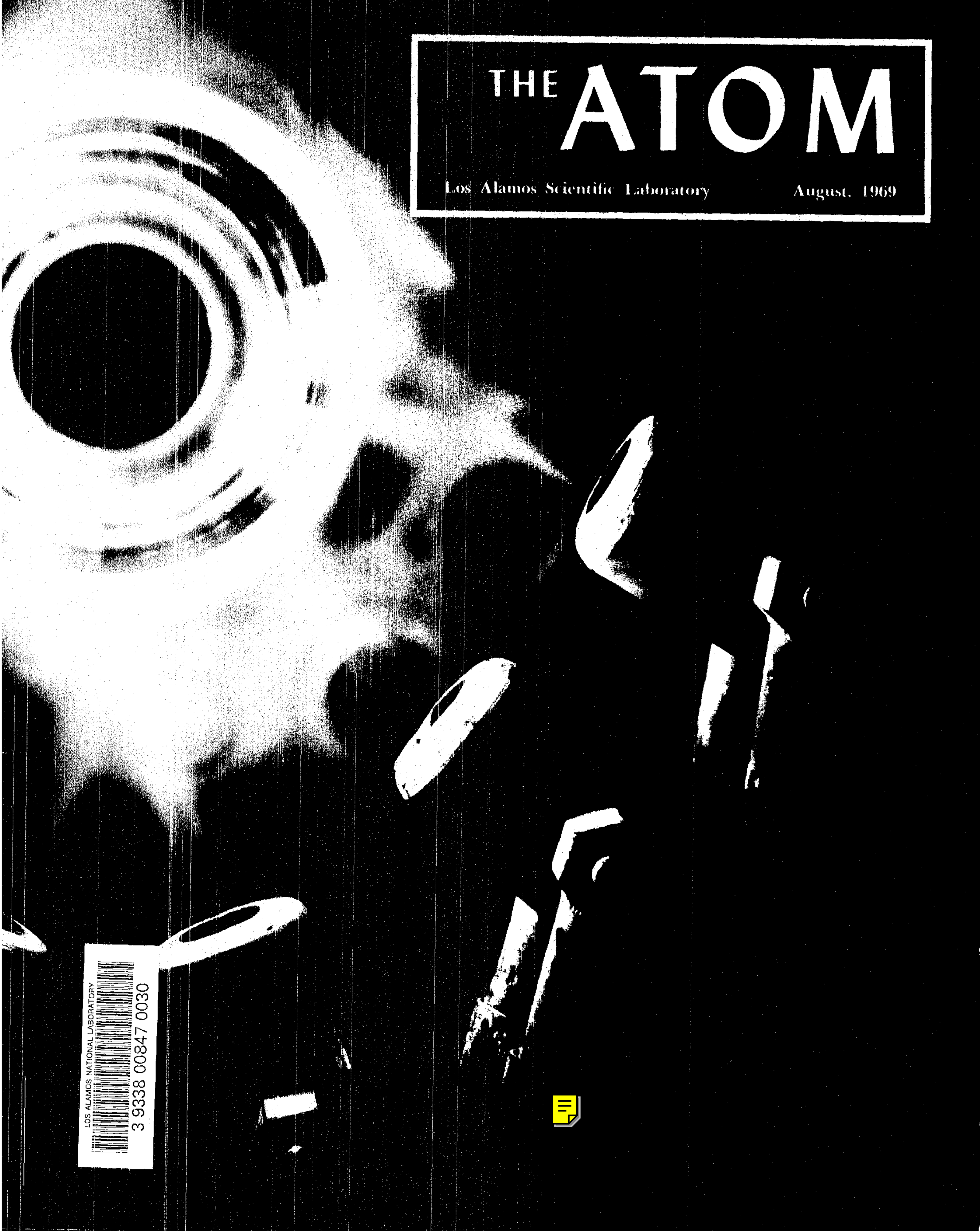
THE ATOM

Los Alamos Scientific Laboratory August, 1969



Volume 6 Number 8
August, 1969

THE ATOM

Published monthly by the University of California, Los Alamos Scientific Laboratory, Office of Public Relations, P. O. Box 1663, Los Alamos, New Mexico 87544. Second Class Postage Paid at Los Alamos.

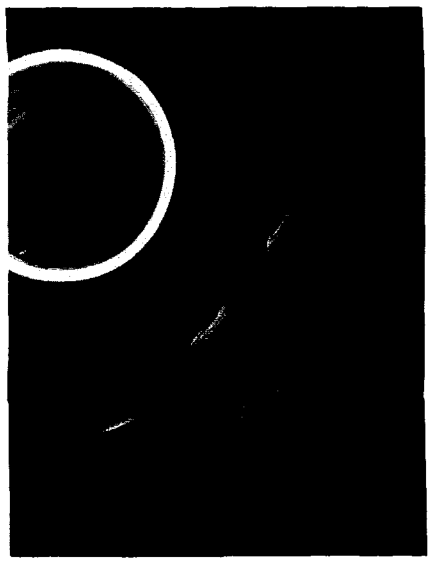
CONTENTS:

Editor: Kenneth J. Johnson

Photography: Bill Jack Rodgers
and Bill Regan

Office: D-413 Administration Building. Telephone: 7-6102. Printed by The University of New Mexico Printing Plant, Albuquerque.

Los Alamos Scientific Laboratory, an equal opportunity employer, is operated by the University of California for the United States Atomic Energy Commission.



COVER:
PUB-1 Photographer Bill Jack Rodgers was looking down a quartz-glass cylinder, heated to a white-hot working temperature of 3,000 degrees centigrade by hydrogen-oxygen torches which formed a half-moon around it, when he snapped this month's cover photo. Work on the glass object was being done by SD-3, LASL's scientific glassblowers. The story begins on page one.

No Huffing and Puffing in Scientific Glassblowing

The quartz-glass cylinder that decorates the cover is shown from another viewpoint. Working on the object is Charles Henderson. Shortly after this photo was taken, Henderson demonstrated the durability of quartz by placing the cylinder under a cold water tap to cool. It didn't shatter or crack.

By Bill Richmond

A skilled art—whose basic processes haven't changed much in 4,000 years—plays an important role in the various programs of the Los Alamos Scientific Laboratory.

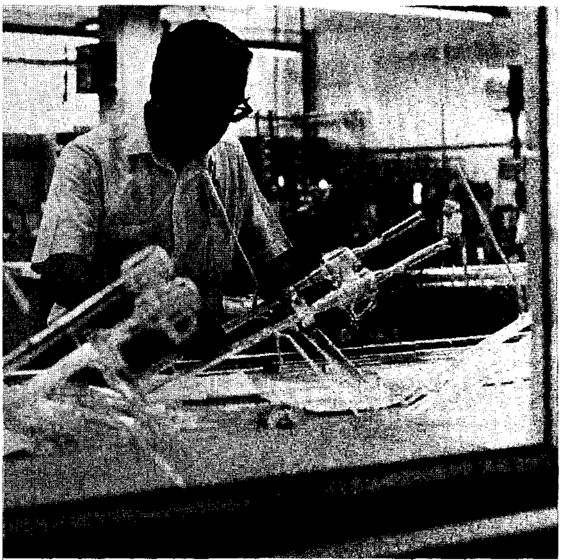
It's the art of glassblowing. Or, to be more precise, it's scientific glassblowing.

For the uninitiated, the word "glassblowing" conjures up an image of a lab-coated man blowing hard into a long metal tube to give shape to molten glass at the other end. This "huffing and puffing," although perhaps applicable in certain glass industry work, bears little resemblance to scientific glassblowing at LASL which relies on a sharp eye plus skilled and experienced hands. A certain amount of blowing is indeed part of the job, but huffing and puffing is not. Instead, it is more like blowing up a balloon and knowing how much pressure to apply and when to stop.

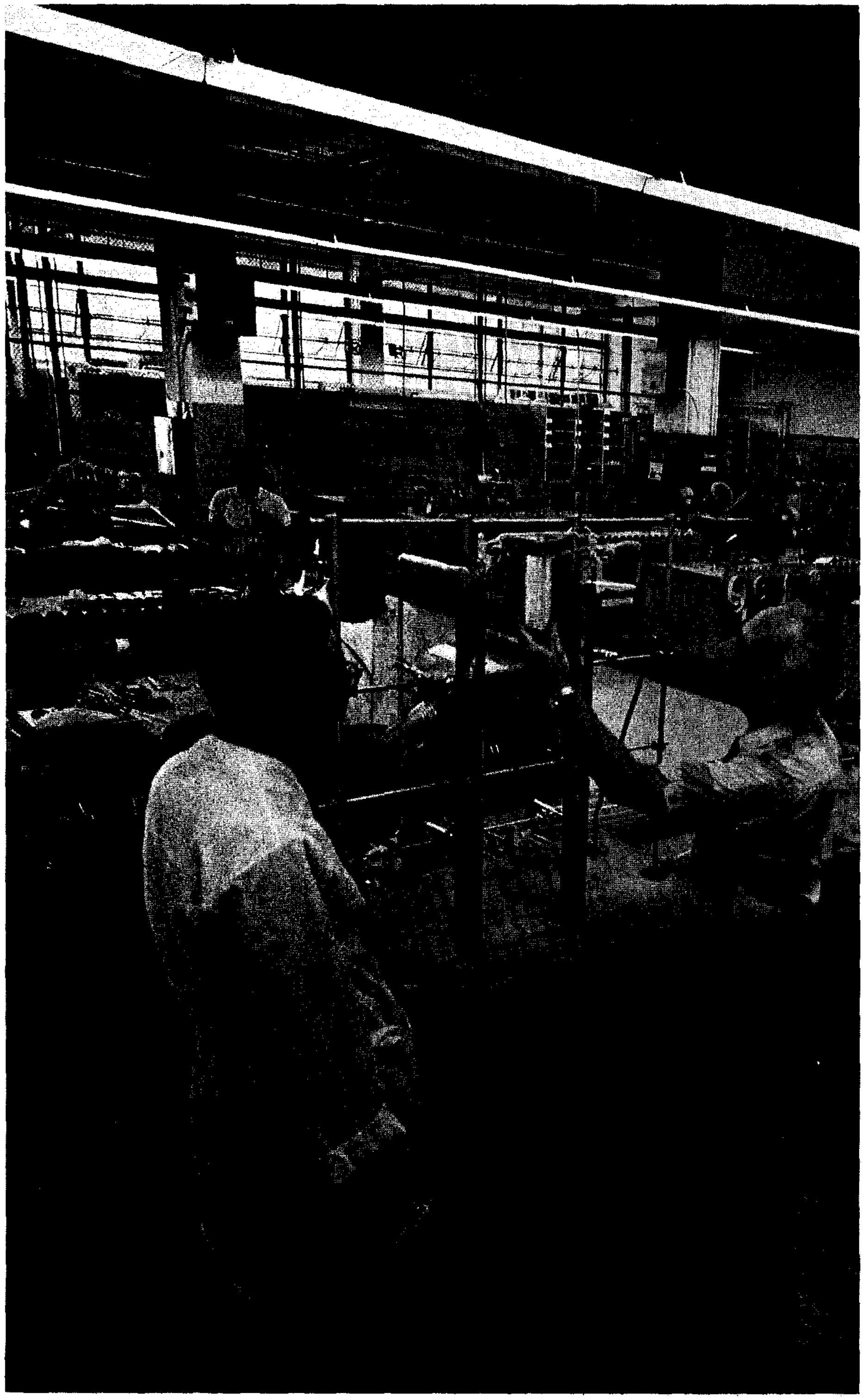
The glassblowing service at LASL is provided by SD-3, under Group Leader Arno Roensch.

As a rule of thumb, those things that are shelf items of a manufacturer, such as test tubes, beakers and flasks, are stocked by the Supply and Property department and obtained by the various groups as they are needed. Other items, needed to

Continued on page 3



Arno Roensch, SD-3 group leader, inspects some glass-work fashioned by his group.



Paulus Thomas, right, inspects a job at the main shop before giving it to Robert Dinegar GMX-7, left, who ordered it. At center is Glassblower Lou Schlatterer.

. . . Glassblowing

Continued from page 1

perform a special function, are made by SD-3.

"We don't make glass in either of our shops," Roensch said. "We buy glass items and tubing already made and then convert them to the specifications called for in the order."

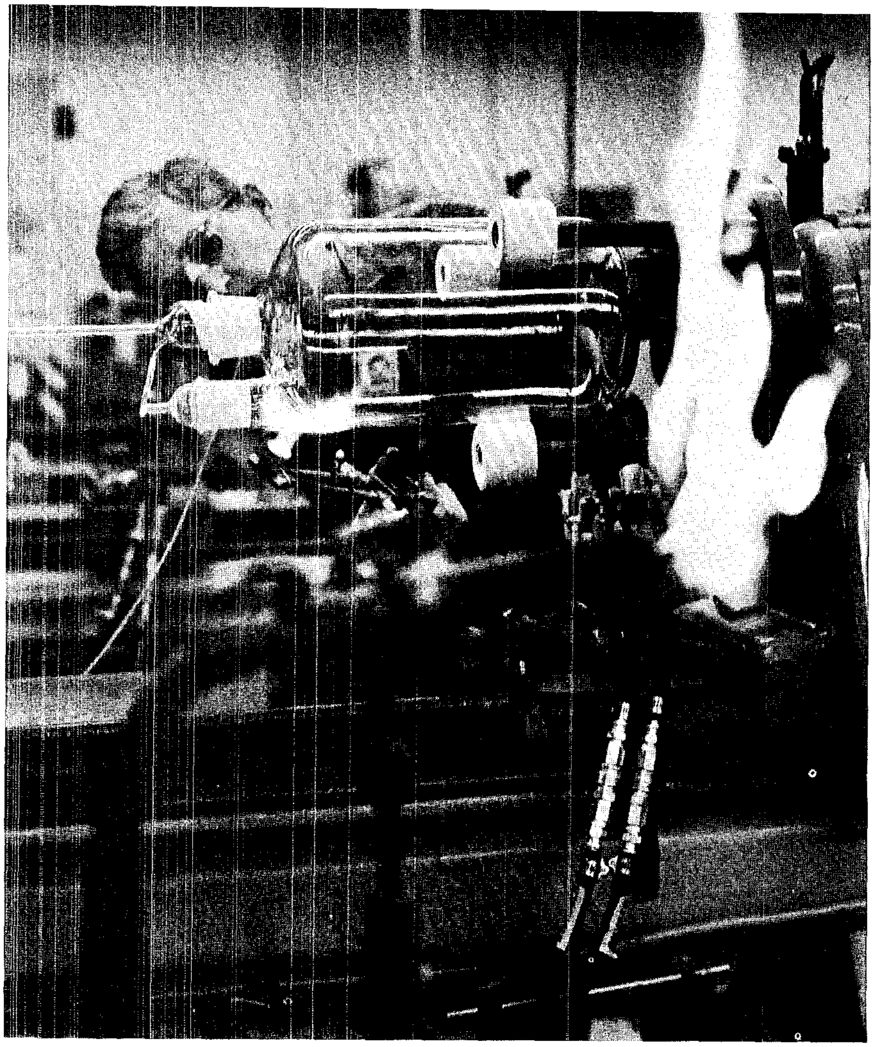
There are two glassblowing shops at the Laboratory. The main one is in the Shops building. An auxiliary is located in the CMR building. The auxiliary shop is necessary for two reasons: First, because the greatest concentration of chemists is in the CMR building and these chemists are among SD-3's biggest customers; and second, because contaminated glass can be worked with in the CMR building but it is not allowed in the main shop which is a "clean" area.

Roensch and his six glassblowers work primarily in the main shop but, the group leader spends a couple of hours each day in the auxiliary shop taking orders, turning out jobs, and discussing special problems with persons in CMR.

"All of our group are available to work in the field with groups that have special problems," Roensch said.

The oldest known specimens of glass are from Egypt and date back to about 2000 B.C. That country had a well-established glass industry by 1500 B.C. The first glass manufacturing plant in America was built in 1608 and glass was among the first cargo exported to England. In spite of the age of the art, the basic processes of glassmaking have not changed since ancient times.

For centuries the art of glassmaking was one of the most closely guarded secrets in the world. Information was passed from father to son and there was a thriving business for assassins who were hired to prevent trade secrets from being stolen and, perhaps, to reduce the competition.



Glassblower Max Newman works on a three-necked bottle. By blowing through the rubber tube in his mouth, Newman maintains pressure inside the bottle.

Most glass is a mixture of silicon, an alkali, lime and sometimes cullet (waste glass). Other ingredients can be, and frequently are, added to obtain a certain desired result. For example, boron can be added for thermal and electrical resistance, barium will increase the refractive index, and metallic oxides will impart color.

The materials are heated to an extremely hot temperature, skimmed of impurities, and then poured into molds or blown by the use of a long tube. This is the process followed by most glass manufacturers.

To the scientist the advantages of glass over metal are many. Glass is transparent, can be fabricated with ease, is chemically inert, can be made air-tight, and can be modified at a later date with little trouble. Glass can be melted, twisted, bent, stretched and blown like a balloon.

continued on next page

Eulogio Serrano, left, produces several special-order glass pieces by using the glassblower's basic tools—heat, dexterity and air. Below, Newman works on a part of a vacuum system.

. . . Glassblowing

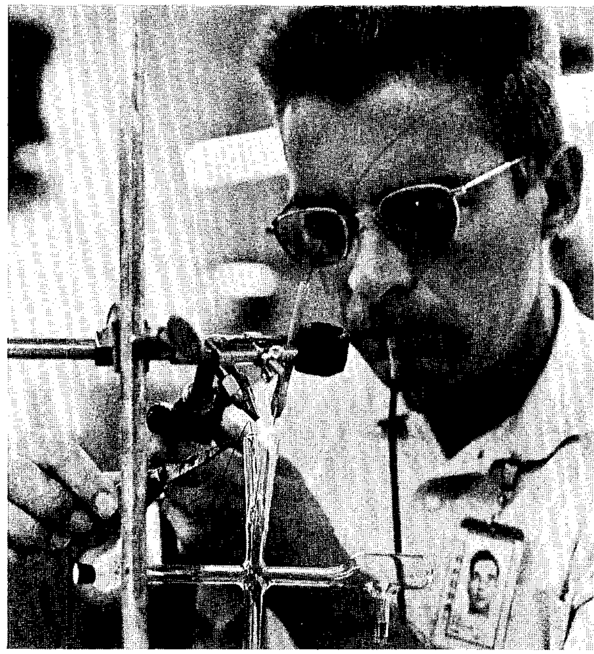
continued from preceding page

Literally any desired shape or configuration is possible with glass and can be accomplished in a fraction of the time that metal requires.

Starting with stock items and tubing, LASL's glassblowers can produce fantastically complicated products ranging from a mercury diffusion pump and trap assembly to a one-of-a-kind Rube Goldberg-type result that commercial glassblowers have never heard of.

SD-3 works with pyrex and quartz glassware. Pyrex is the easiest of the two to work with. At a temperature of about 1,200 degrees centigrade, pyrex can be shaped or molded. This is known as its working point. Pyrex can be worked by heating with a torch of natural gas and oxygen.

Quartz, however, has a working-point temperature of about 3,000



Schlatterer fashions a diffusion pump, above, while Bill Fox joins a tungsten metal seal to a glass apparatus at right.

degrees centigrade and special hydrogen-oxygen torches must be used for it to reach this temperature. Quartz, called for in about half of SD-3's jobs, has greater thermal durability than pyrex and thus is becoming more popular with Roensch's customers.

In addition to fabricating completely new devices, the glassblowers are also called on for maintenance jobs. If a crack develops in a vacuum system, for example, the glassblowers can take their torches to the laboratory where the system is located and perform the repair work immediately.

The LASL glassblowers average more than 20 years experience in the field. Roensch, whose father was a glassblower, started his apprenticeship in 1934. However, he dabbled with glass-work even before that in a small shop his father had set up in the basement.

The qualifications for a scientific glassblower at the Laboratory are strict: four years of apprenticeship plus a minimum of six years of experience, familiarity with several prescribed types of glass, ability to operate all lathes and measuring and testing devices and to perform all work to a tolerance of half a millimeter or less.

"We have gotten down to a tolerance of 30 microns (one-millionth of an inch) for quartz fiber work," Roensch noted.

In addition to Roensch, the other glassblowers in SD-3 are Paulus Thomas, Lou Schlatterer, William Fox, Max Newman, Eulogio Serrano and Charles Henderson III—all inheritors of a 4,000-year-old art.

UHTREX Reaches Design

Shift Supervisor Hurshel Ainsworth, left, checks and logs all procedures of experimental plan which brought UHTREX to power. In background are Clarence Woodcock and Norm Wibel.

Temperature

By Bill Regan

How high is ultra high?

This is like asking how high is high fidelity. It is a relative thing.

But in the case of the Los Alamos Scientific Laboratory's Ultra High Temperature Reactor Experiment (UHTREX) it is design temperature —2,400 degrees fahrenheit—measured at the helium gas coolant outlet. And in June, that is the temperature at which UHTREX began operating. It is the highest temperature yet attained in a closed cycle nuclear reactor. This is more than a thousand degrees hotter than any other contemporary reactor operating with a recirculating coolant. The gas cooled reactor at Peach Bottom, Pa., which is the only other one of this type operating in the United States, has a gas outlet temperature of about 1,400 degrees fahrenheit.

Why the interest in high temperature? Higher temperatures generally can improve the thermal efficiency of power plants—especially if gas turbines are some day harnessed directly to gas cooled reactors in large electrical generating plants. Temperatures such as those attained in UHTREX also extend the potential for using nuclear reactors to provide process heat for various industrial needs.

However, the purpose of UHTREX is not to produce power or industrial heat. It is designed exclusively for experimental use to advance the state of technology applicable to gas cooled reactors, particularly in the following areas:

1. Study of the effects of high temperature on fuels of various types.

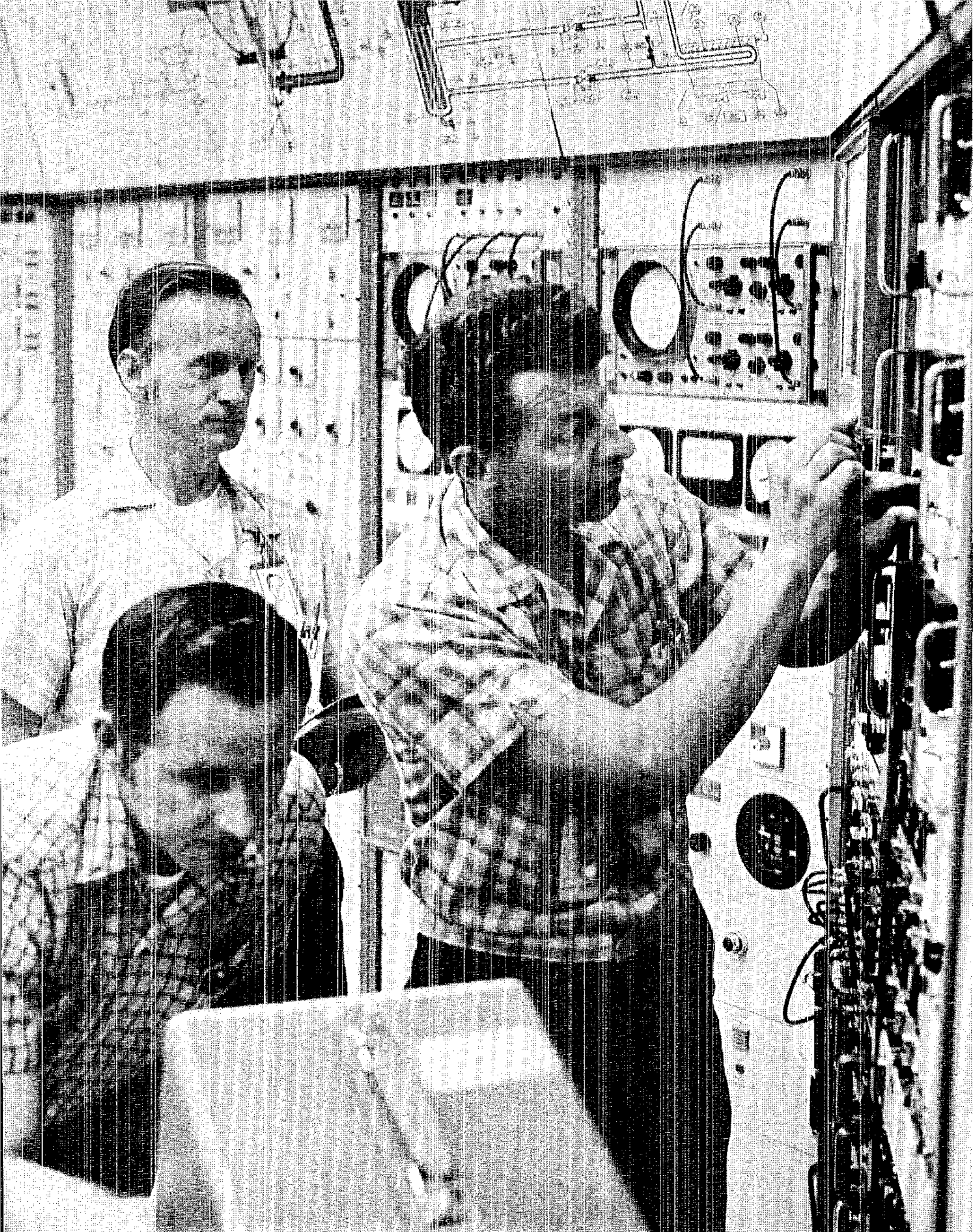
2. Investigate and contribute to a better understanding of the behavior of the small fraction of fission products which leak out of the coolant.

3. Check the effectiveness of gas coolant purification systems under continuous operating conditions.

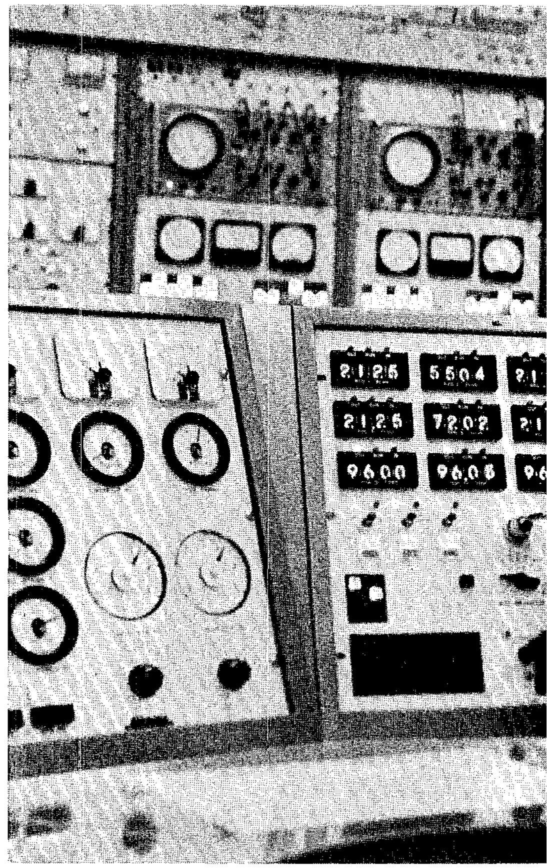
Fuels are easily studied in UHTREX primarily because of its unique, loading system which permits loading and unloading fuel specimens without shutting down the reactor. The UHTREX core can be rotated so that any part of it can be

continued on page 9

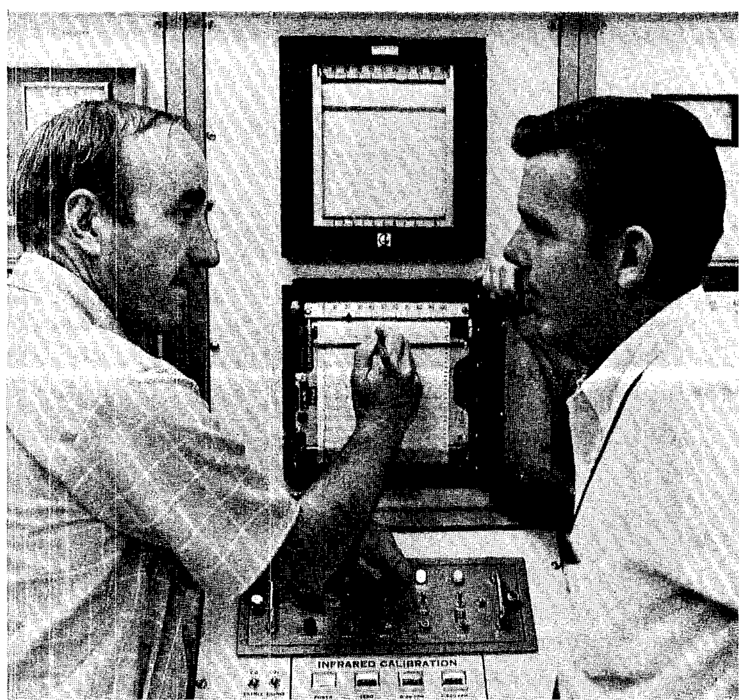
K-4 Group Leader Bob Warner reports progress of experimental plan which brought UHTREX to design power and temperature.

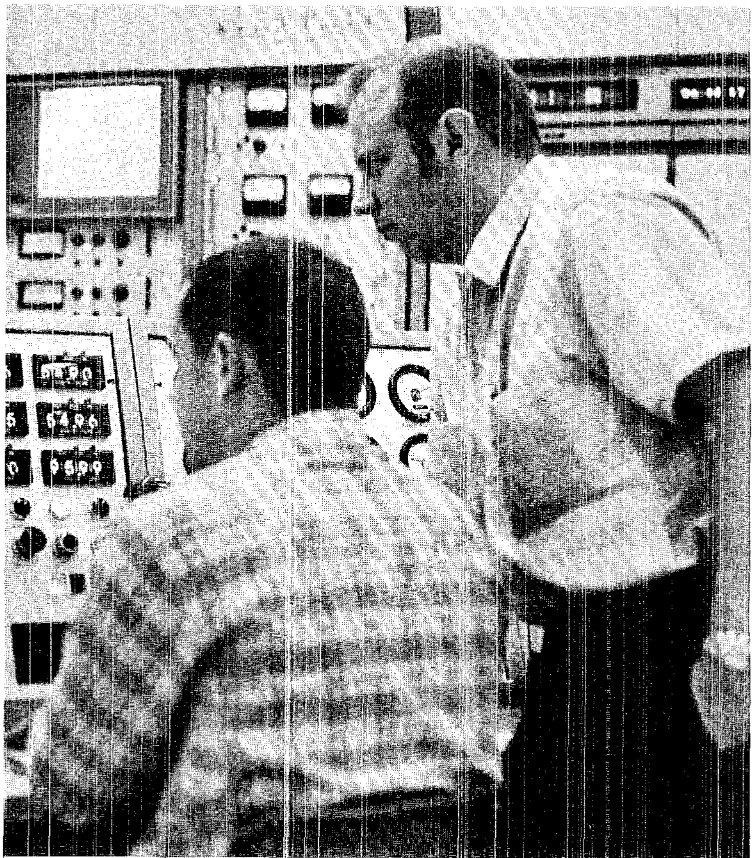


Pat Dolin, John Kottmann and John Lundgren, left to right, were part of the team that kept close watch on instrumentation performance in the UHTREX control room.



Below, K-4 Assistant Group Leader Dick Daly, left, discusses gas chromatograph operation with Bud Utz.





Larry Booth, right, assistant K-4 group leader, and Reactor Operator Wibel intently watch control panel readout.

UHTREX . . .

Continued from page 7

aligned with the fuel loading machinery. Four fuel elements rest end-to-end in each of 312 fuel channels and removal of an element takes only a few minutes and can be done at any time. When a new element is pushed in from the outside by a loading ram, another element is displaced into a slot in the center of the core. It falls out of the reactor and is mechanically conveyed to a fuel handling cell. During sustained use, reactor fuels gradually "burn up" (fissioning uranium has given up energy and become depleted) and in conventional reactors periodic major shutdowns are required for rearrangement of some elements in the core geometry and replacement of others with new fuel. In UHTREX, the fuel is arranged so that as the uranium becomes depleted in a particular fuel element it is simply pushed into a region of higher neutron flux and continues to produce as much power as it did initially. Only the most highly depleted elements need to be removed to keep the reactor running at uniform temperature without the perturbing effect of control rods. Test fuel specimens can be inserted or removed at any time. In contrast, when fuel testing is done in conventional power generating reactors, experimental fuel specimens can only be loaded and removed during major shutdowns which are likely to occur only about once a year.

Why can't other reactors run as hot as UHTREX? There are many design considerations, but the most fundamental limitation is imposed by the physical and chemical properties of the fuel and core materials. In most reactors, to keep the radioactive fission products from contaminating the reactor coolant, the fuel is encased in a metal can that must not be allowed to overheat. The UHTREX core is made of graphite—the most refractory material known—and the fuel elements consist of graphite loaded with uranium carbide, which is also very refractory.

The uranium carbide is distributed in the form of millions of microspheres (each about the size of a ballpoint pen tip) which are coated with layers of pyrolytic carbon. It is this protective carbon coating which prevents most of the radioactive fission products from escaping into the coolant and it is the attainment of a better understanding of this leakage that is one of UHTREX's objectives. The microspheres are obtained commercially, but they are processed into usable fuel form

continued on next page

J. C. Elder, left, Joe Bergstein, center, and Booth study data on UHTREX's stepwise ascension to design power and temperature.

UHTREX . . .

continued from preceding page

(one inch outside diameter by five and a half inch long cylinders) by a graphite mixing and extrusion process in CMB division. Machining to final length is done in the LASL Shops department.

Data on fission product migration will be more easily interpreted in UHTREX because the fuel elements are directly in contact with the coolant without intervening graphite structures or helium purge streams. If large gas cooled reactors are to be used for commercial production of power, it is necessary to have a better understanding of the behavior of this small percentage of fission products which find their way into the coolant.

The gas coolant cleanup system will be intensively observed to accumulate data on effectiveness during sustained operation of the reactor at design power and temperature. To cool the reactor core, about three pounds of helium per second are pumped through the primary circuit by a 60 horsepower blower rotating at 12,000 rpm on gas lubricated bearings. The blower's 35 pound rotor floats on a film of helium to alleviate bearing wear and to avoid the need for an oily lubricant that would contaminate the main coolant. The helium cleanup system, consisting of four stages, continuously purifies about two pounds of the coolant per minute. The coolant is diverted from the primary circuit to avoid buildup either of corrosive contaminates or of radioactivity.

Principal stages in the cleanup system are: a metallic filter which removes particulate matter; an oxidizing unit consisting of a heated column of cupric oxide pellets; a bed of ceramic pellets, called molecular sieves, which adsorb moisture and carbon dioxide; and refrigerated columns of charcoal that adsorb radioactive fission products. To avoid overloading the cleanup system with moisture and other volatile contaminants that were driven out (outgassed) of the carbon parts of the reactor during initial startup, the reactor temperature was raised very slowly over a six-week period. After the system has been thoroughly outgassed, the role of the cleanup system will shift more to the removal of radioactive contaminants and less to chemical corrosives.

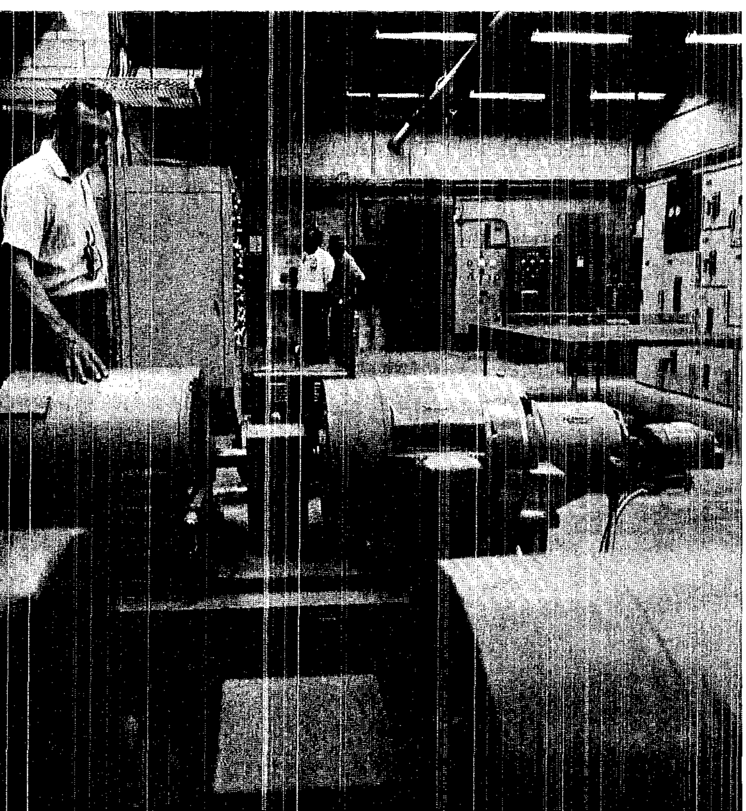
Many months of preliminary experiments at low power followed the initial attainment of criticality in Aug. 1967. These were necessary to understand the operating characteristics of this important new K-division research facility. The reactor first went critical at room temperature and required the loading of only 6.3 kilograms of uranium. As the temperature was raised it was necessary to increase the loading by increments to the present 11.4 kilograms since more uranium is needed to maintain criticality at elevated temperatures. As a result of observations during preliminary helium flow testing, some minor changes were made in the gas cooling system to keep steel containment temperatures within acceptable limits. Because the helium outlet temperature in UHTREX is almost the melting point of steel, some of the piping and containment vessels must be internally insulated and externally cooled to avoid overheating.

This mid-1969 beginning of Ultra High Temperature Reactor Experiment marks the end of a 10-year period of design, development, and construction. What is now called UHTREX was originally conceived in K division under the name of Turret. Basic responsibility was assigned to GMX division in mid-1959 in keeping with the Laboratory's technical diversification policy and the reactor was planned for a location just southeast of S site.

The Turret project was announced in Jan. 1960 and scuttled in the early stages when all funds were cut off without warning early in 1961. Several months later there were rumors that Turret would be reinstated. There were also rumors it would not be revived. But by mid-May 1961, Turret was once again alive, only under a new name—Ultra High Temperature Reactor Experiment.

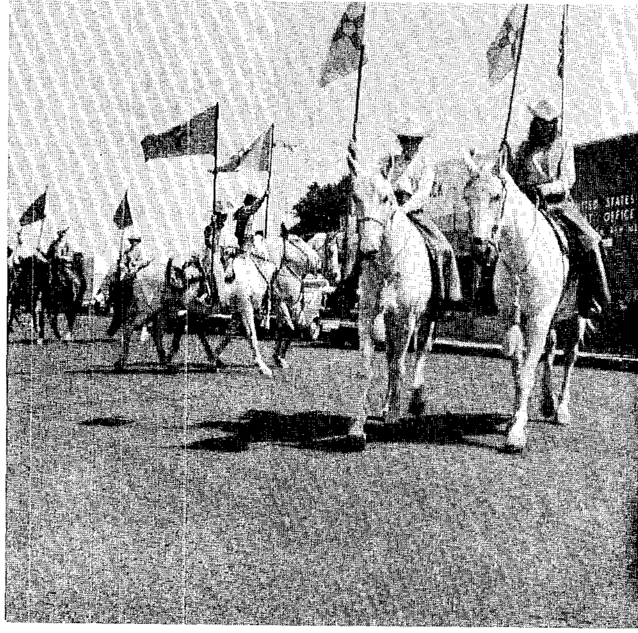
When work was resumed, the project and most of the personnel were assigned to K division and the site had been changed to its present location south of Ten site. Many detailed features of the design and experimental objectives were changed, but the basic approach was the same as in the original Turret. In Oct. 1961, it was announced that UHTREX construction bids would be called for in February of the following year with construction expected to start in late spring. Construction did start in July, 1962, on the reactor building. It was finished in Feb. 1964; the reactor pressure vessel arrived in Aug. 1965; the core was installed in June 1966; criticality at low power was achieved in Aug. 1967; and design power operation began in late June, 1969.

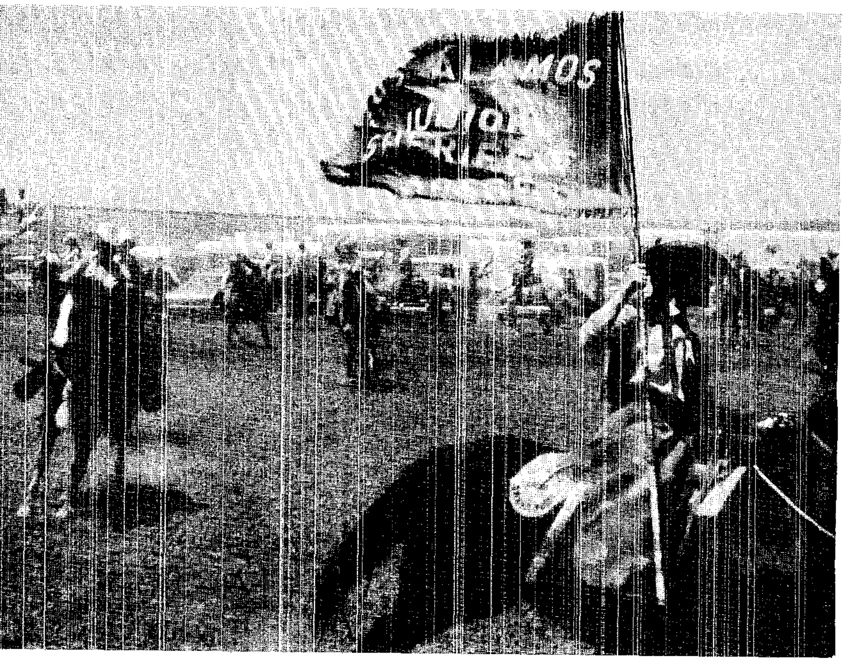
These electric motors power the mechanical equipment for UHTREX. In foreground, is Charles Mueller. Les Page and Dick Johnson watch control board at rear.



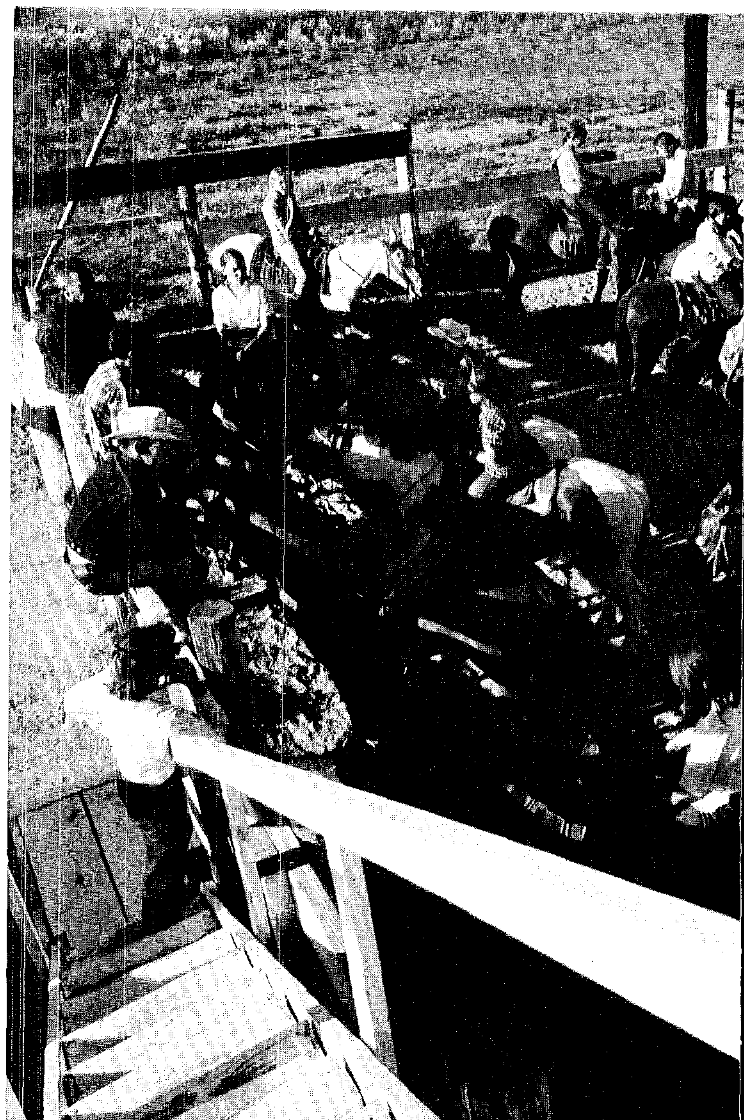
Horses, Kids, plenty of practice are the makings of Los Alamos County's top notch

Junior Posse





The Junior Posse drill team took part in the Los Alamos County Fair and Rodeo last year and is looking forward to the event again this year. (Photo by Bob Crook)



Junior Posse members listen as Drillmaster Sonny Thomas and Assistant Bob Crook outline activities of an evening practice.

At the Annual Junior State Rodeo parade in Santa Rosa this year, Los Alamos took first place. (Photo by Bob Crook)

"Get him in there Jimmy--"
"*Bring him around Rufus!*"
"Alright, watch your spacing! Spacing!"

Listening intently to these commands and for the whistle that would signal the start of the next maneuver were members of the Los Alamos County Junior Sheriff's Posse. On horses, in a column of fours, they rode at a slow gallop 'round and 'round the Los Alamos County rodeo arena.

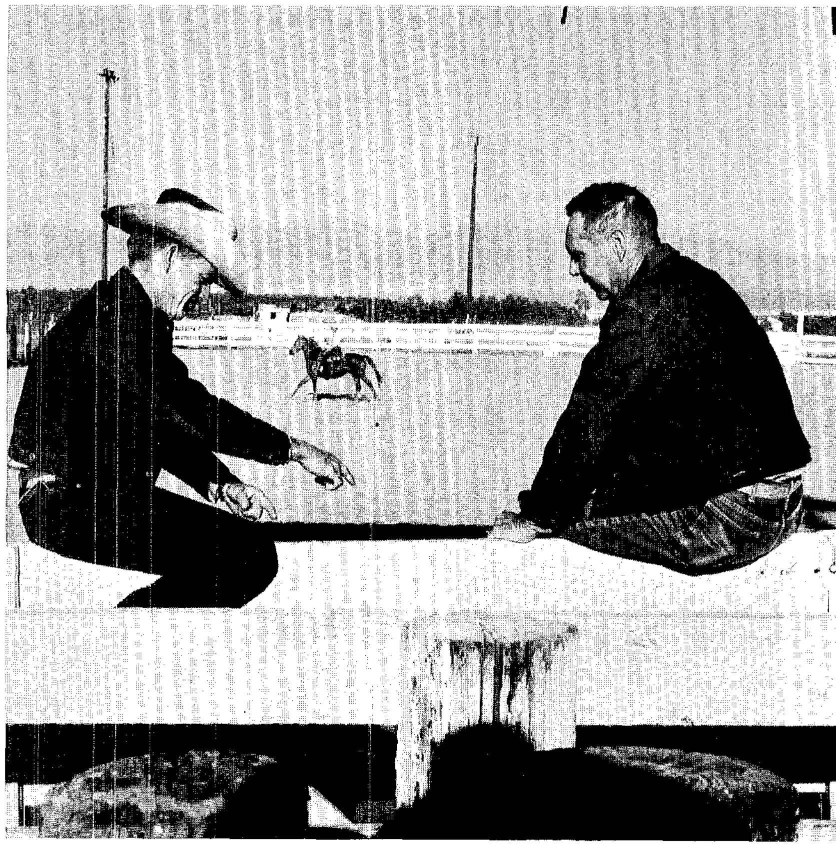
At the sound of the whistle, odd numbered horses turned in a tight circle to the right while even numbered horses continued to move in a straight line. In completing the circle, the odd numbered horses rejoined the column in the position formerly occupied by even numbered horses or, in other words, traded places with them.

Proper spacing, as emphasized by the commands, is of utmost importance in a maneuver like this one. If not far enough apart, horses would have had to slow their pace to avoid colliding with those rejoining the column.

The object of proper spacing is to keep the pace the same while in a column formation or during a maneuver so that in appearance the movements of each horse and rider appear as effortless and synchronized as a finely tuned watch.

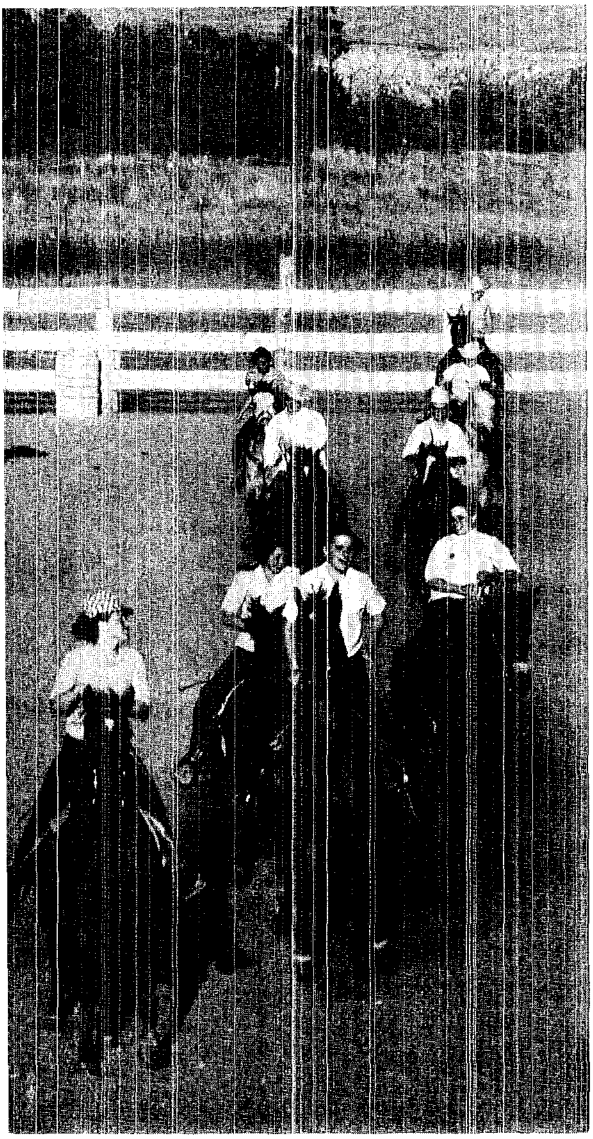
Giving the commands was Sonny Thomas, drillmaster for the Junior Posse. Thomas, a Zia Company em-

continued on next page



Thomas and Crook discuss drill-team maneuvers prior to an evening practice session.

The camera looks at the practicing Junior Posse from the viewpoint of a spectator.



. . . Junior Posse

continued from preceding page

ployee, is assisted with this duty by Bob Crook, D-8 group leader at the Los Alamos Scientific Laboratory.

The Junior Posse is a fun and social organization for youngsters from eight to 18 years of age who have horses and whose parents are either residents of the county or job connected. They practice twice weekly—currently Monday and Thursday evenings—during most of the spring, summer and fall.

For more than a decade the Posse has been performing publicly and has won several riding awards in New Mexico and Colorado. Most of these performances have been parades and rodeo-connected activities such as posting of the colors and the pivot, an exercise heralding the announcement of dignitaries prior to the start of a rodeo performance. Last year, however, the organization extended its capabilities to rodeo specialty acts, to include drill maneuvers featuring variations of the "wheel," "figure-8," and "threading the needle."

The vehicle for extending its capabilities was a drill team whose members vary from performance to performance and do not exceed 16. Most rodeo arenas, Crook said, will conveniently accomodate a 16-member drill team. It is also a number that can generally be met despite illness or travel by the membership, and it permits maximum participation by all members of the Posse, he said.

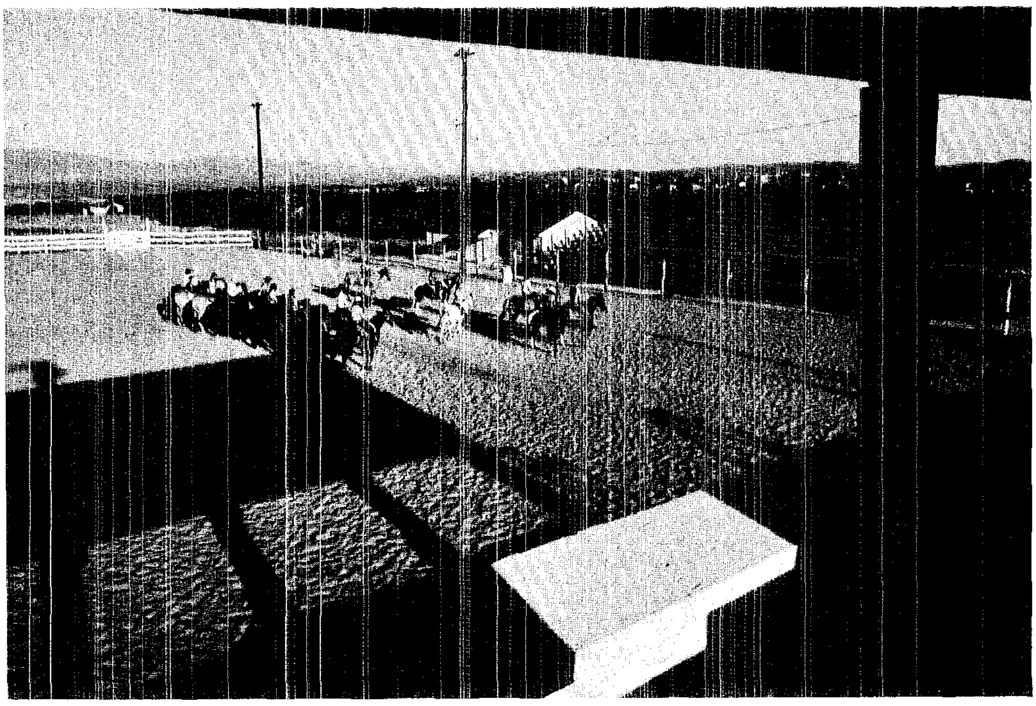
At the twice-weekly practices, a youngster and his horse learn to work together as a unit and as an integral part of the drill team. Practice is generally aimed toward its next public appearance which is currently the local Annual New Mexico Junior Rodeo, sponsored by the Sheriff's Posse, during the Los Alamos Fair and Rodeo Aug. 23-24.

"Invariably, when the Junior Posse goes to a parade or rodeo, it comes up with a first or second place," Crook said. He noted the group took first place in competition at the Annual State Junior Rodeo parade in Santa Rosa in June, an event considered by Posse members to be one of the most important on their seasonal circuit.

The nature of the performance can generally be anticipated by the uniforms worn by Posse members. For parades and pivots they wear green chaps and vests, yellow shirts and straw hats; they carry the state flag of New Mexico and use yellow horse blankets. Members of the drill team wear blue jeans, red neckerchiefs, white shirts and long, red, trailing sashes; they carry red and white flags.

In addition to public appearances the Junior Posse frequently sponsors trail rides which this year included a five-day Pecos Wilderness Area trip. Some of its members

Left, single columns of riders converge at the center of the Los Alamos Rodeo Arena to form a column of twos. Below, the group practices the pivot.



Above, Junior Posse members do one of several variations of the wheel. Left, Thomas gives the group a pep-talk during a break at a practice session.

participate in rodeo events, horse shows and other livestock activities.

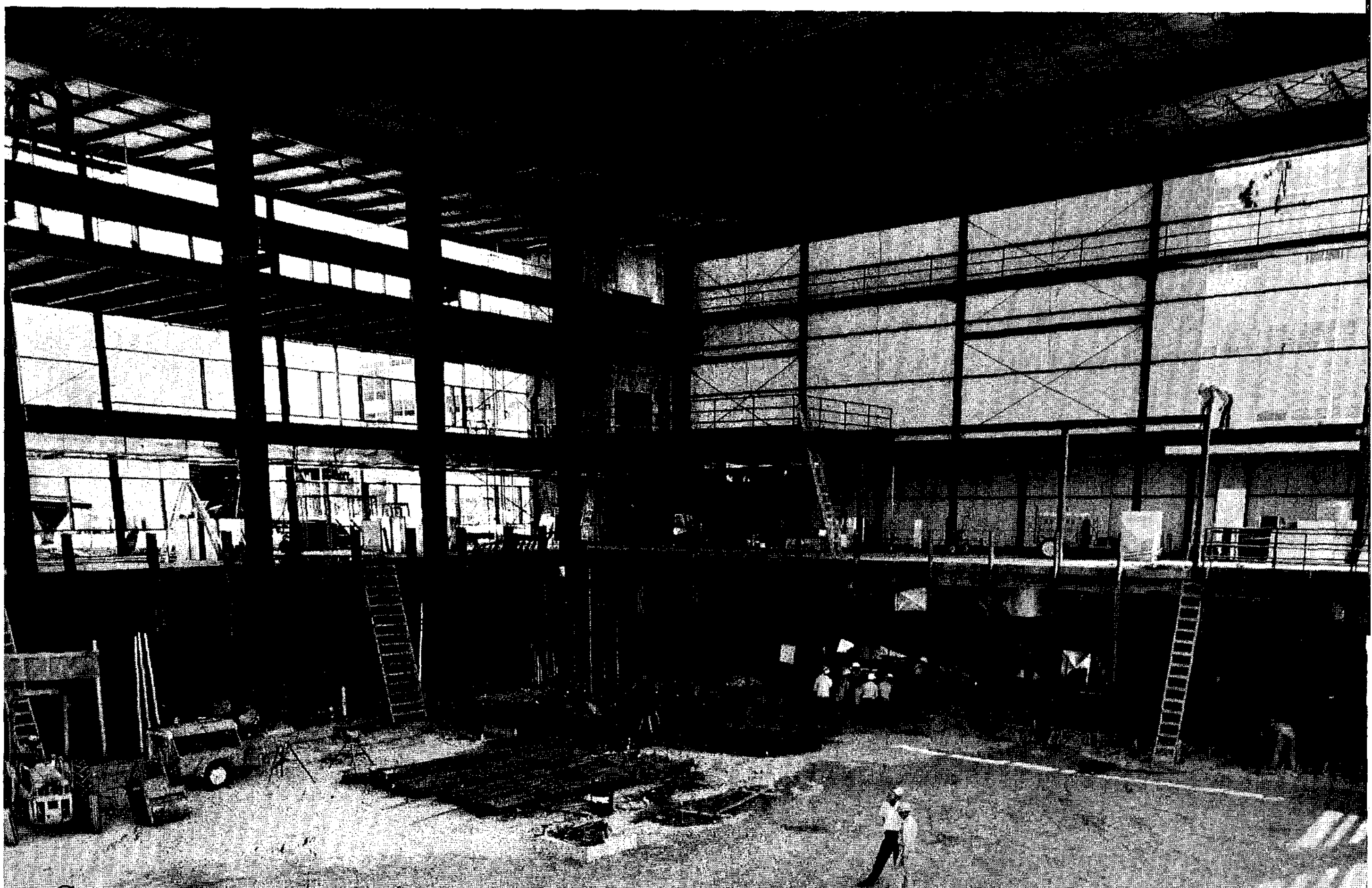
The organization operates on a budget of about $1,200 per year. Most of it goes toward providing transportation for youngsters and horses to the various places they perform. Traditionally the members raise about two-thirds of the total figure themselves by sponsoring enchilada dinners, car-washes, candy and manure sales, a junior dance on one night of the Los Alamos County Fair and Rodeo and other miscellaneous events. The deficit is made up from their own pockets.

The organization is sponsored by the Los Alamos Sheriff's Posse. The chairman of its Youth Committee, Thomas, serves as drillmaster and is responsible for coordination of Junior Posse activities such as transportation, lodging and meals, and to provide guidance for the youngsters when needed. He is aided by sponsors who are elected by Junior Posse officials.

Current sponsors are Dale Holm, Jim Andrews, Bob Hendron, Becky (Mrs. Ben) Diven, Opal (Mrs. Edwin) Wingfield and Danielle (Mrs. Don) Black.

They were elected by Junior Posse officials Chris Holm, major; Nancy Andrews, captain; Steve Noyes, lieutenant; Carrie Hendron, secretary; and Dea Wingfield, treasurer.

LAMPF and Scyllac Facility Head Major Construction Projects at LASL



Construction of technical facilities at the Los Alamos Scientific Laboratory continued at an accelerated pace during the last fiscal year ending June 30. Construction totaling $3.4 million was completed despite curtailment of all federal construction except that which was deemed vital to the national welfare.

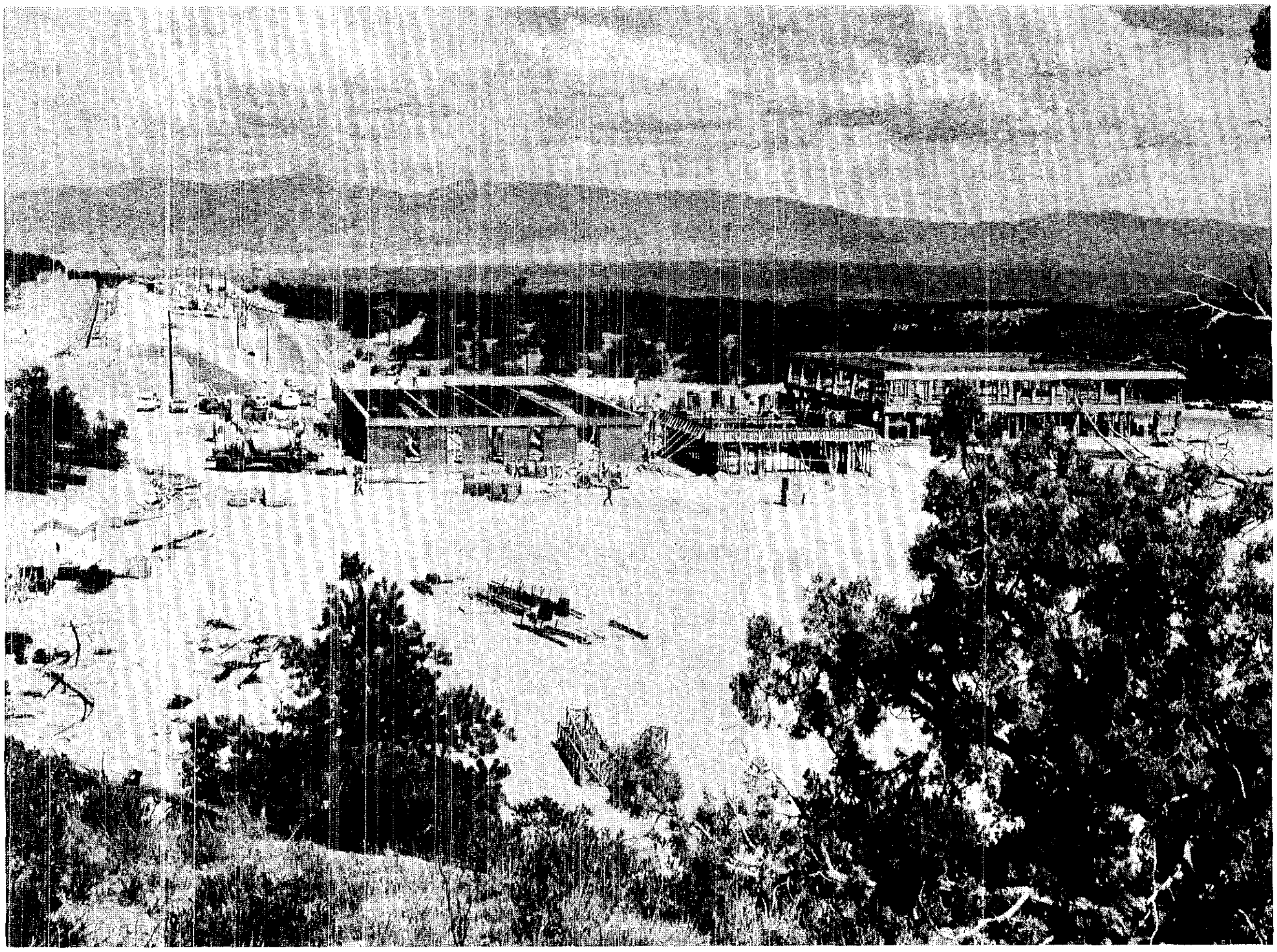
Facilities under construction since the beginning of the 1970 fiscal year, July 1, will have a total cost of $28,875,000. Budgeted for authorized projects which are being readied for construction is $8,750,000. The major part of the latter figure is for the Los Alamos Meson Physics Facility and the Laboratory and Energy Storage Facility for the Sherwood program.

The largest projects completed last year were the $990,000 Radiochemistry Laboratory Core Facility and part of LAMPF for $1,166,000. LAMPF projects included the Equipment Test Laboratory and Phase II of site utilities.

Smaller structures were completed for C division, CMB-6, CMB-11, N division, Engineering department, the Sherwood program and Supply and Property department.

Construction is progressing on the Scyllac Laboratory and Energy Storage Facility which was authorized last year for the Sherwood program. Total budget cost for the project is $8.5 million. Of this $2,150,000 has not yet been released.

Five components of the Meson Physics Facility are now under construction. They are the laboratory-office building; the building that will house the injector and Alvarez units of the accelerator; the structures that will house the waveguide accelerator and clusters of large radio-frequency tubes which will amplify power to the accelerator; a 115-kv electrical substation; and the operations building. The costs of these facilities total $11,500,000, including architect-engineer fees. Completion of these components



The present state of construction on the Scyllac Laboratory and Energy Storage Facility is shown at left. Above is the laboratory-office building being constructed at the Los Alamos Meson Physics Facility.

will provide all the space required for the accelerator, controls, and the MP-division staff. The remaining projects for the facility are the experimental areas, the beam switchyard, extension of site utilities and a nuclear chemistry facility.

The third largest construction project underway is the rehabilitation of DP site. The total cost of the project is $3.5 million. The program is to upgrade DP-site facilities which were constructed during World War II. Due to the security classification of the area, design is being accomplished by ENG-2 and construction administration by ENG-4.

Also under construction is a laboratory-office addition to SM-216 on South Mesa for J-9 and J-14. This addition will provide the needed laboratory and office spaces for the enlarged staffs of these groups

Construction projects which have been authorized and are pending release for construction are the LAMPF experimental areas for MP division; dry box and special fabrication and assembly facilities for CMB division; improvements to the Health Research Laboratory for H division; Rover test facilities for N division; and a primary electrical distribution system—a $1 million project that will provide power sources for LAMPF and other eastern technical areas.

Administrative support for construction projects at LASL is a function of the Engineering department under the direction of L. Philip Reinig. The department determines the scope of the facility with the using group and division, compiles conceptual and cost control estimates, prepares project data for budget submittal, establishes design criteria, effects liaison with the Atomic Energy Commission and the architect-engineer, and reviews construction. All of these activities are coordinated for each project by an experienced construction project engineer attached to ENG-1.

Harry S. Allen Retires

Harry S. Allen, who has been chiefly concerned with supply and property at the Los Alamos Scientific Laboratory for 26 years, has retired. He was presented with his Certificate of Retirement by Laboratory Director Norris E. Bradbury June 30. The day after, he and his wife, Marian, moved to Rockport, Texas, where they have owned property for the past few years.

Allen came to Los Alamos May 18, 1943, to set up a stockroom, run a warehouse and purchase supplies and equipment for the Manhattan Project. Nov. 1, 1945, he became head of Group A-4, the forerunner of the Supply and Property department. In 1948 when Supply and Property was formed, Allen was named to head the department. He held this position until Dec. 10, 1968, when he gave the reins to Robert Van Gemert. Thereafter, he served as a staff consultant until his recent retirement.

"We have a lot of friends here," Allen said. "We'll miss our friends, but it appears to be a good idea for both of us to get to a lower altitude. We bought a lot near Rockport four or five years ago.

"We like that part of South Texas very much. The people are friendly. It's a three-hour drive to Houston or San Antonio and a half-hour drive to Corpus Christi.

"We'll be busy getting our home built for about a year. We bought a 25-foot fishing boat. I plan to build a small sail boat after we get settled. I want to teach her (Marian) how to sail."

Allen was born in Washington, Conn. He was graduated from William Penn Charter School in Philadelphia in 1930, and from Wesleyan University, Middletown, Conn., with the B.A. degree in chemistry in 1934.

The Allens have two daughters, Mrs. Betsy Porter of Omaha, Neb., and Mrs. Dorothy Ruthven of Albuquerque.

"I was doing chemical research when the war broke out," Allen said. "The Navy wouldn't have me because I was color blind. I worked for the Manhattan Engineering District for more than a year in New York before coming to Los Alamos. Two floors of a physics building at Columbia University were being made into chemical laboratories. I was hired to buy equipment, needed in a hurry, to outfit the laboratories.

"Dana Mitchell was my boss. He came to Los Alamos as Oppenheimer's assistant in March of 1943. He called me a few weeks later and asked me to come out here.

"The job was buying, setting up a stockroom, and running the warehouse.

"When we started, it was a small hand-to-mouth operation with the greatest emphasis on what was needed immediately and with very little red tape as far as paperwork was concerned. We built a stock room from nothing to some 33,000 items today.

"We had an elaborate security setup. Everything was delivered to a Los Angeles or Chicago warehouse. In turn it was shipped to Santa Fe. For 10 years some of the things that were shipped here came in my name. We had remarkably little trouble under the circumstances. It was a little slow because everything had to be handled twice.

"To begin with, including warehouse people and truck drivers, we probably had 35 people in 1943. Today we have 220 people. But today we do a lot more for a lot more people. The size of the Laboratory has grown from about 300 to 4,100 people over the same period.

"I remember we bought something like 100 miles of old twisted pair-wire for the Trinity shot instrumentation. Today there is nothing like it used; they use high grade coaxial cable. We bought 10 big barrels of porcelain insulators, the kind you nail on wooden arms. They were used from zero point at Trinity to the control point.

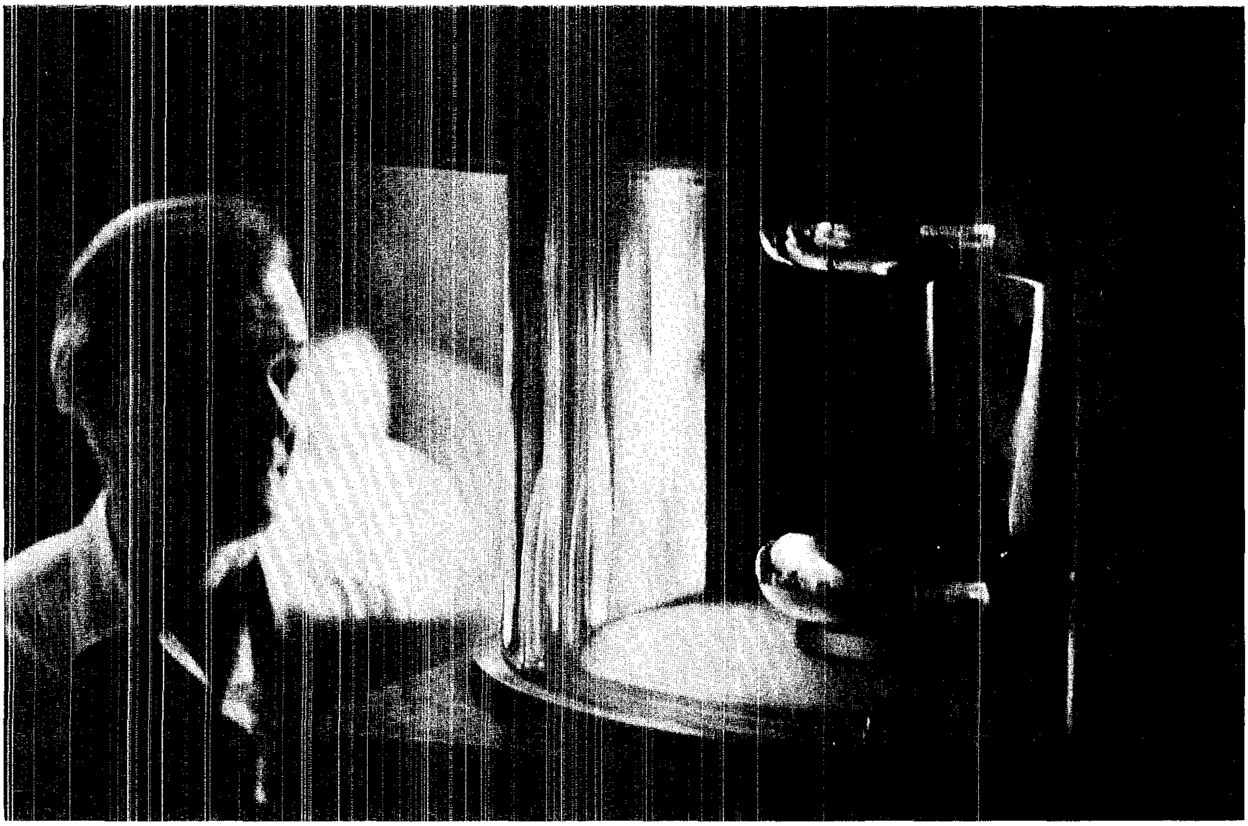
"Our present stock room operation is practically all computerized so we get daily listings of items to order compared with what was issued on the same day.

"The number of purchase orders written is decreasing because of blanket orders which are also computerized. Blanket stock orders in the last four to five years have cut down the number of orders from about 30,000 to 25,000 a year.

"Purchasing has become more formalized over the years because of price justification and other formalities required by the AEC.

"The department has spent something like half a billion dollars on commercial sources. Purchases paid for by the Laboratory's budget funds have averaged about $33 million a year for the last four years.

"I don't know what to consider highlights of my career; it was probably seeing the world's first nuclear detonation near Alamogordo."



A new exhibit in the Los Alamos Scientific Laboratory's Science Museum and Exhibit Hall is a spark chamber to show the presence of cosmic rays which continually bombard the earth's atmosphere. A spark chamber is a detector of nuclear particles. The one recently installed at LASL has two brass electrodes about seven and one-half inches apart, one of the widest-gapped chambers known. When a charged particle crosses the gap it leaves a trail of ionized gas. A short pulse of high voltage applied to the electrodes causes visible sparks to form along the trail of ionized gas. Supplying this voltage is a 200,000 volt generator. The spark chamber was built entirely by LASL personnel. In this photo Associate P-Division Leader Henry Motz observes the spark chamber in operation.

short subjects

R. Douglas O'Dell, associate professor of nuclear engineering at the University of New Mexico, assumed duties as director of the University's Los Alamos Graduate Center Aug. 1.

O'Dell, a member of LASL's Group K-1 since August of last year while on leave of absence from the University, succeeds **Richard H. Williams,** associate professor of electrical engineering, who has been the director for the past three years.

Michael Moore, P-3 alternate group leader, has been appointed chairman of the Atomic Energy Commission's Nuclear Cross Sections Advisory Committee and **Richard Taschek,** P-division leader, has been named as an ex officio member.

Moore succeeds another LASL staff member, Associate P-division leader **Henry Motz,** as chairman.

Three long-time Laboratory employees retired June 30.

George B. Ponton, SP-8 laundry supervisor, retired after 23 years at LASL. He and his family will make their home in Escondido, Calif.

Paul G. Murray, SD-5 machinist, retired after 15 years with the Laboratory. He was first employed at LASL in 1951 and rehired in 1954. He will continue to make his home in Los Alamos.

John H. Pomeroy, GMX-3 lead operator in the machine maintenance unit, retired after nearly 19 years at LASL. He was employed by the Shops department in 1950 and later transferred to GMX-3. He will continue to reside in Santa Fe.

Roger H. Moore, C-5 alternate group leader, has been granted Professional Research and Teaching Leave by the Laboratory for one year at the University of California at Los Angeles. The leave was effective July 1.

Moore is writing a textbook on "Special Techniques in Applied Statistics," which he is co-authoring with **Gary Tietjen,** C-5, and teaching a graduate course in statistical methods.

Rodney S. Thurston, W-4, has been elected chairman of the Board of the Cryogenic Engineering Conference for the 1969-70 term.

Thurston was elected during the recent annual Cryogenic Engineering Conference on the campus of the University of California at Los Angeles. The next conference will be at the University of Colorado, Boulder, in June of 1970.

The conference is concerned with all technical and applied aspects of engineering at temperatures below minus 190 degrees fahrenheit.

Nine persons who attended classes offered through the University of New Mexico's Los Alamos Graduate Center received degrees at the University's commencement exercises in June.

They were **Jerome Beery,** P-3, who received the Ph.D. degree in physics; **Larry Blair,** GMX-7, M.S. in physics; **James Doss,** MP-2, M.S. in electrical engineering; **Charles Frantz,** CMB-14, M.S. in nuclear engineering; **Charles Orth,** J-11, Ph.D. in chemistry; **John Pritchard,** CMB-6, B.S. in physics; **James Shipley,** P-1, M.S. in electrical engineering; **Garland Turner,** T-8, M.S. in physics; and **Mahlon Wilson,** MP-6, Ph.D. in mechanical engineering.

Mack J. Fulwyler, H-4, who attended classes at the University of Colorado, Boulder, under the Laboratory's Advanced Study Program, received the Ph.D. degree in biophysics.

Theos J. Thompson, professor of nuclear engineering and director of the Massachusetts Institute of Technology Nuclear Reactor Facility, is a new member of the Atomic Energy Commission.

The new commissioner was a staff physicist at the Los Alamos Scientific Laboratory from 1952 to 1955. He was chairman of the design committee for the Omega West Reactor and was in charge of dismantling "Clementine," the world's first fast reactor.

He has been at MIT since 1955. He received the AEC's Ernest O. Lawrence Memorial Award in 1964 for his leadership in developing safe, useful and economic nuclear reactors and for inspired teaching of nuclear engineers.

C. E. Larson, president of Union Carbide Nuclear Division at Oak Ridge, has been nominated to the Commission by President Nixon as successor to **Francesco Costagliola.**

The Technical Side

Presentation at seminar at Yale University, New Haven, Conn., May 6, and at joint seminar of Carnegie-Mellon University and University of Pittsburgh, Pittsburgh, Pa., May 7:

"Direct Interaction Studies with 20-MeV Tritons" by E. R. Flynn, P-DOR

Presentation at seminars at Bell Telephone Laboratories, Whippany, N.J., May 26, Plasma Physics Laboratory of Princeton University, Princeton, N.J., May 27, and Courant Institute of Mathematical Sciences of New York University, New York City, May 28:

"Application of Hamilton's Principle to Nonlinear and Linear Analysis of Vlasov Plasmas" by H. R. Lewis, Jr., P-18

Presentation at Harvard School of Public Health, Boston, May 28, and at School of Public Health, University of California, Berkeley, June 6:

"Industrial Hygiene in Nuclear Industries" by H. F. Schulte, H-5

Presentation at colloquium, Physics Department, University of California, San Diego, June 2:

"Numerical Simulation of Two-Beam Plasma Instabilities" by R. L. Morse and C. W. Nielson, both P-18

Presentation at Ninth Texas Nuclear Science Symposium for High Schools, Austin, June 6:

"Particle Accelerators as Instruments of Basic Research and Human Welfare" by L. Rosen, MP-DO

Presentation at Health Physics Society Annual Meeting, Pittsburgh, June 8-12:

"Calibration of Two-Stage Air Samplers" by J. E. Partridge and H. J. Ettinger, both H-5

"Evaluation of Plutonium Exposure Using Spot Urine Samples Adjusted to 24-Hour Excretion" by W. D. Moss and E. E. Campbell, both H-5

"Health Physics and the New Generation of Accelerators" by D. R. F. Cochran, MP-6

"A Refresher Course in Criticality Safety" by D. R. Smith, N-2

"Skin Response to a Point Source of Fissioned $^{235}UC_2$" by P. N. Dean, H-4, Julia Langham, H-DO, and L. M. Holland, H-4

Presentation at US-UK Libby-Cockcroft Meetings on Burnup, Los Alamos, June 9-11:

"Nondestructive Measurement of Fuel Element Burnup by Gamma Scanning" by D. M. Holm, W. M. Sanders and B. K. Barnes, all K-1

Presentation at AIAA Fifth Propulsion Joint Specialist Conference, U.S. Air Force Academy, Colorado Springs, Colo., June 9-13:

"Design of a Nuclear Furnace Reactor" by H. H. Helmick, N-2, and H. J. Newman, N-3

"The Nuclear Rocket Program at Los Alamos" by F. P. Durham, N-DO

"Phoebus 2A and Pewee 1 Reactor Test Results" by W. L. Kirk, N-DO, and L. L. Lyon, N-1

Presentation at 20th Annual Meeting of the Tissue Culture Association, Detroit, June 10-12:

"RNA Synthesis Throughout the Life Cycle in Chinese Hamster Cells" by R. A. Tobey and M. D. Enger, both H-4

Presentation at International Meeting of European Space Research Institute, Frascati, Italy, June 11-18:

"Numerical Simulation of Collisionless Shocks" by R. L. Morse, P-18, and C. R. Shonk, J-10 (invited)

"Plasma Observations of the Earth's Bow Shock by the Vela 4B Satellite" by M. D. Montgomery, P-4 (invited)

Presentation at Physics Department, School of Molecular Sciences, University of Warwick, Conventry, England, June 12:

"Attempts at the Characterization of Anomalous Water by Physical Methods" by S. W. Rabideau, CMF-2

Presentation at seminars, at NASA's Lewis Research Center, Cleveland, June 12, and at Thompson-Ramo-Wooldridge Research Laboratories, Cleveland, June 13:

"The Cam Plastometer at LASL" by J. E. Hockett, CMF-13 (invited)

continued on next page

the technical side . . .

continued from preceding page

Presentation at 24th Northwest Regional Meeting of the American Chemical Society, Salt Lake City, June 12-13:

"The Aerobic Glycolysis of Malignant Mammalian Cells" by C. T. Gregg and J. M. Machinist, both H-4

Presentation at Third Midwest High Temperature Chemistry Conference, Iowa City, June 12-14:

"Analysis of High Temperature Deviations in Knudsen Cells" by J. W. Ward, CMF-5 (invited)

"Mass Spectrometric Investigation of Plutonium Oxide Vapors" by R. N. R. Mulford, CMF-5

Presentation at 15th Annual Meeting of the American Nuclear Society, Seattle, June 15-19:

"Coarse Mesh Rebalancing and Chebyshev Acceleration in Transport Calculations" by K. D. Lathrop, T-1

"Evidence of Intermediate Structure in the Neutron Induced Fission Cross Section of ^{244}Cm" by R. R. Fullwood, J. H. McNally and E. R. Shunk, all W-8

"Fuel Temperature Coefficient Determination in UHTREX from Transient Experiments" by J. C. Vigil, K-1, L. A. Booth and J. Bergstein, both K-4

"Let's Urge Orderly Students to Assume Responsibility" by R. L. Carter, W-8

"Measurement of ^{235}U and ^{238}U Fissioning Fluence Distributions in the Phoebus-2A Shield" by C. W. Watson, N-2

"Models for Fuel-Cycle Analysis in Large Fast Breeders" by T. J. Hirons and R. D. O'Dell, both K-1

"A Multi-Spectra Irradiation Technique for the Nondestructive Assay of Fissionable Materials" by R. H. Augustson, C. F. Masters and H. O. Menlove, all N-6

"Necromantic Acceleration Techniques" by W. L. Hendry, T-1

"Observations About Criticality Safety" by H. C. Paxton, N-2

"Plutonium-238 Materials as Radioisotopic Heat Sources for Human Use" by L. J. Mullins, CMB-11, G. M. Matlack, CMB-1, R. L. Nance, CMB-11, C. F. Metz, CMB-1, and J. A. Leary, CMB-11

"Tailored Spectra from 14-MeV Neutron Sources" by D. B. Smith and H. O. Menlove, N-6

"Technique for Fast Fission Cross Section Measurements of Curium Isotopes" by D. M. Barton and P. G. Koontz, both N-2

"Thermal Reactor Safety" by W. R. Stratton, N-2 (invited)

"Two-Dimensional Gamma Scans of Thin Fuel Element Sections" by B. K. Barnes, D. M. Holm, W. M. Sanders, J. E. Swansen and D. D. Clinton, all K-1

Presentation at IEEE Workshop on the Theory of Computer Arithmetic, Leamington Hotel, Minneapolis, June 16:

"Imprecise Arithmetic" by N. Metropolis, C-DO

Presentation at Metals Research Section, Westinghouse Electric Corporation, Lamp Division, Bloomfield, N.J., June 16:

"The High Temperature Creep Behavior of Graphite" by W. V. Green, CMF-13

Presentation at Symposium on "Structures of Water and Aqueous Solutions," University of Chicago, June 16-18:

"The Raman Spectrum of Liquid Water at High Angular Dispersion" by L. A. Blatz, CMF-2

Presentation at AIAA Second Fluid and Plasma Dynamics Conference, San Francisco, June 16-18:

"The Interplanetary Plasma" by A. J. Hundhausen, T-12

Presentation at Cryogenic Engineering Conference, University of California, Los Angeles, June 16-18:

"Cooldown Flowrate Limits Imposed by Thermal Stresses in Liquid Hydrogen or Nitrogen Pipelines" by J. K. Novak, CMF-9

"Frost Formation on a Cylinder at Cryogenic Temperatures" by J. C. Bronson, CMF-9

"Heat Transfer to Nitrogen in the Vicinity of the Critical Point" by R. L. Von Berg, Cornell University, Ithaca N.Y., K. D. Williamson and F. J. Edeskuty, both CMF-9

"J-T Liquefaction of Hydrogen-Hydrocarbon Gas Mixtures" by J. R. Bartlit, K. D. Williamson and F. J. Edeskuty, all CMF-9

"A Time-Delay Model for Thermal-Acoustic Oscillations" by R. S. Thurston, W-4

Presentation at Ninth Biennial Conference on Carbon, Boston, June 16-20:

"Creep Behavior of Hot Isostatically Pressed Graphite" by E. G. Zukas and W. V. Green, both CMF-13

"Development of a Technique to Thermally Shock Graphites" by C. R. King, N-7

"The Effect of Boron on Some Properties of a Polycrystalline Graphite" by P. Wagner, J. M. Dickinson and L. B. Dauelsberg, all CMF-13

"Joining Graphite to Graphite with Transition Metal Foils" by D. J. Sandstrom, CMB-6

"Microstructural Changes Produced in Graphite by High Temperature Creep" by W. V. Green and E. G. Zukas, both CMF-13

"Modification of an Isotropic Graphite by Use of Acidular Flour Additions" by J. M. Dickinson, P. E. Armstrong and P. Wagner, all CMF-13

"Thermal Shock Testing Using Focussed Electron Beam Heating" by P. E. Armstrong, R. D. Reiswig and L. S. Levinson, all CMF-13

"The Use of Differential Thermal Analysis as a Method of Determining Graphite Fabrication Variables" by E. M. Wewerka and J. M. Dickinson, both CMF-13

Presentation at seminar, Department of Microbiology and Public Health, Michigan State University, East Lansing, June 17:

"Changes in RNA Synthetic Rate During the Life Cycle of Mammalian Cells" by R. A. Tobey, H-4 (invited)

Presentation at meeting of the Los Alamos Geological Society, June 17:

"Use of Polarizing Microscopy to Identify Minerals" by E. S. Robinson, CMF-4

Presentation at American Physical Society Meeting, Division of Plasma Physics, Rochester, N.Y., June 18-20:

"Numerical Simulation of Two-Beam Plasma Instabilities" by R. L. Morse and C. W. Nielson, both P-18 (invited)

Presentation at colloquium, Rutgers University, New Brunswick, N.J., June 18:

"The Los Alamos Meson Factory from a User's Point of View" by R. Macek, MP-6

Presentation at Research Participation Program, University of New Mexico, June 19:

"Current Problems in Radiobiology" by D. F. Petersen, H-4 (invited)

Presentation at American Society of Mechanical Engineers Meeting, Computational Approaches in Applied Mechanics, Illinois Institute of Technology, Chicago, June 19-20:

"Computer Simulation of Fluids in Motion" by W. E. Pracht, T-3

Presentation at Seventh International Shock Tube Symposium, Toronto, Canada, June 23-25:

"Infrared Measurement of Chain Branching Rates in Hydrogen-Oxygen Mixtures Ignited by Reflected Shock Waves" by R. W. Getzinger, L. S. Blair and D. B. Olson, all of GMX-7

Presentation at Third European Conference on Controlled Fusion and Plasma Physics and the Symposium on Beam-Plasma Interactions, Utrecht, The Netherlands, June 23-27:

"Dynamic-Stabilization and Turbulence Experiments on Theta-Pinch Plasmas" by R. F. Gribble, E. M. Little, W. E. Quinn, F. L. Ribe, G. A. Sawyer, K. S. Thomas and D. M. Weldon, all P-15

"Numerical Simulation of Beam-Plasma Interactions Using the Particle-In-Cell Method" by C. W. Nielson and R. L. Morse, both P-18

Presentation at Research Participation Program, University of New Mexico, June 24:

"Organic and Enzymatic Synthesis of Polynucleotides" by F. N. Hayes, H-4 (invited)

new hires

C division

Francis A. Maestas, Espanola, C-1
Norma J. McFarland, Los Alamos, C-1
Charles L. Sargent, Cordova, C-1
Robert G. Bechtel, Fort Worth, Texas, C-2
Byron C. Eppler, III, Hobbs, C-2
James T. Koch, Weatherford, Okla., C-2
Howard J. Lev, Malden, Mass., C-2
Robert W. Mitchell, Phoenix, Ariz., C-2
Earl Haynes, Tallahassee, Fla., C-5
Nicholas J. Nagy, III, Los Lunas, C-5
James B. Morris, Jr., Midland, Texas, C-7

CMF division

Dennis J. Alarid, Santa Cruz, CMF-9
Chester F. Hwang, Evanston, Ill., CMF-9
Edward R. Lady, Ann Arbor, Mich., CMF-9

D division

Edward C. Walterscheid, Carlsbad, D-1 (rehire)
Marcia J. Adams, Los Alamos, D-2
Rose Lenhart, Los Alamos, D-2
Horris M. Crane, Los Alamos, D-6 (casual)
Barbara A. France, Los Alamos, D-8

Engineering department

Walter J. Finchum, Klamath Falls, Ore., ENG-3
Albert Bowie, Houston, Texas, ENG-5
Suzan Buzzard, Los Alamos, ENG-5 (casual)

GMX division

Sheri R. Spencer, Los Alamos, GMX-1
Lyle E. Becknell, Neosho, Mo., GMX-3
Donald G. Olson, Minot, N. Dak., GMX-3
Jose E. Talachy, San Juan Pueblo, GMX-3
David S. Warren, Red Cliff, Colo., GMX-4
Lee J. Valdez, Espanola, GMX-8

H division

Ronald W. Blankenship, Espanola, H-1 (rehire)
William Crismon, Jr., San Antonio, Texas, H-3
David J. Martinez, Alcalde, H-7

J division

Daniel E. Dyvig, Ames, Iowa, J-DOT
Roscoe J. Butler, Jr., Caroleen, N.C., J-8
Reed J. Jensen, Gridley, Calif., J-10
Grace M. Gutierrez, Espanola, J-14

K division

David M. Holman, Lancaster, Calif., K-4
John E. Foley, Central Point, Ore., K-5

MP division

Kathleen E. Stallings, Espanola, MP-DO (casual)
Gilbert J. Salazar, Espanola, MP-1
Jose D. F. Gallegos, Santa Fe, MP-2
Frank T. Lucero, Espanola, MP-2
Federico E. Martinez, Dixon, MP-2
Edward R. Weiler, Chicago Heights, Ill., MP-3
Epitacio A. Vigil, Jr., Santa Fe, MP-5
Catherine R. Wiig, Los Alamos, MP-5

N division

Patsy L. Trussell, Los Alamos, N-1
James J. Halvey, Chicago, Ill., N-6
John J. Malanify, Troy, N.Y., N-6
John B. McHale, Los Alamos, N-6 (casual)

P division

Marlee W. Meissner, Los Alamos, P-DO
Lavern G. Wiig, Hamburg, Iowa, P-1
Wiley E. Draper, Rocksprings, Texas, P-2
Harlan W. Harris, Las Vegas, Nev., P-16

Personnel department

Jennie Martinez, Los Alamos, PER-4 (casual)

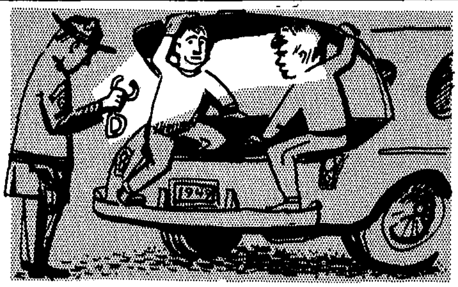
Shops department

James M. Haines, Albuquerque, SD-1
Ronald E. Roemer, Baltimore, Md., SD-1
Sandra D. Lujan, Santa Cruz, SD-2

W division

William S. Bennett, III, Denver, Colo., W-9

20



years ago in los alamos

Culled from the August, 1949, files of the Santa Fe New Mexican
by Robert Porton

Teenagers Enter Los Alamos in Car Trunk

Two Santa Fe teenagers who didn't find the female situation at home quite to their liking, visited Los Alamos over the past weekend. They did it without government passes, too. "We just came in to see if we could find dates" police quoted the pair as saying. They were "just messing around," they said later. "Lots of people do it." They did not elaborate, according to town police. Their entry was made in the trunk of a car driven by a friend who holds a permanent pass, and who is employed by a contractor here. They were released after questioning. Police did not say what action would be taken against the youth who allowed the pair to ride into the government reservation in the trunk of his automobile.

Prefabricated Houses Tried in Atomic City

Six two- and three-bedroom houses of a preconstructed type are being set up on the Hill for study. Local AEC officials say there's a possibility they may be bought for future development if they pan out in trials. The "Lustron" pre-molded houses appeared to have lower maintenance costs than other houses being constructed here according to a member of the engineering branch.

Chief of White Rock Police Appointed

Wilmer C. McDaniel has been appointed deputy sheriff of Los Alamos County and will serve as police chief of White Rock. McDaniel will command a force of three patrolmen as soon as the massive housing development warrants. So far about 50 families have moved into the White Rock area. Ultimate population there will be about 2,500, the AEC has estimated. The new police chief will have headquarters at White Rock's two-cell jail.

Hill Voters to Register

All equipment for registering Los Alamos County's estimated 3,500 voters has arrived. Beginning of the sign-up awaits final decision of the League of Women Voters as to whether or not they will aid in the registration, county commissioners said late last night. The League has said informally that the assistance will be given. Registration books must be locked up before Aug. 20 to meet a 30-day interim demanded by law, before a special election here in late September. Los Alamos County has been divided into nine election districts and three precincts. Local residents are currently registered in Sandoval County, of which the Hill was a part before it became a county on June 4.

what's doing

NEWCOMERS CLUB—Fashion show and buffet luncheon, Aug. 27, 1 p.m., Los Alamos Golf Club, Tickets $2.50. For information, call Mrs. Fran Talley, 662-4110.

OUTDOOR ASSOCIATION—No charge, open to the public. Contact leader for information about specific hikes.

- Aug. 2—Pecos hike, Betty Perkins, 8-4916
- Aug. 10—Night hike, Virginia Winsor, 2-3440
- Aug. 17—Cerro Rubio, Walter Green, 672-3203
- Aug. 23-24—Trampas Lake to Santa Barbara, Ed Kmetko, 8-4911 (suitable for children over nine).
- Aug. 30-Sept. 1—Crater Lake, Colo., Marlene McKee, 2-4988.

MESA PUBLIC LIBRARY—Through Aug. 19, acrylics, Paul St. John; Aug. 20-Sept. 17, oils, Aletha Howard.

SANTA FE OPERA: Box office open at Los Alamos Building & Loan Monday, Wednesday, and Friday, 10 a.m. to 1 p.m. For Information call Mrs. Beth Motz, 2-4992.

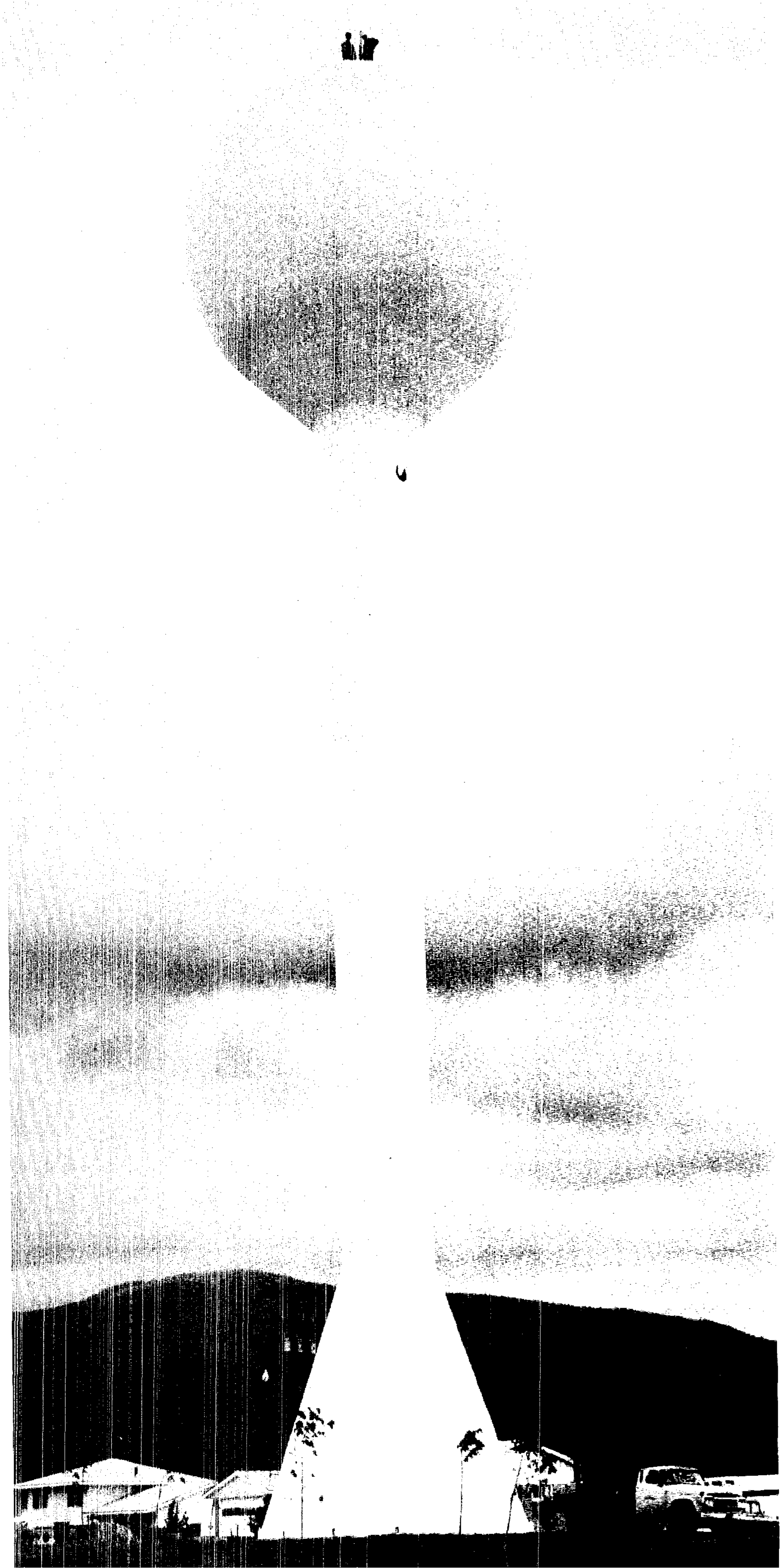
- Aug. 1, 6, 9, 15—"Le Rossignol" and "Help! Help! The Globolinks"
- Aug. 2, 8, 13—"Salome"
- Aug. 14, 20—"The Devils of Loudun"
- Aug. 16, 22—"The Magic Flute"
- Aug. 21, 23—"Tosca"

RIO GRANDE RIVER RUNNERS—Meetings scheduled for noon, second Tuesday of each month at South Mesa Cafeteria. For information call Cecil Carnes, 672-3593.

LOS ALAMOS ARTS COUNCIL—Arts festival Aug. 21 through Aug. 24.

- Aug. 21—8:15 p.m., Civic auditorium, professional dance program.
- Aug. 22—7:30 p.m., County building parking lot, teenage street dance featuring contest between high school bands, (chaperoned)
- 8 p.m., Lodge, Chamber music concert and drama reading, "Lysistrata."
- Aug. 23—2:30 p.m., Lodge, children's carnival and program; 8 p.m., Lodge, variety show
- Aug. 24—2:30 p.m., Lodge, Indian dances on the lawn.
- 7:30 p.m., Lodge, violin recital, Kay and Brian Johnson.

PUBLIC SWIMMING—High School Pool—Monday through Friday, 2 to 5 p.m., Saturday and Sunday, 1 to 6 p.m.



Workmen on top of the Barranca Mesa water tower are dwarfed by its size.