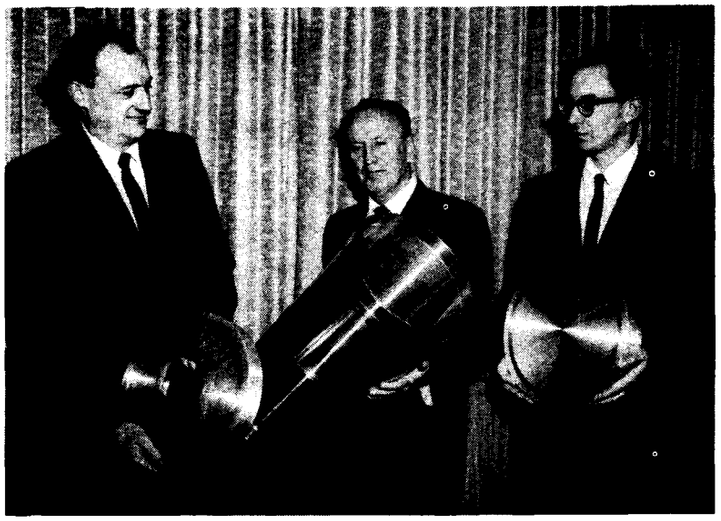


Above: (left to right) Jack B. Esgar, William C. Morgan, and Richard H. Kemp with the boltless attachment and seal for pressure tank heads they designed.

Harold Kaufman, (left), is shown with electron bombardment ion engine he invented.

Largest Invention Award at the Center Given Kaufman; Esgar, Morgan, Kemp Honored

The largest invention award ever made to a Lewis Research Center scientist was presented to Harold R. Kaufman at National Aeronautics and Space Administration Headquarters in Washington, D. C., yesterday.

Three other Lewis engineers, Jack B. Esgar, William C. Morgan, and Richard H. Kemp, also received invention awards from NASA Deputy Administrator Dr. Hugh L. Dryden during the special ceremony.

Kaufman received $4,000 for his invention of an electron bombardment ion engine which may be used for space flights to Mars and beyond. The award was made for a contribution of "significant value in the conduct of aeronautical and space activities," under provisions of the Space Act.

An ion engine can operate only in the vacuum of space and creates thrust by electrically accelerating charged ions of cesium or mercury to high velocities. The efficiency of such engines has already reached 80 per cent. Present engines appear to have a life of 1,000 hours or more. Development is underway to extend this lifetime to the one or more years necessary for trips to other planets.

Esgar, Kemp, and Morgan received a joint award of $1,400 for their invention of a boltless attachment and seal for pressure tank heads that may save hundreds of thousands of dollars during the coming years. Their award was made under the Government Employees Incentive Awards Act.

The device invented by Esgar, Kemp, and Morgan is used for testing possible materials at various wall thicknesses for use in tankage for spacecraft and rocket vehicles. Prior to the Lewis innovation actual tanks had to be fabricated for testing. Now a simple hollow cylinder is used between the two reusable self-sealing heads. The device saves about $300 a tank.

Both inventions were considered by the Inventions and Contributions Board because of a determination that applications for patents should be filed.

KAUFMAN

Kaufman is head of the Advanced Systems Section, Electromagnetic Propulsion Division and has applied for several patents in the electric propulsion field. He joined Lewis in 1951 immediately after graduation from Northwestern University where he earned a bachelor of science degree in mechanical engineering. At Lewis he has specialized in research on turbojet engines and electric propulsion.

Kaufman and his wife, Elinor, have three children: Brian, 11, Karin, 9, and Bruce, 6. They live at 301 Kraft Street in Berea.

ESGAR

Jack Esgar joined the Lewis staff in 1947 and participated in aircraft piston engine development and gas turbine cooling problems. As Chief, Structures Branch, he is currently supervising research on space vehicle structures and materials.

A native of Wiley, Colorado, he earned his bachelor of science degree in mechanical engineering from the University of Colorado in 1943.

Esgar, his wife, Evelyn, and daughter, Colleen, 19, reside at 5097 Whitethorn Avenue, North Olmsted.

KEMP

Richard Kemp is Head of the Powerplant Structures Section of Materials and Structures Division. He has specialized in stress and vibration research in propulsion structures.

A native of Genoa, Ohio, Kemp graduated from the University of Toledo just prior to joining the Lewis staff in 1943.

Kemp, his wife, Frances, and three sons, Richard, 19, David, 17, and Paul, 16, live at 999 Richmar Drive, Westlake.

MORGAN

William Morgan is presently engaged in the study of stress and strain distribution in thin wall structures in Lewis' Materials and Structures Division.

A Lewis employee for nearly 21 years, Morgan is a graduate of Ohio University with a bachelor of mechanical engineering degree. He also holds a patent for aircraft turbine blades.

He and his wife, Margaret, reside at 27350 Langle Road, Westlake, with their two children, Barbarba, 19, and John, 16.

Additional Recent Awards For Inventions

Three inventions to increase the usefulness of the nuclear research reactor at the Plum Brook Station won incentive awards for their inventors late in January.

A fourth award went to a Lewis inventor who devised a better logic circuit to handle data accumulated by satellites and transmit it back to earth.

Seven hundred dollars went to Robert Steinberg and William B. Schwab.

Steinberg, Reactor Analysis Section, and Schwab, Materials and Stresses Services Section, developed a method and device for mapping the neutron flux or power level of each section of a reactor in a fraction of the time necessary by previous methods.

John W. Macomber of Mechanical Design Section C was awarded $500 for his invention of a nuclear reactor control rod assembly with improved driving mechanism. This assembly is used for controlling power level in the reactor.

A $200 award was presented to Joseph M. Savino and Chester D. Lanzo for developing a simulated fuel assembly for the reactor. The simulated fuel assembly is substituted for the actual fuel rods in the reactor and is instrumented to measure the flow of cooling water through the reactor.

Lanzo works in the Reactor Components Section, Savino in the Heat Transfer Branch.

The transistorized logic circuit developed by John C. Sturman, Instrument Development Section, won a $100 award. Used for relaying information back from satellites and space probes, his circuit offers increased efficiency and decreased power consumption.

Conference Speakers

Electric Propulsion

Seven Lewis researchers will discuss various phases of the Center's electric propulsion work at an upcoming conference.

Sponsored by the American Institute of Aeronautics and Astronautics, the Fifth Electric Propulsion Conference will be held March 7-9 in San Diego.

Lewis speakers and the papers they will present are:

Paul D. Reader, "Durability Tests of Mercury Electron-Bombardment Ion Thrusters".

J. A. Wolters, "Life Testing of Electron Bombardment Cesium Ion Engines".

Paul M. Margosian, William R. Kerslake, "Experimental Evaluation of a Two-Directional Electron-Bombardment Ion Thruster".

Joseph F. Wasserbauer, Kerslake and Margosian, "A Mercury Electron-Bombardment Ion Thruster Suitable for Station Keeping and Attitude Control".

Daniel S. Gold and George L. Kvitek, "An Analysis of Particle-Formation Efficiency in a Colloid Thruster".

Harold Kaufman, Chief of the Ion Physics Branch at Lewis, will be chairman of the session on Ion Engines.

The Electric Propulsion Conference is held annually to discuss advances in electric propulsion design and engineering.

Invention Awards Presented

The Inventions and Contributions Board has given $2,600 recently to 15 Lewis staff members for the development of significant inventions. They are:

Dale W. Cooper and Perry W. Kuhns, Spacecraft Technology Division, $100 for *Generator for a Space Power System;*

Harold R. Kaufman, assistant chief, and William R. Kerslake, Electromagnetic Propulsion Division, $400 for *Ion Thrustor Cathode;*

John W. Gregory and Donald L. Nored, Chemical Rocket Division, $200 for *Combustion Chamber;*

Robert C. Finke and Robert H. Vetrone, Electromagnetic Propulsion Division, $500 for *Electrode and Insulator with Shielded Dielectric Junction;*

Robert C. Finke and Walter M. Krawczonek, Electromagnetic Propulsion Division, $500 for *Apparatus and Method for Measurement of Electrical Signals;*

James D. Heckelman, Reactor Division, Plum Brook, $400 for *Multi-Alarm Summary Alarm;* and

Harold E. Sliney, Fluid System Components Division, $300 for *Self-Lubricating Flouride-Metal Composite Materials.*

IR-100 Award winner ... the electron bombardment ion thruster.

IR-100 Award cites Lewis ion engine

Lewis Research Center was recently honored in Chicago for the "development of one of the 100 most significant technical products of the year."

The award was presented for the electron bombardment ion thruster, a type of electric rocket engine, invented by Harold R. Kaufman, Assistant Chief of the Electromagnetic Propulsion Division at Lewis.

Winners are selected by a panel of some of the country's best known scientists and engineers including a nobel prize laureate. The IR-100 awards are sponsored by Industrial Research Inc. of Beverly Shores, Indiana.

Lewis has been honored four times in previous years since first entering the competition in 1966. The winners are selected by a panel of leading scientists and engineers.

There are two electron bombardment ion thrusters presently on a spacecraft orbiting the Earth to demonstrate the engine's ability to function reliably for long periods of time in space. The spacecraft, called SERT II for Space Electric Rocket Test, was launched February 3 of this year. The first engine operated continuously for 3,785 hours, a little more than five months. The second engine has been operated for more than 1,000 hours now and it is hoped it will meet the objective of continuous operation for six months in space.

In the future the ion thrusters may be used to position Earth-orbiting satellites or as a primary propulsion system to propel spacecraft to distant planets.

The development of the electron bombardment ion engine has spanned many years. Initial studies started back in the 1950's at Lewis. By 1964 the first space test was conducted on a suborbital flight which proved this type of thruster would work and produce useful thrust in space. The SERT II orbital flight of this year is proving the thruster is ready for application to a wide variety of space missions.

Ion engine inventor earns PhD

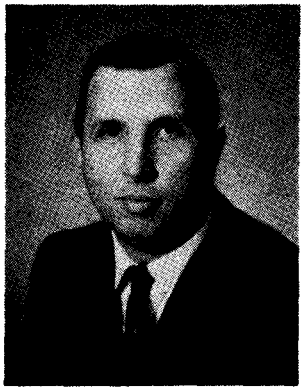
Harold Kaufman, Assistant Chief, Electromagnetic Propulsion Division and recognized throughout the world for his ion engine invention, will receive his PhD in June from Colorado State University.

Assisted by Lewis' Training Branch, Kaufman began work on his PhD in September 1969. He had previously earned a Bachelor's degree in mechanical engineering from Northwestern University.

At Lewis Dr. Kaufman has specialized in research on turbojet engines and electric propulsion. He developed an electron bombardment ion rocket for which NASA presented him an invention award "for a contribution of significant value in the conduct of aeronautical and space activities."

Two of Dr. Kaufman's rockets were used in the SERT II experiment. In orbit, one rocket operated successfully for more than five months and the other nearly three months. Although the test fell short of its goal to achieve six months of operation, it proved that electric propulsion is ready for space applications.

Dr. Kaufman is an Associate Fellow of the American Institute of Aeronautics and Astronautics, a member of Lewis Training Commission representing the Advanced Research Institute and coordinator for the Lewis Advanced Study Program.



Lewis duo judges at youth science fair

Two Lewis employees were among a team of NASA judges sent to the International Science and Engineering Fair held May 10-14, in Kansas City, Missouri to present awards to outstanding high school science students.

Stuart Roosa, command module pilot of Apollo 14, was the main speaker.

The NASA team, headed by Dr. Norman E. Pentz of the Physics and Chemistry Division, was composed of representatives from Headquarters and field installations. Lewis' other team member was Dr. Charles C. Giamati, also of Physics and Chemistry. Dr. Pentz has participated as a judge since 1963, except during 1966 and 1968.

LEWIS RESEARCH CENTER
CLEVELAND OHIO

November 5, 1971

Director, scientists merit NASA awards

Director Bruce T. Lundin, John C. Freche, and Dr. Harold R. Kaufman were honored for outstanding achievements last Friday (October 29) at NASA's 13th Annual Awards Ceremony in Washington, D.C.

Each man was accompanied by his wife at the afternoon ceremony.

Lundin received the space agency's highest award, the Distinguished Service Medal. Dr. James C. Fletcher, NASA Administrator, presented the award to Lundin for his " . . . distinguished career and significant contributions..." to the nation's aerospace programs. His citation, in part, reads: "His leadership in management of research and development programs have provided a strong base upon which this nation can build for the future in aeronautics and space."

Dr. Kaufman, Assistant Chief of the Electromagnetic Propulsion Division, was presented a NASA Exceptional Scientific Achievement Medal. It recognized Dr. Kaufman's invention and development of the electron-bombardment ion engine, a type of electric rocket which is now ready for space propulsion applications. Ion engines may be used in the future for positioning of spacecraft in earth orbit, or for propelling spacecraft to distant planets.

Freche, Chief of the Fatigue and Alloys Research Branch, also received a NASA Exceptional Scientific Achievement Medal. His award was for " . . . outstanding contributions to the advancement of high temperature materials technology and in the science of metal fatigue."

The Exceptional Achievement Medals were presented to Dr. Kaufman and Freche by Dr. George M. Low, NASA Deputy Administrator.

The Lewis men were among 83 agency personnel to receive awards in the ceremony held at the Department of Health, Education and Welfare Auditorium in Washington.

Names in the News

BRAUN

Martin J. Braun has recently been appointed Chief of the Mechanical Systems Branch, Atlas/Centaur Project Office. Since joining Lewis in April, 1963, Braun has worked in the Launch Vehicles Division. His appointment confirms the position he has held for the past year, being responsible for all mechanical systems on the Atlas/Centaur vehicle and for mechanical ground systems at Launch Complex 36 at Cape Kennedy. For 12 years prior to his Lewis career, he worked on missile systems for Goodyear Aerospace in Akron.

Murray B. Gordon, Lewis Labor Relations Officer, will chair a meeting sponsored by the American Society of Mechanical Engineers with the Institute of Electronics and Electrical Engineers and the National Society of Professional Engineers participating on November 17 at the Cleveland Engineering and Scientific Center starting with a social hour at 6 p.m. The Center is located at 3100 Chester Avenue. Speakers at the meeting will present a variety of views on the subject "Should Engineers Join a Union."

Apollo 15 has been described as the most scientifically fruitful mission to date. One of NASA's scientist-astronauts, **Dr. Karl G. Henize**, will discuss that topic "from the viewpoint of a support crewman" on November 12 in a program sponsored by the Cleveland Astronomical Society. Dr. Henize, who has a Ph. D. in astronomy, will talk at 8:15 p.m. at the Schmidt Lecture Hall of CWRU, 2100 Adelbert Road. The program is open to the public.

Robert Schwartzenberg of the Test Installations Division caught this 25 3/4-pound muskie September 3 at Pymatuning Lake. He used a nine-pound test line and struggled more than two hours before landing the 46-inch long fish. Schwartzenberg, who plans to mount the fish, was told that it was the biggest ever caught in Pymatuning Lake.

September and October were touring months at Plum Brook Station, thanks to the coordination of **John Weeks**. With the Employees Annual Picnic, the high school student tours, and three Sundays when the public drive-throughs showed off the Station's beauty and facilities, almost 10,000 persons now have a better diea of the mission of the Station and of Lewis.

Papers tell research story

The results of Lewis scientific and engineering investigations continue to be disseminated to the professional public through conferences and annual meetings of various technical societies. During the next two weeks, papers by Lewis authors are being presented as follows:

"Technology for Low Cost Solid Rocket Boosters," by Carl C. Ciepluch, at the Joint Army-Navy-NASA-Air Force Propulsion Meeting in Las Vegas Nov. 1-5.

"Deformed Brueckner-Hartree-Fock Calculations for Light Nuclei," by Richard C. Braley, Dr. William F. Ford and Hiram College professor Dr. R. L. Becker, at the American Physical Society Meeting in Tucson November 4-6.

"Review of NASA Aerospace Oxygen Accidents and Incidents" by Paul M. Ordin at the Oxygen Compressors and Pumps Symposium in Atlanta November 9-11.

"A Stored Program Channel Processor for CAMAC (a new international standard for digital instrumentation)" by Dr. Robert W. Bercaw at the Fall Symposium of the Digital Equipment Computer Users Society in San Francisco November 11-13.

"Reliability Testing and Demonstration of Aerospace Problems" by Vincent R. Lalli at the Ninth Annual Reliability Engineering and Management Institute at the University of Arizona November 9-13.

At the Second Symposium on Uranium Plasmas in Atlanta November 15-17, nine Lewis-authored papers are being given: "Effect of Bouyancy on Fuel Containment in an Open-Cycle Gas-Core Nuclear Rocket Engine" by Henry A. Putre; Shock Tube Technique for Opacities at High Pressures for Gaseous-Core Rockets" by Vernon H. Gray and Dr. Richard W. Patch; "Of What Use Could Nuclear Engines be to Society?" by Frank E. Rom; "Performance Potential of Nuclear Gas-Core and Fusion Rockets; A Mission Applications Survey" by Edward A. Willis, Jr. and Laurence H. Fishbach; "Mini-Cavity PROBE Reactor" by Robert E. Hyland; "Optical Transmittance of Fused Silica at Elevated Temperatures during High Energy Electron Bombardment" by Albert B. Smith; "Nozzle and Cavity Wall Cooling Limitations on Specific Impulse of a Gas-Core Nuclear Rocket" by Albert F. Kascak; "Crew Radiation on Dose from the Plume of a High Impulse Gas-Core Nuclear Rocket during a Mars Mission" by Charles C. Masser; and "The Open-Cycle Gas-Core Nuclear Rocket Engine — Some Engineering Considerations" by Maynard F. Taylor, Charles L. Whitmarsh and Paul J. Sirocky, Jr.

Three Lewis papers on ion research are being presented at the American Physical Society in Madison, Wisconsin November 15-18: "Ion-Cyclotron Wave Generation with an m = 1 RF Coil" by Dr. Donald R. Sigman; "The Effect of Metallic Reflectors upon Cyclotron Radiation" by Dr. Richard A. Krajcik and "Mechanism of Hot Ion Production in a Modified Penning Discharge" by Dr. J. Reece Roth.

At the 17th Conference on Magnetism and Magnetic Metals in Chicago November 16-19, Gary N. Benninger's paper on "Thermal Expansion of Single Crystal Dysprosium-Yttrium Alloys" is being presented.

Dr. David P. Fleming will present his paper "Externally Pressurized Gas Lubricated Journal Bearings with Herringbone Gooves — Load Capacity and Stability Analysis" at the Conference on Externally Pressurized Bearings in London, England November 17-18.

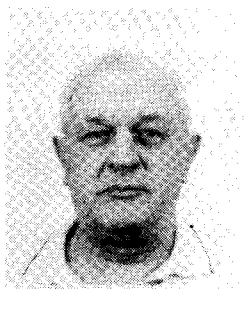
Accountants hear Lundin

Bruce T. Lundin will speak to the Cleveland Chapter of the Federal Government Accountants Association on November 15, 1971, at Stouffer Restaurants' El Cantina Room in the Erieview Plaza building. Lundin will speak on the future of NASA and the on-going programs at the Center. Employees of the Center are invited. Further information and dinner reservations can be obtained by contacting Charles Calvert at PAX 8412.

Six staffers choose retirement

Now that **Harry L. Worster** has retired he will move to southern Ohio and work on his 73 acre farm that he has purchased. A mechanical modelmaker in the Machine Shop Branch, Fabrication Division, he joined Lewis in October 1943. During his career at Lewis he has worked on research hardware such as ion engines and ordnance engines. He and his wife, Dorothy Helen, have one son who teaches school in Portage, Indiana.

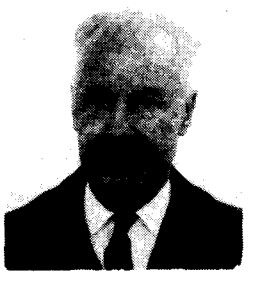
After more than 25 years of government service, moving to Florida is on the schedule for **Joseph P. Schellhaus** and his wife, Mary. Chief of the Administration Services Branch, SNSO, he joined in April 1968 in that capacity. Previously he was with SNSO, Jackass Flats, Nevada, as Director of Administrative Services Division.



Buying a new home in North Carolina is included in the after retirement plans for **Albert P. Sainsbury** and his wife, Marie. He leaves Lewis with more than 29 years of government service. Most recently a member of the Metallurgical Branch, Fabrication Division, he joined Lewis in 1944 and worked for a number of years as a toolmaker and metal modelmaker in the machine shop. Before joining Lewis he was a civilian employee with the Navy Department.

Ski trips and photography will keep **Fred Odar** busy after he retires this month. A nuclear engineer in the Reactor Applications Branch, Nuclear Systems Division, he joined Lewis in 1963. Before that he was with the U.S. Army for two years in the early 1950's. All his work here at Lewis has been related to different nuclear reactor concepts. Most recently this has included design of shields for nuclear reactors. He also has been responsible for thermionic cell tests, heat transfer studies and vibration testing of fuel support tubes for the Tungsten Water Moderated Reactor. He and his wife, Ludmilla, plan to stay in the Cleveland area. They have two children in school, a daughter, Dorthea, and a son, Andrew.

John R. Hendershot will begin full time management of a bowling alley now that he has retired. A metal worker leader in the Research Installations Branch, Facilities Operations Division, he joined Lewis in 1950 after four years with the U.S. Navy. During his career here he has been responsible for arc welding, vacuum welding, iron work, and other various other jobs. He and his wife, Iris, have ten children two of which are married.



John T. Flynn retires this month with more than 27 years of government service. An off shift supervisor in the Plant Protection Office, Office of Director of Technical Services, he joined Lewis as a mechanic in the Altitude Wind Tunnel area in 1944. He has worked as a foreman in the Mechanical Services Division and most recently has been responsible for operations at the Center after hours. He and his wife, Irene, will enjoy being able to take short trips whenever they please. He has one son.

THE LEWIS NEWS presents the Lewis Research Center story in terms of its people, its purpose and its progress. Published on alternate Fridays, the News is produced by the Public Information Office, Lewis Research Center, National Aeronautics and Space Administration, 21000 Brookpark Road, Cleveland, Ohio 44135.

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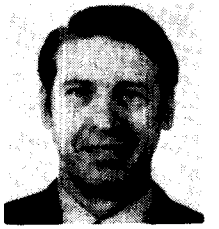
Editor ..... **Charles Mitchell**

Retirement annuity attracts many

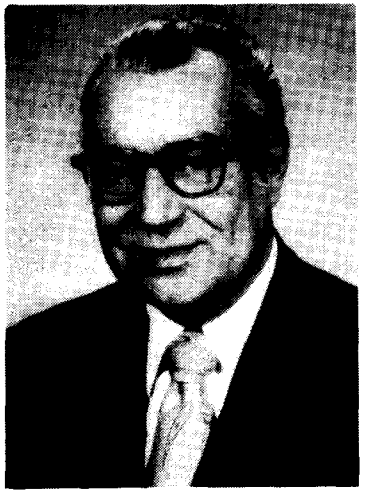
After he retires early next month, Dr. Harold R. Kaufman will begin a new career as a Professor at Colorado State University. Assistant Chief of the Physical Science Division, Dr. Kaufman joined Lewis in 1951 as a research engineer. He has specialized in research on turbojet engines and electric propulsion. He developed an electron bombardment ion rocket for which NASA presented him an invention award "for a contribution of significant value in the conduct of aeronautical and space activities." In 1969 he received the James H. Wyld Propulsion Award of the American Institute of Aeronautics and Astronautics for the original research on his engine and leadership in his field. In 1970 Lewis Research Center received an award from Industrial Research magazine for Dr. Kaufman's Electron Bombardment Ion Thruster as one of the top 100 inventions. In 1971 he was awarded the NASA Medal for Exceptional Scientific Achievement.

Dr. Kaufman and his family will be residing in Fort Collins, Colorado. He and his wife, Elinor, have four children.



Paul C. Simon completes 26 years with Lewis on May 31, when he leaves to work for a consulting engineering firm. Before joining Lewis in 1948 as an aeronautical engineer working with the 8x6 Wind Tunnel, he served as a B24 pilot in the military for three years. In 1964, Simon came to his present position as an operations engineer in Research Facilities Section, Research Installations Branch, Physical Science Division. He and his wife, Margaret, have three sons.

Arthur A. Medeiros rounds out a 30 year career at Lewis this month. He joined Lewis in 1944 and was appointed to his present position as Manager of the Refan Project Office, V/STOL and Noise Division in 1972. He was also with the Space Nuclear Propulsion Office for 10 years and prior to that was head of the Rocket Nozzle Heat Transfer Section. Medeiros is looking forward to touring the United States this summer with the intent of eventually looking for a place to relocate. He and his wife, Rae, have four children.



Astronaut Schmitt heads energy effort