

# THE ATOM

Los Alamos Scientific Laboratory

LOS ALAMOS NATIONAL LABORATORY  
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# THE ATOM

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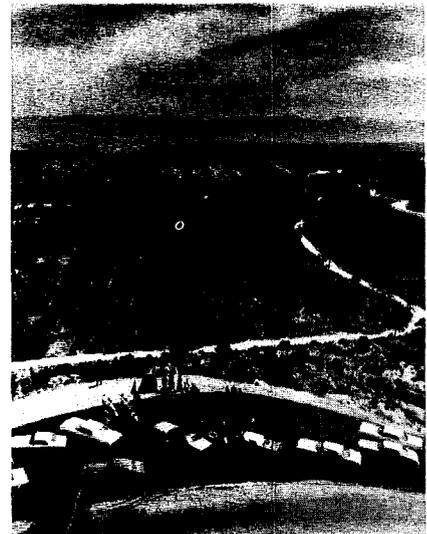
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## COVER:

The caravan of cars carrying Senator Clinton P. Anderson and other dignitaries to Los Alamos, stopped enroute for a ceremony dedicating New Mexico Highway 4 as the "Senator Clinton P. Anderson Scenic Route." The brief ceremony, photographed by Henry Ortega, ISD-7, was the beginning of Anderson Day at Los Alamos. For more detailed information on the event and additional photographs, see the story which begins on page one.



Senator Clinton P. Anderson

## *LASL Meson Facility Named for Clinton P. Anderson*

*H*ighlighting many tributes to Clinton P. Anderson during day-long festivities at Los Alamos was the announcement by AEC Commissioner James Ramey that the Los Alamos Meson Physics Facility will be named for the retiring, 76-year-old senator from New Mexico.

Ramey was one of hundreds of federal and state dignitaries and New Mexico citizens celebrating "Clinton P. Anderson Day" in the Atomic City. Anderson has been an instrumental congressional figure in promoting atomic energy research. He is a member of the Joint

Committee on Atomic Energy, the Aeronautical and Space Sciences Committee, the Senate Finance Committee and the Interior Committee.

Anderson Day started with the formal dedication of New Mexico Highway 4 as the "Senator Clinton P. Anderson Scenic Route," which is marked by a monument near Los Alamos overlooking the Rio Grande Valley. A plaque on the stone monument identifies Anderson as "U.S. Representative, Secretary of Agriculture, U.S. Sen-

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AEC Commissioner James Ramey makes the surprise announcement that the Los Alamos Scientific Laboratory's Meson Physics Facility will be named after Senator Anderson.



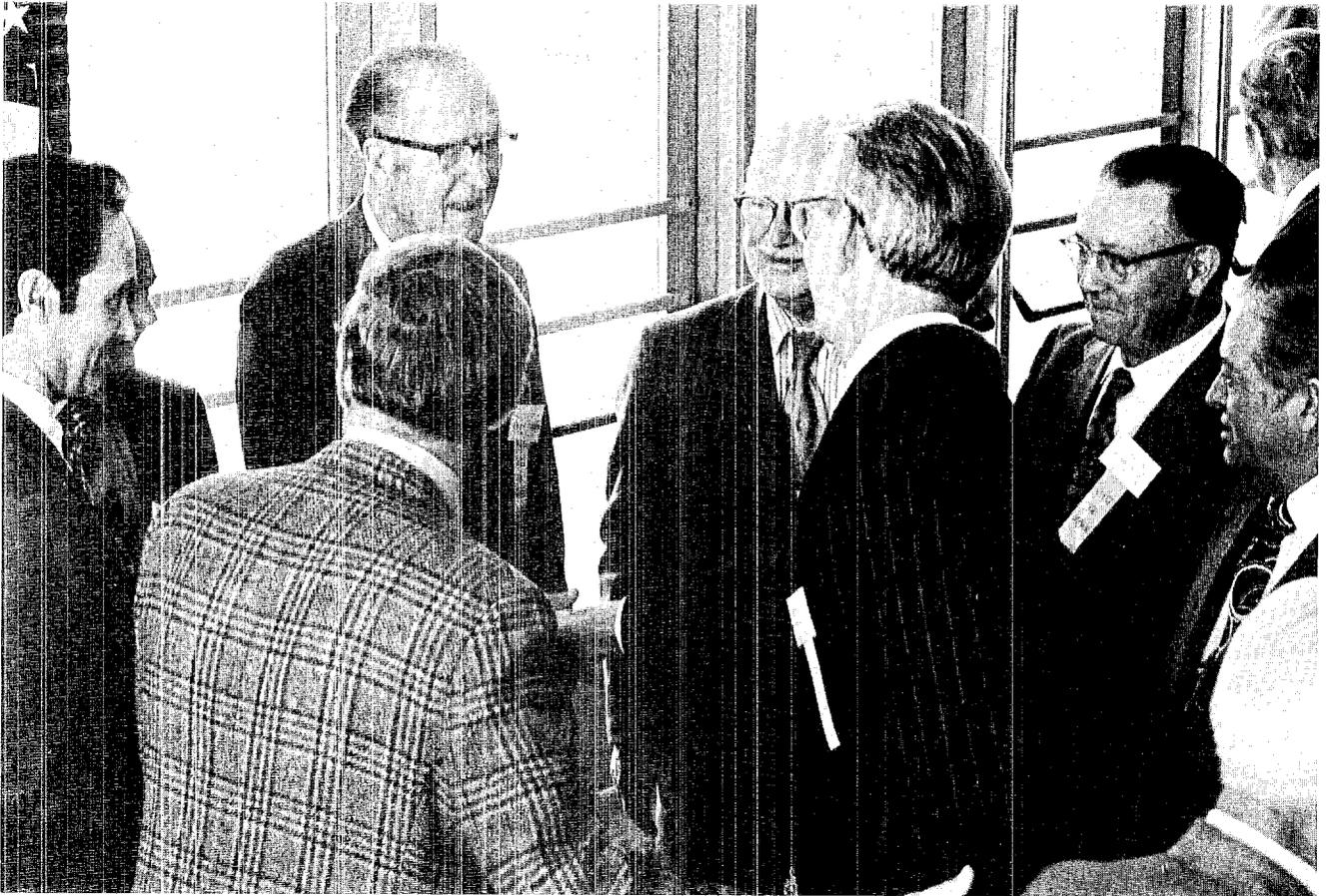


Anderson smiles his pleasure after being given the first "Clinton P. Anderson Day" badge.

Senator and Mrs. Anderson are shown in front of the monument on New Mexico Highway 4 which identifies the route as the "Senator Clinton P. Anderson Scenic Route."



Anderson and New Mexico Governor Bruce King watch the parade from a reviewing stand on Trinity Drive.



Above, greeting Anderson in the foyer of Civic Auditorium are Harold Finger, assistant secretary of the Department of Housing and Urban Development; LASL Director Harold Agnew (back to camera); Chet Holifield, member of the Joint Committee on Atomic Energy; James Fletcher, director of the National Aeronautics and Space Administration; AEC Commissioner Ramey; and U.S. Senator Joe Montoya. Left, Anderson embraces Barbara Sena, long-time close friend and sister of the late Senator Dennis Chavez. Below, Anderson talks with Ramey and Agnew prior to the assembly in Civic Auditorium.





Anderson waves to the hand-clapping audience and on-stage dignitaries at Civic Auditorium. Shown in the photograph are Gerold Tenney, chairman of the Citizen's Committee for Anderson Day, King, Ramey, former New Mexico Governor Jack Campbell, Mrs. Anderson, Agnew, Senator Gordon Allott of Colorado, and John Russell, chairman of the Los Alamos County Council.

ator, one of our nation's architects in the fields of agriculture, conservation, health, space exploration, atomic energy and others."

Following this dedication, Anderson mounted a reviewing stand on Trinity Drive in Los Alamos where he watched a parade given in his honor. Hundreds of citizens turned out to watch the procession of bands, floats and beauty queens.

Crowning the day's activities was an assembly in Civic Auditorium before a capacity crowd. It was here that AEC Commissioner Ramey gave the surprise announcement that the Los Alamos Scientific Laboratory's Meson Physics Facility would be named for Senator Anderson.

U.S. Senator Gordon Allott of Colorado, President Nixon's representative to the Anderson Day observance, read a letter from the President which stated: "New Mexico has great reason to be proud of your long and outstanding Senate career. You have represented

your constituents with the highest dedication, responsibility and sensitivity to their needs."

Gerold Tenney, chairman of the Citizen's Committee for Anderson Day, presented the retiring senator with five bound volumes of testimonial letters and proclamations from national, state and local officials and citizens. Included were letters from former Presidents Harry Truman and Lyndon Johnson. Other plaques, pictures, certificates and proclamations paying tribute to the senator were displayed in the auditorium's foyer.

Other speakers at the auditorium ceremony were New Mexico Governor Bruce King; Former Governor Jack Campbell; James Fletcher, director of the National Aeronautics and Space Administration; Harold Agnew, LASL director; John Russell, chairman of the Los Alamos County Council; and Delbert Sundberg, master of ceremonies and former chairman of the Los Alamos County Council. ❀

# Charles Cremer Receives Lawrence Award



James Schlesinger, chairman of the Atomic Energy Commission presents Charles Cremer of the Los Alamos Scientific Laboratory with the AEC's 1972 Ernest Orlando Lawrence Memorial Award. Cremer, one of five recipients of this year's award, was given the honor at the Germantown, Md., headquarters. (AEC photo)

Charles Cremer, TD-4 group leader at the Los Alamos Scientific Laboratory, is one of five scientists to receive this year's Ernest Orlando Lawrence Memorial Award.

The award consists of a gold medal, a citation and \$5,000. It was presented to Cremer at the Atomic Energy Commission's Germantown, Md., headquarters.

Cremer, whose group is responsible for small weapon design calculations, was cited "For his contributions to the development of weapons design codes, his achievements in the design of small weapons and for his imaginative and skillful leadership in the development of novel small design concepts."

Cremer joined the staff at LASL in 1960 where he has become one of the foremost weapon designers in the United States. His work at the Laboratory has been concerned with the theoretical and calculational aspects of nuclear weapon design.

He has been active in the review and evaluation of nuclear cross sections used in weapons design codes, and has been responsible for stimulating the many experiments providing essential information for the normalization of design

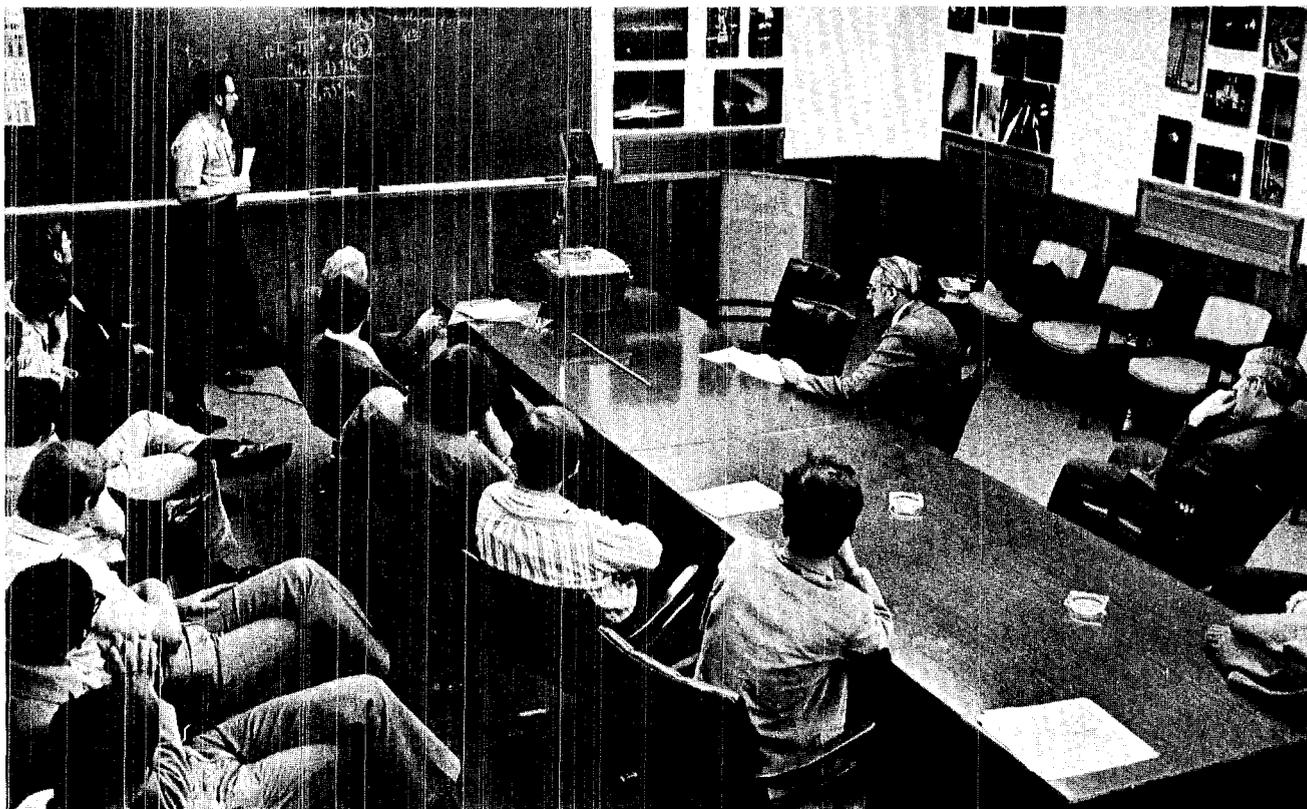
codes. Many current and planned weapon systems in the nuclear stockpile contain fission devices for which Cremer has a principal design responsibility.

He has been a leader in originating and developing new weapon concepts which offer new possibilities for modernizing United States nuclear forces. He has played a leading role in conducting theoretical studies of the vulnerability of nuclear weapons systems. He has also played a major role in developing nuclear explosion codes.

The award was established in December of 1959 to perpetuate the memory of the late Ernest O. Lawrence, inventor of the cyclotron and director of the AEC's laboratories which now bear his name at Berkeley and Livermore, Calif.

The award is made to not more than five recipients in any one year. It is made in the spring to men and women not more than 45 years of age who are citizens of the United States and who have made recent, especially meritorious contributions to the development, use and control of atomic energy in areas of all sciences related to atomic energy, including medicine and engineering. ✻

# 'Bonus' Scientists and Engineers



Some of the Los Alamos Scientific Laboratory's research and development projects are advancing with the help of some "bonus" scientists and engineers. These are personnel who have been granted Presidential Internships at LASL to broaden their work experience and thereby their transition to future jobs necessary to society.

At present there are 17 interns assigned to various groups at the Laboratory. They bring to 19 the number of interns that have participated in the President's program.

The program was designed to enable approximately 420 young, unemployed scientists and engineers possessing advanced degrees to work for one year at federal research and development installations. It grew out of discussions between officials of the President's Office of Science and Technology and the Department of Labor. The

latter made \$3 million available for the program which is administered by the National Science Foundation.

Under the Foundation's direction, \$7,000 is allotted for each intern, an amount that must be matched or bettered by the employing laboratory.

At LASL intern candidates were selected in accordance with procedures and criteria used for post-doctoral appointees and the National Science Foundation's guidelines for Presidential Internships in Science and Engineering.

LASL Director Harold Agnew said the program is "... an excellent way to maintain and utilize the scientific manpower resources of this country.

"I am extremely pleased to see these efforts being made by the President to assist the young scientists and engineers in this country who were hit the hardest by bud-

At a meeting of Presidential Interns with Douglas Chapin, second from right, program director of the National Science Foundation's graduate fellowships and traineeships, Intern Gary Salzman explains research work he is doing in P-DOR. At right is LASL Director Harold Agnew.

getary cutbacks. We must maintain our scientific leadership. We cannot afford to fall behind. We must not discourage undergraduate students from the study of science and pursuing advanced degrees. This program should show that this country's leadership cares about them."

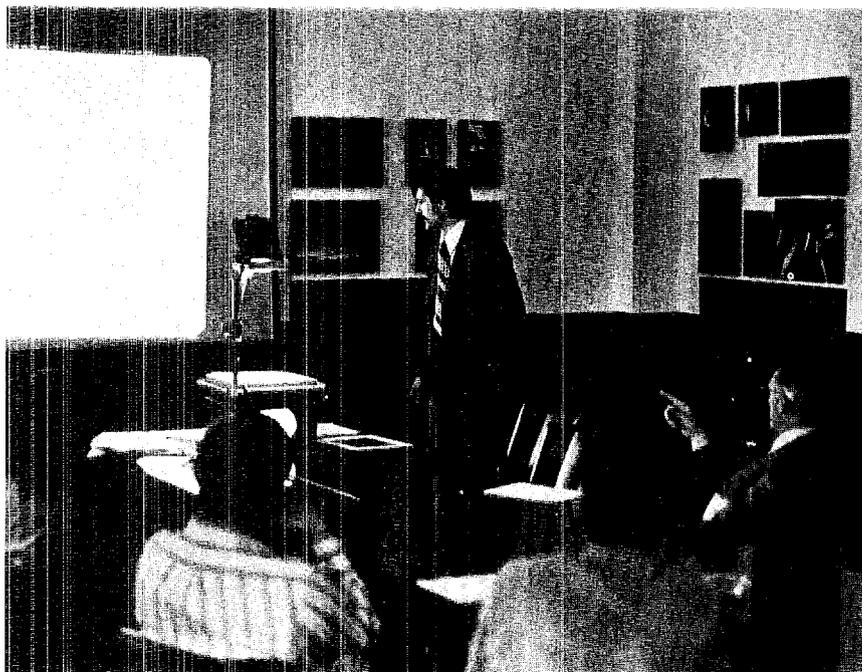
Edward David, Jr., science advisor to the President, said of the program: "We would hope to expose the trainees to both the problems and the capabilities of government research and development and put them in positions where they can best benefit the nation and themselves.

"These people provide a unique pool of skills and resources, much of it developed at taxpayers' expense in colleges, universities and various laboratories. They represent a vital national resource."

David noted that unemployed young scientists and engineers under age 30 who hold advanced degrees should benefit greatly under the program. These people are among the hardest hit by the current job squeeze with an unemployment rate of 5.3 per cent according to a survey by the National Science Foundation.

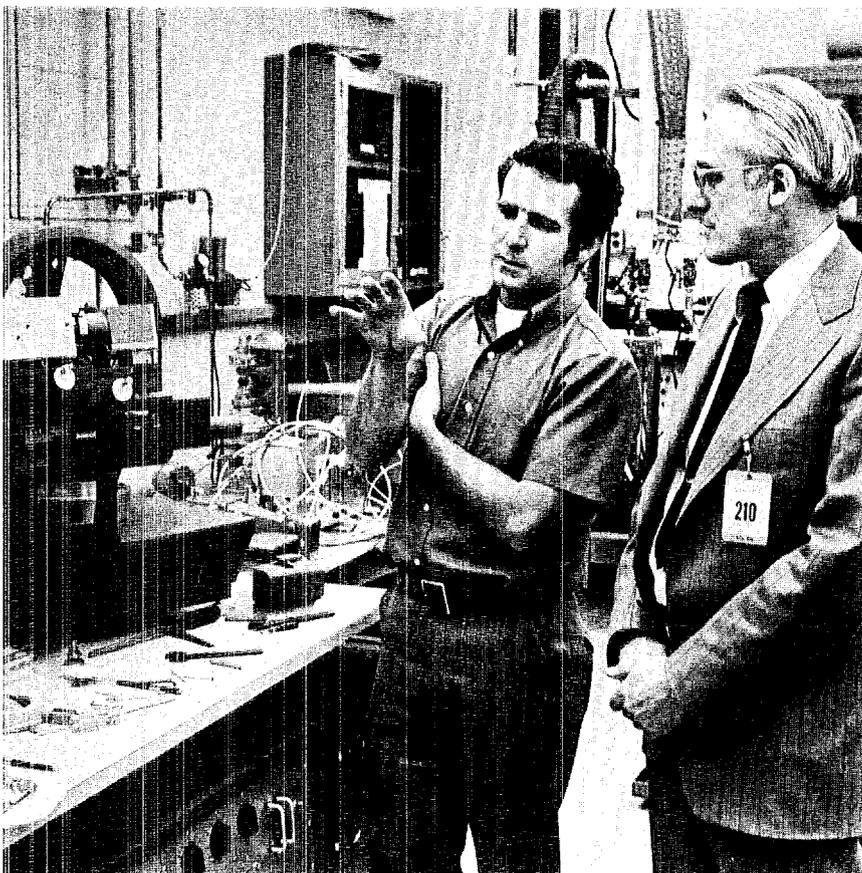
The President's science advisor said the fields in which the young scientists would have the greatest impact are those of current social concern. These include pollution, trash disposal, management and integration of large projects, and the nuclear field in areas as diverse as new power systems or criminal and medical laboratories where nuclear techniques are making major contributions.

According to Charles Canfield, head of LASL's Personnel department, the interns have been placed, insofar as possible, in areas of research mentioned by David. "The President's Internship Program is a one-year proposition that is non-renewable," he said, "although, assuming that the Laboratory's budget is adequate, the intern will be offered another year of employment just as the rest of our post-doctoral appointees." ❀



Chapin asks a question of Tom Mills, intern assigned to CNC-4, during a meeting with Presidential Interns at the Laboratory.

Chapin discusses x-ray crystallography work being done at CNC-4 with Robert Ryan.



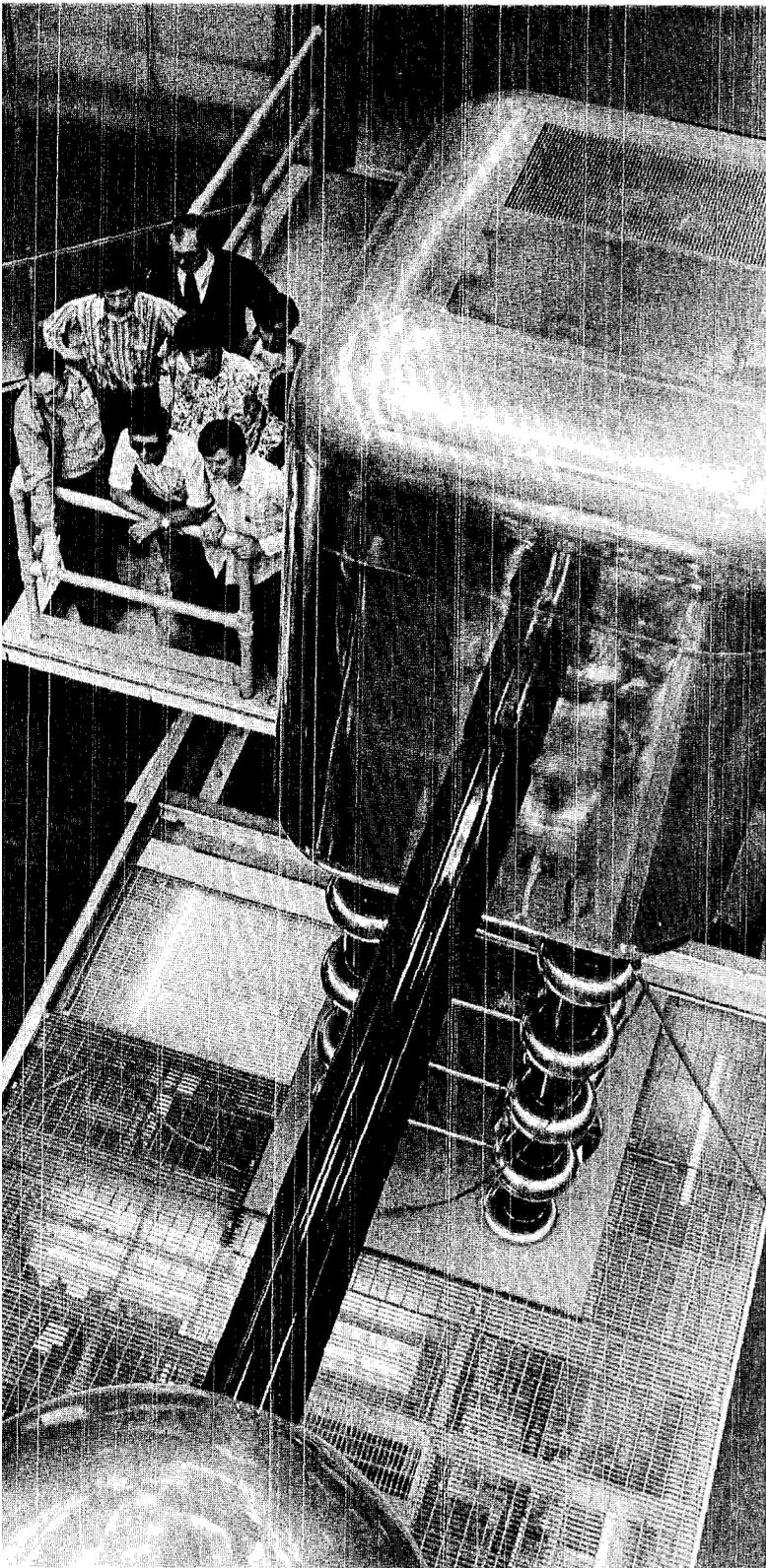
# Science Youth Days Draws 800 Students

For three days, approximately 800 students from a five-state area stopped studying science in their high school classrooms and visited the Los Alamos Scientific Laboratory to actually see science at work.

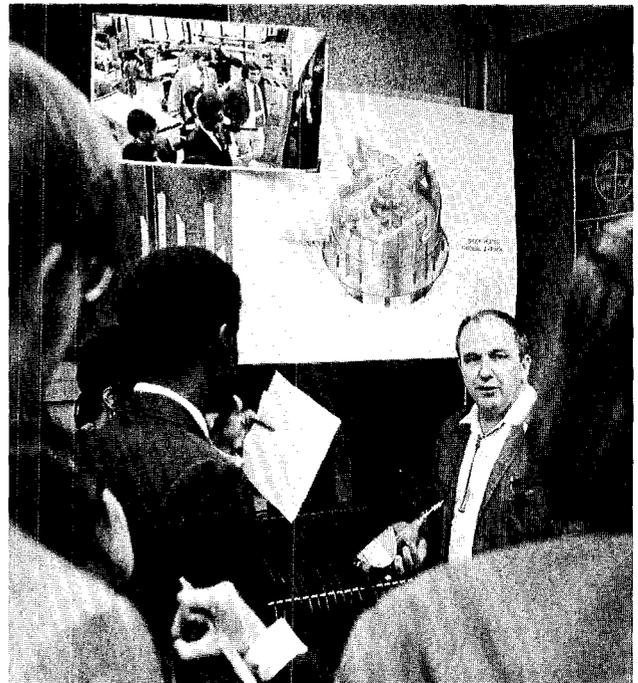
The event was the 15th Laboratory-sponsored Science Youth Days. Under the chairmanship of Ken Hill, ISD-2, Laboratory personnel offered the students guided tours of many of the research and development activities underway at LASL.

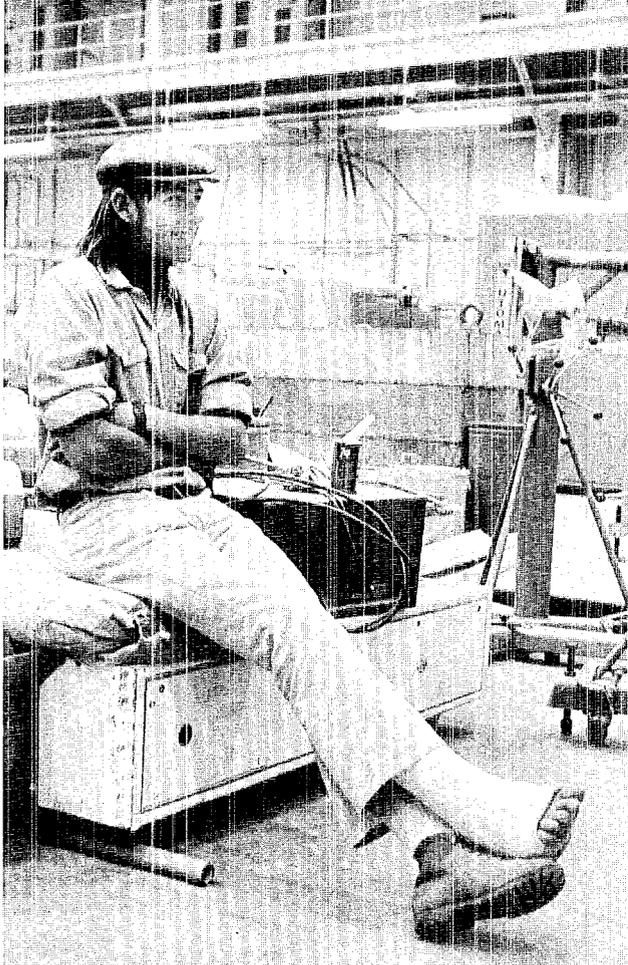
Students from Los Alamos toured facilities the first day of the event. Many were selected as honorary guides to assist Hill and other ISD-2 personnel coordinate tours the following two days for students from New Mexico, Texas, Colorado, Arizona and California.

Hugh Karr, P-14, explains to students from Los Angeles, Calif., how Sherwood scientists are attempting to contain a thermonuclear reaction in a magnetic "bottle."



The new Cockcroft-Walton machine at the Los Alamos Meson Physics Facility is shown by Arvid Lundy, MP-1, to Science Youth Days visitors from Santa Cruz, N.M., and Snyder, Texas.

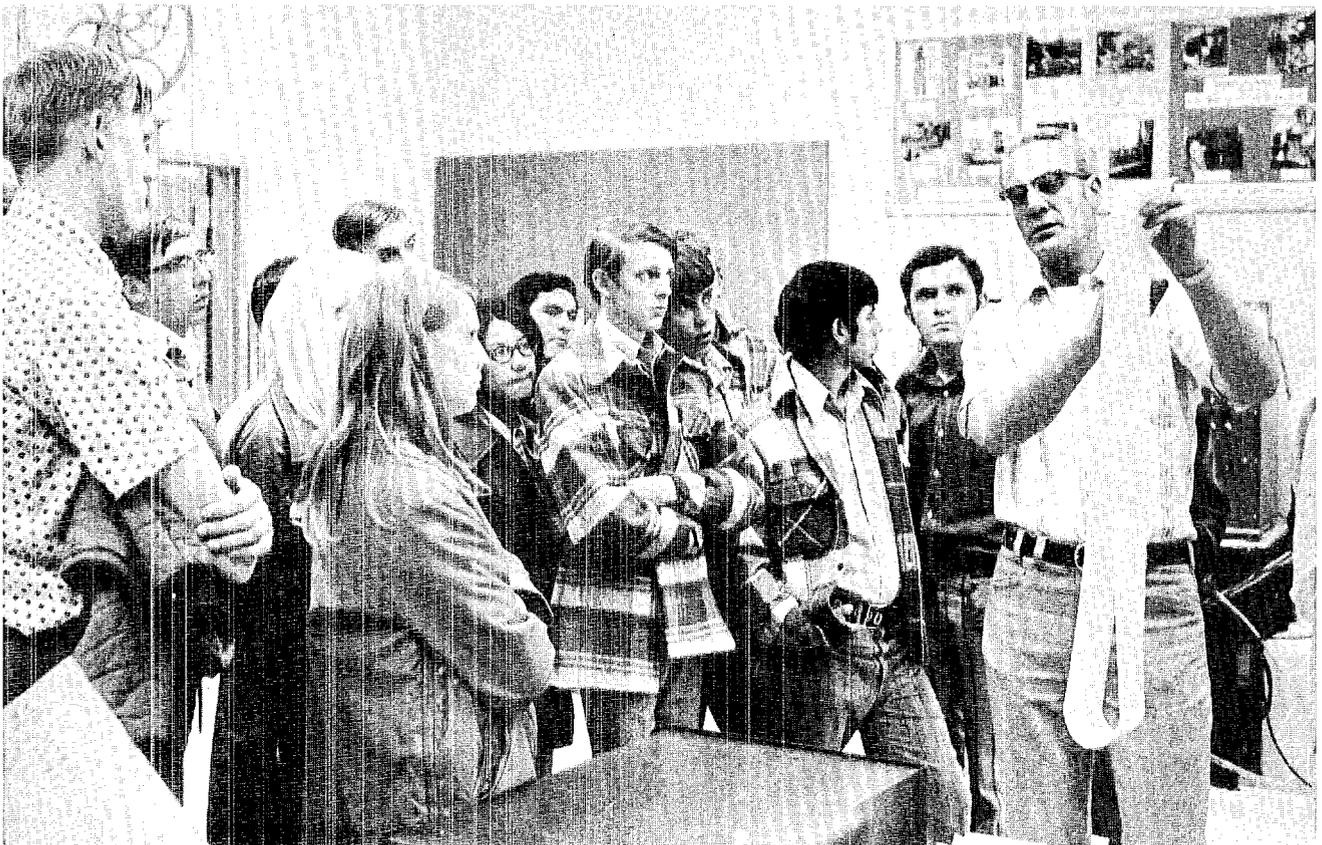


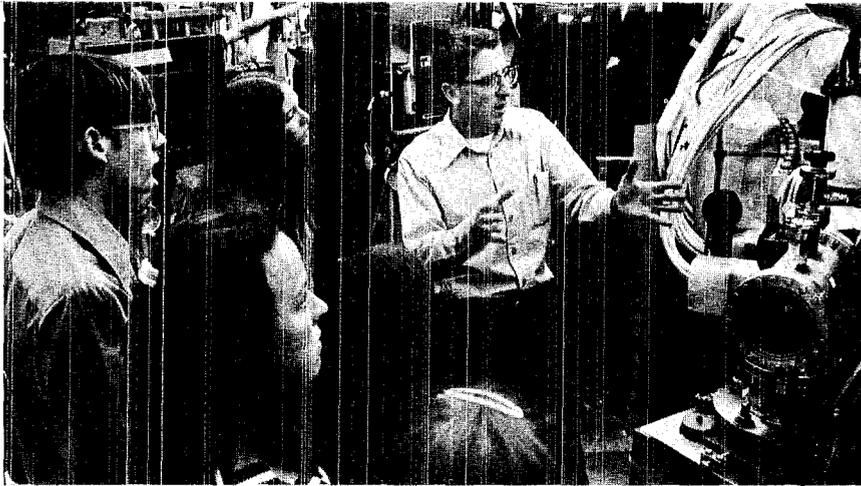


Jay Lory and Steve Meixner, both of Los Alamos High School, take a close look at laboratory mice used by members of Group H-4 at the Health Research Laboratory.

Doug Davenport, Santa Fe, found it difficult to participate in a portion of the tour at the Meson Facility because of the cast on his foot.

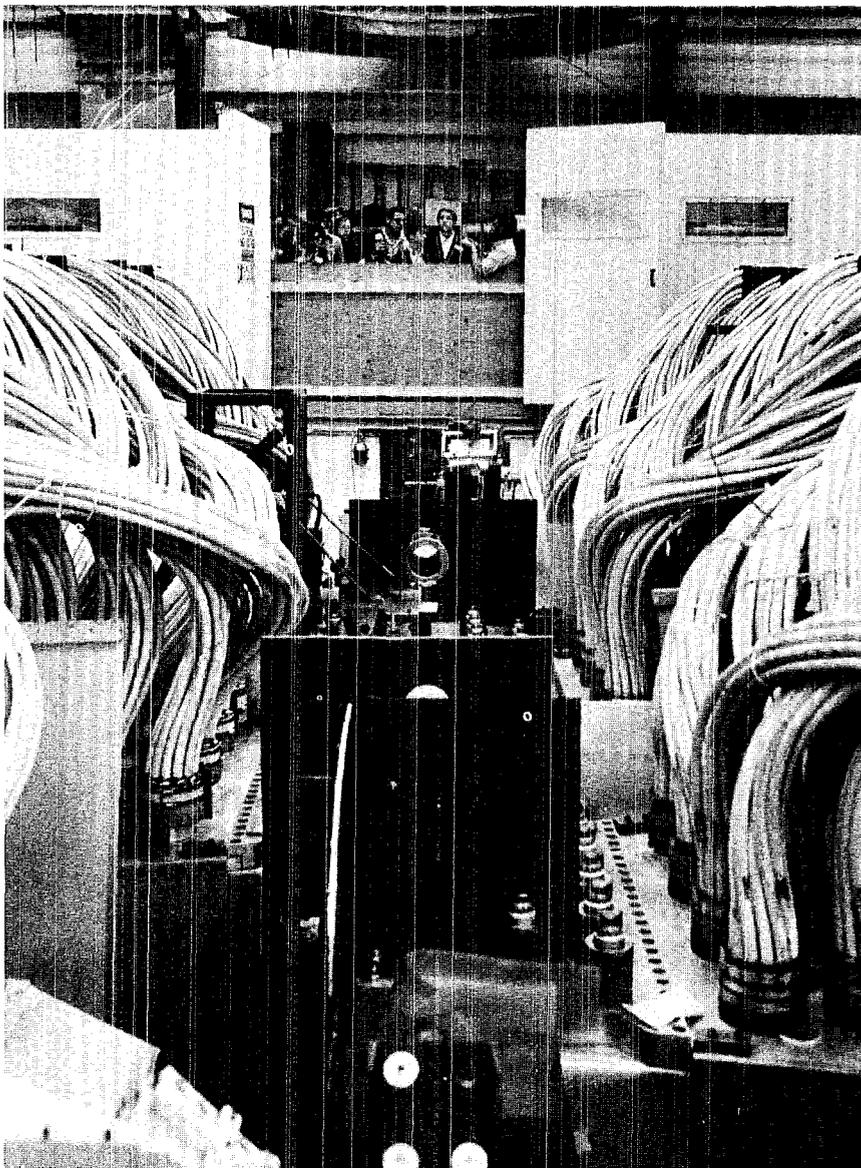
Jim DeField, H-5, interprets recorded information from respirator tests for students from Del Norte and Antonito, Colo.





Warren Quinn, P-15 associate group leader, explains to students from Los Alamos how the toroidal Scyllac machine will work.

Students from Phoenix, Ariz., look through an opening in the partition which separates the Sherwood Project's linear and toroidal Scyllac experiments.



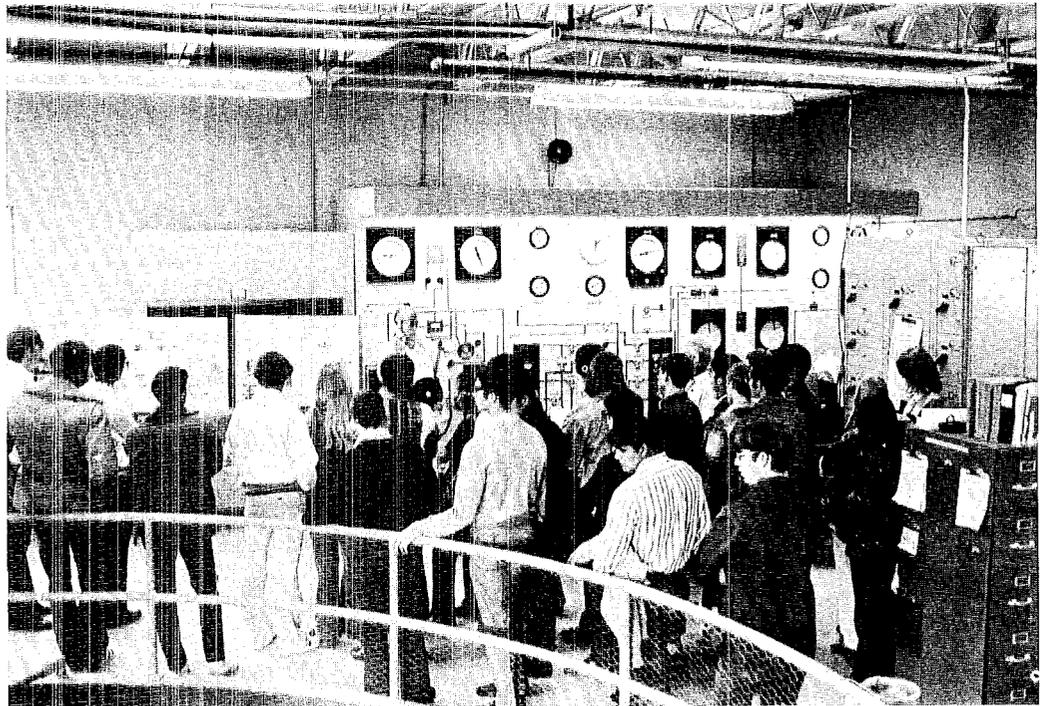
Gary Salzman, P-DOR, tours the Tandem Van de Graaff Facility's experimental area with students from Gallup.



Norris Nereson, P-2, explains the function of a fuel element container for the Omega West Reactor for Phoenix, Ariz., students.



Operating a demonstration program on a graphic terminal computer at the Tandem Van de Graaff Facility are Turner Laquer, Los Alamos, Johnny Hengel, Gallup, and Jay Treiman, Los Alamos. In background are Richard Teshima and Suzanne Hooker, both of Gallup.



Tom Short, H-7, explains LASI's liquid waste disposal system to students from Artesia and Monte Vista, Colo., Taos, and Sargent, Texas.



Don Peterson, H-4, narrates a demonstration on cell counting for Xandria Hall and other Los Alamos High School students.

Bill Stocum, H-5, explains respirator fitting tests conducted at LASL's Occupational Health Laboratory to Los Alamos students Don Witte, Ted Torrey, Doug Stoll and Cliff Pollock.



# LASL Facilities and University Research

Several months ago, Los Alamos Scientific Laboratory Director Harold Agnew invited college and university presidents or their representatives to Los Alamos to explore possible areas of mutual cooperation. At that time, the director offered to share a portion of the Laboratory's wealth of facilities, equipment and qualified people with educational institutions.

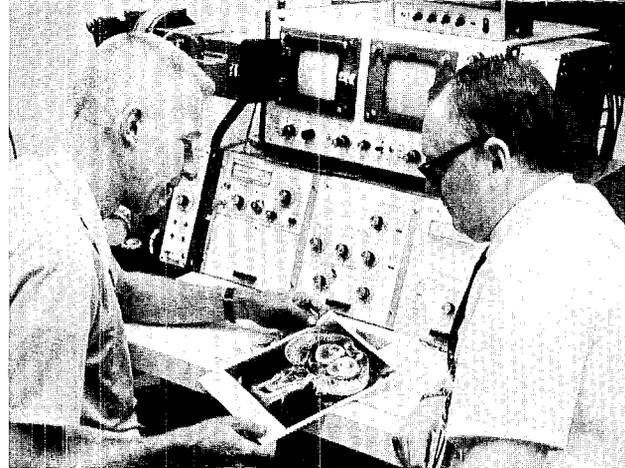
At present, a professor from Eastern New Mexico University, Portales, and an undergraduate student from the University of Utah, Salt Lake, are taking advantage of the director's offer.

James Sublette, professor of biology and graduate dean at Eastern New Mexico University is spending one day each month at the Laboratory gathering data for a series of projects on the descriptive morphology of insects. "Insects live in water of varying quality," Sublette said. "By making species assessments, we can learn something about their ecology."

For this work, Sublette is utilizing the GMX-1 scanning electron microscope, an instrument with much greater depth of field than conventional microscopes, capable of magnifying work up to 100,000 times its original size. He is being assisted in his work at the Laboratory by Tom Gregory of GMX-1.

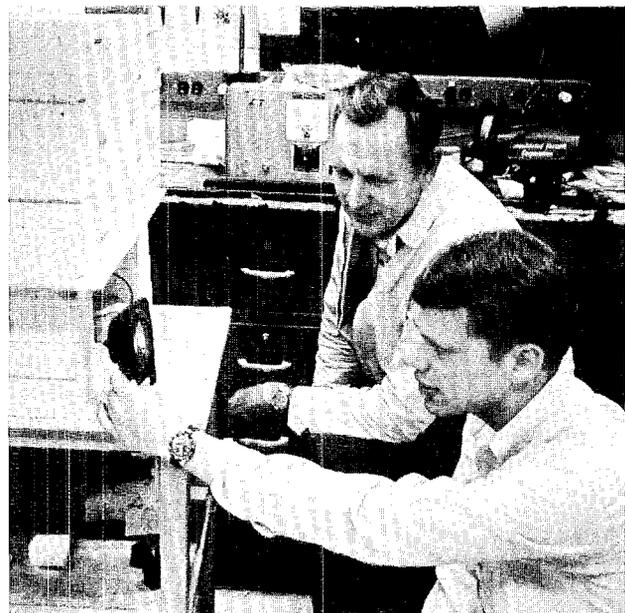
Dan Hopkins, a senior at the University of Utah majoring in metallurgical engineering, is doing research for a thesis on two-phase liquids. Under the supervision of Guy Elliott, CNC-2, Hopkins is currently using H-9 laboratory facilities to carry out his research.

Present studies include a copper-tin mixture in its liquid phase. "In the liquid phase, copper and tin are like oil and water," Hopkins said. "They don't mix. This study is to show the composition and structure of two such liquids existing together." Practical applications for the information from this study, the student said, might be found in foundries where two-phase liquids under certain conditions can cause porosity and poor mechanical properties in castings.



Tom Gregory, GMX-1, works with James Sublette, Eastern New Mexico University. Sublette is gathering data on insect morphology. With Gregory's assistance, he is using the GMX-1 scanning electron microscope.

Dan Hopkins, University of Utah, checks the temperature gauge on the furnace he is using to melt metals for his studies of two-phase liquids. With Hopkins is Guy Elliott, CNC-2, who is supervising the undergraduate's project.



# Reducing the Hazards

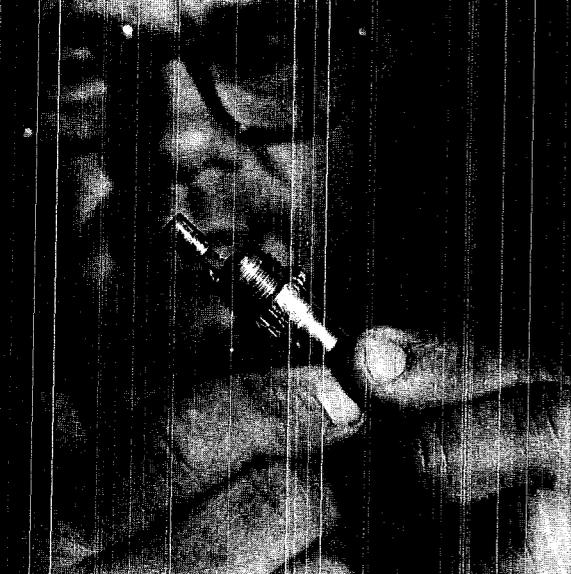
**A** group of scientists at the Los Alamos Scientific Laboratory is studying the electrical characteristics of U.S. Air Force electroexplosive devices in an effort to reduce some of the hazards associated with their use.

Electroexplosive devices (EED's) are used by the Air Force for such purposes as releasing bombs, rockets and other ordnance, jettisoning wing tanks, effecting stage separations on multi-stage rockets, and

actuating explosive bolts and squib batteries and fire extinguishers.

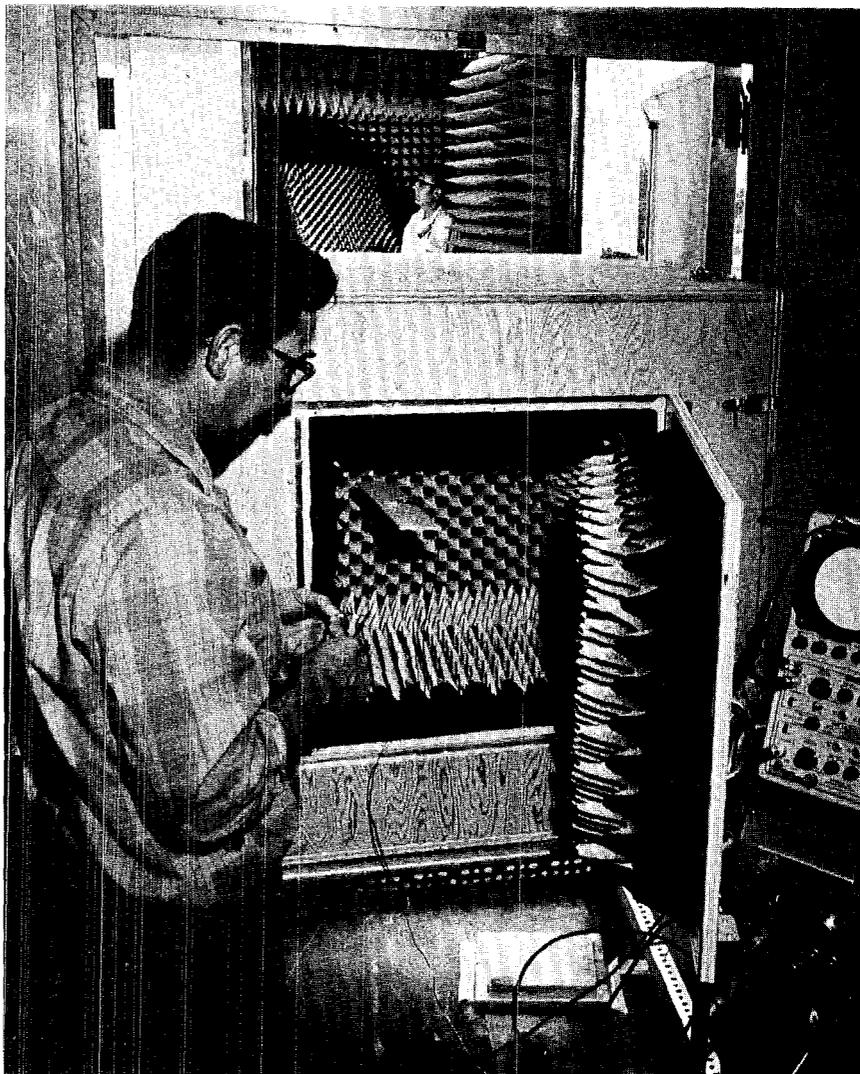
The EED is similar in principal to the blasting cap used in construction work. It employs a sensitive explosive which is ignited by electrically heating a self-contained bridgewire.

Although the intended mode of firing is by a direct current pulsed to its bridgewire, the blasting cap is somewhat sensitive to all other wavelengths of the electromagnetic



An Air Force electroexplosive device is attached to a connector for a static electricity firing test by Bill Patterson, GMX-7.

A laboratory radar system is used to test the susceptibility of EED's to radio waves. The devices are placed in anechoic (no echo) chambers, lined with radio-frequency absorbing material, so they are not influenced by reflected energy. In foreground, Russell Youngblood, E-2, tests an EED in a 36-inch chamber. Marvin Joppa, GMX-7, is shown in the eight-foot chamber in background.



spectrum which may be present in the blasting area. If exposed to these "stray currents" over long periods of time, there is a possibility of predetonation. Such currents can be induced by electrical storms, static electricity, or by radiation from nearby power transmission lines, commercial radio and television stations and two-way radios.

Electroexplosive devices are also sensitive to stray currents although their electrical initiation levels were designed to be well separated from those of other direct-current transmitting equipment, and to be high enough to absorb large amounts of incidental radiation without igniting. Although these

parameters were adequate for the times, Air Force officials are concerned that they may soon become outdated.

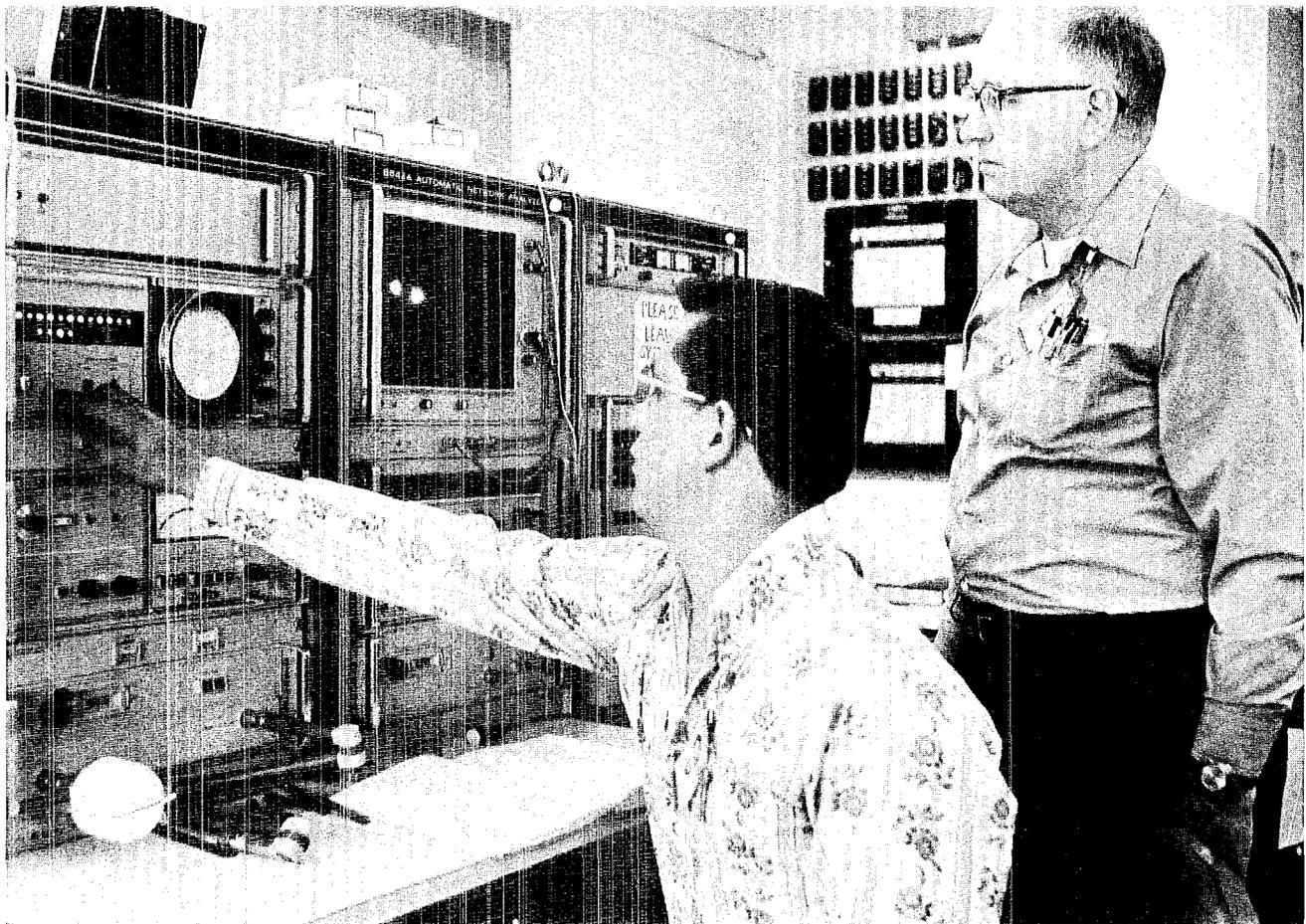
Although more numerous, commercial sources of electromagnetic radiation have not become substantially more powerful in the past few years. Such sources are still a matter of concern. But, the principal reason for the current review of EED electrical characteristics was prompted by the development of new and more powerful radar systems that will come on line in the future.

Most sources of electromagnetic radiation are "continuous wave" transmitters which steadily build

up heat in the bridgewires of blasting caps and EED's. Radar systems, however, transmit powerful pulses of radio-frequency energy which are reflected back by airborne objects and observed between pulses. With this method of transmission it is possible to cause "thermal stacking" in electroexplosive devices. This is a phenomena whereby the time-lapse between pulses is not long enough to allow the bridgewires in EED's to cool to ambient temperature. Each successive pulse of radio waves causes the accumulation, or stacking, of heat in the bridgewires.

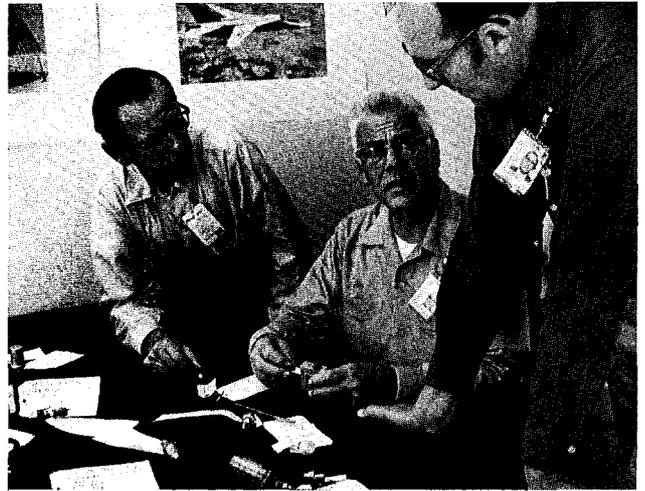
Because of the potential hazards

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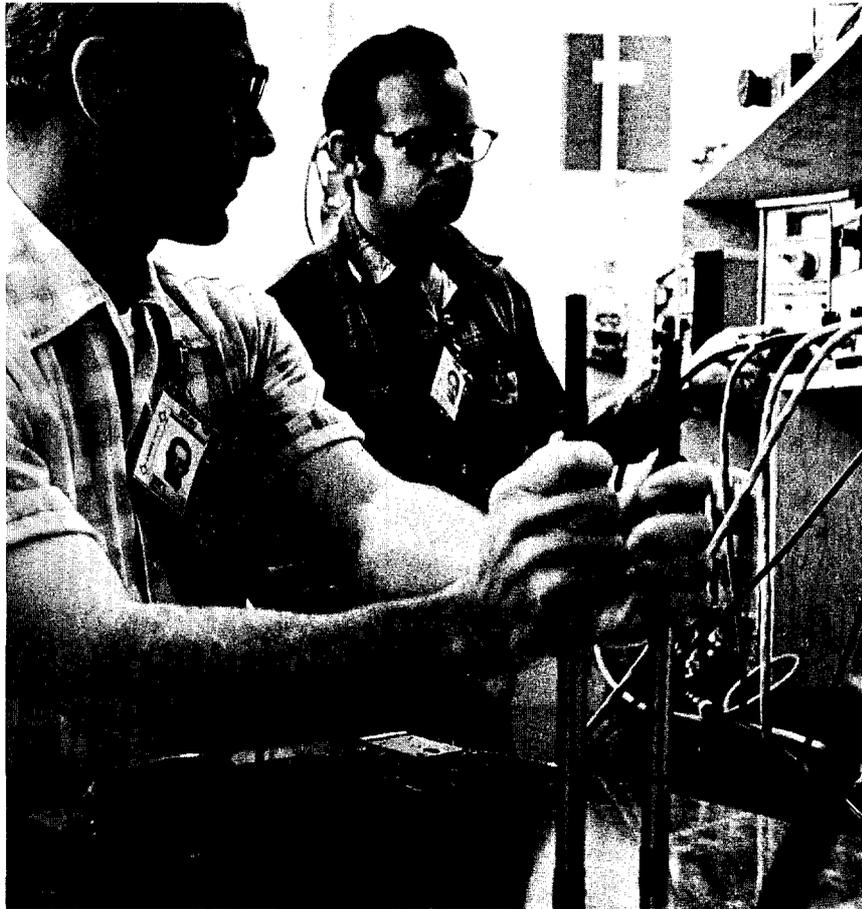


Paul Martinez, E-2, and Bob Freyman, E-DOR, nondestructively test an EED on the Automatic Network Analyzer. The electroexplosive device being tested is inside the white protective container at lower left.

Bud Hayes, GMX-8, Jay Todd, GMX-7, and Joppa discuss test plan procedures for the EED project.



Bert Dennis, GMX-7, and Patterson conduct a radio-frequency test on an electroexplosive device. The double-stub tuner, operated by Dennis, is used to adjust the frequency level between the EED and the energy source.



E-DOR. They are assisted by Technicians Bill Patterson, Jewell Pederson and Mary Mirabel of GMX-7, and John Gonzales, Paul Martinez and Russell Youngblood of E-2.

The objectives of the project are: (1) To categorize and list by part number, manufacturer, stock number, designator, function, weapons systems and electrical firing characteristics the some 300 nonnuclear EED's in the Air Force inventory; (2) To conduct controlled firing and functioning tests of EED's with emphasis on radio-frequency sensitivities; (3) To conduct firing tests on selected EED's to permit characterization of the inventory by type and sensitivity, particularly at radar frequencies; and (4) To make recommendations to the Air Force with regard to the elimination of potentially vulnerable devices; reduction of the total number of devices; improvements in procurement and design specifications and practices which will result in lower overall cost, improved safety and reliability; and provide electroexplosive electromagnetic hazard guidelines which are realistic, but not unduly restrictive.

The project is being carried out at LASL under a contract between the Air Force and the Atomic Energy Commission with local arrangements made through the Laboratory's Office of Special Projects. Characterization work began last July and is expected to be completed by the end of this calendar year.

posed by the installation of more powerful radar systems, Los Alamos scientists are placing special emphasis on the sensitivity of EED's to radio frequency-energy. Both destructive and nondestructive test equipment and procedures are being used to determine the sensitivities of electroexplosive devices to a wide range of electromagnetic wave lengths. The physical characteristics of EED's and as-

sociated electrical systems, as they may relate to abnormal ignition situations, are also being investigated.

The project at Los Alamos is managed by Melvin Brooks, associate GMX-division leader. Other principal investigators are Robert Spaulding, GMX-7 group leader; Marvin Joppa, Bert Dennis and Jay Todd of GMX-7; Bud Hayes, GMX-8; and Bob Freyman,

# short subjects

**Henry Heyman**, assistant for legal liaison, has retired.

Heyman was employed by the Laboratory for more than 20 years. He was first employed at LASL in 1948. He left in 1954 to serve as head of the Patent department for Hughes Aircraft in Culver City, Calif. He returned to Los Alamos in 1956.

In addition to his Laboratory service, Heyman has been active in civic affairs. He has served as justice of the peace and as a county commissioner in Los Alamos.

He received the B.E. degree in electrical engineering from Johns Hopkins University, Homewood, Md., and the L.L.S. degree in law from American University, Washington, D.C.

Heyman, and his wife, Phyllis, who retired from Laboratory service earlier, will continue to live in the Espanola Valley.



**Robert Warner**, MP-DO, has been appointed chairman of the LASL Reactor Safety Committee effective June 1.

Warner was appointed to the position by Laboratory Director **Harold Agnew** to succeed **Rolf Peterson**. Peterson has been appointed alternate leader of LASL's newly formed Financial Management Office.



**VosBert and Frances Peters** have retired from the Laboratory and will move to Tucson, Ariz.

VosBert was employed in Group SD-5 for more than 20 years. Mrs. Peters served at the Laboratory for 18 years. She was employed by W-4 until 1971 when she transferred to TD-4.

**Suzanne Krainock**, CNC-4, a long-time employee at LASL, died March 21 at the Los Alamos Medical Center. Miss Krainock came to Los Alamos as a member of the Women's Army Corps when the Laboratory was part of the Manhattan Project.



**Oscar Harrington**, former member of Group CMB-7 died recently. Harrington was employed by the Laboratory 18 years. He is survived by his wife, Betty, and four daughters, Debbie and Christine at home; Nancy, Dallas, Texas; and Mrs. Barbara Bichl, Los Angeles, Calif.



The goal in the recent clean-out campaign at LASL was a 20 per cent reduction in record and reference material. According to **Gilbert Ortiz**, ISD-5 alternate group leader, who chairmanned the campaign, the goal was far exceeded.

Ortiz noted there was a 27 per cent reduction overall—38 per cent reduction in reference material and 21 per cent reduction in record material.

“A total of 20,700 cubic feet of records were destroyed in the campaign,” Ortiz said, “and hundreds of pieces of office furniture and filing equipment were turned in for reissue. There were better than 300 file cabinets turned in and more than 350 bookcase sections.”



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# Of Sherwood Theory

At a recent meeting of scientists to discuss theories of controlled thermonuclear research, there was probably as much talk about theory during break periods as there was during official sessions of the meeting, as indicated by several of the photographs shown here.

The meeting was an important milestone in controlled thermonuclear reaction research. Held at the Los Alamos Scientific Laboratory, the event was attended by approximately 100 notable scientists from the United States and Western Europe who are seeking methods to control and use a thermonuclear, or fusion, reaction as a source of future electrical power. 

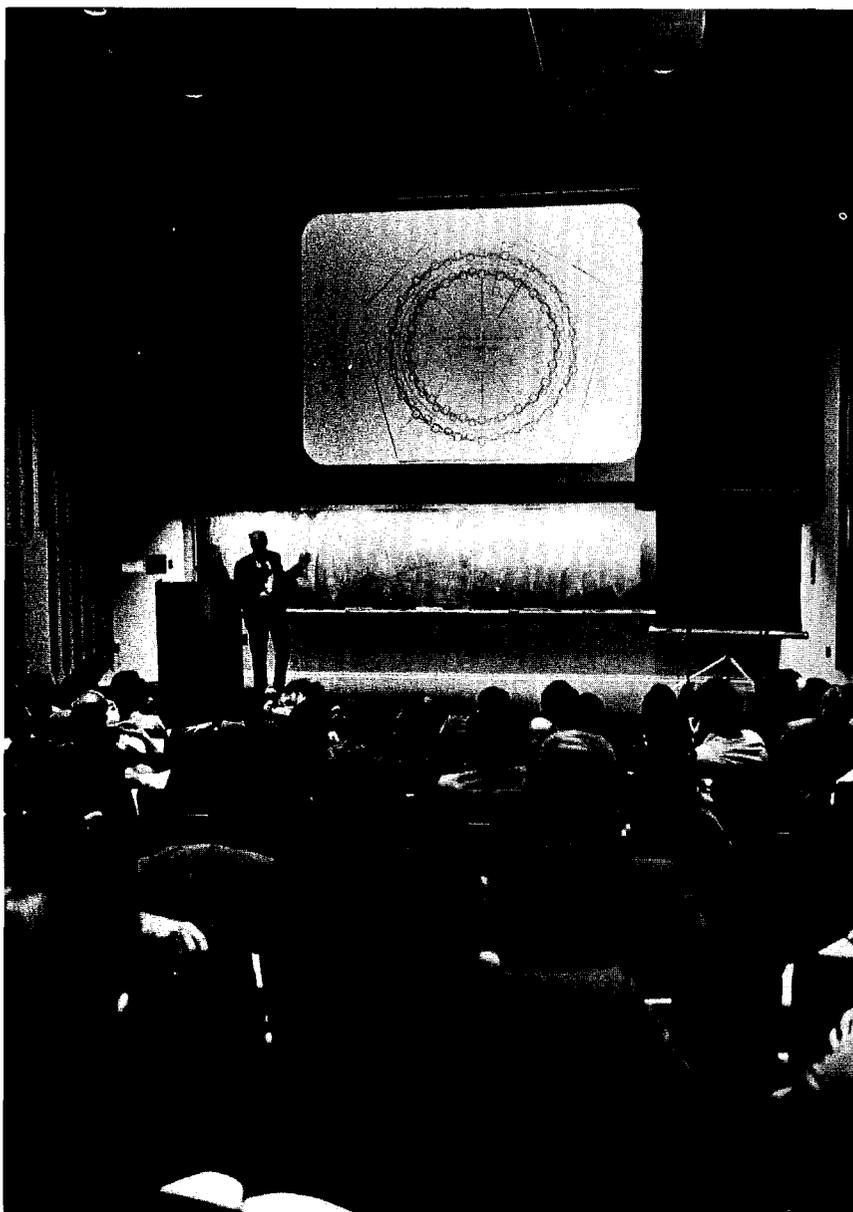


Above, Oscar Buneman, Stranford University, and Bill Ellis, P-15.



Above, Donald Pearlstein, Lawrence Livermore Laboratory, and Allan Glasser, University of California at San Diego.

G. Guest, Oak Ridge National Laboratory, presents his paper, "A Summary of the Theoretical Plasma Physics Program," at the P-division Analytical Center.





Fred Ribe, P-15 group leader, discusses Scyllac experiments at LASL with John Goffey, University of California at San Diego, and Miles Winsor and Katherine Weimer, both of Princeton University.



Left, Ralph Lewis, P-18, and Gunther Spies, New York University.



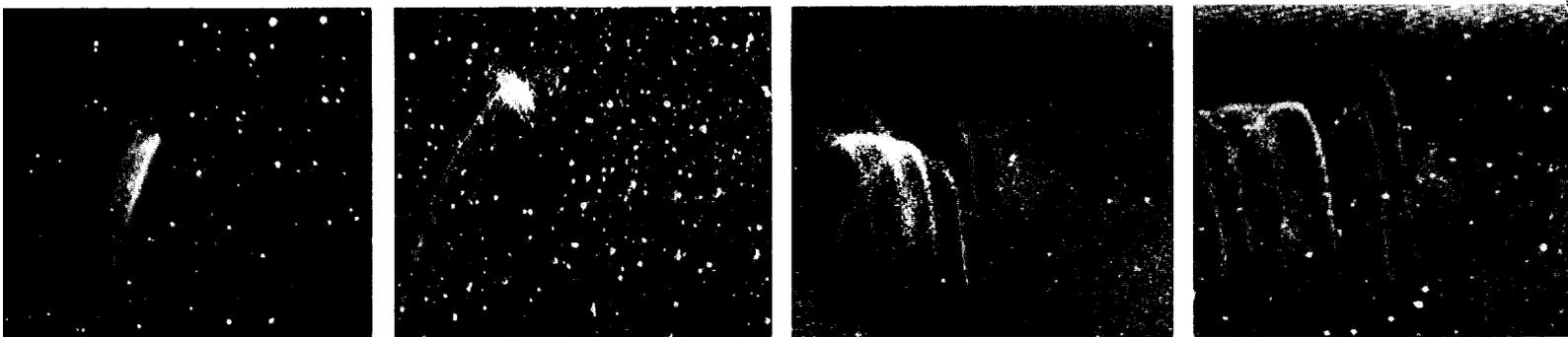
Above, Ravi Sudan, Cornell University, and Bruno Coppi, Massachusetts Institute of Technology.

Warren Quinn, associate P-15 group leader, T. K. Fowler, Lawrence Livermore Laboratory, and Jay Hammel, P-17.

Jeffrey Freidberg, P-18, and Jack Byers, Lawrence Livermore Laboratory.



# More Questions Than Answers



These observations from Barter Island show the barium ions starting to trace a field line and then spreading out over several lines.

Scientists have ended up with more questions than answers from their latest experiment to trace the earth's magnetic field lines.

Space physicists from the Los Alamos Scientific Laboratory's Group J-10 and the University of Alaska Geophysical Institute recently collaborated in an attempt to "paint" a magnetic field line from pole to pole with barium ions. This experiment, called Oosik, depended on a rocket launched from the Poker Flat Range near Fairbanks, Alaska, to carry a payload of barium metal surrounded by a high-explosive shaped-charge into the upper ionosphere.

Detonation of the explosive vaporized the barium and blasted a visible jet of particles, ionized (electrically charged) by solar ultraviolet radiation, upward along a geomagnetic field line.

This technique was used on two occasions last fall. Launches from the Hawaiian Islands made it possible for man to see and trace for the first time a low latitude magnetic field line for its whole length, a distance of 6,900 km (4,285 miles). This initial success encouraged the investigators to expect that a similar particle injection along a high latitude field line from Alaska would travel from the northern auroral zone to the southern auroral zone along that line. The scientists hoped that this high latitude field line might be made visible perhaps to an altitude of 35,000 km (21,735 miles) at the magnetic equator and for its entire span north to south, a distance of 100,000 km (62,000 miles).

At best the Oosik experiment could have painted a geomagnetic field line from polar region

to polar region. Its prime objective was to determine to what extent this could be done. The objective was not entirely accomplished although the barium ions probably did travel the full 100,000 km distance.

Strong support for this probability has been provided by data recorded by the Pacific Northwest Laboratory's Battelle Observatory at Rattlesnake Peak near Richland, Washington. At a recent Oosik data review meeting, Battelle's Dick Hoch reported that barium signals were detected by a 60-inch large aperture photometer at five points along the predicted path of the ion jet. The photometer scanned across approximately 30 degrees azimuth at selected times and elevations. The last signal was recorded at 55 minutes and 10 seconds after injection. This would have placed the ions at about 32,000 km or nearly two-thirds of the way to the equatorial high point.

The biggest and most intriguing question of all is whether the small concentration of ions injected by man could have been responsible for stimulating auroral phenomena or even triggering a magnetic substorm. When the Oosik experiment was first proposed some physicists suggested the possibility of creating such phenomena with cold ions. Ions which did not have sufficient velocity to go over the equatorial high point would fall back to the northern conjugate region over a period of several hours.

There was an unusual auroral display which started about 17 minutes after injection and lasted about an hour. There was also a sudden appearance of very low frequency (VLF) radio



Bob Jeffries, left, J-10, and Dick Hoch, Pacific Northwest Laboratory's Battelle Observatory, discuss the significant data recorded by the large aperture photometer operated by Batelle at Rattlesnake Peak, Washington. Jeffries manned the southernmost observation station for LASL at Timaru, New Zealand.

signals which were recorded at this time. These effects probably were coincidence. But even the most remote possibility that they were not is an exciting subject for discussion among the experimenters from Alaska, Washington and New Mexico. Natural auroras and disturbance of the geomagnetic fields are believed to be caused by streams of high energy particles pouring in from the sun.

For example, flares on the sun produce an increased flow of plasma in the solar wind which moves around the protective shield of the earth's magnetosphere. The increased plasma flow compresses the magnetic field more on the sunlight side of earth than normal. Then, an extremely complicated series of interactions and disturbances takes place in the magnetic envelope that surrounds the earth. This is manifested in light emissions in the auroral zones of the northern and southern hemispheres as well as world-wide perturbations in the ionosphere. These ionospheric perturbations have a very great effect on long distance radio communications.

Preliminary data analysis from Oosik shows that the payload was injected at the desired altitude of 544 km (337.8 miles). The shaped charge blasted the barium jet up along the field line at the proper velocity—11-14 km per second. The barium streamer moved upward and also took up the convective motion of the magnetosphere to move south and east. It separated into several streaks, each marking a different field line. This separation cut down the concentration of particles in each streak and made the streaks more difficult

to see. Yet the streaks were observed for more than 15 minutes by which time they had reached to beyond 10,000 km (6,210 miles).

When the violent aurora occurred at 17 minutes after release the barium streaks rapidly dispersed. After 20 minutes the ion streaks could no longer be observed, even with special image-intensified optical equipment which amplified the light signal 1,000 times. Observation posts below the equator were not able to record any data, but observers at Johnston Island photographed the streak for 13 minutes.

Now scientists are wondering whether a heavier barium payload is necessary to insure visible observations over such a long distance or whether all that is required is a much lower level of magnetic activity at launch time and for many minutes after. Prior to the Oosik launch magnetic activity had been higher than desired, but at launch time it quieted down.

Data analysis for Oosik will continue for many months to attempt to better understand this region of space near earth. Since the space age began, man has found that this area is not a void, structureless region as earlier supposed. It is filled with plasmas, intersected by sheaths, and permeated by a complicated pattern of electric currents and electric and magnetic fields.

Answers to these mysteries may only be found with more data. Already, LASL scientists and their Alaskan collaborators are talking about a next launch, perhaps many launches over a long time period to investigate this fascinating area where man took his first steps only so recently.



# the technical side

Taken from LASL Technical Information Reports submitted through ISD-6

**Seminar, Chemical Engineering Department, University of New Mexico, Albuquerque, March 1:**

"The Numerical Calculations of Fluid Flows" by R. S. Hotchkiss, T-3

**Seminars, Departments of Psychiatry and Pharmacology, University of Colorado Medical Center, Denver, March 1, and Department of Molecular, Cellular and Developmental Biology, University of Colorado, Boulder, March 2:**

"Structural Alterations in Histones of Synchronized Mammalian Cells" by G. R. Shepherd, H-4 (invited)

**Thirteenth Scintillation and Semiconductor Counter Symposium, Washington, D.C., March 1-3:**

"Neutron Coincidence Counters for Nuclear Safeguards Applications" by J. E. Foley, A-1

**Conference on High Pressure Physics and Planetary Interiors, Houston, Texas, March 1-3:**

"Equation of State and Phase Diagram for Dense Hydrogen" by G. I. Kerley, T-4

**Lockheed Research Colloquium, Palo Alto, Calif., March 2:**

"The Los Alamos Meson Physics Facility—A New National Capability for Basic Research and Potential Applications" by L. Rosen, MP-DO

**Twelfth Annual Symposium on Behavior and Utilization of Explosives in Engineering Design, sponsored by New Mexico Section of the American Society for Mechanical Engineers and the University of New Mexico College of Engineering, Albuquerque, March 2-3:**

"Code Calculations of Initiation and Performance of Explosives" by C. L. Mader, T-4 (invited)

"High Explosive Materials" by A. Popolato, GMX-3

"Detonation Phenomena" by W. C. Davis, GMX-8

**Courant Institute, New York, N.Y., March 3:**

"Stability of a Finite Beta  $I = 2$  Stellarator" by J. P. Freidberg, P-18

**Seminar, Chemistry Department, University of New Mexico, Albuquerque, March 3:**

"Why Scattering?" by N. C. Blais, CNC-4

**Texas Technological College, Lubbock, March 6:**

"Energy and Controlled Fusion" by J. L. Tuck, P-DO (invited)

**Twenty-third Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Cleveland, Ohio, March 6-10:**

"The Extraction and Spectrophotometric Determination of Bismuth as the Iodide Complex" by I. K. Kressin, H-5

**Integrated Contractors Meeting on Metallic and Inorganic Coatings, Oak Ridge, Tenn., March 7-8:**

"Accelerated Corrosion Testing of Electroplated Uranium and Uranium Alloys" by B. W. Powell, CMB-6

"Vacuum Vapor Coating of Particulate Materials with Aluminum" by H. Sheinberg, R. E. Riley, and J. M. Taub, all CMB-6

"A Review of Electrochemical Process Development at LASL" by R. Seegmiller, CMB-6

**Colloquium, University of Texas, Austin, March 8:**

"Conjectures on the Nature of Ball Lightning" by J. L. Tuck, P-DO

**Seminar, Applied Physics Division, Argonne National Laboratory, Ill., March 9:**

"Neutron Source Potential of Dense Plasma Focus Devices" by J. W. Mather, P-7

**Seminar, Chemistry Department, University of New Mexico, Albuquerque, March 9:**

"Stable Isotopes and the Synthetic Chemist" by D. G. Ott, H-4 (invited)

**Colloquium, University of Maryland, College Park, March 10:**

" $^{244}\text{Pu}$  as a Possible Indicator of Interstellar Dust Within the Solar System" by G. A. Cowan, CNC-DO

**University of New Mexico School of Medicine's Albuquerque District Nurses Association Meeting, March 14:**

"Some Comments About Life and Science in the USSR" by L. Rosen, MP-DO (invited)

**Meeting, American Society for Non-destructive Testing, Los Angeles, Calif., March 16:**

"Concepts of Radiographic Image Enhancement" by D. H. Janney, GMX-11, B. R. Hunt and R. K. Zeigler, both C-5

"A Survey of Radiographic Image Enhancement Experience" by B. R. Hunt and R. K. Zeigler, both C-5, and D. H. Janney, GMX-11

**Seminar, Biochemistry Department, University of New Mexico, Albuquerque, March 16:**

"Effects of X-Irradiation on DNA Precursor Incorporation and DNA Replication in Chinese Hamster Cells" by R. A. Walters, H-4 (invited)

**University of California at San Diego Substorm Workshop, La Jolla, March 16-17:**

"Measurements of Magnetotail Plasma Flow" by E. W. Hones, Jr., P-4

**Colloquium, Rice University, Houston, Texas, March 17:**

"Interaction of Science with Society" by L. Rosen, MP-DO

**Symposium on Two-Nucleon Transfer and Pairing Excitations, Argonne National Laboratory, Ill., March 20-21, and Seminar, University of Indiana, Bloomington, March 22:**

"Alpha Transfer Reactions" by J. D. Garrett, P-DOR

**University of Texas, Austin, March 21, and Texas A&M University, College Station, March 27:**

"Polarized Ion Sources, Polarization Phenomena Using Gadgets to Demonstrate Principles" by J. L. McKibben, P-9

**Graduate Student Seminar, University of Colorado, Boulder, March 21:**

"The Instrumentation and Control Systems for LAMPF" by R. A. Gore, MP-1

**Meeting on Anomalous Absorption of Intense High Frequency Waves, University of Colorado, Boulder, March 21-22:**

"Absorption of Very Intense Laser Radiation in Overdense Targets" by R. L. Morse, T-6, C. W. Nielson, P-18, and L. E. Rudsinski, C-4

"High Frequency Electrostatic Plasma Instabilities with Collisions" by B. M. Marder, P-18

"Parametric Instabilities of Finite Amplitude Whistlers" by J. M. Kindel and D. M. Forslund, both P-18 and E. L. Lindman, J-10

"Anomalous Microwave Absorption Near the Plasma Frequency" by H. Dreicer and J. C. Ingraham, both P-13

"Interpretation of Anomalous Microwave Absorption Measurements" by J. C. Ingraham and H. Dreicer, both P-13

**Underground Nuclear Test Measurements Symposium II, Stanford Research Institute, Menlo Park, Calif., March 21-22:**

"Dynamic Strain Measurements in a Multilayered Cylindrical Structure" by B. P. Shafer, P. A. Secker, B. E. Todd, all W-10, and H. H. Luke, W-1

"Internal Damage from Sheet Explosive Tests on Cylinders with Areal Support" by R. S. Thurston and J. R. Brown, both W-10, R. D. Boyd, formerly W-10, J. D. Harper, GMX-6, and M. J. Katz, W-2

**Interagency Mechanical Operations Group Meeting, Savannah River Plant, Aiken, S.C., March 21-23:**

"Computer Controlled Electron Beam Welding Facility at LASL" by E. L. Brundige, CMB-6

**American Astronomical Society, Division of Planetary Science, Kona, Hawaii, March 21-24:**

"Comet Formation" by W. F. Huebner and L. W. Fullerton, both T-4

**Seminar, University of Indiana, Bloomington, March 23:**

"Nuclear Spectroscopy with Alpha Producing Heavy Ion Reactions" by J. D. Garrett, P-DOR

**St. Olaf College, Northfield, Minn., March 23:**

"In Vitro Studies on the Synthesis of Ribonucleic Acid Using Ionizing Irradiated RNA Polymerase" by G. F. Strniste, H-4 (invited)

**South Plains Section, American Chemical Society, Eastern New Mexico University, Portales, March 23:**

"LAMPF from the Nuclear Chemist's Viewpoint" by B. J. Dropesky, CNC-11

**Eighth Annual Symposium, New Mexico Chapter, American Vacuum Society, Albuquerque, March 23-24:**

"Mass and Velocity Sensitive Molecular Beam Analyser" by J. B. Cross and N. C. Blais, both CNC-4

"Apparatus for Measuring Optical Properties of Films" by J. F. Andrew, CMB-5

"The Vapor Pressure of Pul<sub>2</sub>" by W. M. Olson, CMB-5

"Monte Carlo Analysis of the Behavior of Divergent Conical Effusion Orifices" by J. W. Ward, CMB-5, M. V. Fraser, C-4, and R. L. Bivens, C-7

**Sherwood Theory Meeting, Los Alamos, March 23-24:**

"Fast Wave Heating of Tokamak Plasmas" by J. M. Kindel, P-18, and F. W. Perkins, Princeton University, N.J.

"Parametric Instabilities at Low Frequencies above the Lower Hybrid" by J. M. Kindel, P-18, and H. Okuda, Princeton University, N.J.

"Parametric Instabilities of Whistlers" by D. W. Forslund and J. M. Kindel, both P-18, and E. L. Lindman, J-10

"MHD Stability of Diffuse Two-Dimensional Equilibria" by J. P. Freidberg and B. M. Marder, both P-18

"Application of the Vlasov-Fluid Model to the Screw Pinch" by J. P. Freidberg and H. R. Lewis, both P-18

**"Stability of a Finite Beta  $l = 2$  Stellarator" by J. P. Freidberg, P-18**  
**Symposium of Northeastern Accelerator Personnel, Tallahassee, Fla., March 23-24:**

"Progress Report on the LASL Polarized Ion Source" by J. L. McKibben, P-9

**Thirteenth Annual Northwest Regional Science Fair, Albuquerque, March 25:**

"Guessing the Future from the Past" by J. L. Tuck, P-D0

**University of Wisconsin, Madison, March 27:**

"Recent Developments in Monte Carlo Calculations" by D. R. Harris, T-2

**American Physical Society Meeting, Atlantic City, N.J., March 27-30:**

"Physical and Radiobiological Aspects of Pi Minus Mesons in Therapy" by M. R. Raju, H-9 (invited)

"Phonon Structure Factors in Bismuth and Antimony" by R. E. MacFarlane, P-2

**Committee meeting of the Scientific Advisory Group on Effects, Orlando, Fla., March 27-30:**

"Dense Plasma Focus" by J. W. Mather, P-7 (invited)

**University of Wisconsin, Madison, March 28:**

"Monte Carlo Simulation of Biological Population Interactions" by D. R. Harris, T-2

**Cryogenic Workshop, Marshall Space Flight Center, Huntsville, Ala., March 29-30:**

"Cryogenics in Space Experimentation at Los Alamos Scientific Laboratory" by J. R. Bartlit, P-8

**Special CANNIKIN Symposium, 67th Annual Meeting, Seismological Society of America, Honolulu, Hawaii, March 29-April 1:**

"Long Period Water Wave Measurements from the CANNIKIN Nuclear Explosion" by K. H. Olsen, J. N. Stewart, both J-9, J. E. McNeil, Delco Electronics, Goleta, Calif., and M. J. Vitousek, Hawaii Institute of Geophysics, Honolulu



Culled from the May, 1952, files of the Santa Fe New Mexican by Robert Porton

### Telephone Call Rates Increase

Local calls from pay telephones will change from five cents to a dime effective May 5 the Mountain States Telephone Company announced recently. The change in the local calling rate from coin telephones is in accordance with the new schedule approved by the State Corporation Commission.

### Quick Thinking Youth Stops Car

Fast action by a 12-year-old Hill youth averted what might have been a serious accident when he halted a driverless car in which a six-month-old baby was riding. Gene Dunn, son of Mr. and Mrs. William C. Dunn, applied brakes in the out-of-control vehicle as it rolled north along Diamond Drive near Mountain School. The child's mother had left the car moments before and stated she believed children entered the car after she left and inadvertently released the brake. Young Dunn received praise from local officials for his quick thinking.

### Los Alamos Residents Run for Election

Several choices will be offered voters in the primary election. Among those residents competing for places on the ballot are: Democrats Henry Heyman, Cecil Badsgard—county commission; Wilmer McDaniel—sheriff; Louis Rojas and Michael Clancy—constable; Republicans Ralph Carlisle Smith—probate judge; Theodore Trujillo—constable; and George Hawthorne—county assessor.

### Stray Youngster Returned to Daddy

It all started with a telephone ringing in the police station—"Police Department, Bunch speaking." A minute elapsed. Policeman Carl Bunch hung up the receiver and shook his head knowingly—another stray youngster, one of many found every week in Los Alamos. Summoning a colleague to handle calls, he went out to the store in his patrol car. The owner of the business establishment went back to his office and returned with a tiny girl with big eyes and a sucker. She looked up at Bunch, smiled and greeted him—"Hi, daddy."

## what's doing

**PUBLIC SWIMMING:** High School pool—Monday through Wednesday, 7:30 to 9 p.m.; Saturday and Sunday, 1 to 6 p.m.; Adult Swim Club, Sunday 7 to 9 p.m.

**SIERRA CLUB:** Luncheon meeting at noon, first Tuesday of each month, South Mesa cafeteria. For information call Brant Calkin, 455-2468, Santa Fe.

**RIO GRANDE RIVER RUNNERS:** Meetings scheduled for noon, second Friday of each month at South Mesa cafeteria. For information call Joan Chellis, 662-3836.

**LOS ALAMOS SAILORS:** Meetings at noon, South Mesa cafeteria, first Friday of each month. For information call Dick Young, 662-3751.

**OUTDOOR ASSOCIATION:** No charge, open to the public. Contact leaders for information.

May 6-7—Alternate date for Chama Canyon, Jon Cross, 662-7521 and Les Redman, 445-2943

May 13—May Pilar slalom race, John Martin, 662-6451

May 14—Pilar downriver race, James Fretwell, 662-6477

May 20—Espanola to Otowi, Les Redman, 445-2943

May 20—Kayak workshop (practice session), Jon Cross, 662-7521

May 21—Hike into White Rock Canyon to watch Sierra Club river run, Cecil Carnes, 672-3593

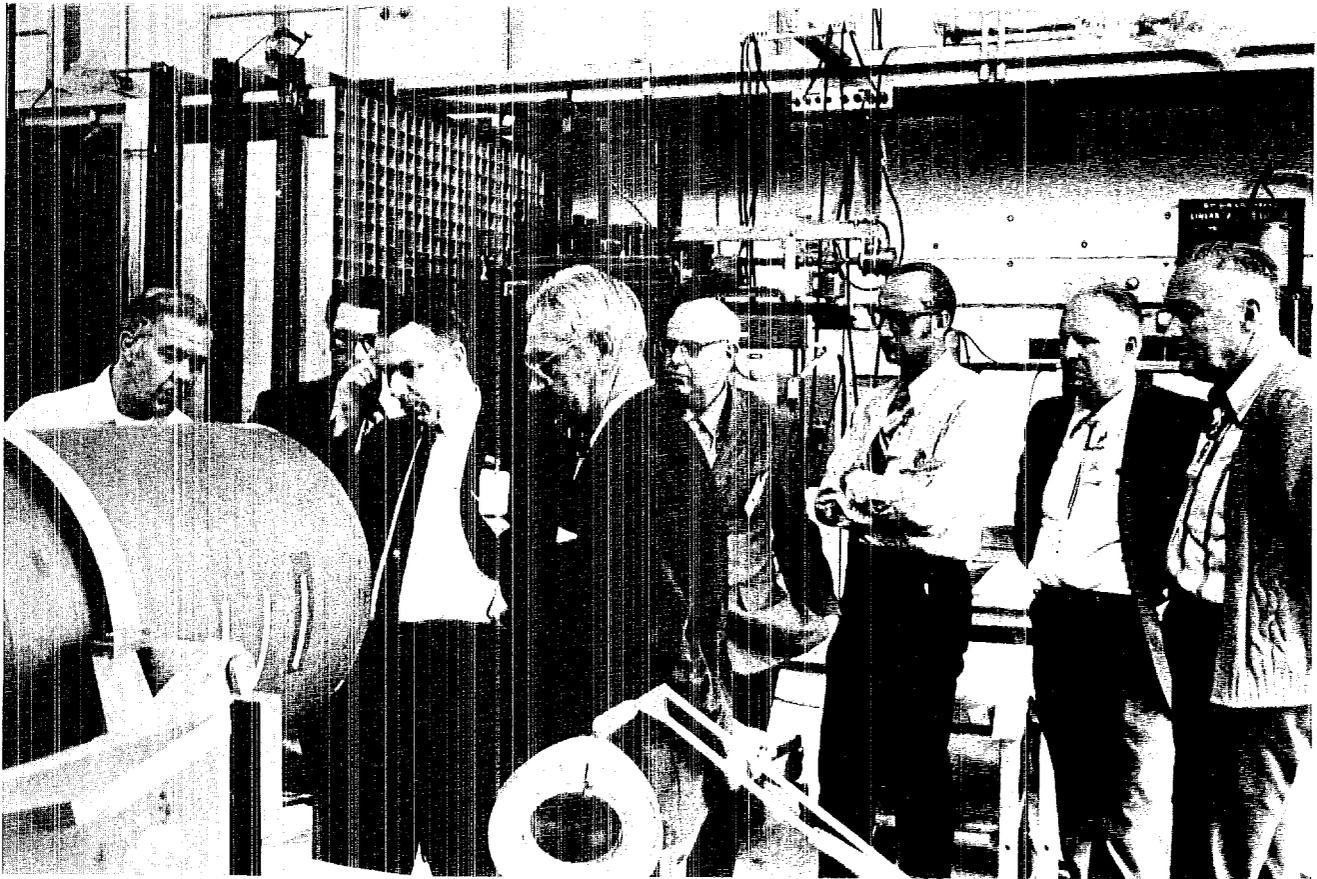
May 27-29—Delores River, Colorado, Dave Blevins, 662-7458, and Mac Fraser, 662-7478

**SPORTS CAR CLUB DEL VALLE RIO GRANDE:** Meetings 7:30 p.m., Hospitality room, Los Alamos National Bank, first Tuesday of each month. For information call Gerry Strickfadden, 672-3664 or Frank Clinard, 662-4951.

**MOUNTAIN MIXERS SQUARE DANCING CLUB:** Mesa School, 8 p.m. For information call Florence Denbow, 662-5014.  
May 6—Festival—Santa Fe  
May 20—Bones Craig, club caller

**NEWCOMERS CLUB:** May 24, 7:30 p.m., Hospitality room, Los Alamos National Bank, "Peddlers' Market." For information call Linda Hertrich, 662-9355.

**MESA PUBLIC LIBRARY:**  
April 26-May 17—Aletha Howard, small paintings  
May 1-May 15—Ikebana International Exhibit  
May 16-June 1—Los Alamos Arts Council Crafts Fair Exhibit



Francis Gavigan (third from left), flight safety officer, Space Nuclear Propulsion Office toured kiva facilities at Pajarito site during his recent visit to the Los Alamos Scientific Laboratory. Others shown are John Orndoff,

alternate N-2 group leader; William Milstead, SNPO; Roderick Spence, N-division leader; Harold Hessing, SNPO; Glen Graves, Dir. Off.; Luther Lyons, alternate N-1 group leader; and Hugh Paxton, N-2 group leader.

Henry T. Motz  
3187 Woodland  
Los Alamos, New Mexico

87544

Estelle Ramey, a professor in the Department of Physiology and Biophysics, Georgetown University, Washington, D.C., is shown as she toured Health Research Laboratory facilities at LASL. With her are Marvin VanDilla and John Steinkamp, both of H-4. Mrs. Ramey was in Los Alamos as key speaker for one of the Laboratory's regular colloquiums where she talked on "Sex Hormones and Executive Ability," before a capacity crowd.

