

Bob Park Named Fellow by American Physical Society

Bob Park, supervisor of Surface Kinetics Division 5331, was named to the rank of Fellow in the American Physical Society. The announcement was made in the May issue of the BULLETIN OF THE



AMERICAN PHYSICAL SOCIETY and cited Bob's contributions to physics.

He has published a series of papers on structure and properties of surfaces. Currently he is serving as chairman of the Surface Science Division of the American Vacuum Society and as special editor of the JOURNAL OF VACUUM SCIENCE TECHNOLOGY for the 1971 International Conference on Solid Surfaces Proceedings Issue. He is also advisory member to the Annual Physical Electronics Conference of the American Physical Society and a member of the committee for the Annual LEED Theory Seminar.

Bob joined Sandia in 1965 and has been engaged in surface analytical techniques since. Before joining Sandia he was a research associate at Brown University where he earned his PhD degree in physics in 1964.

John McKiernan Re-elected ASME Regional Vice President

John McKiernan, supervisor of Systems Studies Division 1651, has been elected to a second two-year term as Vice President, Region VIII, of the American Society of Mechanical Engineers.



The Rocky Mountain Region VIII, encompassing New Mexico, El Paso, Colorado, Utah, Wyoming, Idaho and Montana, is one of 11 geographical regions of ASME.

John will be responsible for coordinating administrative and technical activities including public affairs, continuing education, and relations with colleges and universities within the Region. He has served as vice president and secretary of Region VIII, is a past Section officer and a past member of the National Nominating Committee. John has been with Sandia for 20 years.

So Long DASA & USA — Hello DNA & USAF

On July 1 the Defense Atomic Support Agency, familiarly known as DASA, got itself a new name — Defense Nuclear Agency (DNA). The name change coincides with other changes, notably the merger of Kirtland, Manzano and Sandia Bases. On that date the Air Force assumed the role on Sandia Base heretofore filled by the Army. No changes in Base access rules are anticipated.

LAB NEWS

VOL. 23, NO. 13

JULY 2, 1971

SANDIA LABORATORIES • ALBUQUERQUE NM • LIVERMORE CALIF • TONOPAH NEV



TONOPAH TEST RANGE in Nevada is unique in the development testing business. For the story of the range and its people such as Harold Rarrick (left), operations supervisor, and Tex Samuelson, camera operator, see story starting on page six.

Labs Releases Payroll, Employment Figures

Sandia Laboratories payroll for fiscal year 1971 (July 1, 1970 to June 30, 1971) amounted to \$98.9 million, including the \$13.4 million payroll at Sandia Laboratories Livermore. For FY '70, the figures were \$103.4 million and \$13.7 million respectively.

About 7300 persons were on roll at fiscal year end at Sandia Laboratories, including some 1000 at Livermore. This total is 255 less than at the end of FY '70, because of the reduction in force during the spring of 1971.

Assets of the Atomic Energy Commission's installations operated by Sandia Laboratories totaled \$292.5 million at the end of FY '71, compared to \$278.1 million in FY '70. These figures represent undepreciated value of buildings and facilities at Sandia Laboratories, Albuquerque; Sandia Laboratories, Livermore and Tonopah Test Range in Nevada.

Purchases by Sandia Laboratories in the State of New Mexico amounted to \$33.2 million for FY '71. The figure does not include purchases from other AEC contractors. In FY '70, purchases in the state amounted to \$32.3 million.

Of the amount spent in New Mexico in FY '71, 98 percent went to Albuquerque firms.

VP Marks Quarter Century Of Classification Work

Bob Henderson, Vice President 7000, was among a select group honored last week at a banquet in Washington, D. C., given in observance of a quarter century of special service by the AEC's Committee of Senior Reviewers.



Glenn Seaborg, AEC Chairman, was banquet host for the Committee which has assisted the Commission in the difficult job of setting classification policies relating to atomic energy programs.

The seven-man group of Senior Reviewers includes scientists from LASL, UCLA, LRL and Union Carbide.

Mr. Henderson has long been involved in classification matters, and for many years has been Chairman of the Sandia Classification Board. Classification policies relating to nuclear ordnance are his special area of competence.

Vista New Mexico

Adobe—A Primer On The Stuff

When you tell Aunt Tillie back in Cincinnati that you live in a mud house in New Mexico, what she's already suspected about you and your move to the sand dunes and oven-like heat of our state is confirmed in her mind — you really are out of your gourd.

But someday, perhaps, Aunt Tillie will visit you and if she sticks around for more than a few hours (and we don't have a sand storm), she may return to Cincinnati convinced that you reside in the best of all possible locales and in the most comfortable and charming of homes. Adobe, New Mexico, and the Southwest are strikingly compatible, and most of us who live here find a special appeal in adobe homes — whether we live in one or not. Indeed, a non-credit course offered at UNM, "Build Your Own Adobe," is now going into its fourth or fifth repetition and continues to enroll large numbers of persons bent on living in an adobe.

What's the attraction? An aesthetic one chiefly. Adobe homes are *not* cooler in the summertime, warmer in winter, all folklore notwithstanding (more about that later). And they cost more, at least if you have one built from scratch and do no work yourself. But in our plastic world, surrounded by mass-produced objects of dull geometric precision, the crudeness and irregularity of adobe construction have a one-of-a-kind charm. Sunlight and shadow on an undulating adobe wall approach art, where the same sunlight and shadow on, say, the brick wall of Bldg. 880 doesn't do much for us.

Inside an adobe home, the feeling of massiveness is palpable. The thick walls (12 to 16 inches) are chiefly responsible for this, but heavy ceiling beams and brick floors contribute too. We respond warmly to the apparent security of the heavy construction — "apparent" because an adobe is no place to be in an earthquake.

Did Spanish explorers find adobe structures as they ranged up the Rio Grande Valley? They did, but the structures were not quite the same as contemporary adobes. Many Pueblos in existence at that time used stone laid up with mud mortar and, in some cases, plastered with the same material. This type of construction can be seen today in Hopi villages and at Acoma. Another variation was the solid mud wall, probably built up by the "dribbling" method: a soupy mixture of mud is poured in layers, day by day, until the desired height is reached. To this day, mud walls are built using this method by natives in the dry regions of North Africa.

The use of pre-formed adobe bricks appears to have been an innovation introduced by the Spanish settlers. In many ways, the development was a quantum jump in adobe technology. Construction was faster and not dependent upon resources immediately available at the building site. The builder accumulated his supply of adobe bricks (usually made by himself), toted them to the place and was ready to proceed after a few preparatory steps.

Except for size, the present day adobe brick is indistinguishable from those made in those early days. A fairly wide range of sandy soils containing no organic matter is suitable for brick fabrication. Clay should be present in the soil, but only in small amounts because too much causes excessive shrinkage and cracking. One persistent myth is that straw must be added to the mud to impart strength — sort of like steel reinforcement bar in concrete. Actually, the only possible benefit is that the straw may enhance the curing of the wet block, and most adobe producers use no straw whatever.

Adobe brick size is not standard in the same sense that a regular brick is. Locally (Albuquerque), the nominal size is 4" x 10" x 14", but farther north, in Taos, length runs to 16 inches. And in California the most common size is 4" x 12" x 18". The only real constraint on dimensions is the weight of the finished product. Local adobes will run about 35 pounds each, and he who lays up several hundred in a day knows the true meaning of manual labor.

In adobe construction, the builder has one important decision to make before the first brick is laid — which way to lay them, with 10-inch or 14-inch dimension forming the thickness of the wall? Since contractors are in business to make money, they usually lay adobes the 10-inch way, thus using fewer bricks. But of all the things that go into an adobe house, the raw material cost of the adobes themselves is small, especially compared with equivalent costs in frame construction where lumber alone is a high expenditure. A sizable adobe house (about 2000 sq. ft.) with 10-inch walls will use about 8000 adobes, with 14-inch walls an additional 3000. Since the bricks cost from \$120 to \$150 per thousand, it is clear that this material cost is not too significant.

We mentioned earlier that those nice thick walls really don't have much insulation value. For engineering types, the "k" value for heat conductivity of adobe averages 3.5 BTU/sq. ft./hour/inch of thickness per °F difference between outer and inner surfaces. In simpler terms, an adobe wall would have to be 36 inches thick to equal the insulative quality of the 4-inch insulated wood frame wall common in local construction. One observer notes, rather trenchantly:

"In my opinion, the belief that adobe is warmer in winter and cooler in summer to a greater degree than other types of construction is due to several conditions not readily noticeable to the casual observer. First, the adobe walls in buildings of times past may be two feet or more. Second, the window openings are small and few in number. Third, the building may be located in a protected valley under a 500-year-old cottonwood tree. The above conditions certainly help the heating and cooling of any building."

Anyhow, the termites won't get to your adobe home — at least not to the walls.



A LITTLE MUD, A LOT OF MUSCLE, and you too can make adobes. Pile up enough of 'em and you end up with a house and that adobe look — irregular lines, rounded corners, a sense of massiveness.

Tragedy Strikes Two Sandia Families

The son of Ed Ashland (1514) was among the three Albuquerque men lost on the Air Force plane that went down in the Pacific in mid-June. Donald Ashland was 30 years old at the time of the accident. Besides Ed and Mrs. Ashland, he is survived by his wife Charlette. A memorial service was held yesterday at the Crestview Baptist Church.

A boating accident claimed the life of 14-year old Peter McCarthy, son of David McCarthy (1921). Peter was with a group of Boy Scouts going down the Green River in Utah on rubber rafts. An upset occurred in rapids, and the boat occupants were swept downstream. The other Scouts finally made it to shore and were rescued by helicopter.

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LIVERMORE LABORATORIES

JULY 2, 1971



RETURNING OYOC's Randall German (8313), left, and Tony Reid (8324) pick up their badges in Security.

Two Master's Degree Recipients Under OYOC Return

Two Sandians have returned to the Laboratories after receiving Master of Science degrees under the One-Year-on-Campus (OYOC) Plan of Sandia's Graduate Education Program. Under the OYOC Plan, bachelor-level technical people study full time while in residence for one academic year at an approved university.

Randall German of Metallurgy Division II 8313 was awarded an MS degree in metallurgical engineering from Ohio State University. He received his BS degree in materials science from San Jose State College and joined Sandia/Livermore in December 1969.

Tony Reid of Systems Research Division I 8324 was awarded an MS degree in electrical engineering from Stanford University. He came to Sandia/Livermore in June 1970 following graduation from Rensselaer Polytechnic Institute with a BS in electrical engineering.



DR. MAX BIGGS, consultant physician at Sandia/Livermore, was guest speaker at the annual medical management banquet meeting of the Northern California Association of Industrial Nurses held April 16 in San Leandro. He discussed "Preventive Coronary Care in Industry." Gail Patton (8212) served as a hostess for the event.

Take Note

Mike Soderstrand of Acceptance Equipment Division 8136 presented a technical paper coauthored with Dr. Sanjit Mitra of the University of California/Davis at the 1971 IEEE International Conference on Systems Networks Computers held recently in Oaxtepec, Mexico. Entitled "Sensitivity Analysis of Third Order Filters," the paper appeared in the March issue of the INTERNATIONAL JOURNAL OF ELECTRONICS. Mike also presented a paper, "On-Line Digital Filtering Using PDP-8 and PDP-12," at the 1971 Symposium of the Digital Equipment Computer Users Society held in Atlanta, May 13-15.

* * * *

Bruce Held of Safety Engineering and Environmental Health Division 8263 has been elected to the board of directors of the American Industrial Hygiene Association for a three-year term. A member of the national organization since 1959, Bruce has been serving as chairman of the Local Sections Committee and vice chairman of the Respirator Committee. He is also currently a member of the local AIHA Northern California Section. At the annual meeting of AIHA held in Toronto, Canada, May 24-28, Bruce presented a paper entitled, "What's Old in Respiratory Protection."

* * * *

Several Sandians have been elected to serve on the Executive Board of the Mt. Diablo Subsection of San Francisco, American Society of Mechanical Engineers for the coming year. They are Ray Ng (8352), secretary; Stan Greenberg (8131), treasurer; and the following committee chairmen: Jerry Alcone (8176), membership; Del Elliott (8175), director; Pat Gildea (8124), honors; and Charlie Landrum (8351), professional division. Louie Tallerico (8331) is past chairman of the Board.

Congratulations

Vic Dominguez (8235) and Ann Frapwell married in Pleasanton, June 19.

Gene Helz (8163) and Helen Duletsky married in Reno, Nev., June 15.

Mr. and Mrs. Steve Haney (8341) a daughter, Sherry Christine, June 14.

Mr. and Mrs. Jack O'Connor (8313) a son, Brian Scott, June 3.

Tolly Vincent (8177) and Harvey Williamson married in Pleasanton, May 28.

Sympathy

To Jim Ackerman (8256) for the death of his father-in-law in Castro Valley, June 12.

To Ken Henry (8311) for the death of his mother-in-law in Hartsville, S.C., June 9.

To Bill Zinke (8122) for the death of his father in Eugene, Ore., June 7.

Jack Dini Elected Fellow by British IMF

Jack Dini of Metallurgy Division 8312 has been elected a Fellow of the British Institute of Metal Finishing. The British IMF confers the only qualification in metal finishing to be recognized worldwide. There are presently about 12 who have been so honored in the United States. Those elected have made a marked contribution to the science or practice of metal finishing and have established a reputation in the field.



Since joining Sandia/Livermore almost nine years ago, Jack has been involved in research and development efforts in electroplating, electroforming, and printed circuits. He has authored or coauthored over 25 technical reports, 13 of which have appeared in scientific journals.

Jack has a bachelor of metallurgical engineering degree from Cleveland State University. He is a registered professional metallurgical engineer in the State of California and an active member in the American Society of Metals and the American Electroplaters Society. A recipient of the AES J.J. Hanney Memorial Paper Award in July 1968, he was recently appointed chairman of the national AES Books and Symposium Committee for a three-year term.

Touring Northern California

The July schedule at the East Bay Regional Park District includes the following:

On July 3, Coyote Hills Regional Park will hold an open house featuring a tour of the Stanford Research Institute Bio Sonar Laboratory at 12 noon, 1, 2, 3, and 4 p.m. (park at picnic area) and Indian shellmound tours at 1, 2, 3, and 4 p.m. (park near entrance sign and follow signs to Mound ALA-328).

Sunday afternoon, July 4, Tilden Regional Park will offer a holiday program in the nature study area. At 1 and 3 p.m., the nature puppet show will be presented, followed by snake talks at 1:35 and 3:35.

Any Saturday in July, join a park ranger from 8:30 to 9:30 p.m. at the campfire circle in Del Valle Regional Park for one of a number of campfire programs.

On Sundays, meet at the same place from 9:30 to 11 a.m. for a discovery walk with a naturalist.

Each Sunday in July from 1:30 to 4 p.m., Sunol Valley Regional Park will feature "Frontier History of Sunol." A walk with a naturalist follows the path of the first American homesteaders' arrival in the area, with stops at historic sites along the way.

On July 24, at Sunol Park's Las Encinas Meadow, a "star party" will be held. Meet at dusk near the telescope pier.

Supervisory Appointments

DON SCHUELER to supervisor, Solid-State Electronics Research Division 5153, effective July 1.

Don began at Sandia in August 1963. His initial assignment was in a microelectronics technology division, working with thin film and ferroelectric devices. In August 1966, Don was on leave of absence for a year to teach at the University of Nebraska. Returning to Sandia for a year, he was then selected for Sandia's Doctoral Study Program. Don received his PhD in electrical engineering from the University of Nebraska in 1969. Since January of this year, he has been in the Radioisotope Power Supply Division.

Earlier, Don earned BS and MS degrees in EE from the University of Nebraska. He is a member of the Institute of Electrical and Electronics Engineers and of the Sigma Xi, Sigma Tau, and Eta Kappa Nu honor societies.



RON ANDREAS to supervisor, Exploratory Systems Division VI, 1222, effective June 16.

Ron joined the Laboratories in April 1963 as a staff member in the advanced data systems organization. In 1967 he

transferred to a group working with arming, fuzing and firing systems. Ron was selected to participate in Sandia's Doctoral Study Program in 1968. After earning his PhD in electrical engineering from UNM, Ron returned to his former organization and has remained with this exploratory systems group until his present promotion.

Ron's BS and MS degrees were awarded from the University of Kansas. He is a member of Eta Kappa Nu, Sigma Tau and Sigma Xi honor societies.

Ron and his wife Suzie have one child and reside at 7300 Vista Del Arroyo NE.



Recreation News

FUN AND GAMES

The Sandia Women's Golf Association played their annual tournament at Los Alamos on June 5. Low gross winner was Pat Anderson (7225) with Betty Chappell (AEC) runner-up. Rose Hainlen (4152) captured low net and Emma Hollingsworth (3256) was runner-up.

The next regularly scheduled tournament will be held July 10 at the UNM South Course.

* * * *

Jarvis Bumgarner (1611) and Al Maes (1612) are the Sandia Laboratories table tennis doubles champions. During the final games recently Daril Gutscher (1213) and Dwayne Mozey (1211) took the second place spot while Keith Treece (2442) and Werner Kuhn (7433) took third.

—Norma



ROGER CAMPBELL (5411) at the wheel of his 1931 Model A roadster, is happy with the results of his two-year job of restoration. Wayne Young (5267) is wondering how long it will take him to get his 1931 pickup into showroom condition. In the meantime, they're ready for the next Model A Club get-together.

Model A Club Members Swap Parts, Ideas & Fun

"You can usually spot a vintage car buff by his back yard — he's apt to have anything from a pretty respectable looking car to a stripped frame and numerous parts just waiting for attention."

Roger Campbell (5411) continues with his definition of the old car fan, "somebody with a bit of patience, know-how, lots of enthusiasm — and it helps to be a real 'scrounger'."

Roger is president of the Albuquerque chapter of the Model A Club. Wayne Young (5267) is vice president and Ben Petterson (1212) is treasurer. The club name is Poco Quotros (Little Four), which refers to the Model A's four-cylinder engine. "Those little cars can run all day," Roger says, "with a top speed of about 65 mph."

The club has 67 members, and all of them have one or two cars in various stages of restoration. "One of the greatest things about belonging to this group," Wayne says, "is the invaluable contact with other people who have experienced the same problems you might face. We meet once a month and pass on information about our cars, where you can buy a certain part or, maybe, how a member can make a hard-to-find part."

Members compete in local, regional and national meets. In 1966 the National Meet was held in Albuquerque, hosted by the local club, with about 300 entries. Monthly events include a Bonnie and Clyde Dinner with members dressed in appropriate costume, a drive up to Sandia Crest for a picnic, ball games, parades, almost any occasion where the group can drive their cars.

Roger just recently restored his 1931 roadster. It was a complete job from the frame up, and took two years of work. "My car is pretty unique and that particular model is hard to find," he says. "I brought most of

the parts and pieces from New York in a rental trailer. The finished car represents parts from 10 other cars, and the only difference from the original model is the brakes. As a safety feature, I installed hydraulic rather than mechanical brakes."

The car is quite an eye-catcher — bright yellow body with a black top, white side walls, wind wings and, naturally, the rumble seat. Roger's four children enjoy the car, but the only trouble is they can't all fit into the rumble seat. Roger's wife Mary Kay did a beautiful job of restoration on the interior, and the whole family helped with the application and rubbing of eight coats of lacquer.

Wayne Young has two cars — a 1929 four-door sedan, completely restored, and a 1931 pickup that he's now working on. Other Sandia members of the Model A Club are Ken Bixler (7244), who is working on a 1929 pickup; Don Doak (1544), a 1929 sport coupe; and Ben Petterson, a 1931 Victoria sedan. Anyone interested in the club should contact one of the members and as Wayne says, "for \$5 a year you sure get a lot of fun."

Roger says everyone who has ever restored a car says "never again!" "But after you rest awhile and get your lawn back in shape, you sort of keep one eye open for the next one — something a little special, and after all, with all the experience and help from your friends it really ought to be a snap. . ."

Sympathy

To Harvey Metzler (1321), for the death of his father in Colby, Kans., June 15.

To Alfred Montoya (4514), for the death of his father in Los Lunas, June 11.

To Si Upson (AEC/ALO) on the death of his mother in Albuquerque, June 21.

Hardness of Alumina Oxide Ceramic Calls for Different Machining Approach

Alumina oxide ceramic materials are blended, powdered and made into a variety of forms by many different processes, but all have a characteristic hardness which may approach that of diamonds.

When it comes to shaping the Al_2O_3 ceramic forms into more intricate parts — often with close dimensional tolerances — this hardness becomes a problem. If the material is machined in an unfired state, there must be allowance for shrinkage; if the material is machined after firing, diamond burrs or wheels are needed. In either state, dust from the ceramic is an irritant to the worker and is abrasive to machines.

The Composite Materials Machining Section 7142-4 was set up a year and a half ago under Bob Becker. The group's responsibility was to come up with ways to machine ceramics, carbons, fiberglass, foams, and other uncommon materials.

Results have been impressive:

—Turning tools and core drills were designed with built-in vacuum systems to suck away dust created by the shaping or drilling, thereby leaving the machined part clean.

—Valuable experience has been gained in machining bisque state (unfired) Al_2O_3 ceramic materials, then shrinking the part to desired tolerance during the firing process. As a rule this process eliminates later grinding of the part to specifications following firing. But each combination of materials has its own shrinkage factor, and a statistician, Bill Robertson (1644), worked with the group to determine shrinkage factors and the best firing conditions (both time and temperature).

—A 95 percent improvement has been made in preventing cracks and breakage of bisque materials during machining by bonding the unfired material onto a metal pad. The parts are held together by a vinyl acetate cement which has a low melting point. (Some bisque material is so soft that the surface erodes in ordinary handling, and a small camel's hair brush must be used to remove dust residue.)

—Tools made at Sandia from scrap alumina oxide (Al_2O_3), then fired in a kiln, have outperformed commercially available tools in machining ceramics. The material can be shaped into any desired tool geometry.

Currently the group is developing processes to press ceramic powdered materials onto mandrels through isostatic pressure for subsequent hot pressing in molds. "This would improve the consistency of the shrink factor," Bob Becker explains. "The next step may be to create ways to perform injection molding."



JEWELER'S LATHE connected to shadowgraph is used by Royce Bewely (7142-4) to machine a piece of unfired ceramic to shape depicted on a template. Scope-to-work piece ratio is 20 to 1.



CERAMIC MATERIAL is positioned on a metal holding plate (to relieve strain on soft material) as Charles Ladig (7142-4) operates this mill. Flexible hose connected to a commercial vacuum cleaner keeps machined part clean and prevents inhalation of ceramic dust.



PIECE PARTS of alumina oxide ceramic (Al_2O_3), machined in "bisque" state, retain their precise shapes although shrinkage during firing may have been as much as 17 percent.

Sandians Participate in International Ion Conference

Several members of Radiation Physics Research Department (5110) have recently returned to Albuquerque after attending the Second International Conference on Ion Implantation in Semiconductors, held in Garmisch-Partenkirchen, Germany, May 24-28. The conference, supported by both the West German and the Bavarian State Ministries for Science, was attended by scientists from 11 European countries as well as Japan and the U.S.

Sandians whose papers are being published in the Proceedings are Fred Vook (5110), Tom Picraux, Jim Borders, Keith Brower, Herman Stein and George Arnold (all 5111), and Wendland Beezhold and Errol EerNisse (both 5112). Their papers deal with Sandia research in the field of ion implantation.

In addition to the International Conference, Fred Vook presented papers at several universities and laboratories in England and in Vienna, Austria. Tom Picraux spoke before scientists in Aarhus, Denmark, and Stockholm, Sweden, and Jim Borders presented papers at laboratories in France and Germany, and at Oxford University, England.

Summing up Sandia's involvement in the conference, Fred says, "Attendance at the Conference was extremely worthwhile, both for the opportunity to present and hear the technical papers, and for the opportunity to personally discuss our research with leading international scientists."

Pueblos Exhibit at Museum of Albuquerque

"Changing Look of the Pueblos" is the subject of a new exhibit at the Museum of Albuquerque.

Featuring the Middle Rio Grande Pueblos, the exhibit uses lithographs, books, models and historical photographs to show the architectural changes that have occurred. The exhibit demonstrates that the Pueblos are vital communities adapting to changing social and economic conditions and reflecting the influence of other cultures. Pueblos included are Acoma, Laguna, Isleta, Sandia, Zia, San Felipe, Santa Ana, Santo Domingo, Jemez, and Cochiti.

The exhibit will remain at the museum through November. The museum is closed on Mondays, open 10 a.m. - 5 p.m. during the week, and 1-5 p.m. on weekends.

Credit Union Declares Quarterly Dividend

The Board of Directors have declared the 2nd Quarter Dividend at an annual rate of 6%. This was credited to share accounts on July 1 to shareholders of record as of June 30. Please remember that your statement for the second quarter, to be mailed in mid-July, only covers activity through June 30 (so the 2nd quarter dividend will not be shown). The dividend amount shown is the total of dividends paid January 1 and April 1.

* * * *

The Education Committee headed by Earl Simonson (4122) has recently published an informative brochure titled "Your Credit Union." It's full of current information and answers most of the questions you may have about the Credit Union. Copies are available at the Credit Union. "Your Credit Union" is "must" reading, even though you may not be a member — yet!

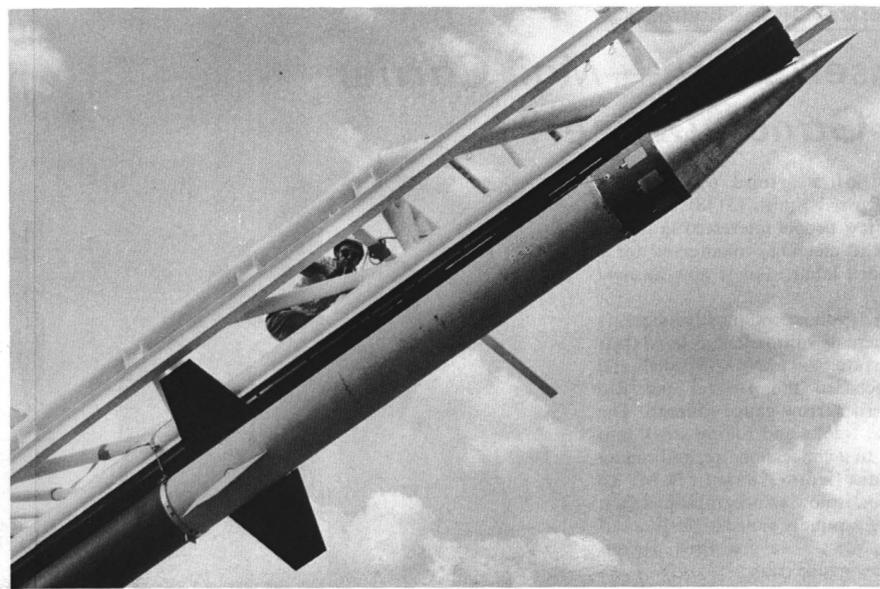
LRL Renamed

The Board of Regents of the University of California has approved the formal recognition of the Ernest O. Lawrence Radiation Laboratory — Berkeley and the Ernest O. Lawrence Radiation Laboratory — Livermore as administratively separate organizations, with the Director of each Laboratory reporting directly to the President. The two Laboratories have been renamed the Ernest Orlando Lawrence Berkeley Laboratory (LBL) and the Ernest Orlando Lawrence Livermore Laboratory (LLL), respectively.



TEST DIRECTOR Jack St. Clair scans the hard target complex from Tonopah Test Range's operations room. Weather is ideal for testing purposes but clouds and high winds occasionally delay

tests. Jack and Lloyd Williams are responsible for scheduling and coordination of all tests conducted on the range.



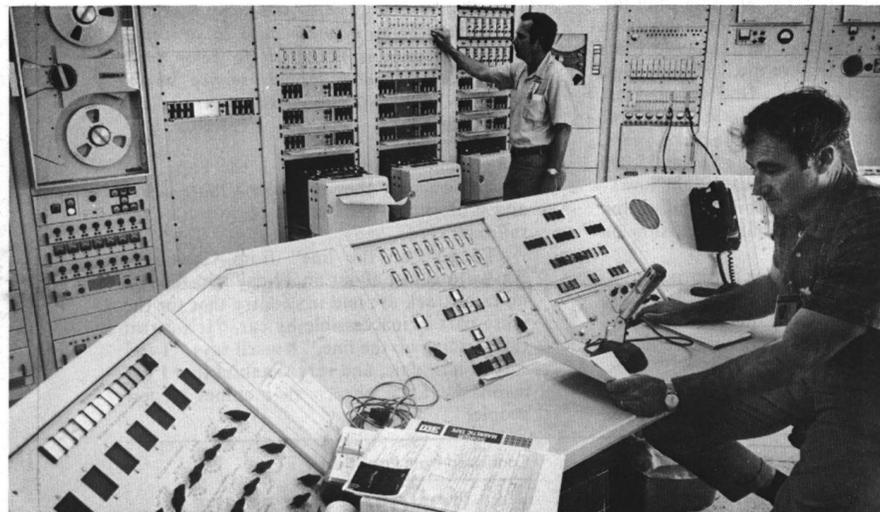
JIM WEBER, high on a rocket launcher, makes final adjustments of Sandia Nike-Nike development rocket.



KEN DATZ in the operations room at Tonopah Test Range handles air control and communications with military organizations.

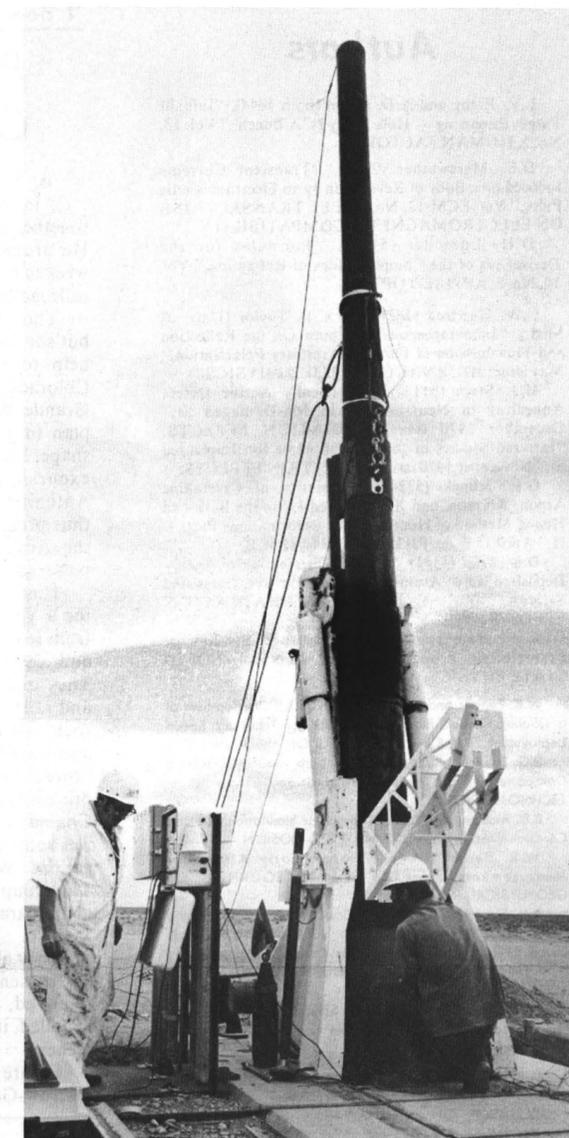


LLOYD YOUNG, using the radar plotting board in the operations room, can control aircraft to plus or minus 25 feet on any given run over the target areas of the range.



TELEMETERING CENTER at Tonopah Test Range is operated by Bob Beasley, left, and Al Brazda. This central station, along with mobile stations, records

a wide variety of data transmitted from test units and also provides instant playback.



155 MM GUN, raised to 89° firing angle, is readied for a shot. Facilities include heat and cold chambers where test units can be brought to required temperatures and immediately fired. The men fire the guns from an underground control bunker.



PRE-TEST CONFERENCE — From left, Leo Scully (9472) and Jack St. Clair (9473), Tonopah Test Range personnel, go over requirements for a rocket test with Larry Rollstin (5624), rocket development engineer, and Richard Howell (9310), Test Project Management Department engineer.

'A Tremendous Sandia Resource'

TONOPAH TEST RANGE

Tonopah Test Range is unique. Highly instrumented with facilities including tracking telescopes, radars, telemetry instrumentation, computers, phototheodolites, and a variety of high speed cameras, the range sees a full schedule of testing almost daily. Located in the remote desert reaches of southern Nevada, where wild horses still roam, the range enjoys weather that is ideal for testing purposes. Only three testing days were lost last year because of weather.

The tests range from rocket launches, to air drops, to acceleration and shock tests using 155mm guns, plus a variety of tests for DOD agencies.

Last month the men of Tonopah Test Range Department 9470 conducted 13 air drop tests and fired 25 rounds from the 155mm gun; in addition they launched a Sandia Nike/Nike development rocket. Not too long ago, explosive tests for Project

Plowshare and impact tests of SNAP units were done at TTR.

Since the best optical conditions for the giant tracking telescopes occur a half hour after sunrise or a half hour before sunset, range people either get up very early or arrive home very late. For early morning operations, the men sometimes leave McCarran Field at Las Vegas around 3 a.m. for the flight to the range.

The computerized data systems available at the range provide immediate "quick look" data for development engineers. For an air drop, for instance, the data provided include a complete flight profile in which the test unit is located in time and space, plus a read-out of all telemetered data broadcast from the unit from release to impact. The tracking telescopes, positioned by radar, provide motion pictures in color of the test unit in either 35mm or 70mm format. These films are invaluable to development people testing

parachutes or parafoil designs, as well as to rocketeers concerned with first and second stage separations or payload performance.

Range radars lock onto the test unit and follow it down. Long focus television cameras simultaneously provide a video picture on monitors in the operations room while a videotape recording is also made, again for more "quick look" data.

The radars also pinpoint where the test unit lands — information which enables recovery crews to bring the unit back to the shops immediately for inspection, no small achievement considering that a test shell 6 inches in diameter and less than 20 inches long will get up to 50,000 feet and drift several miles.

The men are seasoned professionals with an average of five years in range operations. Milo Navratil heads the Electronics



LEO SCULLY, supervisor of Optical Measurements Division, adjusts video monitor prior to firing of a 155mm gun. The big guns see a heavy schedule of tests at the range.

(Continued Next Page)

Authors

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D.H. Loescher (5153), "Formulas for the Derivatives of the Complex Index of Refraction," Vol. 10, No. 5, APPLIED OPTICS.

C.W. Harrison (2627) and C.D. Taylor (Univ. of Miss.), "Inhomogeneous Plasmas: On the Reflection and Transmission of Fields of Arbitrary Polarization," May issue, JOURNAL OF APPLIED PHYSICS.

H.J. Stein (5111), "Electrically Active Defect Annealing in Neutron and in Ion-Damaged Si," December 1970 issue, RADIATION EFFECTS: "Infrared Studies of the Crystalline of Ion Implanted Si," November 1970 issue, RADIATION EFFECTS.

G.E. Jelinek (5224), "Properties of Crystalline Argon, Krypton, and Xenon Based Upon the Born and Huang Method of Homogeneous Deformations Parts I, II," April 15 issue, PHYSICAL REVIEW B.

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W.B. Pepper and I.T. Holt (both 9320), "Development of a Gliding Guided Ribbon Parachute for Transonic Speed Deployment," Vol. 8, No. 4, JOURNAL OF AIRCRAFT.

R.G. Easterling and R.R. Prairie (both 1643), "Combining Component and System Information," May issue, TECHNOMETRICS.

B.D. McLaughlin (5531), "Computer Simulation of Stress Corrosion Cracking," Vol. 27, No. 2, CORROSION.

W.R. Perret (9111), "Jarum Early Aftershock Measurements," Vol. 76, No. 11, JOURNAL OF GEOPHYSICAL RESEARCH.

A.H. Nayfeh (VPI) and W.S. Saric (9341), "Stability of a Liquid Film," Vol. 9, No. 4, AIAA JOURNAL; Saric and Z. Lavan (ITT), "Stability of Circular Couette Flow of Binary Mixtures," Vol. 47, No. 1, JOURNAL OF FLUID MECHANICS.

M.J. Landry (7211), "Variable Spaced Giant Pulses from Multiple Laser Cavities in a Single Lasing Medium," June issue, APPLIED PHYSICS LETTERS.

M.R. Scott (5222), "The Application of Invariant Imbedding to Characteristic Value Problems," January issue, PROCEEDINGS ON THE HAWAIIAN INTERNATIONAL CONFERENCE ON SYSTEM SCIENCES; with P. Nelson (Oak Ridge National Laboratory), "Internal Values in Particle Transport by the Method of Invariant Imbedding," June issue, JOURNAL OF MATHEMATICAL ANALYSIS APPLICATION; "Convergence of Picard's Method," Vol. 77, No. 8, AMERICAN MATHEMATICAL MONTHLY; "Numerical Solution of Unstable Initial Value Problems by Invariant Imbedding," Vol. 13, No. 4, THE COMPUTER JOURNAL.

G.E. Jelinek (5224), "Properties of Crystalline Argon, Krypton, and Xenon Based upon the Born and Huang Method of Homogeneous Deformations. I. Zero-Pressure Thermal and Elastic Data," Vol. 3, No. 8, PHYSICAL REVIEW B.

M.M. Madsen and J.M. Peek (both 5234), "Eigenparameters for the Lowest Twenty Electronic States of the Hydrogen Molecule Ion," Vol. 2, No. 3, ATOMIC DATA.

H.D. Fisher (1541), "Bending Stress at a Clamped Support of a Conical Shell Subjected to Thermal and Pressure Loadings, June issue, AIAA JOURNAL.

E.J. McGuire (5234), "L-Shell Auger and Coster-Kronig Electron Spectra," June issue, PHYSICAL REVIEW.

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M.J. Clauer (5114), "Relaxation Effects in Spectra: Eigenvalue Treatment of Superoperators," Vol. 3, June 1971, PHYSICAL REVIEW B.

W.J. Brya (5152), "Polarized Raman Scattering in Transparent Polycrystalline Solids," Vol. 26, No. 18, PHYSICAL REVIEW LETTERS.

L.R. Edwards (5132), "Effect of Pressure on the Magnetic Transition of $MnAs_xSb_{1-x}$ Solid Solutions," Vol. 42, No. 4, JOURNAL OF APPLIED PHYSICS.

J.F. Cuderman (5232), "A Comparison of Ta, W, and Pt-8%W Surface Ionization Detectors for Fast Potassium Atom Detection," Vol. 42, No. 5, REVIEW OF SCIENTIFIC INSTRUMENTS.

'I Been Workin' On The Railroad'

Russell Smith—Mail Carrier Or Gandy Dancer?

A friend of a friend of a friend . . . invited Russell Smith (3148) to a get-together of a few people interested in trains. He attended the meeting, volunteered for a weekend of hard labor, and is now an avid railroad buff.

This group of volunteers, mostly amateurs but some of them ex-railroaders, offered their help to the state when New Mexico and Colorado purchased the Denver and Rio Grande Western narrow-gauge railroad. The plan to get the tracks and rolling stock into shape, lease it to a concessionaire, and run an excursion train from Chama, N.M. to Antonito, Colo., is now an accomplished fact, thus preserving a rapidly vanishing artifact of the American West — a coal-fired, steam-powered, narrow-gauge train.

Russell and his friends have been working for a year on the railroad, doing everything from repairing the line to moving all the stock and equipment from Antonito to Chama. They did the job on weekends, replacing ties and rails, building up the road bed, removing rock and mud slides and refurbishing towers and water tanks. "Believe me," Russell says, "those tanks are a job. One of our last projects was to repair the water tank at Chama. It hadn't held water for two years, was some 25 feet in diameter and holds 55,000 gallons. We hope that it's watertight now!" The group also painted the towers and station in preparation for the opening excursion on June 26.

They also converted a box car into a fresh-air passenger car. With most of the sides removed, the interior paneled and seats installed, it's great for views of the spectacular scenery.

Future plans of the group, called the Narrow-Gauge Railroad Association, include



RUSSELL SMITH (3148) polishes the headlight of Engine 484 just before a practice run up the line from Chama. The Cumbres and Toltec Scenic RR ran its first charter excursion June 26, attracting railroad fans plus those out to enjoy some magnificent scenery. Regular service begins tomorrow with trips scheduled each weekend through Sept. 6.

some training programs with the hope that perhaps one day they can take a more active and professional part in the operation of the railroad.

To go "up the line" from Chama to Antonito is just about an all-day trip. The 64 miles of track are laid in country that for the most part is inaccessible by car. "It's a real thrill, riding up the line," Russell says. "I feel sort of nostalgic, and very thankful that I got involved. It's a chance that comes to few people."

Continued from Page Seven

TONOPAH TEST RANGE

Measurements Division responsible for the radars, computer and general electronics required for all range testing.

The Optical Measurements Division under Leo Scully handles the tracking telescopes, cinetheodolites, and ordnance.

Range Operations Division headed by Harold Rarrick provides overall coordination of range activities. Each test conducted at the range is directed by either Jack St. Clair or Lloyd Williams who are responsible for planning, coordinating, scheduling and range safety plus issuance of a summary report of each test.

Continual improvement of range facilities is the responsibility of TTR Development Division under Dan Parsons. This group, working in Albuquerque, has developed new mounts and operating systems for the 155mm gun facility, several tracking telescopes and rapid tracking mounts, the range's central data system, and various radar and telemetering systems.

Sam Moore, range manager, says, "The facilities, instrumentation, know-how and flexible scheduling at Tonopah Test Range provide a quick reaction capability not available elsewhere in the country. The range enables engineers and scientists of AEC and DOD agencies to evaluate ideas on short time scales. It is a tremendous resource for Sandia programs."

Promotions

Barbara Blackwell (8217) to typist clerk
Dorothy Marklin (7431) to administrative clerk



WET & WILD — white water on the Colorado River of the Grand Canyon gives four Sandians reason to hang on (and later drink a beer). They are, from left, Tom McConnell (9325), John Shunny (3432), Herb Sutherland (5163) and Doug Ballard (7361). Five-day trip down river covered 135 miles.



Speakers

W.J. Whitfield (1742), "Principles of Laminar Air Flow Systems"; H.D. Sivinski (1740), introductory remarks and moderator of panel on the application of clean room technology to surgery suites, Symposium on Clean Room Technology in Surgery Suites, May 21-22, JFK Space Center, Fla.

O.J. Burchett (7362), "Some Applications of Holographic Interferometry," University of Oklahoma, April 27, Norman.

J.R. Freeman (5241), "Computational Plasma Physics at Sandia," Cornell University, April 30.

R.L. Park (5331), and J.E. Houston (5332), "Diffraction from Statistical Step Models," 4th LEED Theory Seminar, May 1, Washington, D.C.

C.P. Skillern (3311), "Noise and the Environment—An Industrial Hygiene Approach," Region 9, American Society of Heating, Refrigeration and Air Conditioning Engineers, May 7, Albuquerque.

Walter Herrmann (5160), "Solid Dynamics Research in an Industrial Environment," University of Florida, May 7, Gainesville.

J.M. Hueter (3134), "Creativity—Choice or Chance?" Industrial Photographers of the Southwest annual conference, May 8, Santa Fe; "Sandia's Program for Training, Both Procurement and Technical Personnel in Value Engineering as Applied to the Procurement Area," Procurement Management Symposium, AEC Division of Contracts, May 13, Denver; "Through Rose Colored Glasses," National Secretaries Association annual division conference, May 15, Silver City.

A.J. Arenholz (9428), "A Review of the SADIE System," Rio Grande and Phoenix Chapters of the Association for Computing Machinery, May 10, Phoenix.

Walter Herrmann (5160), "Wave Propagation in Porous Materials," AF Materials Lab, May 11, Wright-Patterson AFB, Ohio.

O.E. Jones (5130), "Shock Waves and the Mechanical Properties of Solids," May 11 and 12, Naval Weapons Lab, Dahlgren, Va.; Maryland Institute of Metals, College Park,

Md.; Naval Ordnance Laboratory, Silver Spring, Md.

B.W. Duggin and R.I. Butler (both 7342), "Use of Manganin Gages to Measure Sweeping Shock Pressure Loads," ISA Aerospace Symposium, May 10-12, Las Vegas.

D.L. Johnson (5245), "REBA, A Pulsed Electron Beam Generator," 11th Symposium on Electron, Ion, and Laser Beam Technology, May 12-14, University of Colorado, Boulder.

T.S. Rathke and M.H. Woodward (7524), "Automation of Velocity Gage Calibration," 2nd Symposium on Stored Program Controllers, Livermore.

A.D. Swain (1644), "The Motivation of the Volunteer," New Mexico Society of Professional Engineers, May 20, Santa Fe.

H.E. Guttman (1644), "A Method of Determining the Detectability Range of Camouflaged Objects," National Academy of Sciences NRC Committee on Vision, May 21, Washington, D.C.

A.R. DuCharme (5331), "Application of Pseudopotential Theory to Defect Properties of Metals," Solid State Seminar, Dept. of Physics, Virginia Polytechnic Institute and State University, May 21, Blacksburg, Va.

D.S. Drumheller (5163), "The Frequency Filtering Behavior of Composite Materials"; D.E. Munson (5163), R.P. Reed (9116), and C.D. Lundergan (5163), "Hugoniot and Thin Pulse Attenuation Measurements in Cloth Laminate-Quartz Phenolic"; L.M. Barker (5161) and R.J. Lawrence (5162), "A Rate Dependent Model for Dynamic Finite Difference Calculation on Composites," AF Weapons Labs, KAFB, May 25-26, Albuquerque.

W.J. Whitfield (1742), "The Effect of Relative Humidity on Adhesion of Small Particles to Surfaces," 10th Annual Meeting of the American Association for Contamination Control, May 26, Washington, D.C.

L.W. Brewer (3311), "The Status of the Accreditation Program for Industrial Hygiene Laboratories," American Industrial Hygiene Conference, May 27, Toronto, Canada.

K.L. Brower (5111), "ERP Studies on Irradiated and Ion Implanted Silicon," Bell Telephone Laboratories, Murray Hill, N.J., May 19.

H.J. Stein (5111), "Ion Implantation From a Radiation Damage Point of View," Air Force Cambridge Research Lab, Bedford, Mass., May 20.

N.C. Anderholm (5114), "Elastic Stress Generation in Quartz Phenolic by Laser Deposition," JOWOG 26 Working Group Meeting, KAFB, May 20-21.

R.P. Clark and D.A. Nissen (both 2345), "Evaluation of Long Life Primary Cells," 25th Power Sources Symposium, Atlantic City, N.J., May 23-25.

G.E. Jelinek (5224), "Lattice Dynamical Equations of State Calculations of Some van der Waals Solids," University of Washington Chemistry Department, Seattle, June 2.

L.P. Bradley (5245), "Laser Controlled Switching," IEEE/OSA Conference on Laser Engineering and Applications, Washington, D.C., June 2-4.

C.L. Burns (3432), "Coping With Microminiaturization With Words and Graphics," 18th International Technical Communications Conference, San Francisco, June 2-5.

G.H. Haertling (2317), "Recent Improvements in the Optical and Electrooptic Properties of PLZT Ceramics"; P.D. Thacher (5153), "Ferroelectric Ceramics Displaying A Linear Electrooptic Effect"; and J.C. Crawford (1410), "A Ferroelectric-Piezoelectric Random Access Memory," IEEE Symposium of the Applications of Ferroelectrics, IBM Watson Research Center, Yorktown Heights, N.Y., June 7-8.

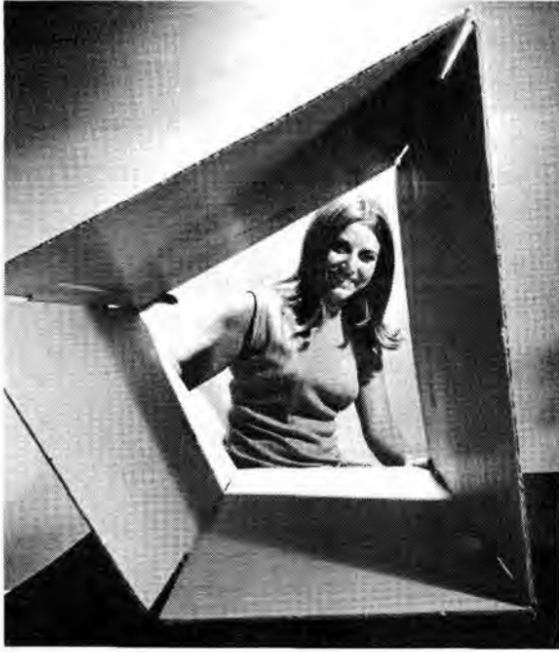
C.E. Land (5153), "Electrooptic Effects in Ferroelectric Ceramics and Their Device Applications," RCA Labs, Princeton, N.J., June 10.

W.E. Wilson (2633), "Aspects of Microwave Engineering: 1971," Department of Engineering, Highlands University, Las Vegas, N.M., May 25.

L.E. Pope (5133) and R.A. Graham (5132), "Effects of Deformation on the Austenite Start Temperature of an Iron Nickel Carbon Alloy"; R.W. Rohde (5531) and C.E. Albright (2635), "The Influence of Uniaxial Tensile Stress on the Austenite Start Temperature of an Iron-Nickel-Carbon Alloy"; J.C. Swearingen (5165), "Analysis of the Thermomechanical Behavior of 6061 Aluminum in Terms of Dispersion Hardening"; R.H. Erickson (5321), "High Temperature Creep of Molybdenum-I Microstructure"; G.J. Jones (5321), "High Temperature Creep of Molybdenum-11. Characterization of the Creep Curve," Spring Meeting of the Metallurgical Society of AIME, May 17-20, Atlanta.

T. Duffey (1544), "Transient Response of a Plastically Anisotropic Cylinder in Plane Strain," Third Canadian Congress of Applied Mechanics, May 17-21, Calgary, Canada.

W.J. Kass (5521), "Hydrogen Diffusion and Permeation in 309S Stainless Steel," 8300 Seminar, June 24, Livermore Laboratories.



VERY WISE or very . . . well, seems someone ordered a box with 20 x 30 inch sides. Of course, they didn't specify that the sides of equal length be opposite each other. Helen Payne (1432) smiles through resultant 20 x 30" box.



VOCATIONAL guidance counselors listen to Charles Conley of Electronics Division 7131 explain workings of a tape calibrator. Counselors, from schools throughout the state, toured a number of laboratories and shops within the Tech Areas.

Service Awards

July 2-15

25 Years

Paul Dailey (7363).

20 Years

Jay Grear (1652), Howard Durham (1752), Lovella Montoya (3416), Archie Fisher (4252), Francis Vogel (4552), Dan Fenstermacher (7211), Robert Hamilton (7250), Bill Little (8250), Francis Thompson (9213), Robert Parry (9232), Chester Ricker (3113), Wilbert Sherman (7431), Joseph Lackey (7654), Loren Converse (8121), Ted Pfeffer (4612), Dick Ballard (8212), John Tolmie (1614), Eleanor McPhate (4131), Francis Martin (7283), Charles Riley (4232) and Dorothee Drury (3411).

15 Years

Duane Hughes (100), Phillip Young (1513), Tom Lane (1540), Ben Sedlack (1612), Norman Scott (3511), John Leroy (4251), Roger Abbott (7250), Johnny Hartley (7451), Leland Pierce (2317), Glenn Holmes (7512), John Irwin (1225), Kermit Lindell (1742), Betty Sherred (4135), Jack Bloomquist (9211), Marcus Martinez (4614), Edward Bernard (3520), Vitalia Salas (4131), Don Lundergan (5163), Paul Blaylock (9132), Richard McKnight (9222), Mina Carnicom (9328), Richard Brooks (7323), E.T. Cook (2313), Joe Sanchez (4613) and Bill Purchase (4363).

10 Years

David Newcomer (1553), Edwin Summons (1752), Marjorie Ready (3321), Marv Torneby (3428), Edward Barkocy (7284), Charles Kinsey (7342), Richard Illing (7421), Charles Coffin (7612), William Burd (7624), Carl Smith (7651), Paul Freeman (8271), Harry Chaney (9217), Robert Holt (9231), Lewis Suber (9237), Robert Davis (7346), Ronald Soutar (9225), William Drozdick (7651), Paul Konnick (2634), John Weinlein (2654), John Sarkis (7613), Edward Kociscin (7614), George Kolesar (7614), James Hoffman (5233), Dick Wilhite (8251), Patricia Carothers (8275), John Rosborough (2453) and Robert Frazer (7221).



JOEL FERGUSON, former Mayor Pro Tem and City Councilman in Lansing, Mich., recently met with a group of Sandians to discuss issues and elements of the Black movement. Other speakers discussed Indian and Chicano movements in noontime presentations in Tech Area Theatre.

Take Note

Rudy Baca (4552) has left Sandia Laboratories to accept a position with the Office of Contract Compliance, U.S. Coast Guard, Washington, D.C.



Rudy started at Sandia as a janitor in 1950

and rose through various grades to his last position as MLS in Plant Engineering's Budgeting Division. He obtained his education by taking advantage of the many opportunities offered by Sandia's education programs. He earned his BA in business administration from the University of Albuquerque

in 1956 and took graduate courses at UNM.

Leaving Sandia after almost 21 years, Rudy wishes to express his thanks to the Labs and the many people who helped him during his different assignments.

* * * *

Victor Gabaldon (7143) is chairman of the American Legion's annual fireworks display this year. The event takes place at University Stadium, 8:15 p.m. on Saturday night, July 3 — 75 cents for adults, two bits for kids. Thirty-five aerial and ground displays will be featured, and there will be a musical program before the fireworks.



UNIVERSITY OF VERA CRUZ chemistry students were greatly interested in ion implantation studies being done with a Van de Graaff accelerator in Division 5111. Gil Cano (5235), left, explained the operation in Spanish. Fred Vook (5110), center front, is the department manager.

LAB NEWS Opens Classified Ads to Young Work Seekers

Job opportunities in Albuquerque for young people on school vacation are pretty thin. The many Sandians who are parents will vouch for this sad situation. And it's likely that at least one element in Albuquerque's recent disturbances is the simple boredom that comes from having nothing to do and all summer in which to do it.

As an experiment, we think there might be some value in offering space in LAB NEWS to the sons and daughters of Sandia and AEC employees to advertise their availability for work. The ads will appear with the other classified ads under a "Work Wanted" heading and will be subject to the same rules about length, submission in writing, etc.

As a suggestion, have your youngster be specific about the type of work he or she can do, area of city desired (in case of transportation problems), age, and any special equipment he can bring to the job, e.g., a truck. Here's an example: Charles, age 15, Eubank and Menaul area, will wash windows, prune trees, polish cars. Jones, 283-1234.

Deadline for receipt of all ads for the July 16 issue is Friday noon, July 9. Be sure to include your name and organization.

'Dusty' Cravens Is Mainstay in Children's Theatre Productions

"My Sister the Dragon," "Harkee the Cat" and other weird-sounding plays are standbys in the repertoire of the Albuquerque Children's Theatre. "Dusty" Cravens (9230) and his family are standbys of a different type.

"It all started five years ago," Dusty recalls, "when our daughter Cathy bugged us to see one of the plays. Then she wanted to go backstage. Then we met the director Bill Hayden. First thing we knew, we all were involved."

Dusty has been president of the non-profit theatre group for the past three years and also helps backstage. "My only experience on stage was in a high school play many years ago," he says. "I forgot my lines."

Mary, his wife, and Mrs. Laura Culver, his mother-in-law, make costumes for all the productions. Daughters Cathy and Carol often appear in the plays or ballets.

The children's theatre has been in operation nearly 10 years and customarily produces several plays each season. The last two productions were presented in Popejoy Hall to sell-out audiences. Special admission prices are given to groups of 10 children or more.

"During the summer we go 'on tour,'" Dusty continues. "We will visit the main public library, six branch libraries, Model Cities library, and the YWCA with free presentations of 'My Sister the Dragon' and several one-act plays." Last summer the touring play was "Wind in the Willows."

The regular season will resume next October with "The Beauty and the Beast."

"Appearing on stage before the audience gives many of the children confidence in their own ability. It's a help to them and also fun," he says.



• SHOPPING CENTER •

CLASSIFIED ADVERTISING
Deadline: Friday noon prior to week of publication unless changed by holiday.
A maximum of 125 ads will be accepted for each issue.

RULES

1. Limit: 20 words
2. One ad per issue per person
3. Must be submitted in writing
4. Use home telephone numbers
5. For Sandia Laboratories and AEC employees only
6. No commercial ads, please
7. Include name and organization
8. Housing listed here for rent or sale is available for occupancy without regard to race, creed, color, or national origin.

MISCELLANEOUS

3/4 HP MOTOR, Craftsman 1725 rpm 110/220, \$25. Merritt, 299-1482.
USED 40-gal. hot water heater, \$10; Harper, 298-0146 after 5:30.
8-PIECE DINING ROOM SET, sable walnut finish, hutch has sliding glass doors, \$150. Vandi, 255-0685.
WIG, blonde frosted human hair, \$7. Erlandson, 296-7351.
SEAR'S 2 1/4 HP 18" reel-type lawn mower, \$25. Hart, 299-8832.
LADY KENMORE DISHWASHER, top loader, avocado, 2 yrs. old, \$115. Huff, 296-7977.
FORD engine, 289 cu. in., complete, \$75; 3-spd. full syncro trans., \$50. Elder, 268-7479.
MEN'S 10-spd. racer bicycle w/thorn-proof tubes, 21" frame w/26" wheels. Hoagland, 282-3825.
POWELL mini-bike, \$90 or best offer. Copeland, 344-1135.
KAYAK, 17', 3-man, used twice, \$85; Accura 3 mm enlarger, trays, \$20; Remington Royal typewriter, \$25. Smith, 255-9852.
MODEL RAILROAD, American Flyer, 4 engines, 18 cars, 6 bldgs., 11 switches, 79 sections track, all mounted on fold-up board, make offer. Molter, 282-3203.
CAMERA, Polaroid model 101 auto., w/flash attachment, \$25. Parks, 296-2261.

68 MOTORCYCLE, 100cc Yamaha, street bike, \$150 firm. Duvall, 299-8744.

SWING SET; child's table & 2 chairs; 2-wheeler, child's tractor. Myers, 256-0642.

GRAND BAROQUE silverware by Wallace, 30% off retail, 4 dinner knives & forks, a few serving pieces. Worrell, 299-0381.

ELECTRIC GUILD GUITAR, Semi hollow body, dual pickup, gold plated hdw., hard felt-lined case, \$150; AMPEG amp, 12" speaker, adjustable tremelo, \$25. Fletcher, 298-2142.

BEDROOM furniture: 5-dwr. chest, 5-dwr. vanity, mirror & bench. Haycraft, 299-3220.

OUTBOARD motor, 7.5HP Evinrude fleetwin, \$140. Gain, 299-5271.

DINETTE, 2 tables/6 chairs, \$25. Ward, 299-0944.

CESSNA 172 Club membership, '60 model, 250 hrs. SMOH, strobe CHT, MK-III, VHT-3, new upholstery & rug, \$750. Nelson, 282-5203.

SCISSORS TYPE electric grass trimmer, \$15; Craftsman hand lawn mower, \$5. Smith, 299-6873.

CANOE, 16' fiberglas Canuck canoe & paddles, \$150. Roper, 898-4134.

COFFEE TABLE, corner table, 2 end tables, \$20 ea.; radio/stereo, RCA, ebony cabinet, \$125; white leather contour chair, \$75. Horn, 268-1054.

RUGS, gold 12 x 18, 9 x 12, 8 x 9, used 1 yr., best offer. Miskowicz, 298-8301.

19' x 7' - 10" SAILBOAT, cabin, foam mattresses, head, retractable keel, motor, trailer, alum. mast, dacron sails, sink, fiberglas over wood, \$1500 or best offer. Frye, 255-8364.

GERBILS, 75¢ ea. Porter, 298-3623.

MEDITERRANEAN bdr. suite, twin headboards, night stand, bachelor chest, mirror, desk & chair; walnut storage unit. Thomas, 268-2565.

EXTERIOR DOOR, 36" wide, 9 panes top half, crossbuck bottom, painted white, cut for std. hdw., \$20. Merritt, 299-1482.

ARC 5 receiver 3MC to 6MC, built in AC power supply & speaker, ideal for 80 MTR novice, \$15. Nogle, 299-3863.

GAS RANGE, Tappan Holiday, 30" wide, coppertone, \$125; fireplace screen, 40" x 32" w/tools, all brass, \$30. mirror, plate, 48" x 30", \$15. Crumley, 299-5293.

CRAFTSMAN 3" port. belt sander, 1 hp motor, brand new in unopened box, new, \$48, sell for \$40. Brammer, 265-8194.

DISHWASHER, GE port., \$75. Bacon, 243-7372.

DAISY AIR RIFLE, BB, pump action, \$10. Martin, 299-6768.

'69 YAMAHA 350cc motorcycle, new tires plus 1 good spare, \$600. Cowham, 298-4249.

BOY'S BIKE, 20", AMF, std. style, red & chrome, whitewalls, \$20. Anderson, 299-7782.

THREE WIRE No. 6 Al polyethylene insulated electrical service wire, 12¢ per foot. Souder, 282-3121.

GUITAR, Mossrite solid body, 12-string, white, w/case, \$250; doll crib w/doll; port. sewing machine. Swiss, 265-5346.

'69 HONDA CB 350, 12,000 miles, chrome tank, forks, air cleaners, etc., many extras & tools, \$425. Altherr, 298-0827 after 7.

BOAT & TRAILER, 15' Soonercraft tri-hull, 55hp Evinrude, used less than 50 hrs. Hereford, 298-1052.

1 TON TRAILER AXLE w/hubs, new bearings & races, wheels, u-bolts, \$30; 10' x 10.5' moss green nylon

carpet w/pad, \$20. Campbell, 268-8445.

CARS & TRUCKS

'63 CORVAIR Spyder conv., rebuilt engine. Larsen, 299-3496.

'66 PONTIAC convertible, full power, factory air. Gault, 296-5675 after 5.

'67 DODGE Custom Sportsman A100, 3-spd. slant six, below wholesale, \$1100 or best offer over loan. West, 282-3460.

'66 CHEV. 1/2-ton pickup, 6-cyl., 3-spd., 250 CID engine, long wide box, \$900. Zucuskie, 268-3105.

'67 MGB, wire wheels, white, \$1350, \$100 under book. Frauenglass, 265-7372.

'64 FORD XL 4-dr. HT, bucket seats, console, Hydromatic, AC, PS, deluxe vinyl upholstery w/special chrome trim inside, \$1000. Steele, 877-1225 after 5:30.

'69 CAMERO SS, 350 engine, \$2300 or \$200 down & take over payments. Benton, 877-2473.

'56 OLDSMOBILE, 4-dr., running condition, make offer. Gray, 299-7035.

'64 BELAIR V8, 327 cu. in., factory air, 53,000 miles, one owner, make offer, interested in trade for 3/4-ton pickup. Fitzgerald, 298-8851.

'64 VOLKSWAGEN CAMPER, luggage rack, camper heater, 2 new tires, Elfner maintained, \$950. MacDonald, 1-867-5268 after 6.

'66 GMC pickup, V6, 3/4-ton, 4-spd. lwb. Yrene, 345-1531.

'69 CHEVELLE, 307 V8, lt. green, 4-dr., AT. Gabaldon, 855-9612.

'67 DATSUN 1/2-ton pickup, best offer. Ambrose, 299-0380 after 5.

'53 CHEV. PICKUP, 4-spd., \$150 as is. Moery, 299-3630.

'70 JEEP WAGONEER, stick shift, PS,

air, 29,000 miles, 4-wd, tinted glass, hubs, \$3700. Downing, 299-6945.

'63 BUICK Riviera, \$675. Savage, 299-7130.

'70 VW, white w/red vinyl interior, less than 10,000 miles, under warranty. Hollar, 299-5795.

REAL ESTATE

5 ACRES in Placitas & 5 acres mountain property, both well located, good price for cash sale. Crosby, 255-4737.

ONE OR TWO ACRES on San Antonio Mountain near Tres Piedras, hunting & fishing. White, 265-2226 after 5:30.

WANTED

BICYCLE, 10-spd. in good condition. Oberst, 299-1224.

BICYCLE, girl's 26" single or multi-speed, doesn't have to be in perfect shape. Bartlett, 299-4861.

RESPONSIBLE family needs 2 or 3-bdr. furnished place w/dishes, linens, July 17 to Aug. 14. Excellent Albuquerque references. Evans, 298-5925.

YOUTH BED, good condition. Olman, 298-5024.

INDOOR exerciser cycle. Reed, 299-7425.

WATER TANK approved for human consumption, 200-300 gallons. Rowe, 298-4849.

HOUSE TRAILER, prefer furnished but will consider otherwise, approx. 8' x 40', good condition. Duran, 867-5251.

HORSE TRAILER, prefer 2-horse capability. Souder, 282-3121.

COLLEGE student w/tutoring & child care experience wants to tutor elementary subjects, reading, Spanish, or math, \$3.50/hr. Ellingson, 299-4056.

Celebrate July 4th At Club

The Fourth of July will be celebrated at the Coronado Club in the swinging tradition that has been established through the past few years. It's a big family day starting with recreational swimming in the twin pools at 11 a.m.

At noon, the Albuquerque Parks and Recreation Band will present a concert.

The Club offers a Fourth of July picnic special in the form of two hot dogs, beans and a soft drink for 40 cents.

All afternoon, sack races, three-legged races, water-filled balloons and pie eating contests will be conducted for kids of all age groups.

Admission is free to members and families, but members only, please.

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TONIGHT, Wildman Sol Chavez and his popular purple trumpet will lead the mighty Duke City Brass through happy hour dancing. Special prices are in effect from 5 to 9 p.m. The seafood buffet will be spread from 6 to 8 p.m. Yolanda Adent will take over the main lounge for a sing-along starting at 9 p.m.

Next Friday the Four Keys will hold the bandstand-while the Mexican food buffet is spread. On July 16, the Club's famous chuckwagon roast beef will top the buffet menu and Frank Chewiwie will make the happy music.

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INDEPENDENCE DAY July 4th will be celebrated on the Coronado Club's newly-enlarged patio area with an old-fashioned American family picnic starting at 11 a.m. Games and contests for kids and adults, special refreshments, and a concert by the Albuquerque Parks and Recreation Band are scheduled. Irene Chavez (4154), Archie Pearlman (4331) and Pat Davis (AEC) urge you to attend.

THE CORONADO FILM SOCIETY, which got off to a good start last month under the chairmanship of Tony Veneruso (1213), will meet again Thursday, July 15, to see "The Golden Age of Comedy." This award winning film brings together all the classic skits and comedy of early Hollywood, including Laurel and Hardy, Charlie Chaplin, the Keystone Cops and others. The movie will start at 7:30 p.m. and admission is free to members. A special short subject is also slated.

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THE STAGE SHOW and family movie this month is scheduled on Saturday, July 17, and features a great new marionette show by Ron and Mary Kay, a sing-along for kids conducted by Yolanda Adent (parents can sing too) and a Laurel and Hardy movie called "Below Zero." Stan and Ollie play a couple of down and out street musicians who blunder into hilarious situations. Happy hour prices will prevail starting at 7 p.m. and Smiling Jim Noonan, Club manager, will have super sandwiches available. Admission is free to members and families.

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TEENAGERS can do their thing at a blast next Thursday, July 8, from 7:30 to 10:30. The go-go and pool party will be emceed by Tom Watson of KQEO and the Star Sapphires will be wired into the bandstand. Member parents should pick up tickets for their youngsters.

SOUL SESSION scheduled Saturday, July 31, will bring back comic Jeffrey Eden whose "Moments of Madness" audience participation show at the Club last year really broke up the troops. Freeman Lacey and the Mark IV will be on the bandstand. The Harvey Wallbanger people will provide a special promotion with prizes for winners.

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SANADO CLUB will treat the kids to a "Country Fair" during their meeting Tuesday, July 13. There will be clowns, magicians, refreshments and prizes starting at 1:15. Mrs. D.S. Tarbox, 1305 Florida NE, will accept reservations by mail.

Events Calendar

July 6 — "Wildlife of the Sandias," and July 13, "Wildfires and Recreation of the Sandias," Forest Service Natural History Lectures, UNM Anthropology Bldg., 7 p.m.

July 7 — "How A New Mexican Became a Chicano," and July 14, "Revolution or Evolution," Lectures Under the Stars, UNM, south of Administration Bldg., 8 p.m.

July 9 and 17 — "Don Carlo," July 10 and 16, "The Magic Flute," Santa Fe Opera.

July 11 — Embudito Canyon, N.M. Mountain Club, Leader: George Park, Tel. 344-4391.

July 15-17, 22-25 — Broadway musical "Gypsy," Civic Light Opera, Popejoy Hall.

July 15-18, 22-25 — "We Bombed in New Haven," Old Town Studio, for reservations tel. 242-4602.

THE SAFE DRIVER

IN SLIPPERY WEATHER, MOST SKIDDING ACCIDENTS OCCUR AT TURNS AND CURVES.



IN APPROACHING TURNS AND CURVES ON A SLIPPERY ROADWAY, THE SAFE DRIVER PUMPS HIS BRAKES RAPIDLY TO REDUCE SPEED, THEN MAINTAINS A CONSTANT SPEED IN TURNING OR ROUNDING THE CURVE.

IF YOU START TO SKID, DON'T BRAKE! EASE OFF THE GAS AND STEER IN THE DIRECTION THE REAR WHEELS ARE SLIDING. AS THE CAR BEGINS TO STRAIGHTEN OUT, STRAIGHTEN OUT THE FRONT WHEELS.

PREPARED BY THE INTERNATIONAL ASSOCIATION OF BUSINESS COMMUNICATORS IN COOPERATION WITH THE HIGHWAY USERS FEDERATION

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