig Gen John R. Guthrie

Ocean Areas, and later was Special Security Representative to the Supreme Commander, Allied Forces, Japan. In October 1946 he was assigned to London, England, for three years as Assistant Military Attache.

Other assignments have included duty as assistant professor of Military Science and Tactics at Princeton University, ROTC, and instructor at the Field Artillery Replacement Training Center School, Fort Bragg, N.C.

He is a graduate of Blair Academy (1938), Blairstown, N.J.; Princeton University (1942); Field Artillery School, Battery Officers Course (1942); the Command and General Staff College (1944); and the National War College (1961).

General Guthrie holds the Legion of Merit, Bronze Star Medal with two Oak Leaf Clusters, Joint Service Commendation Medal, Army Commendation Medal and the Presidential Unit Citation (ROK).

TECOM Names Hubbard Air Materiel Test Head

Assignment of Col William H. Hubbard as director of air defense materiel testing was announced Apr. 12 by the U.S. Army Test and Evaluation Command, Aberdeen Proving Ground, Md.

As head of one of TECOM's eight testing directorates, he will be responsible for air defense weapons, weapons systems and allied equipment. TECOM functions through 16 proving grounds, service test boards, environmental centers and special test activities in the United States, Panama and Alaska.

Col Hubbard joined TECOM from Richards-Gebaur Air Force Base, Mo., where he commanded the 2nd Region, Army Air Defense Command.

Born in 1918 in Newport News, Va., he received his BS degree in industrial engineering from Virginia Polytechnic Institute in 1940 and was commissioned in the Coast Artillery.

During World War II, he served with antiaircraft artillery units in the United States and Southwest Pacific, participating in the Papua, New Guinea, East Indies and Southern Philippines campaigns.

He joined the Antiaircraft Artillery Board at Fort Bliss, Tex., in 1945. Graduated from the Antiaircraft Artillery and Guided Missile School in 1949, he served as antiaircraft artillery officer with First Army headquarters in New York until 1951 when he entered the Command and General Staff College.

In 1953 he took command of the 40th Antiaircraft Artillery Battalion in Germany, later serving as commander of the 8th Antiaircraft Artillery Group and executive officer of the 12th Artillery Group.

Returning to the U.S. in 1955, he joined the faculty of the CGSC and remained at Fort Leavenworth, Kans., until 1959. He was then assigned to headquarters, U.S. Army Continental Army Command, Fort Monroe, Va. He was named chief of staff of the 7th Logistical Command in Korea in 1962 and in 1964 became chief of staff, 2nd Region, ARADCOM. He assumed command of the Region in May 1965.

Col Hubbard's decorations include the Legion of Merit, Bronze Star Medal with V Device and the Army Commendation Medal.

Col William H. Hubbard

Dr. Thomas Will Keynote Power Sources Meeting

Dr. J. Tol Thomas, Director of Research and Laboratories, U.S. Army Materiel Command, will keynote the 20th annual Power Sources Conference, May 24–26, Atlantic City, N.J.

Approximately 300 representatives of Government and more than 900 from industry are expected to attend. The Army Electronics Command, Fort Monmouth, N.J., is sponsoring the conference jointly with the Interagency Advanced Power Group.

Dr. Thomas will speak at a banquet May 24. The Electronics Command will present a filmed 1965 ECOM R&D progress report May 25.

Sixty-seven technical papers are programed in five broad power-source categories: fuel cell battery systems, high energy density battery systems, secondary batteries, thermal and solar energy conversion, and power conditioning.

New MICOM Fluid System Controls Missile Roll Rate

Missile roll rate has been successfully controlled by a fluid amplification system developed by the Army Missile Command at Redstone Arsenal, Ala., using a Test Instrumentation Missile (TIM).

The missile flew approximately 20 seconds, reaching an altitude of 2,500 feet and traveling 7,000 feet downrange. Post-flight data analysis showed that the recent test met all objectives, Missile Command officials reported.

The fluid control system used in the TIM differs from conventional hydraulic and pneumatic controls in that it has no moving parts. A sensing device inside the missile detects any tendency for the missile to roll in flight and activates gas jets which divert pressure of the fluid flow to correct the roll and return the missile to normal position.

Missile Command scientists said development of an acceptable fluid-flow system would provide the Army with the simplest most economical and most durable control technique yet devised. The principle of fluid amplification control was developed originally by the Harry Diamond Laboratories, Washington, D.C., and has found widespread industrial application.

The TIM vehicle, which can be used repeatedly for tests, provides a realistic environment for components and systems considered for further development. After 10 to 20 seconds of flight, an on-board parachute recovery system is deployed to float the missile gently back to earth.

DCS Change Affects 4 Mid-East Stations

All Middle East elements of the Army's Strategic Communications Command have been reassigned to STRATCOM's European headquarters in a general consolidation.

Affected are four Army stations of the Defense Communications System (DCS): the STRATCOM facilities at Asmara; Ankara and Sinop, Turkey; and Tehran, Iran. Missions of the stations remain unchanged, and deactivation involves only the Mid-East headquarters element at Asmara, whose personnel and equipment have been relocated.

A new subcommand, STRATCOM-Italy, was created as an element of the European headquarters to handle all Army DCS operations south of the Alps. Lt Col Michael Ruggerio heads the new organization located at Camp Darby, Italy. STRATCOM-Italy controls all long lines systems in the South European sector, as well as troposcatter terminals at Camp Darby, Savona and in the Verona-Vincenza areas. Subelements include the STRATCOM facility at Leghorn, the 21st Signal Company, the 32nd Signal Detachment and the Automatic Voice Network Switch near Pisa.

STRATCOM, headed by Maj Gen R. J. Meyer, is the Army's manager for worldwide strategic communications and has other subcommands in the Pacific, South America and the U.S. STRATCOM-Europe is headed by Brig Gen Walter B. Bess and is located near Heidelberg, Germany.

Col Mantz Takes Command of Natick Laboratories

Nominated for promotion to brigadier general, Col William M. Mantz has assumed duties as commanding officer of the U.S. Army Natick (Mass.) Laboratories. Until recently he was commander of the Support Command, U.S. Army Alaska.

Most of his assignments since he entered Army service in 1940 have been with the Quartermaster Corps and in research and development activities. From 1960 to 1962 he was chief of the Research and Engineering Division, Office of the Quartermaster General, and then became director, Materiel Readiness, U.S. Army Mobility Command, Detroit, Mich.

Col William M. Mantz

Following a 3-year tour in the Office of the Assistant Secretary of Defense for Research and Engineering in Washington, D.C., he was assigned to Korea in 1959 as chief, G–4 Operations, Headquarters Eighth Army. Later he was chief, Operations and Intelligence, 7th Logistical Command.

Other assignments include: Research Division, OQMG, Washington, D.C. (1950–52); chief, Supply Division, Office of the Quartermaster, Sixth Army, Presidio, San Francisco, Calif. (1945–47); Quartermaster supply officer, 116th QM Regiment, 41st Infantry Division, and later assistant Division chief of staff (1942–45).

Col Mantz received a BA degree from Whitman College, Walla Walla, Wash., and did graduate work in biology, public health and biophysics at the University of Minnesota, University of Michigan and the University of California at Berkeley. He earned an MBA degree in 1962 from George Washington University, Washington.

In 1959 he was graduated from the Industrial College of the Armed Forces, Washington, D.C. He is also a graduate of the short course of the Army Command and General Staff College.

Promotion to brigadier general is expected this month or in July.

Natick Laboratories Report on 92 Research Tasks of 1965

Ninety-two research tasks during 1965 are summarized in the tenth annual report of the Pioneering Research Division, Natick (Mass.) Laboratories.

Distributed early in March, the report outlines the accomplishments and activities of the Pioneering Research Division in basic research in biology, chemistry, physics and psychology. Applied research is reported in microbiology, insect and rodent control, and psychology.

Additional activities reported include operation of the Natick solar furnace, operations of the Food Acceptance Laboratory, work in organic syntheses, analysis of diethyl-m-toluamide, mass spectral service analyses, Clothing and Organic Materials Division analyses, Organic Chemistry Laboratory analyses, and Cold Regions Research Laboratories analyses.

Listed in the appendixes are members of the research staff in their fields of specialty and academic affiliations; also, visiting scientists and their academic affiliations, along with members of consultant and advisory committees. Publications, presentations at scientific meetings and patents involving members of the Pioneering Research Division during 1965 also are listed, along with seminar activities.

Bayer Heads R&D Directorate at AMC

Brig Gen Kenneth H. Bayer was advanced to Director of Research and Development, U.S. Army Materiel Command, to succeed Maj Gen William C. Gribble, Jr., effective Apr. 4, after serving since September 1964 as Deputy Director of Research and Development (Operations).

General Bayer served with the 7th Infantry Division in Korea following graduation from the National War College in June 1963, and in August was promoted to brigadier general. Upon his return from Korea, he commanded III Corps Artillery at Fort Chaffee, Ark., until reassigned to the Army Materiel Command.

From July 1960 until August 1962, he was assistant executive to the Secretary of the Army; from July 1958 to July 1960, he was assigned to the Office of the Chief of Research and Development in Washington, D.C., serving as executive and then chief of the Air Defense Division.

Much of his career has been in Artillery assignments, including continuous duty from October 1949 to January 1958. During this period, he served as chief of the Weapons Systems Section, Antiaircraft and Guided Missile School, Fort Bliss, Tex. Later he was acting G–3, then deputy chief of staff for Operations at the Air Defense Center. He also served with the 60th Antiaircraft Artillery Bn (Light) (75mm) (Mobile), U.S. Army Europe.

Brig Gen K. H. Bayer

During World War II, General Bayer served in the Pacific Theater as military operations officer, Staff Amphibious Group 1, and in the same capacity later with Group 8 until he became assistant G–1, Armed Forces Middle Pacific.

After attending the University of Pennsylvania for two years, he received an MS degree in electrical engineering in 1949. His BS degree in 1940 was from the University of Alabama and he was commissioned in Artillery as a distinguished military graduate in July 1940. General Bayer is also a graduate of the Armed Forces Staff College (1958).

He was born in New York City Apr. 16, 1918.

R&D Leaders Attend Rites for Gen Cone

When Maj Gen John M. Cone was laid to rest Apr. 4 in Arlington (Va.) National Cemetery, with full military honors, General Frank S. Besson, Jr., CG of the U.S. Army Materiel Command, and many of the Nation's R&D leaders paid him final honors.

General Cone was CG of the White Sands (N. Mex.) Missile Range at the time of death. He had served since August 1965, following a tour as director of Quality Assurance, Army Materiel Command, Washington, D.C.

The 51-year-old general suffered a heart attack when he stopped to aid victims of an auto accident while returning to White Sands from a speaking engagement in El Paso, Tex.

His 32-year military career started when he enlisted as a private; he was graduated from the United States Military Academy in 1937.

General Cone spent the majority of his military career in Ordnance Corps assignments. He commanded both the Detroit Ordnance District and the Anniston Ordnance Depot in Alabama.

Ordnance assignments with the IX Tactical Air Command and the Ninth Air Force highlighted his career during World War II. He served in France, Belgium, Holland and Germany from 1943 to 1947.

In June 1956, General Cone was named Ordnance Officer for the U.S. Army in Japan. He returned to the United States to take command of the Anniston Depot and then was assigned to the Office of the Chief of Ordnance in Washington, D.C. He later became chief of the Plans and Programs Division of that office.

Brown Named Communication-Electronics Deputy

Brig Gen Harold McD. Brown took over duties Apr. 1 as deputy chief of Communications-Electronics, Department of the Army.

Commanding general of the U.S. Army Signal Center and commandant, Army Signal School at Fort Monmouth, N.J., until reassigned, he succeeds Brig Gen Lawrence P. Jacobs, who retired to become executive director of the American Society of Photogrammetry, Falls Church, Va.

General Brown, a 1937 U.S. Military Academy graduate, served three years (1958–61) as commanding officer of the U.S. Army Signal R&D Laboratory at Fort Monmouth. Under his command, the Laboratory played a lead role in the successful Score, Vanguard II, Tiros I and Courier satellite launchings.

Brig Gen H. McD. Brown

Other recent major assignments include signal officer, headquarters, U.S. Army, Europe (July 1961–May 1964); chief, Electronics Warfare Department, U.S. Army Electronic Proving Ground, Fort Huachuca, Ariz. (July 1955–February 1958); Office, Secretary of Defense, Munitions Board, Washington, D.C. (June 1953–July 1954).

From October 1941 to May 1944 the general served with the Signal Intelligence Service in the Office of the Chief Signal Officer (OCSigO), Washington, D.C. He was reassigned to OCSigO from 1949 to 1951, and from July 1951 to May 1953.

He also served with the U.S. Army, Pacific (1946–49); Headquarters, First Army, Fort Bragg, N.C.; Fort Jay, Governor's Island, N.Y. (1945–46); and with the 61st Signal Battalion, Camp Shelby, Miss., and Camp Chaffee, Ark. (1944–45).

General Brown is a graduate of the Army War College (1955), the Armed Forces Staff College (1951) and the Command and General Staff School (1944).

He is a senior member of the Institute of Electrical and Electronic Engineers, the American Radio Relay League, the Armed Forces Communication and Electronics Assn., Association of the U.S. Army and the Photographic Society of America.

Army Aviation's Role in Asia Spurs R&D of Light Armor

Requirements for new lightweight armor systems for aircraft and aircrews are getting closer research and development scrutiny as Army Aviation's role in the Southeast Asia conflict grows in importance.

A number of Army Materiel Command agencies, working with the Army Aviation Materiel Laboratories, have been substantially involved in the advancement of materiel technology, including an on-site study in Viet Nam, to accelerate the use of aircraft armor deemed impractical two years ago.

Aircraft vulnerability assessment resources of the Army Ballistic Research Laboratories at Aberdeen Proving Ground, Md., plus the findings of the Army Material Research Agency, Watertown, Mass., and the Natick (Mass.) Laboratories, have contributed to the recent rapid development of aircraft armor.

Research was begun in 1962 at Fort Eustis, Va., by the Army Aviation Materiel Laboratories (AVLABS) to reduce the weight of armor to provide some protection for aircraft and aircrews without excessively diminishing aircraft performance.

The first concept resulting from this research was a fiberglass material used as a "catching" device with perforated steel as a front material to angle the projectile sideways, thus lessening its capability to penetrate armor.

Ceramic composites developed since then have eliminated the need to tip the projectile at an angle to decrease penetrating power, permitting further reduction in armor weight.

More recently, the Aviation Materiel Command (AVCOM) initiated a priority program to develop further ballistic protection systems for all Army aircraft. These systems range from limited protection of about 60 pounds on the OH–13 to more than 2,000 pounds on some of the larger aircraft.

Armor seats, kits or component protection systems have been produced in quantity for such aircraft as the UH–1 series, OV–1, CH–47, CV–2, O–1, CH–37, OH–13, OH–23, CH–21 and the CH–34. Efforts are now underway to develop similar systems for the OH–6, U–1, U–6 and CH–54.

Some of these aircraft may not be Viet Nam at present. However, the R&D community supporting Army Aviation is stressing rapid response to any requirements which may arise with the increasing use of Army aircraft in Viet Nam.

Much of the current work in aircraft armor systems is the result of an extensive on-the-scene study in Southeast Asia by an AVCOM team early last year. Headed by Col Murray E. Manley, director of research, development and engineering at AVCOM, the team visited all Army aviation units in South Viet Nam. Combat personnel were interviewed and assisted in evaluating the existing armor.

AVCOM is developing an armored crash-resistant aircrew seat for the UH–1 series aircraft and ballistic protection continues to be a major objective. Specialists also are exploring means of reducing injuries and fatalities resulting from crashes or abnormally rough landings.

Substantial results expected from this project before the end of this fiscal year may lead to a load-attenuation technique that will permit survival at impact loads well in excess of 25 G's.

A development contract awarded recently to the Defense Technology Laboratories of the FMC Corp., San Jose, Calif., requires evaluation of all facets of aircraft protection; also, to establish sound principles of providing the best ballistic protection for the various Army aircraft within respective weight limits and mission requirements.

The Norton Co. of Worchester, Mass., has been awarded a contract to increase the firm's capability of producing boron carbide as an armor material.

Army Aviation R&D specialists assert that, without question, further modifications in armor materials aimed at decreased weight and improved effectiveness will reduce the vulnerability of aircraft and aircrews against enemy ground fire.

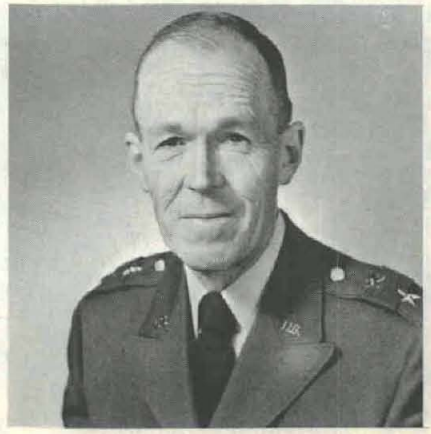
(CREDIT: *Most of the material for this article was submitted by Richard E. Browning, Directorate of Research, Development and Engineering, U.S. Army Aviation Materiel Command.*)

Honeycutt Takes DASA Command at Sandia

Maj Gen John T. Honeycutt succeeded Rear Adm Ralph C. Johnson as commander of the Defense Atomic Support Agency Field Command at Sandia Base, N. Mex., and deputy director of DASA, effective Apr. 21.

From June 1963 until reassigned to his new duties, General Honeycutt was in Paris as assistant chief of staff (Programs) at Supreme Headquarters, Allied Powers, Europe.

The Field Command at Sandia Base is a major subordinate element of the oldest joint services agency of the Department of Defense. General Honycutt, as commander, will be responsible to DASA Director Lt Gen H. C. Donnelly, U.S. Air Force, for supervision of the National Stockpile Sites located in various parts of the U.S. He will also implement DASA responsibilities in nuclear weapons training and logistics.



Maj Gen John T. Honeycutt

A 1933 graduate of the U.S. Military Academy, General Honeycutt was promoted to brigadier general in 1958. After completing the Senior Artillery Officer's Course at the Army Air Defense School, Fort Bliss, Tex., he was commander of the 47th Artillery Brigade (Air Defense) at Fort MacArthur, Calif., from November 1958 to July 1961. The Brigade included 16 Nike guided missile sites. His next assignment was commanding general, Fifth Region ARADCOM, Fort Sheridan, Ill.

The General is the son of the late Brig Gen Francis W. Honeycutt, Class of 1904, USMA. Both of his grandfathers were graduates of the Academy—John T. Honeycutt, Class of 1874, and Millard F. Harmon, Class of 1880.

General Honeycutt was a mathematics instructor at the Military Academy from June 1946 to August 1950. After completing the National War College course in June 1955, he was instructor and later director of the Plans and Operations Division, Armed Forces Staff College, from June 1955 to May 1957.

Army Officer Education, Training System Report Submitted for Staffing

Recommendations of a study group established in June 1965 to examine the Army system for education and training of officers through 1975 have been announced by the Department of Defense.

As the first comprehensive review of the adequacy of the Army officer education system since 1958, the 7½-month study examined some 70 officers service schools and colleges and civilian and industrial institutions.

The report has been distributed for staffing within the Army and copies have been delivered to the other Armed Services for information. Until approved by the Department of the Army, it will not constitute either policy or plans.

The board headed by Lt Gen Ralph E. Haines, Jr., commanding general, III Corps, Fort Hood, Tex., was charged with recommending changes in the system's direction, structure and operation to meet the requirements of a progressive Army.

In the area of officer procurement and retention, the board recommended that the period of obligated service for non-Regular officers (except doctors and dentists) be increased from two to three years; and the period of Regular Army officers (except U.S. Military Academy graduates who currently are obligated to serve four years) be increased from three to four years.

The board found that 86 percent of the Regular Army officers now have college degrees and recommended that the Army set a goal of 100 percent. Modifications were proposed in the missions and objectives of the career schools to prepare Army officers for their future assignments and experiences. The modified courses will be focused on a specific goal and Army organizational level.

The board proposed greater use of extension or correspondence courses, replacing associate courses with a new type mobilization course for certain categories of officers.

Use of electives at various levels of career courses is advocated for intellectual challenge, diversity, and an opportunity for study in depth in certain areas.

Proposals include the establishment of formal officer specialist programs in the following areas: comptroller, systems analysis and automatic data processing.

The board proposes collocating some school and training activities to combine educational and training functions where similarity of school functions and compatibility of educational courses and disciplines exist.

The board's findings are intended to guide the officer education and training system for Army officers of all branches, from the time of commissioning until retirement, at service schools, service colleges and civilian educational, commercial and industrial institutions.

The proposed changes would provide an Army officer with the progressive education and training required to operate in the current and projected world and Defense environment. The board considered rapid technological advances of recent years and military requirements for all levels of conflict.

In industry and in the civilian educational community, the military academic image was found to be favorable. Adjustments proposed by the board are minor when compared to the whole system, which is considered basically sound and effective.

AMC Selects Brig Gen Free as Deputy Director of R&D

Reassigned as Deputy Director of Research and Development, U.S. Army Materiel Command, Brig Gen Richard H. Free is scheduled to report June 1 for his new duties at AMC Headquarters in Washington, D.C.

Currently assigned as Army Southwestern Division Engineer at Dallas, Tex., General Free is completing a 3-year tour in that position after serving as district engineer at Norfolk, Va., for three years.

After attending the Industrial College of the Armed Forces in Washington, D.C., he was assigned in 1959 to Supreme Headquarters, Allied Powers, Europe (SHAPE). He served as executive to General Lauris Norstad, Supreme Allied Commander.

In World War II, he served through four campaigns in Europe as commander of the 101st Engineer Combat Battalion. When the Korean War broke out, he returned to duty as battalion and later group commander of combat engineer units in Korea. He wears both the Silver and Bronze Stars.

Other assignments include: Intelligence officer in the Manhattan Engineer District, Washington, D.C. (1946–47); group commander, Armed Forces Special Weapons Project, Albuquerque, N. Mex. (1948–52); and executive secretary, Military Liaison Committee, Office of the Assistant Secretary of Defense for Atomic Energy (1955–58).

Graduated from the United States Military Academy in 1940, he received a master's degree in engineering from Cornell University in 1948. He is a native of Davenport, Iowa.

Brig Gen Richard H. Free

19 Countries Represented At AFIP Lecture Series

Nineteen countries were represented by more than 300 medical specialists at the sixth annual lecture series of the Armed Forces Institute of Pathology (AFIP) at Walter Reed Army Medical Center, Washington, D.C.

Brig Gen Joe M. Blumberg, MC, director of AFIP, and the Institute's 75-member faculty and staff, representing the Army, Navy, Air Force and the U.S. Public Health Service, presented the lectures.

The 5-day series ending Apr. 1 was opened by General Blumberg, speaking on "The Role of the AFIP in Pathology." He reviewed accomplishments of the AFIP during the past year. Dr. Elson B. Helwig, chief of the Institute's Department of Pathology, lectured on "Nodose Lesions of the Lower Extremities" and served as director of the series.

The lectures are designed to give practicing pathologists a concise review of the latest developments at the AFIP, in advance of publication in medical journals.

Discussion included benign and malignant tumors, techniques in bacteriology, chemistry, histochemistry, toxicology, immunology, parasitology, hematology, injuries by aircraft and auto accidents, effects of drugs on the body and electron microscopy. Several technical films were shown.

The AFIP began in 1862 as the Army Medical Museum. It became a jointly staffed tri-service organization in 1949.

Army Orders Huey Cobra to Replace UH-1B

Forward area replacement of the armed UH–1B Iroquois helicopter by an improved high-speed "aerial weapons platform," the UH–1H Huey Cobra, has been ordered by the Army.

Possessing greater range, speed (over 200 knots an hour) and weapons payload than the UH–1B, the Cobra serves the Army's immediate need for an armed rotary-winged aircraft that can be supplied quickly and deployed directly from the production line to field units with minimal pilot and maintenance personnel training. The first deliveries are expected in mid-1967.

With the same transmission, engine and rotor system of the UH–1B in a streamlined fuselage that gives greater performance and maneuverability, the Cobra will permit maximum use of on-site spare parts in Viet Nam operations. It will serve as the Army's interim armed helicopter until the Advanced Aerial Fire Support System (AAFSS) is available to escort troop-carrying helicopters and provide suppressive fires in the landing zones to support airmobile operations.

The "B" model Iroquois was first used in 1961 as a troop transport and was replaced in 1963 by the UH–1D. The UH–1B was converted as an armed helicopter.

Bell Helicopter Co. describes the Huey Cobra as "the world's first helicopter developed as an aerial weapons platform." The prototype achieved sustained level flight speeds of 200 m.p.h. in company tests. The Cobra broke the 180.1 m.p.h. record set in 1964 by the UH–1D Iroquois for the same helicopter weight class.

Demonstrated last September for the first time since prototype development, the 2-man crew Cobra has since been flown extensively by military and company pilots in rigorous test and evaluation programs.

Basic armament is a flexible turret containing a high-rate-of-fire minigun. Other ordnance which can be installed includes automatic grenade launchers and aerial rockets which can be launched from hard points on the stub wings of the improved aircraft.

Comparing the capabilities of the UH–1H Cobra versus the UH–1B on a 50-nautical-mile mission, a Bell vice president said the Cobra can reach the objective in about half the time, deliver twice the firepower, operate in the area for three times as long, and provide substantially improved protection for the aircraft and crew.

STREAMLINED retracted gear and stub wings improve the speed and maneuverability of the Huey Cobra helicopters the U.S. Army plans to buy as replacements for the UH–1Bs now in Viet Nam. (Bell photo.)

Donley Commands Land Combat Systems

Brig Gen Edwin L. Donley was promoted to that rank Apr. 1 when he took command of Land Combat Systems at the U.S. Army Missile Command, Redstone Arsenal, Ala.

Until reassigned, he was project manager for the Pershing missile system, for which he was awarded the Legion of Merit.

Graduated from the U.S. Naval Academy with a BS degree in engineering in 1940, he has an MBA degree in industrial management from the University of Michigan. He received a Reserve commission and entered the Army in 1941 in the Industrial Division, Office of the Chief of Ordnance.

Brig Gen Edwin L. Donley

During World War II, he served with the 76th Infantry Division in the European Theater, winning the Bronze Star Medal. Since the war he has served a 3-year tour as Ordnance officer with the U.S. Army, Caribbean Area; spent a year on loan to the State Department in the Office, Foreign Liquidation Commission; had two tours totaling six years with the Office, Chief of Ordnance, in Washington, D.C.; and served as executive and deputy commander at Picatinny Arsenal, N.J.

More recently he was with the Korean Military Advisory Group as senior supply and maintenance adviser to the deputy chief of staff (logistics), Republic of Korea Army.

He finished the Command and General Staff College in 1943, the Ordnance School in 1946 and Industrial College of the Armed Forces in 1961.

Army Awards $12.7 Million For Development of AAFSS

Ten prototype AAFSS multiweapon, high-speed Army helicopters will be manufactured and tested under a $12.7 million contract.

The Army recently awarded this amount to Lockheed Aircraft Corp. as an initial increment of a fixed-price cost-incentive contract to expedite engineering development of the Advanced Aerial Fire Support System (AAFSS). The system will have an all-weather, day-and-night operational capability.

All test activities through engineering and service testing are included in the contract to develop the first high-speed (over 200 knots an hour) helicopters designed exclusively as weapons vehicles.

The helicopter will be powered by the 3,400-horsepower T–64–12 gas turbine engine developed by the General Electric Co., Lynn, Mass.

Major subcontractors to Lockheed are: Hamilton-Standard Co., a division of United Aircraft, Windsor Locks, Conn., for the pusher propeller; Steel Products Engineering Co., division of Kelsey Hayes Corp., Springfield, Ohio, transmission; Emerson Electric Co., St. Louis, Mo., armaments systems; and Parsons Corp., Traverse City, Mich., rotor blades.

The system is managed by the Army Materiel Command, Washington, D.C., with Col Lewis W. Leeney as project manager.

TTC Testing Night-Landing Light for Helicopters

Night landings of helicopters in restricted areas may be made more safely if a 26-pound, tricolored projection system passes environmental tests in progress at the U.S. Army Tropic Test Center, Panama Canal Zone.

The Glide Angle Indicator Light (GAIL) furnishes a continuous beam of separate amber, red and green signal lights. Amber indicates that the aircraft is too high, red that it is coming in too low, and green that the desired approach is obstacle-free.

Developed by the U.S. Army Night Vision Laboratory, Fort Belvoir, Va., the light can be carried by a parachutist in a jump or can be air-dropped separately in a container. It is designed for use alone, or in conjunction with regular landing, parking and marking lights.

The system consists of an incandescent light source, a battery, a reflector, filters, projection lens, horizontal- and vertical-scale indicators and a leveling mechanism.

In addition, it contains an open-sighting facility to permit positive visual alignment of the center of the lower limit of the red beam on any desired vertical setting; a rheostat to vary the lamp intensity; and a voltage-regulating circuit.

Engineering and service tests have already been conducted on GAIL in the Continental United States by Development and Proof Services and the U.S. Army Airborne Electronics and Special Warfare Board.

The current tests include simulated field operations and 12 months storage in normal humidity and temperatures encountered in the tropics. During intervals, it will be tested to determine performance, reliability, durability and safety.

The tests are being conducted by the Center with the operational support of the 8th Special Forces Group (Airborne), Fort Gulick; and the Staff Aviation Detachment, an element of the U.S. Army Forces Southern Command.

The U.S. Army Meteorological Team (RDT&E Support) is furnishing required readings in temperature, relative humidity, precipitation, visibility and cloud cover.

Army Nominates Seven For Rockefeller Awards

(*Continued from page 7*)

In 1965, the letter of commendation states, he "was instrumental in bringing about formation of a committee to study movement within the Continental U.S. of nuclear or fission materials other than weapons. The committee developed information on dynamics of transportation accidents and provided a common denominator of understanding to legislators, administrators, and regulators, as well as designers, users and transportation carriers."

Serving as the principal Department of Defense congressional witness on the Federal Aid Highway Program, he was credited with being a major architect of national policy which resulted in increased vertical clearance of highway structures to accommodate future vehicular loads, military and civilian.

The nomination commends him for a "succession of accomplishments benefiting both the Nation's defense and its civil economy."

JAMES A. ROBBINS' work as deputy chief, U.S. Army Audit Agency, has won him the Department of the Army Meritorious Civilian Service and the Exceptional Civilian Service Awards.

As the highest ranking civilian in "one of the largest auditing organizations of its type in the world," he is responsible for working with the highest management levels in the Department of Defense, Department of the Army and other Government agencies on problems of Army-wide scope and importance.

The nomination states that he "has demonstrated throughout his service with the Department of the Army leadership qualities of the highest order." The training program developed under his leadership won a Presidential Citation for the U.S. Army Audit Agency.

(*Continued on page 27*)

AAFSS Group Visits Army Arctic Test Center

Industrial and Army project team members for the Advanced Aerial Fire Support System (AAFSS) recently observed problems presented by extreme cold at the Army Arctic Test Center, Fort Greely, Alaska.

To get first-hand knowledge of how it feels to maneuver in frigid conditions, a 5-man team from Lockheed Aircraft Corp., Burbank, Calif., became the first contractor representatives to accept the Army Test and Evaluation Command's blanket invitation to visit environmental test centers.

Dressed in the bulky protective clothing necessary at the Arctic Test Center, the Lockheed engineers and designers were able to gain a practical understanding of factors that must be considered in developing a new compound helicopter for the AAFSS.

AAFSS INDUSTRIAL TEAM visits the Army Arctic Test Center, Fort Greely, Alaska, to learn about problems confronting personnel and materiel in extreme cold. Lockheed Aircraft Corp. staff members from Burbank, Calif., are Oscar A. Knussi, assistant AAFSS project engineer; Glen Sanderson, assistant project manager; John L. Crigler, marketing engineer; Thomas C. George, flight test engineer, and Alvin B. Stacey, maintainability task leader.

Armed with a variety of weapons for ground targets under extremes of environmental conditions, the new helicopter will couple the fixed-wing horizontal thrust of the airplane with rotary-wing and vertical-lift capabilities.

Combat missions for which the AAFSS is intended are now handled by the UH–1B Iroquois, a converted troop carrier. (The Army recently announced plans to purchase the Bell UH–1H Huey Cobra, an interim high-speed armed helicopter designed as an aerial weapons platform.) (See page 14.)

The Arctic Test Center is about 100 miles southeast of Fairbanks. Temperatures may plunge to 50 below for sustained periods. Plastics and metals become brittle and inflexible in this cold. Ordinary lubricants will not flow. Automotive tires develop flat spots when left standing and will actually shatter when moved.

The California visitors received a warm welcome and a chilly exposure simulateneously. Set down in the snowy foothills of the Alaskan Range, they were shown the need for extensive survival gear carried in aircraft flying in the Arctic. Indoctrinated in the use of snowshoes, they learned the difficulty of moving about in bulky garments.

The Army demonstrated basic problems of cold-weather activity:

- The soldier's clothing and personal equipment must be improved constantly so that he may survive and perform his duties.
- Materiel must be refined to enable men and equipment to function together in cold weather.
- Materiel must be designed and adapted for dependable operation.

The AAFSS development team agreed that the week-long visit had provided new perspectives for planning necessary to produce the new helicopter.

Lt Col S. S. Day

Lt Col R. H. Hurst

Lt Col D. W. Pettigrew

Lt Col L. D. Carter

4 OCRD Staff Assignments Announced

Newcomers assigned to the Office of the Chief of Research and Development at Pentagon headquarters and the Army Research Office include:

LT COL ROBERT H. HURST, assigned as chief, Plans Branch, Research Plans Office, Army Research Office. He served as an R&D officer with the U.S. Continental Army Command (1960–62) and in 1948–49 was aide to Lt Gen Arthur G. Trudeau (USA, Ret.), former Chief of Research and Development.

Graduated from the United States Military Academy in 1944, he earned a bachelor's degree in aeronautical engineering from Mississippi State University in 1959. That same year he completed the Command and General Staff College course.

Trained as an aviation instructor, with a number of assignments in this field, he served as a pilot during the Korean War. In World War II, he was with the 10th Mountain Division in Italy. Recent assignments: G–3, U.S. Army Pacific, 1962–63 and again from 1964–65; 26th Aviation Bn., 1963–64.

Lt Col Hurst has been decorated with the Bronze Star, Air Medal (2 OLCs), and the Purple Heart.

LT COL D. W. PETTIGREW, Jr., assigned as staff officer, Air Defense and Missiles Division. He was chief, U.S. Military Mission to Mali, 1964–66, and a branch and division chief in J–5 (Systems Development Directorate), NORAD HQ, 1962–64.

In 1940, he received a degree in business administration from Hendrix College in Arkansas and was graduated from the U.S. Military Academy with a degree in engineering in 1944. He earned an MS degree in aeronautics and guided missiles from the University of Southern California in 1949.

After completing the Artillery Advanced Course at Fort Sill, Okla., he remained as a missile test officer with the Field Artillery Board from 1953 to 1956. He also served as an instructor at the Guided Missiles School at Fort Bliss, Tex., from 1949 to 1952.

Lt Col Pettigrew was executive and commanding officer, Hercules Missile Battalion, 1957–59, and senior adviser, Viet Nam National Military Academy, 1960–62. His decorations include the Army Commendation Medal and Joint Staff Commendation Medal.

LT COL LESLIE D. CARTER, Jr., is assigned to the Foreign Developments Branch of the International Office. He received an MA degree in political science from Tulane University in 1965 and is a 1948 graduate of the U.S. Military Academy. He also has completed the Infantry School basic and advanced courses and in 1961 was graduated from the Command and General Staff College.

His assignments include: 508th Airborne Infantry Regiment, Fort Benning, Ga. (1953); ROTC, Western Maryland College (1954–56); MAAG, Viet Nam (1956–57); Headquarters Co., 18th Airborne Corps, Fort Bragg, N.C. (1957–60); Office, Chief of Staff, G–4, USARPAC, Hawaii (1961–64).

LT COL SETH S. DAY, R&D coordinator, Nike X-Space Division, is a graduate from the U.S. Military Academy (1949), Command and General Staff College (1963), and the Armed Forces Staff College (1966). He received an MA degree in mechanical engineering from the University of Arizona in 1965.

During the Korean War, he was awarded the Order of St. Andrew (Greek) for his service as a forward observer with the 77th Field Artillery Battalion, 1st Cavalry Division. He later served with the 510th Field Artillery Battalion in Austria and Germany.

Lt Col Day assisted in the organization of the Air Defense Combat Developments Command at Fort Bliss, Tex., where he also was assigned as a nuclear weapons instructor and as a division chief, Research and Analysis, Air Defense School.

Incentive Awards Program Change Benefits Military

Military personnel are now eligible for cash awards up to $25,000 on the same basis as civilians for suggestions, inventions and scientific achievements through the Incentive Awards Program.

Published as Change 4 to Army Regulation 672–301, the new guidelines are in consonance with legislation signed by President Johnson Sept. 22, 1965. Payment of the awards from appropriated funds to all military personnel as well as civilian employees is authorized.

AR 672–301 states that all cash awards will be financed from funds locally available for operating the installation, command or equivalent organization of the commander who approves or, in a case which requires approval above the installation level, recommends the award.

An exception will apply for industrially funded activities. Awards will be charged as an operating expense of the industrial fund activity which approves or recommends the award.

Processing of suggestions, invention disclosures and recommendations for awards for scientific achievements under the provisions of the new authority will continue as prescribed in AR 672–301 and Section 12, Civilian Personnel Procedures Manual No. 1.

DCSPR, Department of the Army (Attention: Incentive Awards Branch, OCP) must be furnished a copy of all adopted suggestions submitted by military personnel and approved recommendations for awards for scientific achievements by military personnel, awarded $250 or over, together with a brief biography of the awardee.

NATO Scientists, Engineers to Discuss Design Problems

Scientists and engineers from 14 nations and 9 agencies of NATO will discuss problems in design and analysis of military field experiments, May 23-27, in Rome, Italy.

The meeting of the NATO Advisory Panel on Operational Research will draw approximately 175 participants, including at least 15 from the Army R&D community. Dr. Kenneth L. Yudowitch of Data Dynamics, Inc., Washington, D.C., is general director of the conference.

Presentations of 21 technical papers will be in English and French, with simultaneous translation to French, English and Italian. Full texts will be distributed to conferees.

Among those presenting papers are Drs. William Pettijohn and A. V. Fend of the Stanford Research Institute Research Office, Experimentation Command of the Army Combat Developments Command, Fort Ord, Calif. Dr. Pettijohn's topic is "Instrumentation for Army Combat Developments Experimentation." Dr. Fend's paper will present some of the results of an analysis of sequences of miss-distance data obtained from live-fire experiments conducted by the CDCEC during 1964–1965. ("An Analysis of Miss-Distance Data from Certain Visually Controlled AA Weapons.")

John Bernens of the Combat Operations Research Group (CORG), Fort Belvoir, Va., will chair the session on "Field Instrumentation," with Dr. William Walton of the Research Analysis Corp. (RAC) Field Office, Headquarters Seventh Army (G–3) at Stuttgart, Germany, serving as discussion leader.

Early registrants for the Rome sessions include Brig Gen Charles J. Girard, deputy chief of staff (data systems), Seventh Army. The RAC Field Office, Europe, also will be represented by analysts Arthur Woods and Eugene Visco. Other representatives will be Col William Vail, Jr., and, Col Ben Harvey, Jr., Combat Developments Command, Fort Belvoir; Dr. Frank J. Harris, J. William Hazell and Henry C. Alberts, all of SRI-CDCEC; and Ben S. Goodwin of the Army Test and Evaluation Command, Aberdeen, Md.

ECOM Crystals Research Emphasizes Sanitation

Extremely precise research requires sanitation standards to eliminate dust and foreign particles down to half a micron in size—or about 200 times smaller than the cross-section of a human hair—in a new "clean room" at the U.S. Army Electronics Command, Fort Monmouth, N.J. Even ordinary pencils are too grimy for recording data.

Located in the Hexagon Building, the room is a facility of the Piezoelectric Crystal and Circuitry Branch, Electronic Components Laboratory.

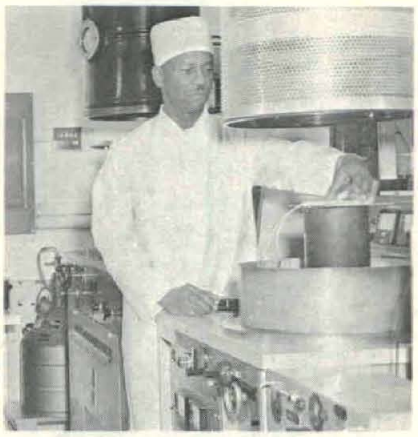
Elimination of microscopic dust and and other foreign particles is essential during final processing and protective sealing of widely used quartz crystals are used in advanced combat radios and related equipment which must remain precisely set on the desired frequency for long periods of time.

The dust-free workroom is valuable also for research to improve the reflecting and transmitting qualities of optical components for Lasers, facsimile equipment, combat surveillance systems and other devices.

Personnel using the 20- by 28-foot room must pass through an entry chamber where they put on spotless white robes, dustcaps, and footgear. Among taboos are smoking, food and drink, paper tissues, keys, earrings, bracelets, handbags, newspapers, books, magazines, sandpaper, files—and common colds.

For transcribing information lint-free paper and ballpoint pens are used. The invisible flakes from a pencil point would produce unwanted contamination.

An electronic filter and particle counter operate constantly. Pressurized air drives away bits of dust that might try to float in while one of the double set of entry-room doors is opened briefly.



"SCIENCE SANCTUM" room, free of dust particles down to 200 times smaller than the diameter of a hair, is used for research at the Electronics Command, Fort Monmouth, N.J. William Washington checks a particle counter for readings of purity of air.

CDEC Testing Missile System With Hawk Unit Assistance

Capabilities of forward area radar-controlled air defense weapons to acquire, engage and destroy representative types of Army aircraft are being examined at the U.S. Army Combat Developments Command Experimentation Command's Hunter Liggett Military Reservation.

The two weapons being tested in the experiment are a radar-controlled gun system and the low-level, surface-to-air missile system represented by the U.S. Hawk Air Defense Missile System.

Aircraft being used in the experiment, which will continue through May, include the Army's Caribou, Mohawk, UH–1B helicopter, the Light Observation helicopter and the big Chinook CH–47 helicopter.

A Hawk Unit—Battery D, 8th Battalion, 7th Artillery—from Fort Bliss, Tex., provided the surface-to-air system, complete with personnel, including seven officers and 81 men. The Unit is commanded by 1st Lt Gentry W. Politte.

The Fort Bliss Unit has previously assisted in several major exercises including joint exercise "Swift Strike III" in South Carolina, and "Exercise Project Team" in the North and South Carolina Maneuvers District.

'Silent Power' Turbine Unit Undergoes ERDL Evaluation

"Silent power" of a 3-kilowatt turbine unit is being evaluated by the Army Engineer R&D Laboratories (ERDL), Fort Belvoir, Va., for possible use in forward areas.

The experimental mercury Rankine cycle power unit—inaudible at 100 meters—is one of three power sources with low-noise characteristics being investigated by ERDL.

The Rankine system consists of a burner, a mercury preheater and boiler, a mercury vapor turbine, air-cooled condenser, mercury-feed pump and controls. Production units would weigh less than 200 pounds.

The turbine is designed for 24,000 r.p.m. to drive a direct-connected alternator. The turbine-alternator-feed pump assembly is hermetically sealed with rotating components on a single shaft.

The model will run on any liquid hydrocarbon fuel, including gasoline, "CITE" and JP–4. Thompson, Ramo, Wooldridge, Inc., of Cleveland, Ohio, built the engine under contract with ERDL.

Also under study in the "silent" category are a reciprocating steam engine and a Stirling cycle engine.

Army RDTE Procurement Contracts Total $452 Million

Army contracts for research, development, test, evaluation and procurement of materiel this past month totaled $452,007,667, with $90.9 million allotted to buy 20,680 new 1½-ton tactical trucks.

The truck order was placed with the Kaiser Jeep Corp. by the Army Mobility Command, Warren, Mich. Designated the XM715, the versatile vehicle will fill military requirements previously performed by the M37, ¾-ton truck. First deliveries of the 2-year order are scheduled in January 1967.

Two smaller contracts let by MOCOM to Kaiser Jeep for various type trucks brought the Toledo firm's most recent order to $95.6 million.

AVCO Corp. received five contracts for helicopter engines, assemblies and services totaling $34,737,538. Two contracts, awarded to the Caterpillar Tractor Co. for tractors and advance production engineering services for trucks, totaled $25,437,500. Of this total, $22.1 million was for tractors.

National Presto Industries, Inc., Eau Claire, Wis., received $18,847,460 of a $32.6 million fixed-price contract for high-explosive artillery shells.

General Dynamics Corp. received $13.5 million for radio sets and mountings (AN/GRC–106 and MT–314/GRC–106), and $1.8 million for radio teletypewriter sets (MD–522 (GRC)).

A $12.7 million engineering development contract for the Advanced Aerial Fire Support System (AAFSS) went to Lockheed Aircraft Corp.

Contracts for development of Pershing missile components, for supplies and services in the testing and evaluating of the Shillelagh antitank missile system, and for components for ordnance items were awarded to the Martin Marietta Corp. The total was $10,903,388, including a $7.3 million increment to a $14.4 million Pershing award.

Philco Corp. received four contracts totaling $9,216,080; for industrial engineering services, maintenance and acceptance inspection equipment for the Shillelagh missile system and the remainder for seven technical control communications centers and ancillary items, $4.9 million.

Four contracts with Bell Helicopter Co. totaling $9,054,233 are for various assemblies for UH–1 helicopters and for UH–1E helicopter procurement.

FMC Corp. was issued four contracts totaling $8,938,850 for 106mm projectile parts, advance production engineering for Hawk launchers, M113A1 vehicle spare parts and for ammunition.

The Heil Co., Milwaukee, Wis., was awarded an $8,130,881 contract for 5,000-gallon fuel tank semitrailers and repair parts and Thiokol Chemical Corp. is getting $7,699,089 on a contract modification for ammunition and for operation-maintenance activities at

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Communication Environmental Control Units Developed

Environmental control units for Army mobile communications, data processing and missile fire-control vans, and vans housing highly sensitive electronic equipment, feature the long, the short and the tall.

Developed by the U.S. Army Engineer Research and Development Laboratories, Fort Belvoir, Va., the units are air conditioners in the broadest sense — serving to heat, dehumidify and ventilate, as well as to cool.

The "family" comes in vertical and horizontal configurations to meet space requirements of mobile shelters. A refrigerant bypass system for continuous or noncycling compressor operation eliminates the interruptions cycling equipment would cause to the electronic equipment operating from the same power source.

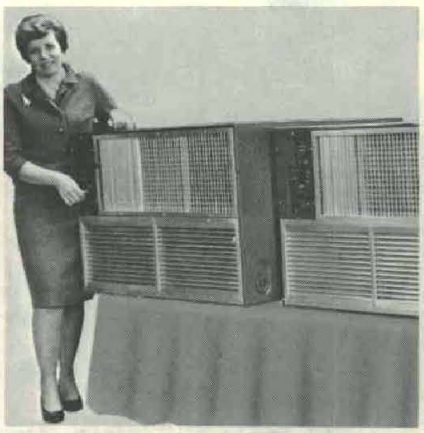
The units operate quietly and reliably from 60 to 400-cycle power in temperature ranges from zero to 120° F. Features include interchangeable and easily accessible components, hermetically sealed compressors, low-maintenance fans, integral resistance heaters, and ventilation compatible with chemical, biological and radiological requirements.

The five vertical members now in production range in capacity from 6,000 through 60,000 B.t.u./hr., and in weight from 130 to 495 pounds. The smallest is 17 x 17 x 28 inches and the largest 33 x 20 x 65 inches.

The 18,000, 36,000 and 60,000 B.t.u./hr. units are one-half the size and weight of conventional military air conditioners in these capacities.

The 6,000 and 9,000 B.t.u./hr. units are truly compact, in view of their specially-placed air intake and discharge openings, heaters, bypass system and complex electronic controls. These requirements have previously prevented the drastic size and weight reductions achieved in larger sizes.

Engineering design tests of the horizontal family members are now under way. Sizes in this configuration start at 24 x 26 x 15 inches for the 160-pound, 9,000 B.t.u./hr. unit. The largest is 42 x 40 x 27 inches, weighs 460 pounds and has a 60,000 B.t.u./hr. capacity. With the 18,000 and 36,000 B.t.u./hr. units, they are expected to be ready for "crash" production in mid-1967, and type classification by June 1968.



THE LONG AND THE SHORT of environmental control units were developed by Army Engineer R&D Laboratories to cool, heat, dehumidify and ventilate mobile communications, data processing, missile fire-control and medical vans. Horizontal configurations (at left) will be ready for "crash" production in mid-1967. Vertical members of a new family of units (right), now in production, range from 6,000 through 60,000 B.t.u./hr., weigh from 130-495 pounds.

the Longhorn Army Ammunition Plant, Marshall, Tex.

A $7.4 million, 2-year-buy contract has been issued to Lear Siegler, Inc., Anaheim, Calif., for classified electronics equipment. The first-year increment is $4.4 million.

Albion (Mich.) Malleable Iron Co. received two contracts totaling $7,252,335. Of a $6 million 2-year-buy contract for body and band assemblies for 81mm projectiles, the first increment is $1.7.

A contract for $6,440,754 for modification of four CH–47A helicopters to an armed and armored configuration went to the Boeing Co.

Two contracts totaling $6,379,138 with Raytheon Co. are for engineering services and design and development of the Hawk antitactical ballistic missile-Hawk improvement program (ATBM/HIP).

The American Hoist and Derrick Co. received a $6,292,800 contract for wheel-mounted, 20-ton cranes. A $6,196,213 contract for components for radio sets (BA386/PRC–25, BA279/U, BA270/U, BA48 and BA414) was issued to Union Carbide Corp.

Other contracts include: Bermite Powder Co., Saugus, Calif., $5,230,320 for detonating fuzes; Ford Motor Co., $5,088,590 for various trucks ($3.9 million of the Ford contract is an increase to a previously awarded $76.6 million contract for trucks extending from December 1964 through December 1966);

Specialty Electronics Development Corp., Glendale, N.Y., $4,895,825 for telephone sets; U.S. Time Corp., Waterbury, Conn., $4,827,435 for production of ammunition components and repair and reactivation of Government-owned production equipment; General Electric Co. $4,421,600 for engines in support of AAFSS, electronic equipment and storage batteries for Iroquois helicopters; Canadian Commercial Corp., $4,336,151 for warhead metal parts and advance production engineering for utility carrier (XM571); Eureka-Williams Co., Bloomington, Ill., $4,288,652 for ordnance items;

Fairchild Camera and Instrument Corp., Clifton, N.J., $4,212,233 for Nike Hercules electron tubes and radio transmitter equipment; Chamberlain Corp. Waterloo, Iowa, $3,844,-550, for warhead parts; Firestone Tire and Rubber Co. $3,820,538 for antitank projectile parts; Carter Carburetor, St. Louis, Mo., $3,446,967, for bomb metal parts; Batesville (Ark.) Manufacturing Co., $3,437,230, for bomb metal parts; Amron Corp., Waukesha, Wis., $3,081,902 for 40mm cartridges; Honeywell Inc., $3,007,095, parts for grenade assemblies;

General Motors Corp., $2,074,380 for transmission units and M114 assemblies; Ingraham Co., Bristol, Conn., $2,980,130, for artillery fuze parts; Olin Mathieson Chemical Corp., $2,822,337 for 81mm fuzes and shells; SCM Corp., Deerfield, Ill., $2,806,902 for teletypewriter sets and ancillary items;

Maxson Electronic Corp., Great River, L.I., N.Y., $2,727,271 for 20mm cartridges and projectiles; Weatherhead Co., Cleveland, Ohio, $2,670,222, for 105mm projectile parts; Merz Engineering Co., Indianapolis, Ind., $2,617,140, for bomb dispenser assemblies; Magnavox Co., $2,369,000, for radio communications subsystem (AN/URC–61) and ancillary items;

Servel, Inc., $2,255,653, for portable radio batteries; Prestolite Co., $2,227,-439, for automotive storage batteries; Stanford Research Institute, $2,218,-159, for basic research in surveillance processes; Wells Marine, Inc., El Segundo, Calif., $2,212,000, parts for detonating fuzes; Flinchbaugh Products, Inc., Red Lion, Pa., $2,091,653, parts for 90mm projectiles;

Northrop Corp., $2,084,081, for 106mm projectile components; Sperry-Utah Co., $2,061,610, for Sergeant Phase II ground electronics research and development; Eltra Corp., Toledo, $2,052,550, for truck generators; American Fabrication Products Co., Indianapolis, $2,048,150, for mortar shell fin assemblies; Stelma, Inc., Stamford, Conn., $2,016,900, for telephone-telegraph terminals;

Sperry Rand Corp., Salt Lake City. $1,989,010, for helicopter inspection equipment and armament subsystems; Harvey Aluminum, Inc., Torrance, Calif., $1,975,000, for 20mm projectiles; Whirlpool Corp., Evansville, Ind., $1,870,844 for 106mm parts; Pioneer Aerodynamic Systems, Inc., Manchester, Conn., $1,846,583 for parachute canopies;

Temco Inc., $1,771,997, for artillery illuminating shells; Cadillac Gage Co., $1,675,000 modification to armored-car contract; Lehigh, Inc., Easton, Pa., $1,599,066, for 2.75 rocket warheads; Gar-Let Manufacturing Co., Inc., Philadelphia, $1.579,800, for cable assemblies; Mack Trucks, Inc., $1,536,-405, for tractor truck axle sets;

Standard Winding Co., Newburgh, N.Y., $1,529,560, for radio amplifiers; Aerojet General Corp., $1,507,953 for ordnance components; Industrial Metal Fabrication Co., Newark, N.J., $1,500,-280, for ammunition containers; American Manufacturing Co., Fort Worth, Tex., $1,476,300, for 2.75 rocket warheads; Scovill Manufacturing Co., $1,434,312, for ordnance items; Galion (Ohio) Amco, $1,412,-400, detonating fuze parts;

Acushnet Process Co., New Bedford, Mass., $1,400,828, for protective masks; General Time Corp., LaSalle, Ill., $1,373,716, for 2.75 rocket fuzes; American Machine and Foundry Co., $1,342,390 for aircraft electrical motor generators; Bulova Watch Co., $1,-338,900, for 2.75 rocket fuzes; Thurmont (Md.) Construction Co., $1,337,-989, for guided missile maintenance shops;

Airport Machinery Corp., Martin, Tenn., $1,319,050, for warhead parts; Sonetronics, Inc., W. Belmar, N.J., $1,306,371, for headset microphones; National Lead Co., $1,300,063, for bomb body assemblies; Hamilton Watch Co., $1,296,841 for 2.75 rocket fuzes;

Kisco Co., Inc., St. Louis, Mo., $1,273,702, for artillery cartridge parts; M. Steinthal and Co., Inc., New York City, $1,268,787, for personnel reserve parachutes; AVCO Corp., $1,264,128, for 2.75 rocket fuzes; KDI Corp., Cincinnati, Ohio, $1,235,807, for 2.75 rocket fuzes; United Aircraft Corp., $1,200,000, for CH–54A helicopters; Gibbs Manufacturing and Research Corp., Janesville, Wis., $1,198,-702, for rocket fuzes;

Microwave Associates, Inc., Burlington, Mass., $1,164,450, for electron tubes for AN/PSS–4 radar sets; Eitel McCullough, Inc., San Carlos, Calif., $1,143,650, for electron tubes; Boyertown (Pa.) Auto Body Works, Inc., $1,097,278, for various types van bodies; Federal Laboratories, Inc., Saltsburg, Pa., $1,096,949, for hand grenades; ACF Industries, Inc., St. Louis, $1,078,650, for ordnance items;

International Telephone and Telegraph Corp., $1,063,320, for audio-frequency amplifiers; Collins Radio Co., Richardson, Tex., $1,053,000, for work on Pacific Scatter Communications System; Atlantic Research Corp., $1,031,723, for bomb case and fuze assemblies. Universal Industries, Inc., $1,018,750, for telephone terminals.

Defense Documentation Center Gains Since 1963 Reviewed

(*Continued from page 2*)

- Improved and additional data banks.
- Expansion of announcement coverage.
- A referral service and an around-the-clock telephone answering service.

Registration procedures to gain access to DDC services were changed with the publication of DoD Instruction No. 5200.21 "Certification for Access to Scientific and Technical Information," on Sept. 1, 1965.

Under the provisions established by this Instruction, DDC Forms 20 and 62 have been replaced by DD Form 1540, "Registration for Scientific and Technical Information Services," and DD Form 1541, "Facility Clearance Register."

The Instruction also requires that DDC maintain a central authority file of all users of Defense technical information services. The file identifies the facility clearances of each registered activity.

In addition to DDC services, registered users are entitled to the services offered by the 22 DoD Information Analysis Centers (IACs). These centers have the mission to collect, review, digest, appraise and summarize data in their respective fields and to provide advisory service concerning this information.

The IACs are given biweekly computer printouts from DDC to ensure that current certification data, including security levels of contracts, areas of need-to-know, and termination dates of services, are available to them.

The new certification procedures provide approval for similar service at all IACs and to all major DoD libraries and are designed to expedite further the flow of DoD scientific and technical documents to qualified users.

Computers Improvements. In December 1963, a new large-scale computer was delivered to the Center as a replacement for two medium-scale computers which could not keep pace with the increasing demands for DDC services.

A time-phased plan of action was instituted to have the new computer meet its original goals. As the steps of this plan were met, various DDC services were added or improved.

DDC User Services

1. ANNOUNCEMENTS
   - Technical Abstract Bulletin
   - Issued Bi-monthly, with Indexes
   - Approximately 2,000 Announcements per issue
2. CUMULATED INDEX
   - Quarterly Indexes
   - Annual Indexes
3. TECHNICAL REPORTS
   - Full-size
   - Microform
4. BIBLIOGRAPHIES
   - Demand Searches
   - Printed Report Bibs
5. RDT&E PROGRAM DATA
6. REFERRAL SERVICES
7. FIELD SERVICES
   - BOSTON
   - DAYTON
   - LOS ANGELES
   - NEW YORK
   - SAN FRANCISCO
   - WASHINGTON
   - * HUNTSVILLE

* Extension Services Concerning DDC

Each year, demands for DDC services increase to new record levels. But more important, these services are being made available in less time and in improved formats. The improvements in services and products reflect progress toward the establishment of a controlled, systematic and timely service to all organizations registered with the Center.

Technical Report Accession and Announcement. More than 50,000 technical reports are being accessioned and announced annually in the DDC *Technical Abstract Bulletin* (TAB). This is distributed biweekly to all organizations registered for service. The Center's collection of research, development, test and evaluation (RDT&E) reports currently totals more than 800,000 titles—the largest of its kind in the Free World.

The input of reports is estimated to be about 60 percent of the total produced, although Defense regulations require that reports of all sponsored work be submitted to DDC for secondary distribution. To locate the remainder of reports which should be brought into the collection, an active acquisitions program was initiated in November 1964.

One method being used within this program is to obtain DoD-sponsored reports requested by users which are not in the system. Among other methods, data banks of RDT&E programs and report bibliographies are monitored for possible sources of documents.

To alleviate the acquisitions problem, DDC now has three full-time military field grade officers assigned to its Office of Technical Liaison—representing the Army, Navy and Air Force. Their principal function is in education and persuasion concerning the Defense technical documentation and information program.

The DDC has long recognized the need for well-indexed announcements, but the resources to provide them were lacking until the new computer was installed. An expanded index service, as a supplement to TAB, was inaugurated in January 1965.

Informative and well-formatted Corporate-Author — Monitoring Agency, Personal Author, Contract and Report Number (Correlation) Indexes were added to the Subject Index for use as search tools. The AD (Control) Number—Field/Group Index remains as part of the basic TAB. The indexes are cumulated quarterly and annually.

In July 1965 DDC began categorizing the document announcements in accordance with the Fields and Groups of the *COSATI Subject Category List.* This is a uniform subject arrangement, endorsed by COSATI (the Committee on Scientific and Technical Information) of the Federal Council on Science and Technology, for use by all Executive Branch Agencies.

Approval was received from the Defense Director of Technical Information to revise the list to provide for the addition of 10 Subject Groups and for the conversion of Group designations from an alphabetical to a numerical system to facilitate computer processing operations.

Conversion of user registration data from the old arrangement of Subject Divisions and Sections to the

COSATI Field/Group structure was completed in January 1966.

The method of printing the *Technical Abstract Bulletin* was changed to a computerized, photocomposition technique which has reduced the size and improved the graphic quality and readability of this announcement publication.

Among other improvements realized in converting to this automated composition process is the inclusion of cross references between primary announcements and related secondary fields and groups, justified right-hand margins, and the arrangements by Groups within Fields rather than by Fields only.

The DDC TAB policy was expanded to announce the existence of selected technical reports of significance to the DoD RDT&E community, including particularly, reports from foreign sources. Announcements of journal reprints reporting Defense-sponsored RDT&E were transferred to the unclassified (white) section of TAB in April 1965.

Data Banks. The DDC established and maintains a data bank covering work units of current DoD-sponsored research and exploratory development. Under the Office of the Director of Defense Research and Engineering program, every military component responsible for research and development efforts is required to describe fully these efforts on DD Forms 1498 (Research and Technology Resume).

In addition to the narrative description of the effort, the form requires other pertinent information including purpose, costs and the activities involved and their responsibilities. DDC processes this information and, through the fully automated system, can provide data on the various types of research, current status of the various efforts, costs and other management information as needed.

This data service, which is initially available only to military organizations, has a tremendous potential for the elimination of unintended duplication of R&D tasks, with resultant savings in time and money. Data-bank experimentation will continue until the system is developed to the point that its output capability meets the requirements of DoD users. More than 17,500 records are in the data file, expected to grow to approximately 70,000 records by 1971.

Data Banks of Contractor Cost Reduction Reports and Contractor Performance Evaluation Reports have been established at DDC at the request of the Office of the Secretary of Defense. Both data banks are presently operational on a manual basis. Reports from the data banks are available to DoD Source Selection Boards and DoD Contracting Officers for contract award and negotiation purposes.

The provisions covering the Data Bank Program are set forth in DoD 7720.13, dated Jan. 27, 1965.

Referral Service. A referral program, under which DDC has established a centralized directory and provides referrals concerning DoD RDT&E programs, was initiated on a limited, nonautomated basis in February 1964.

The purpose of the program is to direct authorized users to the DoD-sponsored organizations, groups and individuals which are known or potential sources of specialized information, or to the National Referral Center for Science and Technology.

New Format for Bibliographies. The fastest growing service offered by DDC is the bibliography service. In 1962 the Center received 4,000 requests for bibliographies. Currently requests are being received at the rate of 17,000 a year and the average processing time is three workdays. During the last week of February 1966, requests for these specialized document listings had grown to an average of 102 per day.

One of the reasons for the increase in popularity is that the format was changed from decks of library-type catalog cards to computer printout bibliographies, bound as finished documents.

The telex bibliography service, started in September 1964 for the DDC Field Offices, was expanded for direct use by DDC customers in August 1965. Users not having their own telex equipment can request these bibliographies, produced in the form of AD (Control) number listings, through the Field Offices of DDC.

Microfiche Replaces Microfilm. Microfiche became the DDC's basic microform for storing documents beginning with the accessions announced in the Aug. 1, 1965 issue of TAB. The use of microfiche (sheet film) has many advantages over the 35mm microfilm (roll film) used previously at DDC, both for the Center and for the users.

Microfiche can be produced more quickly at far less cost, shipping charges are lower, less storage space is required to maintain microfiche files, and they are easier to handle.

DDC's system of microfiche reproduction is in accordance with Federal interagency (COSATI) standards; the film size is 105 by 148.75 mm (approximately 4 by 6 inches). A microfiche of a document can carry up to 58 microimages of pages on the first sheet, and as many as 70 on each "trailer" sheet.

Approximately half of the documents in the DDC collection can each be stored on one microfiche sheet.

Backlogs Eliminated — Operations Current. The ever-increasing requests for services and the problems attendant to the conversion to a new large-scale computer system resulted in undesirably high backlogs at the beginning of 1964.

This situation necessitated use of a relatively high overtime rate and the contracting-out of certain services. Through an extensive reorganization of personnel and by systematization of basic production functions, both backlogs and overtime were reduced to near normal levels by January 1965.

The two notable backlog situations which remained in 1965 were the Cumulated Source Index for June-December 1963 and the Cumulated Subject and Source Indexes for 1964. With the publication of these indexes in August and October 1965, all processing operations became current.

Processing Times Reduced. Significant reductions have been made in processing times for title announcement and request processing operations at DDC. Even with the large increase in accessions and requests for service, the announcement time for documents was reduced from 95

(*Continued on page 22*)

STORAGE SPACE of 100 RDTE documents is compared through microfiche copies (right), hard copy (left), and with 35mm microfilm (center).

Defense Documentation Center Gains Reviewed

(*Continued from page 21*)

in 1963 to less than 25 workdays by July 1965.

Contributors of documents can learn the DDC control (AD) number assigned their reports more quickly if they accompany their submissions with a DDC Form 50, "DDC Accessions Notice." As soon as the AD number is assigned, DDC notes the number on the form and immediately mails it to the source.

Request processing times have been reduced. Users' requests for documents are processed in an average of two workdays if hard copies of the documents are available from shelf stock; in about six days, if the documents have to be reproduced. Requests for bibliographies are processed in an average of three workdays, less than half the time previously required.

New or Revised Instructions. Among the DoD Directives and Instructions which affect the operations and services of DDC, the following are especially important:

A new Defense Instruction 5100.38, the official charter of DDC, was published Mar. 29, 1965. The Instruction reflects changes which have occurred since DDC was created from the Armed Services Technical Information Agency on Mar. 19, 1963. The revised charter clarified DoD responsibilities concerning DDC and enlarged the Center's activities.

Among other important provisions, the new charter made possible an active acquisitions program and authorized the Center to handle classified documents requiring special access.

DoD Instruction 3200.8 titled "Standards for Documentation of Technical Reports under the DoD Scientific and Technical Information Program," was published on Feb. 18, 1964 and republished on Mar. 7, 1966. This Instruction promulgates the mechanical specifications for publishing military-sponsored RDT&E documents and requires the use of a standard format, DD Form 1473, for presenting document control data.

The primary purpose of DoD Instruction 3200.8 is to "simplify and improve document control and cataloging procedures." Technical and scientific reports prepared by in-house laboratories of the Military Departments and other DoD components, contractors, subcontractors and grantees are covered by the Instruction.

One of the strongest points of the Instruction concerns using the provisions of 9-207 (Data-Withholding of Payment) of the Army Services Procurement Regulations for failure of a contractor, subcontractor or grantee to include the DD Form 1473 in official reports of Defense-sponsored RDT&E.

DoD Directive 5200.20, Mar. 29, 1965 "Distribution Statements (Other Than Security) on Technical Documents," establishes official distribution statements for protecting proprietary, privileged, ethical or certain administrative Government or contractor information by limiting distribution of the documents.

This Directive specifies statements which must be used verbatim on technical documents to limit distribution, release or disclosure. These notations are not to be confused with markings for protection of classified information.

Interagency Coordination. DDC personnel have worked with representatives of the Clearinghouse for Federal Scientific and Technical Information (Department of Commerce), the National Aeronautics and Space Administration, the Atomic Energy Commission and other Federal agencies to improve the interchange of technical documentation.

The objective was to establish uniform practices through the media of COSATI standards for descriptive cataloging and other areas of documentation; also, to initiate use of the COSATI Master Subject List by all Federal activities.

DDC joined with NASA, AEC and CFSTI in publishing a comprehensive Government-wide index to publicly available Federal research and development reports. The index is generated from a machine merger of computer input from the four agencies. Publication of the common index began in February 1965.

The first conference between representatives of the 22 DoD Information Analysis Centers (IACs) and key personnel of DDC was held at DDC Headquarters in May 1965 to achieve greater coordination of effort within the Defense Scientific and Technical Information Program.

DDC Selective Dissemination of Information was offered in August 1965 and 18 of the 22 IACs are currently using this service. The IACs are provided machine printouts of bibliographic entries of specific interest on a biweekly basis.

Other Changes. Among many other changes which have been incorporated at DDC since November 1963, the following are of special interest to Defense scientific and technical information personnel.

Responsibility for the publication and maintenance of a DoD Scientific and Technical Information Handbook was delegated to the Administrator, DDC, and it was distributed in March 1965 as a combination training aid and reference tool.

DDC will provide primary distribution in the United States of British, Canadian and Australian R&D reports obtained by DoD components.

To meet increases in requests for documents and other services, three telephones in the DDC Document and Referral Service were equipped with recording devices in April 1965 to enable users to request services after duty hours. This telephone service is of particular importance to users located in the western areas.

Future Plans. The DDC has special responsibilities in continuing analysis of advanced techniques and equipment; also, for testing, evaluating and applying developed techniques, based on studies of user needs, for improved distribution of technical documents. Various studies are underway, on the DoD level and at DDC, to improve both procedures and services of the Center.

Further reduction in processing time for announcement and requests is a continuing goal. Data is being fed to the computer during processing, instead of following processing, for use more quickly in bibliographies and other computer searches. Greater use of electrical transmission for requests for products and services also is being studied. Next year, a faster method for printing TAB from the computer is scheduled by the Government Printing Office. This should further cut announcement processing time by three days.

Other methods of speeding service include the possibility of providing DDC document data on magnetic tape and the initiation of a selective dissemination system under which users would be sent, automatically, microfiche of those documents pertinent to their areas of study.

Changes at DDC all have one major purpose: The establishment of a controlled, scheduled and timely service to organizations within the Federal research and development community. A further aim, however, is to provide this service at the lowest feasible cost.

Redeye Passes 'Torture Tests' in Arctic

Redeye, the Army's shoulder-fired antiaircraft missile system, has completed the Arctic phase of service testing at Fort Greely, Alaska, following developmental tests at China Lake, Calif., and engineering tests at White Sands Missile Range, N. Mex.

Both high-explosive warheads and telemetry packages were used in the tests conducted recently by the U.S. Army Test and Evaluation Command's Arctic Test Center at Fort Greely. Five successful firings were made the final day.

Prior to actual firings, Redeye equipment was field handled and exposed to severe Arctic weather conditions for days at a time. These rigid "torture test" showed that the equipment and operating personnel can perform successfully in an extreme cold environment.

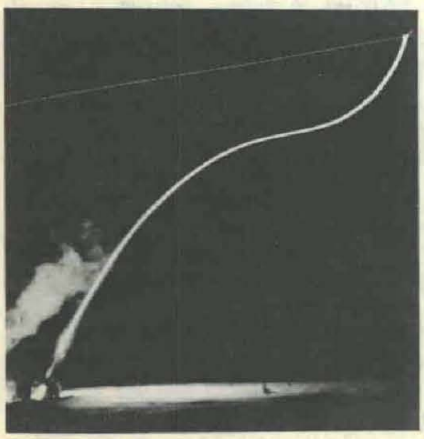
Arctic tests were supported by the Redeye Project Office of the U.S. Army Missile Command, Redstone Arsenal, Ala., and the Pomona Division of General Dynamics Corp., Pomona, Calif., prime contractor.

In the final development testing at the Naval Ordnance Test Station, China Lake, three consecutive firings destroyed propeller-driven drones. The first was shattered at 2,500 feet by a warhead, the second at 400 feet by an unarmed round and the third at 4,500 feet by another warhead.

During its 7-year R&D phase, Redeye scored many successful firings against a variety of targets, including F–9 jet drones and helicopters.

In operation, initial target detection and tracking are done visually by the gunner. When the aircraft is within range, an infrared seeker in the nose of the missile "homes in" on the heat source of the target. The Redeye launcher is made of fiberglass and in combat is discarded after a firing.

The Redeye program is a joint Army-Marine Corps development. Both services will share in the output of production missiles following tropical environment services tests scheduled this fall at Fort Clayton in the Panama Canal Zone.



TWIN STREAKS in the sky dramatically show Army's Redeye missile intercepting a target drone. The missile carried a telemetry package instead of a high explosive warhead, which accounts for the lack of fireworks at the point of contact (upper right). The time exposure was taken at Fort Greely, Alaska.

Engineers Host ABCA Meeting at Fort Belvoir

Representatives from Great Britain, Canada and Australia and more than 50 U.S. Army and Marine Corps officials attended the eighth Quadripartite Engineer Conference at Fort Belvoir, Va., Apr. 6–16.

Lt Gen William Cassidy, Chief of Engineers of the U.S. Army, was the keynote speaker. Maj Gen Frederick J. Clarke commanding general of Fort Belvoir and the U.S. Army Engineer Center, was host and senior U.S. representative.

Lt Gen Ben Harrell, commanding general of the U.S. Army Combat Developments Command, has overall responsibility for the Quadripartite Engineer Conference. The responsibility extends to five branch conferences concerned with doctrinal and materiel standarization between the four member nations.

Delegations from the other Quadripartite nations were headed by: Maj Gen J. H. S. Bowring, OBE, MC, MA, Great Britian's Engineer-in-Chief; Brigadier E. Logan, BE, AMIE, Engineer-in-Chief of Australia; and Col D. H. Rochester, OBE, CD, Commandant, Royal Canadian School of Military Engineering.

The conferees worked on engineering standardization for the ABCA nations behind closed doors, seeking avenues toward reduction of research and development costs and unnecessary drain on R&D resources, as well as measures to achieve full operational compatibility of military materiel on the battlefield.

Coordinator for the meeting was the Engineer Agency of the USACDC Combined Arms Group, Fort Belvoir.

Mobile Teletype Vans Aid Field Forces

Field Army commanders are being provided with substantially improved communications by new teletypewriter systems mounted in 30-foot truck vans. Assembled on a high-priority basis, 12 units are currently being delivered to users.

Capable of handling a greater volume of messages than equipment in current use, the new system has been assembled into two types of facilities—terminal station (AN/MGC–22) and relay central (AN/MGC–23).

Fabrication of the systems was done under overall supervision of the Army Materiel Command's Project Management Office for Army Area Communications System (AACOMS).

The work was performed by the Tobyhanna (Pa.) Army Depot of the Army Supply and Maintenance Command, under the direction of the AACOMS office and the U.S. Army Electronics Command.

The terminal vans contain five sets of equipment for preparing message tapes, commonly used for high-speed teletypewriter transmission and reception over radio or wire links. Four outgoing and four incoming channels are provided by each van.

Messages are received both in tape form and as regular printed copy. For even greater capacity, two or more of the vans can be operated as a single unified facility.

The relay centrals, which serve as intermediate switching points, are located at strategic spots within a communications net for automatic-relay messages over the best routes to widely separated final destinations. They receive and relay message traffic on a total of eight circuits, and like the terminal vans, can be combined to increase capacity.

Van-mounted Teletype System

Kudos

EXCEPTIONAL CIVILIAN SERVICE MEDAL. Dr. Fred B. Daniels recently was presented with the highest civilian award given by the Department of the Army for his research with the Army Electronics Command's Institute for Exploratory Research, Fort Monmouth, N.J.

Dr. Fred B. Daniels

In his work as a physicist, Dr. Daniels uses the Diana moon-bounce radar at ECOM. Results of his experiments have yielded information on the surface roughness of the moon and new findings on the electro content of the ionosphere important to radio communication. He also designed listening devices used by geophysicists in acoustic detection of volcanic eruptions.

MERITORIOUS CIVILIAN SERVICE Awards were presented to Willie L. Doxey and Dr. Robert S. Wiseman. As head of the ECOM R&D Directorate, Doxey was recognized for leadership in realignment of the laboratory structure to improve effectiveness. Dr. Wiseman, director of the ECOM Combat Surveillance, Night Vision and Target Acquisition Labs, was honored for leadership from 1958-65 as chief of the Warfare Vision Division, U.S. Army Engineer R&D Laboratories, Fort Belvoir, Va.

Meritorious Civilian Service Awards were made also to Chandler Stewart and Alonzo J. Vrooman ot the Engineer R&D Laboratories; James J. Lamb, Electronic Proving Ground (USAEPG), Fort Huachuca, Ariz.; George B. Fenwick, Waterways Experiment Station (WES), Vicksburg, Miss.; Foulke O. E. Knudson, Army Aviation Materiel Laboratories, Fort Eustis, Va., and Spencer Logan, Office Chief of Staff, Washington, D.C.

Stewart and Vrooman are supervisory engineers at ERDL. Assigned to the Barrier and Intrusion Detection Division, Stewart was cited for his contributions to the Army's requirement for electronic detection techniques. He also invented a low-cost, reliable all-weather concealed intrusion detector, designed to provide protection for semifixed or fixed strategic military objectives against pilferage and sabotage.

As chief of the Mechanical Engineering Division, Vrooman was cited for devising and fostering techniques in specification, inspection and production engineering that have "had a direct bearing on providing quality hardware to troops at lowest possible cost." These techniques are credited with easing the transition of military R&D items to production, and the adoption of commercial items to meet military needs.

James Lamb, former chief of the Army Electronics R&D Activity, now on the staff of the USAEPG Instrumentation and Range Development Office, was honored for his part in establishing an "in-house, independent research program in reliability techniques that resulted in low cost data as a byproduct of the operation of standard Army communications electronics equipment." He was also cited for having designed the mobile automated digital data transmission test facility.

George Fenwick, recently retired, was commended for leadership of exceptional quality that resulted in an unparalled increase in the diversity and sophistication of the capabilities of the WES Hydraulics Division and for his outstanding technical contributions to the knowledge in the specialized fields of fluvial and tidal hydraulics.

The award was presented by Col John R. Oswalt, Jr., WES director, on behalf of Lt Gen William F. Cassidy, Chief of Engineers.

VICE CHIEF OF STAFF General Creighton W. Abrams, Jr., presents the MCS Award to Spencer Logan.

NAVY Lt Commander Ernest I. Lissy, who spent four years working under Army control, recently received the Army Commendation Medal for his service to the U.S. Army Satellite Communications (SATCOM) Agency, Fort Monmouth, N.J. Col Mitchel Goldenthal (left) SATCOM commanding officer, congratulates Commander Lissy, as Air Force Col James B. Bryant, head of the Defense Communications Agency field office at SATCOM Headquarters, looks on. Lt Commander Lissy was executive and operations officer of the *USNS Kingsport* which mounted a SATCOM-designed terminal used in the SYNCOM communications network. He later served as chief, SATCOM Agency's Systems Operation Division, which was responsible for operational testing of the SYNCOM system.

Foulke Knudson retired after 40 years of service as an officer (Col, USAR) and 15 years of Federal civilian service at the Army Aviation Laboratories. He was cited for his devotion to duty as a transportation requirements analyst and as a small business and labor surplus adviser at the Laboratories.

Spencer Logan was awarded the MCSA by Vice Chief of Staff General Creighton W. Abrams. He was cited for his accomplishments as an employee development officer and coordinator of three Army Staff Programs: the Management Intern, the Summer Intern and the President's Youth Opportunity Programs.

Logan began his career as a packer at Raritan Arsenal, Metuchen, N.J., and is now an employee development officer, GS–13, in the Training and Development Branch, Staff Civilian Personnel Division, Office of the Chief of Staff.

LEGION OF MERIT Awards were made to Col Lemuel E. Pope, Col C. F. Austin and Col Bob H. Glover.

Col Pope, U.S. Army Combat Developments Command's director of Doctrine since February 1963, received the award from Lt Gen Ben Harrell, USACDC commanding general. He was honored for his service as a highly effective adviser and representative of the USACDC, and for activities involving the other Services and Allies.

He is credited with being responsible for major advances of Army-wide and national significance in the analysis and development of doctrine for intelligence, mobility, firepower, command-control-communications, and combat service support for the Army in the field.

Col Austin distinguished himself at the Industrial College of the Armed Forces (ICAF) from 1963 to 1966 while serving as an instructor in the Economic Capabilities Department of the Resident School. Currently, he is plans, policy and curriculm officer in the Office of Academic Plans and Research.

Lt Gen August Schomburg, ICAF commandant, presented the Legion of Merit Award. Col Austin was recently appointed as chief of the Per-

Dr. W. C. Pettijohn

sonnel Research Division of the Army's newly established Directorate of Personnel Studies and Research in the Office of the Deputy Chief of Staff for Personnel in the Pentagon.

Col Glover retired after more than 25 years active Army duty. General Frank S. Besson, Jr., Army Materiel Command CG, presented the Legion of Merit for exceptionally meritorious service, and a personal letter of commendation.

AN OUTSTANDING CIVILIAN SERVICE Award to Dr. William C. Pettijohn recognized his service as director of the Combat Developments Command Experimentation Command's Research Office from July 1961 to the present.

Signed by Lt Gen Ben Harrell, Combat Developments Command CG, the award was presented by Brig Gen Leland C. Cagwin, commander of the CDCEC at Fort Ord, Calif.

Outstanding Performance Awards were presented Apr. 4 at the U.S. Army Research Office to: Irene A. Dunn, chief clerk, Environmental Sciences Division; Juanita S. Whitmire, chief clerk, Research Programs Office; James E. Williams, chauffeur, Supplies and Services Section Adjutant's Office; I. Jeanne Fallen, clerk stenographer, Life Sciences Division.

The awards were presented by Col Thomas N. Chavis, Assistant Director of Army Research, Office of the Chief of Research and Development, and CO of the Army Research Office.

Basic Research Grants Total 9.6 Million

Grants for basic research awarded by the Department of the Army during Calendar Year 1965 to 152 institutions in the United States and abroad totaled $9,651,681. Universities, colleges, institutes, foundations, laboratories and hospitals in the United States, South America, Canada, Australia, Taiwan and Thailand were listed in the report prepared by the Army Research Office, Arlington, Va.

Statistics were consolidated from reports of grants awarded by the Army Corps of Engineers, Office of The Surgeon General, Army Materiel Command, Army Research Office-Durham (N.C.), the Far East Research Office in Tokyo, Japan, and the Army Research Office Headquarters.

Academic institutions which received the largest grants are: California Institute of Technology, Pasadena, $300,000; University of California, Berkeley, $326,340; Johns Hopkins University, Baltimore,Md., $331,800; Massachusetts Institute of Technology, Cambridge, $324,087; University of Rochester, N.Y., $398,264; and University of Wisconsin, Madison, $304,402.

SAM-D Enters New Phase as Army-Navy Project

SAM–D (surface-to-air-missile—development) is entering a new phase, with the Army seeking additional contract proposals to develop the air defense system, with possible common application of portions by the U.S. Navy.

Authorized by the Department of Defense to initiate a "contract definition phase" for SAM–D with Navy participation, the Army plans to ask several contractors for development proposals.

With the Army and Navy working together on this project, the DoD expressed the hope that common areas can be found that will be jointly pursued in meeting future air defense needs. Development is expected to proceed toward a system that will be fully acceptable for the Army and will contain components that are compatible to shipboard conditions.

Preliminary development of components for the weapons system began in mid-1964. SAM–D is the latest generation of an air defense system designed for battlefield and continental defense roles in the 1970s against low-, medium-, and high-flying aircraft and short-range missiles.

A SAM–D battery in the field will be a highly mobile unit mounted on either wheeled or tracked vehicles. Mobile launchers each may carry several single-stage, solid-propellant missiles in launching-shipping containers.

Multifunction phased-array radar will be examined which could perform all the tasks for which several radars have been required in other missile systems. Under normal conditions a single radar might detect and track targets, then issue guidance commands to the missile in flight. A battery control center would coordinate firing operations within the battery and also serve as a communication center.

Plans are for SAM–D to replace eventually the Nike Hercules and a portion of the Hawk systems.

Col Edward M. Dooley is project manager for SAM–D with offices at the Army Missile Command, Redstone Arsenal, Ala. Navy Capt William A. Arthur and Charles A. Cochrell, a Department of the Army civilian, are deputies.

SAM–D Project Manager Col Edward M. Dooley greets Navy Capt William A. Arthur, assigned as his deputy. At right is Navy Commander Alfred M. Pride, assistant deputy.

'Creative Engineering' Turns Ideas Into Tested Prototypes at ERDA

'Engineers & Scientists Welcome'

IMAGINATIVE engineers and scientists are welcome in the new Creative Engineering Shop at White Sands Missile Range. First step (upper right) shows Orville Kuberski reviewing ideas and schematic drawings with Pfc Calvin Humphries. Step two (above left), solid circuits drawn by Humphries come from etching bath and are examined with glass by Ernest Moline as Kuberski checks details. Above center, Ramon Aquirre adjusts a connection and Kuberski points out circuitry part. Step four (above right) begins as machinist Sam R. Winn prepares to lathe mechanical parts. Lower right, finished prototype takes shape, the result of close, creative teamwork.

From idea to tested prototype, with all work by a scientific-technical in-house team, is a creative engineering concept in full swing at the Army Electronics R&D Activity, White Sands Missile Range.

Theorists, technicians and bench workers are melding talents to reduce lead time from new idea to production of materiel that can be tested at the New Mexico missile range, or other Army activities.

This blend of in-house personnel at ERDA is called the "Creative Engineering Shop" by its innovator, Col Herbert D. Harback, ERDA commander. He has given a "redline" priority to work from "basic idea to working model."

The engineering-level man is encouraged to work side-by-side with the electronics technician and model-maker in the design and construction of prototype devices. Manned by a small group of specialists drawn from ERDA's model and machine shops, and from drafting operations units, the shop operates with ERDA's Logistic Support Department. Special funding is thus eliminated.

The shop does not infringe on mass production for Army electronics activities. Instead, it produces finished prototype models, thoroughly tested, for submission to industrial firms for competitive bidding to meet mass production requirements, Col Harback explained.

Prototypes developed by the creative engineering unit may be submitted to other R&D activities in the U.S. or overseas for testing under particular environments.

Pictures shown with this article illustrate the step-by-step production of an in-house electronic device to be used in a ground-base system for recording upper-atmosphere data from a rocket-fired radiosonde.

The parachuting radio transmitter-thermometer - anemometer package transmits atmospheric data during descent at various levels as desired by ground control operators. The ground device permits direct temperature and wind-velocity readings.

Among the shop's current "customers," for example, is the Defense Atomic Support Agency (DASA) with several requirements for electronic devices that cannot be bought "off the shelf." The shop can produce the required prototype and test it or it can deliver the prototype to DASA for testing.

The in-house engineering concept eliminates excessive administrative channels and paperwork. When tallied, actual cash savings are expected to be rewarding. But the big

payoff, Col Harback feels, "is the increased motivation among all personnel gained by working together . . . seeing ideas grow into tangible hardware."

ERDA's Creative Engineering Shop operates in six simple steps:

- An engineer or scientist theorizes about a device that will lead to better equipment for Army and Defense users.
- The idea is taken to a creative technician of the shop.
- The engineer - technician team "huddles" with a draftsman to make the first circuit design.
- Model-makers and etched-circuit specialists build the device with the engineer as adviser.
- Finished prototype goes back to the engineer for field testing and any modifications that may result.
- The prototype is approved.

SCIENTIFIC CALENDAR

49th Annual Conference of The Chemical Institute of Canada, Saskatoon, Saskatchewan, Canada, June 6–8.

Armed Forces Communications and Electronics Conference, Washington, D.C., June 7–9.

Cryogenic Engineering Conference, Boulder, Colo., June 13–15.

5th U.S. National Congress of Applied Mechanics, sponsored by AFOSR, ONR, ARO–D, APS, ASME, AICE, ASCE, AIAA, AMS, Society for Rheology and ASTM, Minneapolis, Minn., June 14–16.

Advanced Launch Vehicle and Propulsion Systems Conference, sponsored by SAE, Huntsville, Ala., June 14–16.

1966 Army Science Conference, sponsored by OCRD, West Point, N.Y., June 14–17.

International Panel Workshop on Basic Research in Malaria, sponsored by OTSG, Washington, D.C., June 15–17.

IEEE Communications Conference, Philadelphia, Pa., June 15–17.

Meeting of the American Nuclear Society, Denver, Colo., June 19–23.

7th Informal Photochemistry Conference, sponsored by ARO–D, Troy, N.Y., June 20–22.

IEEE Symposium for Biomedical Engineering, San Diego, Calif., June 20–22.

International Conference on Crystal Growth, sponsored by AFCRL, Boston, Mass., June 20–24.

National Electronic Packaging and Production Conference, N.Y.C., June 21–23.

Precision Electromagnetic Measurements, sponsored by IEEE, Boulder, Colo., June 21–23.

12th Conference of Army Mathematicians, sponsored by ARO–D and CRREL, Hanover, N.H., June 22–23.

Low Speed Aerodynamic Problems Associated with Helicopters and V/STOL Aircraft, sponsored by USAAML and Cornell Aeronautical Laboratory, Buffalo, N.Y., June 22–24.

2nd Rochester Conference on Coherence and Quantum Optics, sponsored by AFOSR and AFCRL, Rochester, N.Y., June 22–24.

69th Annual Meeting of ASTM, Atlantic City, N.J., June 26–July 1.

West Coast Aerospace Science Meeting, sponsored by AIAA, June 27–29.

Symposium on Quantitative Biology, sponsored by Cold Spring Laboratory for Quantitative Biology, AFOSR, NIH, NSF and AEC, Cold Spring Harbor, N.Y., June (date undetermined).

Symposium on Simulation and Simulators of Dynamic Systems, sponsored by AFOSR and Westinghouse Defense and Space Center, Baltimore, Md., June (date undetermined).

Army Nominates Seven for Rockefeller Awards

(*Continued from page 7*)

Among achievements cited for Robbins are his work in providing audit training guidance to Allied governments in the Republic of China, Korea and Iran in an advisory capacity.

In wide demand as a guest lecturer, he is the author of numerous articles on auditing in leading journals. He has served as a member of the faculty of the Army Command Management School and the Army Logistical Management School, and was formerly a professor of accounting in the U.S. Department of Agriculture Graduate School and the former Columbus University, Washington, D.C.

DR. ELSON B. HELWIG, M.D., has been in the Federal career service since July 1946 and has achieved worldwide renown for his work as chief, Department of Pathology and chief, Skin and Gastro-Intestinal Pathology Branch, Armed Forces Institute of Pathology. The AFIP represents the most comprehensive, integrated grouping of pathology specialists in the world.

Under Dr. Helwig's leadership, the Department of Pathology has expanded to 37 separate branches, an increase of 15 branches since 1955. They are responsible for review and consultation on submitted case histories from the Military Services, Veterans Administration, U.S. Public Health Service and civilian medical facilities.

Author or coauthor of more than 100 articles in professional journals, Dr. Helwig has continued his research and teaching activities despite the burden of management responsibilities. He is the principal investigator on the AFIP Laser Project and he chaired the First Annual Conference on the Biologic Effects of Laser Radiation at the AFIP in April 1964.

More recently he was included as an advisor to the Histopathological Nomenclature and Classification of Skin Tumors meeting of the World Health Organization in Geneva, Switzerland. For a number of years, he has been preceptor to the Osborne Fellow in Dermal Pathology sponsored by the American Academy of Dermatology.

Research contributions that have enhanced Dr. Helwig's reputation include his investigations of Boveen's disease and its relationship to systemic cancer, pioneering studies of Paget's disease, and notable findings in Kaposi's sarcoma.

Management innovations at the AFIP for which he is credited include the microfilming of more than one million pathology case studies now on file at the AFIP, and the installation of electronic and computer equipment to facilitate medical analysis and investigations.

Dr. Helwig is a member of 15 professional societies, has had teaching association or assignments with eight universities and medical schools, and has served residencies at several leading hospitals.

The letter of nomination states, in part: "This physician is a medical pioneer. . . . His reported findings are accepted throughout the world . . . Dr. Helwig symbolizes the mission of the AFIP—Consultation, Education and Research."

DR. RALPH G. H. SIU was nominated for the Rockefeller award by Maj Gen William C. Gribble, Jr., now Deputy Chief of Research and Development, Department of the Army, while he was serving as Army Materiel Command Director of Research and Development. Supporting signatures include Assistant Secretary of the Army (R&D) Willis M. Hawkins, Chief of Research and Development Lt Gen Austin W. Betts and other distinguished leaders.

The record of Dr. Siu's achievements cited in his nomination fills several pages and includes strong testimonials to his skill as a research scientist as well as a scientist program planner and manager. His Government career began in 1943 as a GS-7 individual investigator with the Departrent of Agriculture.

In that capacity, he was the first to identify and quantitatively determine the essential oils contained in guayule rubber, which was being developed as an alternate World War II domestic source for natural rubber.

As a laboratory team leader for the Army Quartermaster Corps in 1944–45, Dr. Siu elucidated the biochemical mechanism of degradation of cellulose by microorganisms, laying the theoretical basis for prevention of mildew-rotting of vast quantities of Army materiel in the South Pacific theater.

From 1946 to 1949, as chief of a small laboratory, he organized and directed the first basic research lab for the Quartermaster Corps. The direct successor of that effort is the Pioneering Research Division of the Natick Laboratories, and its microbiological group remains the world's leading center for deterioration research.

Worldwide renown came to Dr. Siu as leader of a large project from 1954 to 1964. The Rockefeller nomination says he "spearheaded the demonstration of the technical feasibility of the preservation of foods by nuclear radiation. This demonstration in 1965 represents the greatest technological achievement in food preservation since the invention of thermal canning during Napoleon's days."

Out of this pioneering effort came an Army publication now known throughout the world as a standard reference, *Radiation Preservation of Food*, on which Dr. Siu served as chief editor. The citation states that "at least four-fifths of the technical data known in the field today have directly or indirectly stemmed from the teams spawned off the project during his term as project leader."

The food irradiation process is seen as promising to "deinfest weevil in grains; eliminate trichinosis in pork; control liver flukes, tapeworm and salmonella in foods; radically extend the marketing radius of certain fresh foods, such as strawberries and iced fish; inhibit the sprouting of potatoes and onions for year-long storage; make feasible the storage and international shipment of raw meats over long distances without refrigeration; and destroy insects in fruits, thereby enabling them to cross former quarantine barriers. The program has turned out to be the most promising among the U.S. Atoms for Peace endeavors."

When an Army task force was appointed in 1960 to consider the reorganization of the Army that became a reality in 1962, Dr. Siu was the only scientist. Again in 1964, when The Army Research Council was established in January, he served as the first chairman of TARC. The Council produced a voluminous 5-year Army Research Plan, the first of its kind ever developed.

The nomination also credits Dr. Siu with a "significant role in most of the progressive managerial steps taken within the Army during the past decade to enhance the stature and competence of Army scientists and engineers, e.g., the Army Science Conference, the Army R&D Achievement Awards, the Secretary of the Army Research and Study Fellowships, and the Visiting Scientist Programs."

Dr. Siu is known for a unique book in the social sciences series published by Massachusetts Institute of Technology, titled *The Tao of Science*. He has compiled the manuscript for *Dragon in the Cycle*, which attempts to apply the admonitions of the 3,000-year-old Chinese book of prophecy and statecraft, *Yi Ching*, to the Western executive scene. For several years he authored the sagely humorous T-Thoughts column in the *Army R&D Newsmagazine*.

Greatly in demand as a speaker and master of ceremonies at scientific gatherings, Dr. Siu has made more than 150 major invitational addresses. He has served on numerous Department of Defense and Department of the Army as well as other Federal agency committees, and has traveled throughout the world on official Army duties. He is the author or coauthor of 69 papers and has two patents, for curly glass filament and for forming filamentous panels.

VICTOR LINDNER's nomination is supported by a letter signed by General Besson which highly commends his activities in research and development of a long list of ammunition. The nomination states:

"Mr. Lindner's contributions extend across all of the Armed Forces in many fields and have resulted in a reinforcement of the Nation's nonnuclear readiness in a spectacular manner. Not only has the Department of the

(*Continued on page 29*)

OH-6A Leads All Helicopters in World Records

Twenty-one unofficial world records for rotary-wing aircraft have been set by the U.S. Army's new OH–6A light observation helicopter. The OH–6A now claims more world records than any other helicopter.

The new records claimed by the Army—12 for speed and 3 each for distance, climbing and sustained altitude—were established in three different helicopter classes at Edwards Air Force Base, Calif., by five Army Materiel Command aviators and two civilian pilots. Three of the records are for helicopters of all sizes and weights.

Flights were conducted under the supervision of the National Aeronautic Association (NAA), and have been submitted for approval as official world records to the Federation Aeronautique Internationale (FAI) in Paris.

In the medium-weight helicopter class, Army Col Joseph L. Gude, project manager for the LOH Program, set a mark of 172.410 m.p.h. over a 3-kilometer course. This is the top helicopter speed record ever submitted to the FAI, except for the largest classes of helicopters. The recognized medium-weight helicopter record of 123.45 m.p.h. is held by a Hiller OH–23G.

In some cases the OH–6A, powered by a 250-horsepower Allison T–63 gas turbine engine, doubled the existing records.

The OH–6A set records in three helicopter classes: The E–1.B (lightweight), the E–1.C (medium weight) and the E–1 (all helicopters). Out of the 10 possible records in the all-helicopter class, the OH–6A claimed three.

One Russian and two French world marks were exceeded by the OH–6A, which also lifted three times its empty weight (1,000 pounds).

Col Joseph L. Gude

Two of the records set in the all-helicopter class were the longest closed-circuit flight ever made by a helicopter and the fastest speed a helicopter has ever flown over a distance of 2,000 kilometers.

In distance closed-circuit flight, test pilot Jack Schweibold, of the Allison Division of General Motors, flew the OH–6A 1,739.836 miles nonstop to break the existing record of 1,615.742 miles by a Bell UH–1D.

Army Chief Warrant Officer Richard D. Szczepanski averaged a speed of 141.523 m.p.h. over the 2,000-kilometer closed course, exceeding the official record of 133.984 m.p.h. held by a Bell UH–1D.

In the all-helicopter class, Hughes test pilot Jack Zimmerman set a world record of 26,448 feet in sustained altitude in horizontal flight. There was no previous record.

The OH–6A surpassed a world mark held by Russia. Army Col David M. Kyle flew over a 500-kilometer course at 155.205 m.p.h. The existing medium-weight helicopter class record of 105.91 is held by a Soviet KA–15.

Army Lt Col Richard T. Heard made a 171.85 m.p.h. flight over a 15-kilometer course in the lightweight helicopter class, compared with the existing record of 123.58 m.p.h. set by a Hiller OH–23G.

By clocking an average speed of 161.208 m.p.h. over a 100-kilometer closed course, Maj Allan L. Darling claimed another record from the Hiller OH–23G, which had averaged 121.70 m.p.h.

The Hughes Tool Co. is building 714 OH–6A helicopters under a current 3-year contract. The first operational use aircraft are scheduled to be delivered to the Army later this year. The OH–6A is designed to carry out visual observation, target acquisition, reconnaissance, command control and other combat operations.

The one aircraft used in the world-record flights had already logged 660 flight hours, equivalent to about 100,000 operational miles.

ERDL Lets Funds to Build Recuperated Gas Turbine

A recuperated gas turbine engine program underway at the Engineer R&D Labs, Fort Belvoir, Va., is expected to provide a prototype of an advanced, lightweight, compact prime-mover for electric generators and other military applications.

Under a $650,000 contract with the Laboratories, AiResearch Manufacturing Co. of Arizona is providing detailed design and preliminary component development on a 275 hp. recuperated gas turbine engine. The contract also contains options for engine development, testing and delivery.

The design weight of the engine is 550 lbs. and the specific fuel consumption at rated load is 0.48 lbs./hp.–hr. The engine is designed to drive ultra-high-speed alternators or other equipment directly coupled to the engine rotor at speeds of approximately 40,000 r.p.m. Provisions also are included for reducing the speed to a more common 6,000 to 12,000 r.p.m.

A 300 hp. simple-cycle gas turbine is also being developed by AiResearch under a separate contract. Both this and the recuperated engine are part of a family of gas turbines being developed for Army use under a wide range of environmental conditions and on a variety of military fuels.

V/STOL, Helicopter Experts Schedule Symposium

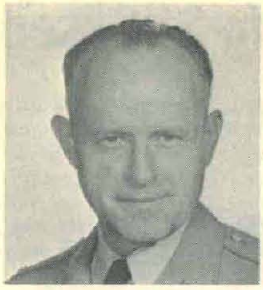
Technical specialists in helicopters and V/STOL aircraft will exchange information at a symposium June 22-24 in Buffalo, N.Y., sponsored by Army Aviation Materiel Laboratories and Cornell Aeronautical Laboratory.

Government agencies, industrial and research organizations, universities, and scientists and engineers from abroad known to be active in V/STOL aerodynamics have been invited to attend the 3-day meeting.

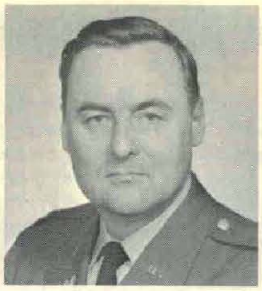
Harold A. Cheilek, technical vice president of the Cornell University-affiliated aeronautical laboratory corporation, said that the sessions will include invited papers on "Low-Speed Aerodynamic Problems Associated with Helicopters and V/STOL Aircraft," informal discussions and a formal panel presentation.

Technical sessions will include reports on theoretical and experimental studies in the following areas:

Aerodynamic characteristics of propellers and rotors in hover, transition and high-speed light; boundary-layer effects on the aerodynamic properties of rotors and lifting surfaces; prediction of the mutual aerodynamic interference effects of rotors, propellers, wings and bodies that are present on composite vehicles; and prediction of the aerodynamic characteristics of various types of propulsion devices used or planned for use on V/STOL aircraft.



Col H. W. Fish



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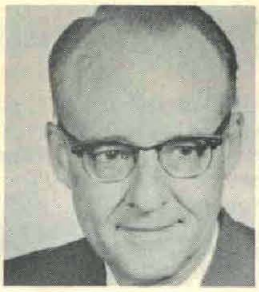


J. T. Pennington

B. J. Bodnar

G. G. Lorenz

GIMRADA Realignment Separates R&D

Reorganization of the Army Engineer Geodesy Intelligence and Mapping R&D Agency (GIMRADA), Fort Belvoir, Va., recently established two distinct operating elements to separate research from development.

The Research Institute for Geodetic Sciences incorporates activities in five scientific research task areas. The Development Laboratories for Mapping and Geodetic Systems are comprised of five revamped development divisions.

Acting director of the Research Institute is Bela J. Bodnar. The Development Laboratories' acting director is Gilbert G. Lorenz.

Col Hamilton W. Fish, GIMRADA commander, recently succeeded Col Lloyd L. Rall, who had approved the agency's new concept prior to reassignment. Col Rall is now Deputy Assistant Director of the Defense Intelligence Agency (DIA) for Mapping, Charting and Geodesy. Col Fish formerly was Department of Defense (DoD) special program management officer in the Office of the Chief of Engineers (OCE).

Organizational division of the two primary GIMRADA R&D elements is in line with the already published philosophy of the Office of the Director of Defense Research and Engineering (DDRE). That philosophy is presented in a November 1964 report, "A Plan for the Operation and Management of the Principal DoD In-House Laboratories."

The Development Laboratories are charged with all specific development categories, beginning with exploratory development and extending through systems development. The standard DoD category schedule for research, development, test and evaluation is followed.

Although the Research Institute serves primarily as a scientific advisory body in mapping and geodesy matters for the Office of the Chief of Engineers, GIMRADA officials foresee a research organization of significant breadth, extending membership beyond regular full-time Army employees.

Under this concept, nonresident members of the Institute would be selected from scientists performing GIMRADA-related tasks with other governmental agencies. Their function would be to coordinate findings with the Institute's task area leaders. GIMRADA research associates and assistants would be assigned to the Institute as aides to the senior scientific and engineering membership.

GIMRADA's new organization has a minimal technical and administrative staff. Key assistant to the commanding officer of GIMRADA is the acting technical director, John T. Pennington.

The major change under the Development Laboratories realignment is the Technical Plans and Systems Analysis Division, formerly the Strategic Systems Division. This amplified division, with Howard O. McComas as acting chief, contains four branches concerned with systems technology and advanced planning, program management and evaluation, special project and systems analysis.

Other divisions of the Laboratories are Surveying and Geodesy, Geographic Intelligence, Graphics and Display, and Photogrammetry and Mapping.

The Institute's research task groups, each with a task area leader, are Photogrammetry and Cartography, Geodetic Surveying and Geophysics, Celestial Geodesy, Physical Sciences Support for Mapping and Geodesy, and Mathematical Support for Mapping and Geodesy.

Army Nominates Seven for Rockefeller Awards

(*Continued from page 27*)

Army benefited, but systems have been provided for the Department of the Navy and Air Force, and to our Allies, which are now being stockpiled in quantity."

As deputy director, Ammunition Engineering Directorate, Picatinny Arsenal, Dover, N.J., Lindner is credited with achievements that "are adding immeasurably to the strength of the Nation."

He has been honored with awards at the highest levels of the Department of Defense and the Department of the Army, in recognition of his work on the Honest John and Little John rockets, many bombs, antitank ammunition, antiaircraft weapons such as Nike Hercules and Hawk, and other high priority selected ammunition areas.

Selection to attend the Industrial War College in 1962 marked the twentieth year of Lindner's service to the Department of the Army. His Civil Service career began at Picatinny Arsenal as a chemist in propellants and explosives.

He served progressively as chief, Physical Chemistry Laboratory, chief of the Technical Services Laboratory, chief of the Special Ammunition Section, chief of Warheads and Special Ammunition Laboratory, and Associate Director for Ammunition. He became deputy director, Ammunition Engineering Directorate, in 1960.

Listed in the tenth edition of *American Men of Science*, Lindner is a member of the New York Academy of Science, a member of the graduate faculty of Stevens Institute of Technology, Hoboken, N.J., and has authored many technical papers. More than 700 scientific and technical works on programs under his supervision have been published during his tenure.

HARRY B. ZACKRISON, Sr., entered the Federal Civil Service in 1933 and was employed initially as a structural engineer in the Office of the Quartermaster General, War Department. Currently, as Adviser to the Director of Military Construction and chief, Engineering Division, Military Construction, his responsibilities encompass a vast program of Corps of Engineers activities.

Involved are projects for the Army, Air Force, National Aeronautics and Space Administration, U.S. Atomic Energy Commission, and many other Government agencies.

The multibillion-dollar program includes master planning and construction of missile and antimissile launching and testing facilities, space support facilities, precise electric power plants, airfield pavement and hangar design, academic and military training facilities, construction of hospitals, research centers and family housing, and other worldwide Corps of Engineers activities.

As the principal representative of the Corps of Engineers in many interagency, national and international programs, Mr. Zackrison is associated with the Producers Council, the American Concrete Institute, the Building Research Advisory Board, and the International Council for Building Research, Studies and Documentation. He is now the National Academy of Sciences-National Research Council delegate to the International Council and a member of the executive committee.

In recent years, he has been deeply involved in Corps of Engineers participation in the NASA Space Program. He has devoted much effort to problems of design and construction in connection with the Houston Manned Spacecraft Center and the Mississippi Test Facility, as well as the John F. Kennedy Space Center in Florida.

Notable accomplishments have earned Mr. Zackrison recognition from many organizations and agencies, dating back to 1945 when

Importance of Promoting R&D Patents Program Stressed

By Stanley Dubroff

SUMMARY OF ARTICLE. Patents are positive proof of concrete results obtained from research and development programs. This article presents an argument in support of an aggressive patent program. It supports the argument by showing the results of such a program, first at Frankford Arsenal, where a patent staff has existed for some time, and then at Picatinny Arsenal where such a program was freshly introduced. It contends that an aggressive program is paying off in the U.S. Army Munitions Command and could very likely have the same results elsewhere. (Editor's note: *Views expressed in this bylined article do not necessarily reflect the official Army policy or position.*

The Problem. Each year the Federal Government expends large sums for the conduct of research and development which results in a considerable number of inventions and discoveries. Frequently, patent applications are not filed on these inventions and discoveries. Members of the scientific and engineering community are not adequately aware of their patent rights, and in most cases have not been informed of what may be patented.

The public interest in a dynamic and efficient economy requires that positive effort be brought to bear upon the filing of patent applications. Failure to protect the results of Government-financed research and development may frequently result in double expense to taxpayers.

The pyramiding of cost is explained by: Government R&D efforts to produce new items; other filing patent applications (perhaps as a result of their independent R&D efforts); and the Government paying again as a result of claims for compensation for patent infringement. The public interest is not served by this compound and unwarranted expenditure of funds.

The prudent administration of Government R&D calls for an active pursuit by all levels of investigators and technical supervisors into results of R&D to uncover subject matter which lends itself to patent protection. But the problem of obtaining patent coverage is not alone that of the investigators and technical supervisors. It calls for the examination of our patent policy, and demands a positive position that *patents are part of the dividends earned from R&D dollar investment*, and are necessary to give recognition and protection to the advances in the art which are the result of Government-financed R&D.

In Department of the Army pamphlet 360–218, Troop Topics, "Research and Development," the conclusion states:

> **In understanding the impact of research and development two points should be stressed. First, R&D effort is dedicated to developing the most modern concepts that will facilitate the soldier's mission. And second, R&D effort is always viewed in light of the fact that the ultimate weapon continues to be man. Research and development is conducted to enhance the combat capability of the individual soldier.**

Still there are conflicting discussions about Government patent pursuits. The question is frequently asked: "Why patents on Government work if the Government never sues?" Also, in gathering statistical data relating to patents, one frequently is asked, "How many of the issued patents are in commercial use?" Or, almost as frequently, "What money benefits have accrued on Government-issued patents?"

Why use the profit motive to measure the performance of a nonprofit organization which, in fact, is prohibited from competing with profit-making organizations? It seems odd to be engrossed in research and development to enhance combat capability, and still measure the patent productivity by using the standard of "commercial gain."

For example, research for new drugs is performed to solve vital health problems—if performed by the Government, to that end alone; if performed by industry, it is also to create a new source of profit. Patents follow and protect discoveries, but it is the technical competence which promotes and enhances a company name and reputation.

The excitement of technical breakthroughs, and the extent of their importance, manifested through the issuance of patents, attracts aggressive talent. Industry takes advantage of this technical posture as evidenced by their advertisements in the "employment available" pages of the Sunday papers.

Why not the Government? Surely the Government has an established technical posture in many fields. Hasn't sufficient money been invested in R&D to warrant recognition through patents similar to that obtained in industry? Why aren't patents a barometer of our scientific and engineering accomplishments, *in and of themselves*, without the need to equate to commercial gain?

Could patents be used *at this point* in time as a measure of achievement? The answer is *no*. Why? Because there has been no overall concerted effort to use patents for this purpose. Hence the necessary patent support has not been made available to the scientific communities.

Organizations that have recognized the importance of patents have built, over the years, a comprehensive patent portfolio. This evidences the advances made in the art and, most definitely, provides the return for the R&D investment.

However, these organizations have benefited in the patent field somewhat at the expense of the scientific community, as patent personnel were hired as part of the spaces in the scientific community.

Stanley Dubroff is Counsel for Patents at Frankford Arsenal, Philadelphia, Pa., and serves also as Assistant Chief Counsel for Patent Law, U.S. Army Munitions Command. He holds a degree of bachelor of science in engineering from Drexel Institute of Technology and bachelor of laws from Temple University, and is a member of the Pennsylvania Bar.

Stanley Dubroff

He was project engineer and engineering supervisor in the research and development of artillery ammunition for seven years prior to assumption of patent duties. With the reorganization of the Army in 1962, he was appointed Assistant Chief Counsel for Patent Law for the U.S. Army Munitions Command and was assigned the patent responsibility for the Munitions Command (in view of the position achieved in the Ordnance Corps by the Frankford Arsenal patent activity). He is co-author of Trademark Law and Practice.

How then do we arrive at a point where patents may be used to reflect scientific and engineering accomplishments? We do so through a concerted and unified effort to place patents in their proper position of importance to the scientific community of the Army. This effort must be three-pronged: Management Education and Understanding; Inventor Education; Patent Staffing and Philosophy.

Management Education and Understanding. It stands as a truism that management is responsible for its own education. Management (and here is meant management over scientific and technical areas) must be convinced that patents are an everyday problem, just as safety, security and good housekeeping are problems.

A knowledge and understanding of the nature of patentable subject matter must be a necessary part of each manager's background. Each manager must appreciate the purpose of a patent program:

- To protect the fruits of Government-sponsored R&D by patenting advances in the art.
- To recognize and reward the employee for inventions or discoveries.
- To utilize issued patents to determine the state-of-the-art at the outset of an investigation.

Determining the state-of-the-art through patent searches in the U.S. Patent Office should be a consideration, if not a requirement in each new task which is undertaken to advance the state-of-the-art. Even in new arts, analogous fields can provide useful information.

The technological foundation built through state-of-the-art searches provides the footing to support a strong, fresh investigation. The act of searching, in and of itself, provides technical continuity in the historical development of the art.

As part of the management education there must be instruction in: Recognizing potentially patentable subject matter; the general understanding of inventorship; the disclosure of inventions (resolve doubt in favor of submitting invention disclosures); when to consult patent counsellors.

Inventor Education. Inventor education may consist of a notation in a telephone directory of where patent counselling may be obtained. On the other hand, it may consist of detailed training of scientists and engineers in all aspects of patent management as it relates to the inventor, including the inventor's responsibilities to his employer.

Consideration of a training program presupposes that a study and analysis of the scientific community has been made, and there exists an appreciation of the type of work being performed.

To facilitate this analysis, the "creative" community may be divided into three groups, by reason of their attitude or type of work. The first group consists of those few people who are aware of patents and who are convinced of the importance of patents to their own standing in the scientific and technical community at large. They may also be aware of the importance of patents to their organization.

This small, select group will find ways to obtain patents, regardless of the interest of management and the availability of a patent organization to assist them. They are usually the most creative people, and indeed they will create their own channels of communication with patent personnel.

The second group, and largest by far, consists of people engaged in research, development and related work. These people are vitally interested in their work, but, unless educated in the value and benefits to the Government and themselves, will not submit invention disclosures.

For the most part, they are aware of the existence of patents, but in their minds they do not have the time to establish channels of communication with their patent personnel and even less time to prepare and submit invention disclosures. This second group's work results in the greatest number of inventions.

The third group consists of those people who ostensibly are not involved in work which is identified with inventions. This group is usually responsible for new or more efficient ways of accomplishing their assigned tasks within state-of-the-art techniques.

Because the number of inventions coming from this group is less than from the other groups, the tendency is to play down the invention aspect of the work. However, it is this group that produces those inventions, which, in the merchandising field, would be considered "quick turnover" inventions,—those from which the advantages to the Government are immediately evident and most quickly realized.

An example of this type of invention is the patent, "Means for Dynamically Adjusting Mechanical Time Fuzes and the Like," Patent No. 3,065,626, issued to G. S. Westerman. The invention permitted automatic fuze-setting in a shorter period of time and with greater accuracy than when accomplished manually, thus resulting in an immediate cost reduction during manufacture.

When one analyzes the "creative" community in the light of educational needs, the inescapable conclusion must be reached that *management and inventor education are mandatory* if the full-dollar value of our R&D investment is to be realized through patents.

Organization Staffing and Philosophy of Patent Activity. The third, and perhaps the most important aspect of the patent effort, is the patent group or activity itself. Which comes first, the patent organization, management education, or inventor education? It is evident that there must be some staffing with acceptable, qualified patent personnel.

To be *acceptable,* a potential employee must have the flexibility to perform all the duites relating to patent prosecution, or be trainable to do so. To be *qualified,* it is not enough merely to meet Civil Service standards. The patent adviser must have the same inquiring attitude as the inventors with whom he will be dealing, and the technical competence to understand the art.

From experience it has been found that patent advisers with a legal education—as well as a physical science degree—have proved to be superior performers. However, with the demands in industry for people having these qualifications, they are becoming increasingly difficult to recruit because of grade limitations.

Notwithstanding recruitment difficulties, some patent staffing is necessary before management and inventor education can begin, for it is the patent people who must present the educational program. Thus, in the selection of patent personnel, management must consider ability to communicate competence in the field, as well as a desire to aid inventors.

The patent adviser must be considered part of the scientific and engineering community. His technical competence must be commensurate with that existent in the scientific community in order that he might best understand the complexity of the inventions which arise.

If an invention is an art which is rapidly advancing and unstable, the patent adviser must be technically equipped to keep abreast of the work by his counterparts at the bench.

Provision must be made for the adequate expansion of the patent staff to handle the influx of invention disclosures to be expected after the education program is complete.

A patent organization should not be so intimately related to the scientific and engineering community that management must suffer the loss of investigatory personnel to fill patent adviser spaces. That is, the space allotment for patent advisers must be

(Continued on page 32)

Importance of R&D Patents Program Stressed

(*Continued from page 31*)

over and above that for the scientific and engineering community.

The policy must be to *augment* the scientific and engineering community with necessary patent advisers. A reasonable ratio of two patent advisers to 100 professionals engaged in research and development must be established in order to develop a strong patent position. It is rare in Government to find the ratio as high as one patent adviser for every 100 scientists and engineers.

While the ratio has always been much less than one to 100, nevertheless, at Frankford Arsenal there is an example of the results that can be achieved when a research and development activity is mindful of patents. (The word "Arsenal" is an historical anomaly. It relates back to the times when such an activity stored and/or manufactured munitions. An "Arsenal" today is a research and engineering center.)

In 1943 the commanding officer appointed a young lieutenant as the patent officer and assigned him to the laboratories for administrative supervision, maintaining a direct reporting requirement. The officer became part of the scientific community.

The *first group* of inventors, discussed earlier, immediately opened channels of communication with the patent officer. At the same time an engineering community began outside the laboratories.

An examination of the invention disclosures and patents over the next 15 years reveals that some names predominate. In fact, one of the most prolific inventors, Mr. C. Walton Musser, coinventor with Dr. William J. Kroeger of the recoilless rifle, contributed by far the greatest number of invention disclosures. Also, because of proximity of the growing patent organization to the laboratories, laboratory personnel dominated the inventor list.

It was not until 1959, when an expanded patent organization conducted a comprehensive inventor education program, that the inventor base started to broaden. The number of invention disclosures increased from an average of about 40 per year to about 100 per year.

A similar program was conducted at Picatinny Arsenal, Dover, N.J., in 1962. The Arsenal, also a research and engineering center under the Army Munitions Command, did not have direct patent support prior to 1962 reorganization of the Army.

The Picatinny effort resulted in an increase from 11 invention disclosures per year to 125 in the 12-month period following the inventor education program. Disclosures now average over 100 per year.

The results at Frankford Arsenal and Picatinny Arsenal show the value of inventor education.

The patent organization is a vital part of the scientific and engineering community. It is involved with scientific and engineering contributions, and should be placed in an environment which encourages creativity. Privacy is essential. The patent adviser must be encouraged to perform at a level approaching his commercial counterpart.

An active "creative" community requires progressive handling of pending actions by their patent organization. Not only must patent prosecution be vigorous, but overall management must be aggressive. Large patent staffs are unlikely. Therefore, paperwork management must be most efficient.

Today in the Munitions Command there is a second-generation automatic data processing (ADP) system for recording case histories. On a periodic basis, this system produces reports on: status of all active cases; activity during the period; last action in each case, by installation (for inventor information); complete tabulations by action; patents issued during the period; and complete case histories.

Other management information is available such as patent advisers' docket status, etc. This system started in January 1964 and is being expanded to include coded information for the scientific and technical information program. Ultimately it will be joined with a new ADP program for patent management under Munitions Command R&D contracts.

Not only have these ADP programs reduced bookkeeping time, but they have made available management information permitting greater efficiency in work performance.

In short, management of the patent activity must be as current as management techniques permit.

Summary and Recommendations. Patents are an advantage to the Army in protecting the fruits of the R&D investments. Many Government patents could issue, as do private ones, on articles or processes that may not at the time be economical because the art does not have available the materials or means to make them economical.

It is suggested that patents are one means for showing embodiments of Army research and engineering efforts that might not otherwise be presented because some other end item was selected for further development or standardization. (On many occasions a development reverts to an earlier design, which may then be covered by privately owned patent.)

One must keep in mind that a very valuable role of a patent is to show that other advances in the art are obvious in the light of *its* contribution. Thus, many patents, while covering inventions never widely used, often prevent the issuance of other patents on related inventions.

A privately owned patent may prevent the Army from obtaining a patent, and an Army patent may well prevent the issuance of a privately owned patent, which might otherwise result in additional cost to the Government in royalties.

A positive policy towards patents best serves the interests of the R&D effort. Consideration of patents—preliminarily in state-of-the-art searches, as well as covering the results of the investigation—should be a requirement of each project, end even the smallest task from which advances in the art may be expected.

Each research and engineering activity should be augmented with adequate patent support. By *adequate* is meant sufficient acceptable, qualified patent personnel to keep reasonably current with invention disclosure submittal. Clerical support should be in line with industrial standards (about one clerk to each two patent advisers).

In addition, the patent adviser should be provided with modern dictating equipment and a private area in which to use it. Consideration should also be given to a compensation schedule which will allow the Government to retain aggressive, technically capable, well-educated patent advisers.

Inventor education should be a requirement for each member of the scientific and engineering community, and should be updated periodically.

Continuing technical education for patent advisers should be a part of their job, to assure that they keep abreast of advances made by the scientific and engineering community.

Patent advisers should take part in the planning of technical endeavors as well as in the review of technical accomplishments.

Organizationally, the patent prosecution support should be as close to the scientific and engineering community as possible. Organization lines must not hamper communications. Inventors must have a direct line to their patent advisers.

Experience supports the proposition that *the public interest is best served by an aggressive Government patent program.*

Friday, 13 Foul Luck Foiled

ERDL Electrical Power Chief Cuts 'Curse' Circuit

Thirteen, even when compounded with the sinister superstition of Friday, is anything but an unlucky number for Oscar P. Cleaver, a much-honored Federal Civil Service career veteran employed by the Army Engineer Research and Development Laboratories.

April Fool's Day, Friday, a 13th consecutive annual Outstanding Performance Rating, and the Department of the Army's highest honor for a Civil Service employee—the Exceptional Civilian Service Award—all came in a neat package for Mr. Cleaver.

General Frank S. Besson, Jr., CG of the Army Materiel Command, presented the Exceptional Civilian Service Award to Cleaver, only a few hours after Col Frank L. Milner, ERDL commander, had honored him with a 13th Outstanding Performance Rating.

Friends might, in view of his numerous awards, josh him about being "Cleaver the Receiver," but they do it mighty respectfully—in all due recognition of his many significant contributions to the success of Army research and development objectives over a 23-year period.

Associates credit Cleaver with "developing the leading Army laboratory in the electrical power field." As chief of the Electrical Department of ERDL at Fort Belvoir, Va., he is responsible for anticipating long-range electrical power requirements of the Army and initiating programs to provide equipment when needed.

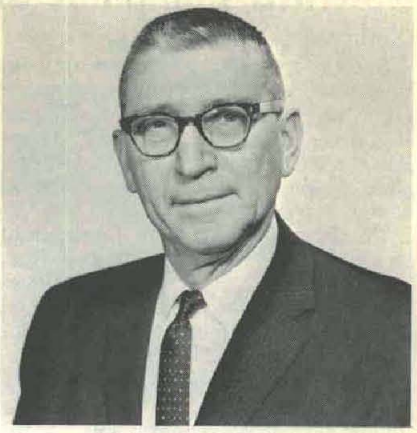
The Electrical Department had responsibility for the Physics Research Laboratory, the Barrier and Intrusion Detection Division, and for the Far Infrared and Warfare Vision Division until the Warfare Vision Laboratory was moved to the Electronics Command at Fort Monmouth, N.J.

One of the most recent significant developments brought about under his guidance has provided the Army with increased capability to see at night through development of infrared and electronic devices that are expected to change military tactics and doctrine in the coming years.

Cleaver received his BS degree in electrical engineering in 1928 from Georgia Institute of Technology, where he graduated as the top student in his class. Two years later he was awarded an MS degree in electrical engineering from Yale University.

In 1946 he entered Government service with the Engineer Board, predecessor of the Engineer R&D Laboratories, after serving four years as an Army officer in illuminating and electrical engineering. For many years he was active in the 2243rd R&D Reserve Unit at ERDL and was commanding officer when he retired as a colonel in 1964.

Since the end of World War II, his research responsibilities have included such programs as the first detector of nonmetallic mines, the first truck-mounted mine detector, an automatic land navigation and position-keeping system for armored vehicles, special power plants for various missile systems, and various infrared night-vision devices.



Oscar P. Cleaver

Cleaver is listed in *Who's Who in Engineering* and *American Men of Science* and is a member of Phi Kappa Phi, Tau Beta Phi, and Sigma Xi.

ERDL Craftsman Retires to Pursue Carving Art

Goingback ("G. B.") Chiltoskey, full-blooded Cherokee Indian and nationally known woodcarver, retired in April after more than 30 years of Federal service, related mainly to Army research and development.

Trained in arts and handicraft at Oklahoma A&M, Purdue University and the Art Institute of Chicago, he served from 1942 to 1947 and from 1954 until he retired as a woodworker and metalsmith at the Army Engineer R&D Laboratories, Fort Belvoir, Va.

"G. B." RETIRES after more than 30 years in U.S. Civil Service. Goingback Chiltoskey, Cherokee Indian, is pictured with some of his work as a woodcarver and modelmaker. In the background is a model of the SM–1 nuclear power plant he built at the Army Engineer R&D Laboratories, Fort Belvoir, Va. He holds carvings of a Kerry blue terrier and a giraffe he carved during his off-duty hours.

"G. B.'s" work has been displayed in numerous galleries, the Smithsonian Institute in Washington, D.C., and at art fairs. He began his Civil Service career in 1935 in a Department of the Interior shop, where one of his carvings was selected for an exhibit in Paris.

Magazines such as the *National Geographic* and *Holiday* carried picture stories on his art. Best known are his carvings of animals, although several years ago he did a scale model of the battleship *North Carolina* for the state "Battleship North Carolina Committee."

Born Apr. 20, 1907, on the Indian Reservation at Cherokee, N.C., he began whittling dexteriously before he learned to speak English. His formal schooling began at age 10 and most recent off-duty woodcarving was a bust of North Carolina's Civil War Governor Vance. It now occupies a prominent place in the restored Vance home in Asheville.

An early carving that attracted attention was the "Great Horned Owl," an award winner in the North Carolina State Art Society's competition in 1953.

With an established demand for his work, Goingback Chiltoskey has returned to his "shop" on the Cherokee Reservation. It is a large concrete block building which doubles as a home for him and his wife but his plans call for a new home to make room for expanding "big business" in woodcarving.

CONARC Pamphlet Cites Army Applications of HumRRO Studies

Specific examples of Army applications of new knowledge resulting from the contract with the Human Resources Research Office (HumRRO) of George Washington University, Washington, D.C., are listed in a new report.

Published by the U.S. Continental Army Command, Fort Monroe, Va., Pamphlet No. 70–1 lists the applications in six categories. It calls on readers to submit knowledge of other specific examples directly to the commanding general, USCONARC.

HumRRO is a contract agency under the direct supervision of the Army Chief of Research and Development (CRD). To provide for improved performance, motivation and leadership of military personnel, the CRD sets objectives for the discovery, development and application of human factors principles and techniques.

HumRRO is concerned with training requirements, needs for training devices, new methods of instruction, factors in motivation, and leadership selection criteria as proved out by scientific testing methodology.

USCONARC Headquarters assigns five research units to support HumRRO divisions located at Fort Knox, Ky.; Fort Ord, Calif.; Fort Benning, Ga.; Fort Bliss, Tex., and Fort Rucker, Ala. These research units provide guidance, support and interpretation of research results to increase the likelihood that successful work can be applied by the Army.

The USCONARC pamphlet contains a reference bibliography applicable to each of the categories reviewed. It includes research reports and training materials which are research byproducts.

Categorically, and with the nature of research utilization described where appropriate, the applications reported by USCONARC are as follows:

Individual Training for Equipment Operation and Maintenance. Task FORECAST provided measures for reconstructing the troubleshooter's job in electronics maintenance, determining more efficient content, and developing more effective maintenance courses. The FORECAST concept has been successfully applied to a Navy LORAN (long-range navigational radar) maintenance training course. Concurrently, the Training Command, U.S. Atlantic Fleet, is testing a shipboard on-the-job modified version of the standard LORAN-FORECAST course.

Task RADOP findings for international Morse code training indicated that individual student achievement can be predicted accurately with regard to time and level; also, that a flexible training schedule promotes efficient learning of code skills. The U.S. Army Signal Center and School at Fort Monmouth, N.J., is using these findings in "International Morse Code" (FM 11–459), scheduled for publication.

A consulting report on vehicle mechanics training consolidates MOS 630, 631 and 632 job requirements. Methods used in determining the job requirements are applicable over a wide range of training situations. The U.S. Armor School at Fort Knox has used this report extensively as background material in preparing the Program of Instruction (POI) for tracked-vehicle mechanics.

Ability to plan successful night operations is largely dependent upon knowledge of what men can see and do when illumination is imperfect. The U.S. Army Armor School used a 1957 HumRRO special report on human factors in military night operations to update its training literature and lesson plans.

The future payoff of research is shown also by the Armor School use of findings of a classified 1959 technical report to develop techniques for employing the new Xenon searchlight and to update "Armor Operations" (FM 17–1) and "Tank Gunnery" (FM 17–12).

Task RINGER found that the learning of fixed-procedure tasks could be accomplished as quickly with inexpensive photographs and line drawings as with costly, realistic simulators. A 1965 research report revealed that there were no statistically significant differences in either mean proficiency scores or average learning times when expensive devices were used.

HumRRO findings in this area also were applied and found appropriate in MOS training in the identification of parts, fixed-procedure training and in testing programs.

Task OBSERVE, aerial observation, received extensive research by HumRRO because of the continuing need for rapid acquisition of complete and accurate battle-area information at all command levels.

The task encompassed the identification of required skills and knowl-

Reservist Studies Overseas Research During Active Duty

Overseas research programs of the U.S. Army received intensive study recently by an Army R&D Reserve officer who deals with international scientific affairs for the U.S. Department of State.

Capt William C. Salmon, a research project officer with the 2391st R&D Army Reserve Unit, Washington, D.C., spent his annual 2-week active duty training at the Army Research Office, Arlington, Va. His assignment was to prepare an "outsider's report" on worldwide Army research.

Employed as a civilian science officer with the State Department Office of International Scientific and Technological Affairs, Capt. Salmon worked with the Army as executive secretary of the International Committee of the Federal Council for Science and Technology, 1962–64.

In his normal work he is concerned with several international programs including Near Eastern and South Asian scientific and technological affairs. He is coordinator for U.S. technical agency support of overseas research which uses U.S.-owned "excess" foreign currency, and is also active in desalination of sea water research.

A native of Bingham, Mass., he graduated from Massachusetts Institute of Technology in 1957 with a BS degree in mechanical engineering, received a master's degree in 1958. An ordnance officer, he served one active duty tour at the Army Ballistic Research Laboratories, Aberdeen (Md.) Proving Ground.

Capt Salmon is a registered professional engineer (State of Massachusetts) and a member of the National Society of Professional Engineers, American Society of Mechanical Engineers, American Association for the Advancement of Science, Middle East Institute and the American Ordnance Association.

Capt W. C. Salmon

edge, development of an experimental course, and preparation of a prototype programed instructional package to meet field training requirements.

These research findings were used by the Army Aviation School at Fort Rucker to revise "Aerial Observer Training" (FM 1–80). Prototype programed texts will be published in a Department of the Army training manual, "Aerial Observer Programed Text."

Orientation and Training in U.S. Army Training Centers. Research findings on land navigation are being incorporated in "Army Subject Schedules 7–111, MOS Subject Schedules 11B10, Light-weapons Infantryman; 11C10, Infantry Indirect Fire Crewman; 11H10, Infantry Direct Fire Crewman; and TC 7–5, Land Navigation."

In addition to this application in Advanced Individual Training (AIT), the Army Chemical Center and School at Edgewood, Md., adapted appropriate research findings to the Plans of Instruction for Chemical Officers and Chemical Staff Specialists.

Incorporated also in the AIT program is the rifle squad tactical training and patrolling instruction developed under Task RIFLEMAN IV. This research produced useful by-products such as an instructor's guide and a listing of critical combat skills, knowledge and performance requirements.

The Infantry School at Fort Benning used Task RIFLEMAN IV publications in the development of Infantry MOS subject schedules and in the preparation and verification of training objectives.

The TRAINFIRE II research report was used by the Infantry School to prepare "Technique of Fire and Tactics, Rifle Squad" (TC 23–9).

Small Unit Training. Two research reports on tank platoon training and on determination of combat job requirements for the armored cavalry platoon have been in continuous use at the Armor School.

The first was used in the revision of "Tank Company Tank Battalion" (ATP 17–37), "Tank Company" (ATT 17–37), "Tank Platoon" (ATT 17–37–1) and "Tank Battalion" (ATP 17–35 and ATT 17–35). Findings of the second report are incorporated into revisions of "Armored Cavalry Troop, Armored Cavalry Squadron" (ATP 17–107), "Cavalry Troop, Cavalry Squadron" (ATT 17–107–1) and MOS Subject Schedule 17–133.

Training for Leadership, Command and Control. A study of human factors in tactical nuclear combat was published in April 1965. This technical report analyzes the probable effects of nuclear warfare on the reactions of a combat soldier which are necessary to understand morale and command problems on the nuclear battlefield and in planning for nuclear combat. The report also presents for use in war games a method for adjusting casualty rates based on psychological factors.

Task OFFTRAIN enabled the Army Infantry School to introduce leadership training literature into the Reserve Officer Training Corps (ROTC) program. The same material is also being used at the Army Primary Helicopter School, Fort Wolters, Tex., to train warrant officer candidates.

Language and Area Training. Examples of cross-cultural problems encountered by Americans working overseas have been incorporated into an instructor's handbook distributed to military schools and agencies concerned with such problems. The Army Special Warfare School at Fort Bragg, N.C., will use the handbook to teach "Attitude Change" and "Communications."

Task CIVIC developed principles and guidelines for assessment of the civic action elements of an environmental improvement program. These findings have been included in "Advisors Handbook for Counterinsurgency" (FM 31–73) by the Special Warfare Agency of the Army Combat Developments Command, Fort Belvoir, Va.

Training Technology. The Army Air Defense School tested a special HumRRO-developed block of instruction on oscilloscopes (OS–8, 24–C and 50–C) produced under Task TEXTRUCT, dealing with electronic test equipment. As a result of superior performance of students, the method was adopted by the school to train Hawk missile-maintenance technicians. Similar training procedures for the TS–352 (multimeter) and TS–505 (VTVM) also were included in Hawk instruction.

New instructional techniques have evolved and several schools reported major development of programed texts in support of POI. The Army Chemical Center and School completed several instructor training course subjects, including New Instructional Techniques, School POI, Lesson Outline, Lesson Plans, Training Literature, Training Films and Doctrine Development. Also completed are Subcourse 32, "The M3A3 Mechanical Smoke Generator"; Subcourse 19, "Review of Mathematics and Physics"; and the POI subject "Map Reading."

"A Handbook for Programers of Automated Instruction" resulting from Task TEXTRUCT is considered of value to all activities engaged in preparing programed material.

Development of duty-oriented performance objectives has made progress in several Army schools, including Armor, Aviation, Chemical, Quartermaster (at Natick, Mass.) and Signal.

An annotated bibliography on the determination of training objectives and a research bulletin on the development of training objectives have proved helpful for several requirements. The Quartermaster School used these publications to prepare a special text, "Duty Oriented Objectives" (ST 10–2–1). The Armor School used the technical report on the control of quality of training for development of tests.

HumRRO research continues to provide data for specific applications throughout Army training elements and for use in the development or revision of instructional programs. The R&D findings are also used by the Navy and Marine Corps and by the military services of NATO Allies.

Established in 1951, HumRRO is working on new research requirements suggested by various agencies. As results are used by Army activities in the Human Research Units and reports are made, a further summary of HumRRO effectiveness will be published.

(*Continued from page 29*)

Army Nominates 7 For $10,000 Awards

he was awarded the Exceptional Civilian Service Award by the Secretary of War. That honor came in acknowledgement of his outstanding achievements in the critical materials conservation program for the Corps of Engineers, and in the search for suitable substitute materials to fill shortages of critical items.

In 1955 he was the winner of the American Standards Award of the American Institute of Architects, the Producers Council and the National Association of Home Builders. He received Corps of Engineers Sustained Outstanding Performance awards for his work annually from 1957 through 1965.

As a member of various committees of the American Concrete Institute, he played an important part in developing codes and standards and in their application to military structures, leading to ratification of a revised code in 1956.

The nomination credits him with being a "motivating force in establishing of uniform standards for negotiation of fees for architect-engineer services used by the Corps of Engineers. As a result of these studies, standards were developed for use throughout the Department of Defense. These standards gained general acceptance by the American Society of Civil Engineers and the American Institute of Engineers, and have been used by other Federal agencies.

"Mr. Zackrison has consistently promoted an expanding field of endeavor to develop a better understanding of design in such diverse fields as soils, foundations, blast protection, corrosion, building materials, pavements, and precise power. . . . He is a valued consultant both within and outside the Federal Government."

John Christians

Swante Swenson

Dr. Maxine Savitz

Cyrus Martin

John Hopkins

11 Competing for 3 Awards at ERDL

Nominees for three awards made annually by the commanding officer of the U.S. Army Engineer Research and Development Laboratories to recognize outstanding leadership, scientific and technological achievements include 10 men and one woman.

ERDL Commander Col Frank Milner will present the highest awards originated within the Laboratories at ceremonies May 20. Each nominee will receive a Certificate of Achievement and monetary award. Winners will receive engraved medals mounted on plaques.

Dr. Maxine L. Savitz, a research electrochemist, was nominated by the Electrical Department for the Scientific Achievement Medal, along with Dr. Heinrich Egghart of the Military Department and Cyrus A. Martin of the Technical Service Department.

DR. SAVITZ was nominated for contributions in advancing the understanding of anodic oxidation mechanisms of hydrocarbon molecules in connection with fuel-cell research.

Dr. H. C. Egghart

DR. EGGHART, a research chemist, pursued studies which have significantly improved the understanding of factors influencing the rate of decomposition of metastable compounds and their stability.

CYRUS MARTIN is a mathematician recognized for work in preparation and periodic presentation of a course that acquaints engineers with the mathematical basis of sampling plans and test criteria in military standards—to permit more effective application of the criteria to quality and reliability-assurance test of items being designed, tested and procured by the Laboratories.

Nominees for the Technological Achievement Medal are Emmett G. Hundley, Military Department; Swante B. Swenson, Technical Service Department; Edward A. Gillis, Electrical Department; John A. Christians, Mechanical Department, and Thomas W. Lovelace, Engineering Department.

SWANTE SWENSON for his activities in the field of plastics fabrication and utilization, especially in buildings.

EDWARD GILLIS for his design of fuel cell electrodes and stacks which have resulted in greatly increased performance and power density in fuel-cell systems.

Jerome Hoeschen

JOHN CHRISTIANS for the development of advanced marine terminals systems to moor ocean-going tankers and unload their petroleum cargoes under wartime conditions, particularly the development of an explosive embedment anchor which reduces the amount of time and material needed to moor such vessels.

EMMETT HUNDLEY for his work on preliminary and final design of the Beach Discharge Lighter task, to insure that this 340-foot, ocean-going Army ship included all Army requirements.

THOMAS LOVELACE for his engineering achievements in perfecting the design, and improving producibility and quality control and cost reduction of the Military Standard Engines.

Leadership award nominees are: JOHN H. HOPKINS, Military Department, for guiding the Army's expanded camouflaged program.

W. G. SPANGLER, Technical Service Depart., research and application of metallic and radioisotope activated luminous materials.

JEROME HOESCHEN, Mechanical Department, for his management of the Design Proof Branch in prosecuting a greatly expanded test and evaluation program to meet urgent requirements for construction and other types of vehicular equipment.

William Spangler

Emmett Hundley

Edward Gillis

Thomas Lovelace