



MEMBERS of 1961 ECP Fund Drive Planning Committee discuss preparations for employee solicitation. Committee members include (l to r) L. L. Pierce (4224), Metal Trades representative; Mrs. J. M. Sharp (4423-2), OEIU representative; Hugo Flores, attending for Carl King, Security Guard representative; W. R. Rosenberg (4360) chairman of the committee; M. J. Sektan (3431-2), campaign coordinator; J. W. Hook (4110), deputy chairman; D. S. Tarbox (3200), and J. C. L. Leslie (3431-2), secretary. 1961 ECP Fund Drive is scheduled to be held October 2-4.

ECP Drive Starts Oct. 2-4; Campaign Captains Named

Arrangements are underway for the 1961 Sandia Laboratory Employees' Contribution Plan fund drive, to be held Monday through Wednesday, October 2-4. The goal for this year's drive is one hour's pay per month for each employee.

Members of the 1961 ECP Committee include W. R. Rosenberg (4360), chairman; J. W. Hook (4110), vice chairman; J. C. L. Leslie (3431-2), secretary; M. D. Tucker (4131-1), treasurer; M. J. Sektan (3431-2), coordinator; Mrs. J. M. Sharp (4423-2) OEIU Representative Local 251; L. L. Peirce (4224) Metal Trades Representative; D. S. Tarbox (3200); and C. R. King (3242), Guards Representative. The committee met Aug. 24 to select drive captains for each organization, and to choose a drive slogan and an ECP letterhead.

Organization captains appointed for the drive are E. R. Frye (1112), W. O. McCord (1430), J. R. Sub-

H. Dailey (2643), C. C. Fornero (3153), D. R. Weldon (3222), E. K. Baker (3341), M. K. Linn (3420), M. E. Grothe (4150), R. E. Hepplewhite (4210), R. S. Lenn (4230), A. E. Hall (4221), L. R. Neibel (4330), D. B. Kennedy (4413), J. L. Hickey (4516), R. D. Flaxbart (4570), R. E. George (4513-3), O. L. Wright (4610), W. A. Otero (4620), G. W. McClure (5152), A. Y. Pope (7130), H. E. Viney (7210), G. E. Hansche (7220), R. H. Schultz (7320), and A. F. Cone (7510). Each drive captain will serve a specified area of Sandia Laboratory.

Solicitors for the drive have been chosen this week and the plan for solicitation has been outlined by the committee. Employees who are not enrolled in ECP by payroll deduction will be personally contacted by a drive solicitor.

All employees who are enrolled in the payroll deduction plan will be given the opportunity to increase their deduction. A payroll deduction card will be sent to all employees.

Sandia Corporation LAB NEWS

ALBUQUERQUE, N. MEX. • LIVERMORE, CALIF.

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Sandians Contribute to Vital Local, State, National Work of Health Organizations

In addition to support of 25 United Community Fund agencies whose activities have been outlined in previous Lab News issues, the Sandia Laboratory Employees' Contribution Plan provides financial aid to nine national health service organizations.

Sandia Corporation employees, through ECP donations, make help a reality for sufferers of cancer, heart disease, arthritis, mental disease, cerebral palsy, muscular dystrophy, multiple sclerosis, and other diseases. ECP funds go to the following agencies; Albuquerque Association for Mental Health; American Cancer Society; Bernalillo County Heart Association; Cerebral Palsy Association of New Mexico; New Mexico Chapter, Arthritis and Rheumatism Foundation; Albuquerque Association for Retarded Children; Bernalillo County Chapter, Muscular Dystrophy Association of America; New Mexico Central Chapter, Multiple Sclerosis Soci-

ety; and the New Mexico Society for Crippled Children and Adults.

Albuquerque Association For Mental Health

J. H. Gibson of Sandia Corporation's Personnel Testing Division 3154 works as a volunteer for the Albuquerque Association for Mental Health. The Association combats mental disease on three fronts. Working with the National Association for Mental Health, the local chapter provides for mental disease research, promotes education of lay and professional people about means of improving mental health, and helps improve existing methods of treatment.

The Albuquerque chapter also carries on many other activities which maintain public mental health. This year, for example, the association has distributed over 1500 copies of a pamphlet on emotional tensions. It provided educational materials to some 74

local groups. Recreation volunteers work with patients at Bernalillo County Indian Hospital; others inform the community about legislation on mental health; others distribute information about the outpatient program and rehabilitation facilities of the Association.

American Cancer Society

The fight against cancer has been going on for many years, but the public's awareness of the disease's nature is comparatively recent. Approximately one-third of the funds donated to the American Cancer Society is spent in educating public and professional groups about cancer. The Society is basically an emergency organization, created to cope with cancer's increasing menace.

The Bernalillo County Chapter of the Society devotes its energies to the maintenance of a number of programs in the fight against cancer. The agency supports a tumor board and a cytology clinic for analysis of cancer-suspect tis-

(Continued on Page 3)



SECRETARY of Bernalillo County Muscular Dystrophy Association, Mrs. Arthur Starz, at left, checks volunteer list with her son, Karl, right, who was 1960 State Poster Child for the Association. They are assisted in the job by Mrs. Cathy Starz, at right, who is supervisor of Albuquerque MD Association office.



IF THIS RED and yellow security flag is flying at the top of the staff it means no security infractions were incurred during the last 24 hours. But if it's at half-mast someone received an infraction. Security supervisor Lt. Noel Kent (3241) is shown raising the flag. Two security flagpoles are located near Bldgs. 802 and 880.



SANDIA CORPORATION Board of Directors met here last week for the annual meeting and technical briefings. Several members of the board also toured Area III test facilities with representatives of Sandia's Small Staff. Shown above, watching a test on closed circuit TV in the control room of the Climatic Test Facility, are (l to r) J. B. Fisk, Bell Telephone Laboratories President; H. I. Romnes, Western Electric Company President; G. C. Dacey, Sandia Corporation Vice President, Research; R. W. Henderson, Sandia Corporation Vice President, Weapon Programs; P. R. Brousse, Western Electric Company Vice President, Manufacturing Division; and E. H. Draper (1000).

Editorial Comment**Labor Day Aftermath
With One Small Hope**

Three hundred and eighty-four Americans died in traffic accidents during the long Labor Day weekend. From these terrible deaths, the ugly statistics show only one small ray of hope.

A Sandia family traveling through Santa Fe was hit broadside by another car which failed to stop as it came onto the highway from a side road. The automobile driven by the Sandia employee was completely wrecked. He and his wife and small child suffered only minor bruises. They were all strapped securely in the seat with belts.

"We were pretty well shaken up, but it could have been much worse," the man said. "The door on my wife's side of the car was thrown open and the child's car seat was bent. I shudder to think what might have happened without the belts."

The National Safety Council estimates that severe injuries from traffic accidents would be reduced by one-third if all Americans had seat belts and used them. Deaths would be reduced by 5000 each year.

Order blanks for seat belts are available from Safety Engineering Department 3210, Bldg. 813. The line forms right there.

Livermore Laboratory recently completed a seat belt program in which 146 employees purchased belts for their cars.

**'Harmony Rodeo' Sept. 30
To Feature Sandians**

The 10th annual "Harmony Rodeo," sponsored by the Society for the Preservation and Encouragement of Barbershop Quartet Singing in America (SPEBSQSA), will be held at the Civic Auditorium at 8 p.m., Saturday, Sept. 30.

Thirteen Sandia and AEC employees will be performing in the Harmony Rodeo. They are R. E. Arvidson (7521), W. L. Clement, (2541), L. A. Faw (2534), L. E. Foster (2563), C. A. Griffin (AEC), R. A. Harley (2534), W. T. Holmes (7182), C. E. Jackson (7117), H. Moore (4543), J. W. Nelson (AEC), A. V. Robnett (1413), R. K. Vokes (3451), and G. S. Wallace (2534).

All types of songs will be included in the show with the theme, "Let's Harmonize." Two groups from El Paso, who were medalists in international competition, will be featured. They are the Border Chorders Chorus and the Desertairs Quartet. Other quartets and choruses from the Southwest will appear.

Tickets may be obtained from any member. For further information contact A. V. Robnett, ext. 47163.



Joan L. Auguston (8212-5)

Take a Memo, Please
Plan ahead to avoid accidents.



CHORDPAINTERS QUARTET will be one of the groups performing at the 10th annual "Harmony Rodeo" on Sept. 30 at the Civic Auditorium. Singers are (l to r) J. M. Morgan, Bell Telephone Company; C. E. Vertress, local pharmacist; C. E. Jackson (7117-1); and R. A. Harley (2534-2). Other Sandians will also appear.

Weekend Vacations**Canyon de Chelly Offers Rugged
Scenery, Great Historical Interest**

This is the sixth article of a series describing weekend vacation spots in Northern California and New Mexico.

For spectacular scenery, combined with historic interest, a visit to Canyon de Chelly National Monument on the Navajo reservation near the New Mexico-Arizona border is a worthwhile weekend trip from Albuquerque.

The monument, administered by the National Park Service, is reached by paved road via U.S. 66 to Grants, then State Highway 68 westward through Window Rock (the Navajo headquarters), Ganado, and Chinle, Ariz. From the trading post at Chinle, which is all that identifies this spot on the map, it's only a few miles on graded road to the Park Service headquarters, public campground, and dude ranch. A system of roads follows the rim of both Canyon del Muerto and Canyon de Chelly. Tours following the canyon floors may be taken in four-wheel drive vehicles.

Canyon de Chelly (pronounced "de shay") derives its name from the Navajo words Tse gi, which mean "rock canyon." Navajos continue to use the canyon bottomland to graze sheep, and raise fruit trees and corn.

Indian use of the canyons dates

**Choral Art Society
Seeking New Singers**

The Choral Art Society of the Albuquerque Theater Arts Center is conducting a membership drive, and is looking particularly for average or better tenor and bass singers.

Rehearsals are held at Zia Elementary School every Tuesday evening from 7:45 to 9:45 p.m. Instruction in music reading is offered from 7 to 7:30 p.m. on Tuesdays, also.

The group of 90 to 125 singers will present its first program, a Christmas Concert, Dec. 7-10.

Interested persons may contact Norman Russell Bell, conductor, at AX 9-6616, or any of the following Sandians: Bruce Caskey (7182), Bryan Finley (3111), Vernon Henning (3151), Peggy Howe, of Minnesota Mutual Life Insurance Co.'s Sandia office, Earl Minor (7522), Clinton Purdue (2422), Don Rost (3211), and Margaret Smith (3211).



SANDIA SECRETARIES are helping plan a one-day seminar for secretaries which includes panel discussions, an office equipment exhibit, and a luncheon fashion show. From left are Ann Michele (4510/4570), Winifred Sandusky (6030), Edith Blum (4200).

**Secretaries Seminar Set Sept. 30;
Sandians Participating in Program**

"Invest One Day in a Better Future" is the theme of a seminar for secretaries to be held Saturday, Sept. 30, at the Cole Hotel ballroom. The event is sponsored by the Albuquerque chapter of the National Secretaries Association.

The official program starts at 9 a.m. with a welcome by Joanne Boyd (4600), president of the Albuquerque chapter. Winifred Sandusky (6030) will discuss the Certified Professional Secretary program. Discussions on "Private Enterprise," "Office Etiquette," and a panel discussion of "Professional Characteristics of a Secretary" are planned.

W. C. Scrivner, Personnel Director (3100), will be moderator for

the afternoon panel on "Management Views a Secretary."

Other highlights of the day-long program include an exhibit of office equipment and a luncheon fashion show.

Sandia secretaries who have been working on the seminar include: Winifred Sandusky, chairman of the general committee; Edith Blum (4200), chairman, letters committee; Jo Hanna (2630), chairman, CPS committee; and Ann Michele (4510), publicity chairman.

All secretaries are invited to attend the seminar. The registration fee is \$5. Registration forms may be obtained in advance by calling ext. 21155.

**Decorating Hobby Produces Cakes
That Are Almost 'Too Pretty to Eat'**

BABY WITH BLANKET of frosting was main feature of Claurys Pine's (4170) most recent cake decoration effort.

"Cake Queen of Bldg. 880" is a title that co-workers think should be awarded Claurys Pine (4170).

Claurys' hobby is cake decorating and she goes all out on most any occasion — birthday, shower, etc. Her latest was a cake in the shape of a baby bed with the baby (doll) covered with a blanket of frosting. Another favorite cake featured a ballerina with a full skirt made of frosting.

"My daughter-in-law and I took a cake decorating course at the YWCA a year ago," Claurys said, "and I've been busy baking cakes ever since. It takes me three or four hours to decorate each special cake."

The cake which was the most time consuming was one decorated to represent an open budget book — complete with lines and figures in black and red. The only complaint Claurys receives is: "It's too pretty to eat."



SPIDER ROCK, rising 800 ft. from the bottomland junction of Rio de Chelly and Monument Creek, is one of the spectacular views at Canyon de Chelly National Monument in Western Arizona.

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FLOOD-STRICKEN FAMILY of Pedro Ortiz, left, (4518), is interviewed by Red Cross disaster worker, Mrs. Pritchett, right. Mrs. Ortiz is seated, with two of her children, on remains of living room furniture. Families of eight other Sandia employees received disaster assistance after flood of Aug. 11, this year.

Flood Damages Hundreds of City Homes; Red Cross Helps Sandians

Southwestern weather, especially during the summer months, can be capricious. Temperatures during an average day are often variable; morning skies can be clear blue and cool, and in the afternoons, thunderheads often mass over mountain areas and dump brief, intense downpours of rain over the flatlands.

Such a sequence of events occurred in Albuquerque during the morning and afternoon hours of Aug. 11. Around dinnertime, as thousands hurried home for the weekend, a sudden storm poured a record rainfall into the community. Thousands of tons of water washed down the city's drainage ditches and arroyos, and in a matter of minutes, the houses of hundreds of Albuquerque families were in danger of destruction.

The homes of eight Sandia employees were flooded by the rain. One of the Sandia employees, Pedro Ortiz, of Area III Maintenance Division 4518, returned from work and found nearly one and one-half feet of water in his yard and in his home. It was im-

possible to channel the water away from furnishings in the house, away from curtains or from kitchen appliances. The water stayed for days, and when it left, nearly everything that it had touched was ruined.

The local office of the American Red Cross came to Mr. Ortiz' assistance, as it did to other Sandia employees' families and to 90 other Albuquerque families, by providing emergency help and financial aid in repairing the flood damage. The Red Cross gave thousands of dollars to pay for food, clothing, rent, furnishings, and medical and nursing bills. It has continued its aid to Albuquerque families from Aug. 11 to the present time.

Sandia employees helped victims of the Aug. 11 flood by their contributions to the Red Cross through the Employees Contribution Plan. Their investments net them a deep satisfaction from their handsome returns, not only to flood victims, but to all of those who benefit from help offered by the ECP agencies.

Homemade 'Sidewheeler' Chugs Along at 7 mph

When Dave Dickie (8125-1) goes boating, he makes quite a splash. His homemade rowboat is equipped with two paddlewheels patterned after the "side-wheelers" of Mississippi River fame.

Dave built the 12-ft. boat from a kit and later added the power system, completing it last month. The motor, paddlewheels, and other parts cost him \$15 and took four months of spare time to complete.

When fully loaded with four passengers, the little boat can churn up the water at a frothy seven miles an hour.

"I always wanted a power boat," says Dave, "but when I started shopping around for a motor I decided it would be cheaper to build one myself."

Dave found an old two-horsepower, four cycle lawn mower engine in a junk yard. He added a reduction gear from a second hand washing machine and connected the whole thing to the paddlewheel drive shaft with a series of belts and pulleys.

For those who might wish to duplicate Dave's design, he offers the following details:

The pulleys, belts, and reduction gear drive the paddlewheel shaft at speeds up to 50 revolutions per minute, a 70 to 1 reduction from the engine's 3500 rpm. A high speed clutch on the engine drive shaft engages when the engine reaches 2000 rpm.

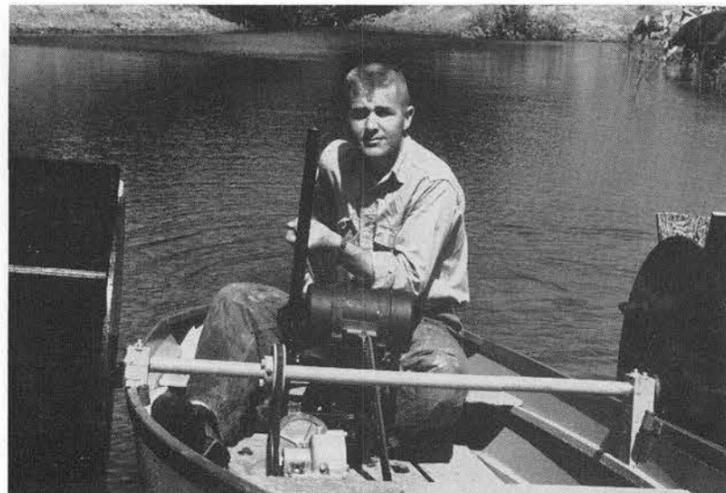
The paddlewheels are connected to the power system by a length of 1 1/4-inch electrical conduit pipe, mounted to the gunwales of the boat by wooden blocks. Similar blocks connect the pipe to the paddlewheel hubs.

Each paddlewheel contains eight fins 10 inches wide and 16

inches deep, sandwiched between two plywood hubs. The fins and the hubs are constructed of 3/8-inch plywood, coated with marine sealer and paint. The assembled paddlewheel is 45 inches in diameter and draws 4 1/2-inches of water.

The boat is steered with an oar, suspended from the stern. Eventually, Dave says, he hopes to control the boat by driving each paddlewheel independently, "but that's my next project." After that, he says, he's going to design and build a sternwheeler.

"This kind of boat has one big advantage," Dave pointed out. "I'll never be up the creek without a paddlewheel."



MODERN DAY HUCK FINN, Dave Dickie (8125-1), tries out his newly-completed paddlewheel boat in a small pond near Livermore. Dave constructed the paddlewheel assembly in four months, using second hand parts purchased at a junk yard.



VOLUNTEER WORKERS at National Arthritis and Rheumatism Foundation office check mailing lists and do other administrative work. The Foun-

ation sponsors an extensive program to combat fraudulent medical and mechanical "cures" of crippling diseases which are offered to patients.

Continued from Page One

Vital Work of Health Organizations

sues. Cancer dressings are prepared and distributed by volunteer workers, who also supply a driver service to and from hospitals. The agency also sponsors cancer-detection days and distributes technical literature to physicians.

Bernalillo County Heart Association

The Bernalillo County Heart Association sponsors several heart-disease programs performed by local physicians. The agency is affiliated with the National Heart Association's research program.

A cardiac clinic sponsored by the local office is open to any patient who is referred by a local physician. The clinic is staffed by local doctors. Educational sessions for physicians are held each year, during which noted cardiologists present latest developments in the treatment of heart ailments.

Observation classes in heart catharizations and surgery are sponsored for graduating nurses. The agency also contributes prizes for local high school science projects.

Cerebral Palsy Association of New Mexico

The Cerebral Palsy Association is a local organization which provides services to palsy victims through the New Mexico Rehabilitation Center. Charles E. Roehrig of Sandia Corporation's Operation Division 3452 is president of the agency's board of directors.

Help for cerebral palsy victims is provided through the physical and rehabilitational therapy facilities of the Rehab Center. The Cerebral Palsy Association sponsors a pre-education class for palsied children to prepare them

for kindergarten and grade school. Complete medical support and out-patient treatment are available through the Rehab Center.

The Association also conducts a public education program to increase awareness and support of association activities.

National Arthritis Foundation, New Mexico Chapter

There are approximately 20,000 people suffering from arthritis in Albuquerque. They receive help from the National Arthritis and Rheumatism Foundation.

The Foundation strives to eradicate arthritis and rheumatic diseases in two ways. First, it carries on an educational program for arthritis patients and the public. The program provides an understanding of the nature and treatment of arthritis and rheumatic diseases. Booklets on home care of arthritic and rheumatic patients are sent to doctors and to patients' homes. The Foundation provides information on arthritis and rheumatism research to physicians and therapists, and it combats exploitation of patients by fraudulent cures or useless treatments.

The Foundation's second method of combating disease is through active medical research. The Albuquerque office earmarks more than one third of its income for research by the national branch.

The Albuquerque Association For Retarded Children

The Association for Retarded Children works with the Child Study Center for Retarded Children in diagnosis and treatment of retarded patients.

Sandia Corporation's medical director, S. P. Bliss (3300), is a member of the advisory board of the organization. The Center diagnoses and treats patients of ages 3-17. A pre-school is operated by the Association for children four to eight years old.

The Association sponsors a professor of special education at the University of New Mexico who prepares public school teachers to work with mentally-retarded children. A public education program makes films, literature, and lectures available to interested public groups. The Association also trains nurses and parents of retarded children.

Bernalillo County Chapter, Muscular Dystrophy Association of America

The Muscular Dystrophy Association supplies medical care and therapeutic aids to victims of muscular dystrophy. The agency also maintains an active public education program, utilizing materials provided by the Association's national office. The agen-

cy provides home-care services for victims of muscular dystrophy.

Mrs. Arthur Starz is secretary of the Bernalillo County Muscular Dystrophy Association. Her husband is in Sandia's Specialties Division 4224. The Starz' son, Karl, was last year's Muscular Dystrophy State Poster Child.

New Mexico Chapter, Multiple Sclerosis Society

The Albuquerque office of the Multiple Sclerosis Society secures funds to be used in overcoming multiple sclerosis.

Money received by the organization is used for services to patients, provision of therapeutic devices, and information and education programs. Monthly meetings are held during which a medical advisory board makes its services available to patients.

New Mexico Chapter for Crippled Children and Adults, Inc.

President of the board of directors for the Crippled Children's Society is H. V. Catt of Financial Division 6021. Other Sandians active in the Society are T. E. Zudick (3465-1) and R. A. Quelle (3122-1).

A crutch and wheelchair loan closet, a direct case service, and a camp for crippled children are provided. The National Society carries on research in various crippling diseases.

Livermore Lab Woman To Form Toastmistress Club at Sept. 18 Meet

Twenty-eight women from Livermore Lab are expected to attend an organizational meeting Sept. 18 to form Livermore's first Toastmistress Club. The meeting will be held at 6:30 p.m. at Lucky Lanes Bowling Alley.

The aims of the Toastmistress Club will be to improve skills in public speaking and effective presentation of ideas.

Organizers for the new group are Evelyn Foote (8212-1), Joan Peterson (8114), and Ellen Cunningham (8233-2). Advice and information for the club were supplied by Chet Tarne (8163-1) and Bob Dougherty (8141-1), Livermore Toastmaster Club members.

A representative of the Alameda, Calif., Toastmistress Club will present details on the national organization at the meeting and will assist with the organization and election of officers for the new club.

Sandia women interested in joining the group may contact Evelyn Foote.



BADGE OFFICE employees in Bldg. 802 are busy these days processing the new badges which will be distributed on Sept. 22, 23, 24, and 25. Peggy Henrie (foreground) matches negatives with pictures; Rae Jackson files negatives; Velda Messersmith checks badges. Laminated ID cards will also be issued on these dates.

New Tech Area Badges Will Be Issued Sept. 22-25

New Tech Area badges will be distributed at Sandia Laboratory Sept. 22, 23, 24, and 25, Security Studies and Education Division 3232 announces. At Livermore Laboratory, the new badges will be issued on Sept. 22.

Employees at each Lab will continue to wear present badges until new badges are issued by supervisors. At this time employees will turn in their old badges and sign a receipt for the new one.

If an employee is not at work on the distribution days, the first day he returns he must pick up his new badge at the Badge Office in Bldg. 800 at Sandia Lab or Bldg. 911 at Livermore Lab before entering any Tech Area.

After scheduled distribution has



FOUR MACHINES in the Badge Office, which each laminate four badges every 12 minutes, are going at full speed now. Helen Gelwicks takes badges out of machines when lamination is completed.

been completed, no employee will be admitted to a Tech Area with his old badge.

Buffet at Coronado Club Features Style Show; September Events Set

A fashion show featuring the "New Autumn Silhouette" will highlight the Coronado Club's monthly buffet dinner-dance Saturday, Sept. 23.

Buffet lines will be open from 6 to 8 p.m., and Judy Clark's models will appear at 8:15. Following this the state and national ballroom dancing champion, Dick Clark, will entertain with exhibition dancing.

Dancing to the music of Al Hamilton's orchestra will be held from 9 to 1. Tickets are priced at \$2.60 for members and \$3.60 for guests. Reservations may be made now at the club office.

For bridge players, a dinner and Open Pairs Club Championship Tournament will be held on Thursday, Sept. 21. Dinner starts at 6:15, followed by play at 7:30 p.m. Cost

of the dinner and the tournament is \$1. Reservations should be made in advance at the club office. For further information call R. M. Fegan (AEC), ext. 40297.

Registration for the 10-week basic and advanced ballroom dance classes will be held on Monday, Sept. 18, the first night of instruction. Beginners will meet at 7 p.m. and advanced students at 8:30. Cost of the entire course is \$6 per person.

"My Man Godfrey" will be the feature movie for Family Night on Sunday, Sept. 24. Free cokes and popcorn will be served during the show which starts at 6 p.m.

Lee Sprague's combo will be playing tonight at the club from 5 to 8 p.m. and next week it will be Rex Elder. Social hour is from 4:45 to 6:15, and the \$1.75 buffet is served from 6 to 7:30 p.m.



A PIECE OF ROPE, a glass of wine, and the "Good Book" serve as appropriate props for three Livermore Lab Sandians who have roles in the forthcoming Cask and Mask production of Arsenic and Old Lace. Left to right, Phil Mead (8233-1), directs Arsenic and Old Lace. (8224-2), plays a clergyman, and Skip Baca (8232-2), sips wine laced with arsenic. The play will run Friday and Saturday nights for three weeks starting Oct. 6 at May School Theatre.

C. M. Stover Develops Aluminum Humidity Sensor; Device Has Varied Applications, Uses

A tiny humidity sensing device, developed by C. M. "Cliff" Stover of Advanced Development Division 7223, has proved to be a superior instrument for measuring relative humidity.

Originally developed to be used in radiosondes, instrumentation carried by a fast-rising balloon to gather weather data, the new humidity sensor seems easily adaptable for a variety of laboratory and field uses.

The aluminum oxide element is so sensitive and responds so rapidly that placing a finger near the element will cause the gauge to leap. Range of sensitivity runs from zero to 100 per cent over extended temperatures of -80°F to 165°F .

The humidity elements consist of two electrodes (layers) of metal separated by a porous aluminum oxide coating. The coating is formed by anodizing the surface of either an aluminum plate or a foil. The other metal electrode (sensor) is deposited over the anodized coating by an evaporation process.

A change in relative humidity causes a change in the resistance and capacitance between the two electrodes of the element. The electrical circuitry associated with the element allows the relative humidity of the element to be read on an indicator.

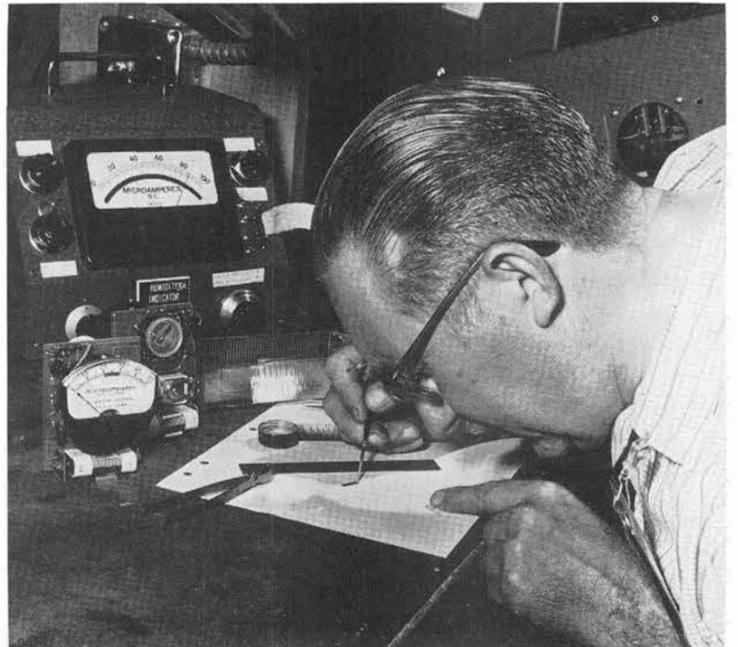
"The idea of using an aluminum oxide sensor is not original," Cliff says. "But earlier attempts were not too successful. The anodizing of aluminum seemed to be the problem."

During the development of his sensor, Cliff explored methods and techniques of anodizing until he became an "expert" in this area. Finally, he produced a very thin, smooth, and porous anodizing on the tiny aluminum element. This coating can only be detected by a slight tinted color when it reflects or diffracts light.

The anodize must be controlled to obtain a uniform surface which contains no areas where moisture may be trapped and cause errors in readings. The area over which the evaporated leads and contacts are placed is sealed with a thin solution of lucite cement.

After the initial success of the sensor in radiosonde instrumentation used by the Field Testing organization, the element was turned over to Advanced Manufacturing Development Division 2564 to coordinate further applications of the sensor.

According to Doug Ballard, 2564 supervisor, the sensor has a wide variety of potential applications—



TINY, THREAD-LIKE WIRE is connected to a new aluminum humidity sensor developed by C. M. "Cliff" Stover. The device has proved to be a superior instrument and applications are foreseen in the weapons program as well as in commercial fields.

from weapon components to a useful instrument to measure the moisture of grain in storage.

"Specifically, our interest is in using the sensor in manufacturing processes and applications where moisture content must be monitored or controlled. For many uses, the device is far superior to anything on the market." In addition, Doug indicated that the commercial applications are limitless. From agriculture to air conditioning, the humidity sensing device will offer tremendous advantages over existing equipment.

A patent application for the process used to produce the element has been applied for, and eventually production of the device may be assigned to a commercial firm.

Cliff Stover first came to Sandia in 1948 and worked in Instrumentation Development. In 1950 he accepted a position at Kirtland Air Force Base to organize the 4925th Instrumentation Laboratory for the Air Force Special Weapons Center. In 1952 he became production supervisor for Crown Engineering in Albuquerque and after six months joined ACF Industries as a test engineer.

He returned to Sandia in April 1956, again in instrumentation development.



HUMIDITY SENSING ELEMENT, developed by C. M. Stover, is shown against a background of a U. S. dime. The tiny device, made from aluminum foil with a thin anodized oxide coating, possesses extreme sensitivity and responds rapidly to humidity changes.

C. M. Gueldenzoph To Retire Sept. 30

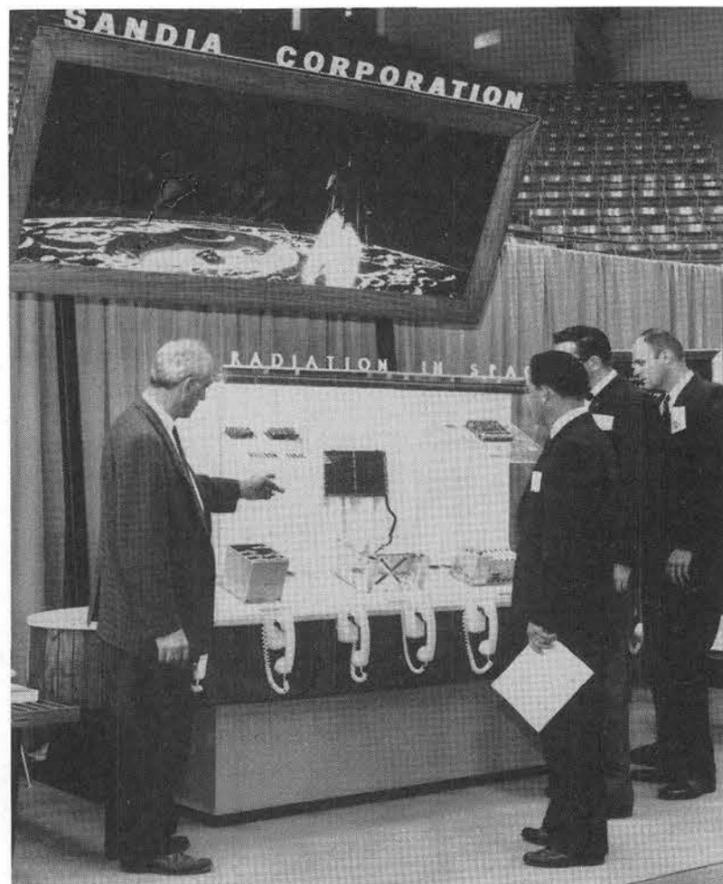
C. M. Gueldenzoph, a precision grinder in Grinding and Jig Boring Section 4251-2, will retire Sept. 30 after working at Sandia Corporation for 10½ years.

"Goldie" had been a precision grinder in Toledo, O., for many years, but changed to motel management when he came to Albuquerque 15 years ago. When his son decided to apply for a job at Sandia, Goldie accompanied him to the employment office and ended up with a job himself.

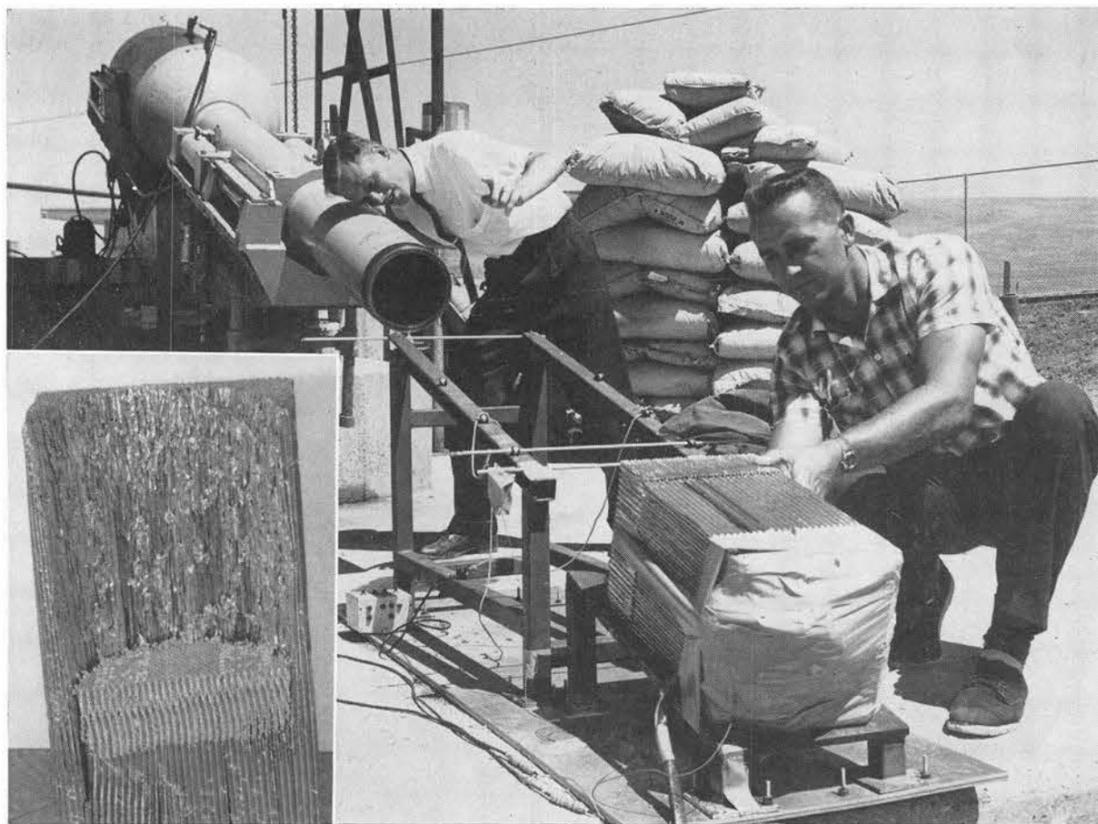
Fishing and golfing will occupy a lot of his time now, as well as home remodeling projects. He and his wife, who live at 2845 Washington NE, plan to remain in the Albuquerque vicinity.

Congratulations

- Born to:**
- Mr. and Mrs. Marlin F. Aker, Jr., (2441-1) a daughter, Pamela Jo, on Aug. 20.
 - Mr. and Mrs. W. A. Gardner (3424/7120) a son, Robert Harold, on Aug. 29.
 - Mr. and Mrs. Frank Tuffs (4542) a daughter, Lori Beth, on Sept. 3.
 - Mr. and Mrs. J. D. Benton (8125) a daughter, Martha Ann, on Aug. 11.
 - Mr. and Mrs. H. S. Bjorklund (8121-1) a daughter, Vivian Margaret, on Aug. 15.
 - Mr. and Mrs. H. L. Brumfield (8115-2) a son, Douglas Ward, on Aug. 28.
 - Mr. and Mrs. Willie Smith (4511-1) a daughter, Valerie Marline, on Aug. 15.
 - Mr. and Mrs. Allan M. Fine (9111) a daughter, Nancy Leigh, on Sept. 6.



SPACE PACKAGES designed by Sandia Laboratory were displayed at the recent Institute of Telemetry and Telemetry Symposium on Space Electronics and Telemetry held at the University of New Mexico. Ben Russo (3431-2), left, discusses the exhibit with a group of UNM students. Hundreds visited the Corporation display.



TARGET for air gun water entry tests at Livermore Laboratory is missile warhead instrumentation attached behind block of aluminum honeycomb. Tests conducted by Ralph Morrison (8126-

2), standing, and Gene Simpson (8121-1), have shown that honeycomb acts much like sea water in passing energy from the air gun projectile to the instrumentation. Inset shows comb after test.

Building better instrumentation . . .

'Honeycomb' Aluminum Blocks Duplicate Shock of Missile Smashing Into Water

A striking similarity between aluminum "honeycomb" and sea water has led to an economical and time-saving technique for testing nuclear weapon instrumentation systems at Livermore Laboratory.

Until recently it was almost impossible to guarantee that instruments recording flight tests would survive when a missile hit water. Now, however, it is possible to test the instruments in advance by attaching them to the rear of a block of pre-shaped honeycomb and firing a projectile at it. The honeycomb acts as a shock absorber, soaking up the blow and relaying it to the instruments in the same way water would.

The crushing properties of aluminum honeycomb were investigated by Ralph Morrison (8126-2) over a two year period, using the Laboratory's 8-in. air gun.

Ralph's early tests revealed that honeycomb crushes at a constant rate when struck by the air gun projectile, regardless of the speed

at which the projectile was fired. Further tests showed that an object attached to the rear of the honeycomb would receive a smooth transfer of energy, much the same as that experienced by a missile hitting water.

This similarity has made possible shock and acceleration testing of large instrumented components in the laboratory. The result is more reliable instruments for use in missile flights and that means finding out more about what happens to missiles and warheads in flight.

"We can evaluate commercial products and our own weapon components quickly and easily this way," Ralph said, "making sure they will work in the field. For example, we tested a commercial miniature tape recorder which the manufacturer claimed would withstand a force of 750g's. The machine fell apart on the first test. Using this test information as a guide, a recorder was designed which met our requirements."

A typical test package consists of a block of aluminum honeycomb with the recording instruments and the object to be tested mounted behind. A projectile is fired from the air gun at the package, crushing the honeycomb and propelling the package through the air into a sawdust-filled pit. There the entire assembly and projectile can be recovered for additional study and salvage.

Rectangular blocks of honeycomb are used in most tests since they are easily cut, and the shape produces square waveform patterns. Other shock pulse shapes can be generated by forming the front of the honeycomb in various geometric profiles.

Test objects have been subjected to forces up to 2000g's, sustained for four milliseconds, using the air gun. The gun can fire a 150-lb. projectile at a muzzle velocity of 500 ft. per second, although most tests require muzzle velocities of 300 ft. per second.



"PRISONER OF WAR" captured during Army Reserve maneuvers conducted in Texas is searched by Capt. V. E. Kerr (4542) and 1st Lt. W. L. Hammond (4343-1). The officers are assigned to 321st Civil Affairs Group, 8th Army Corps (Reserve).

Sandians Complete Summer Camp In Army Civil Affairs Reserve Unit

Thirteen employees of Sandia Corporation have completed annual unit training with the 321st Civil Affairs Group, VIII U. S. Army Corps (Reserve) at North Fort Hood, Texas.

The employees, who were on active duty from Aug. 5 to Aug. 19, include Maj. J. E. Westbrook (3453-1), Capt. V. E. Kerr (4543-3), Capt. R. E. Moll (1111-1), Capt. W. R. Seidel (1432-4), Capt. H. D. Sivinski (7311-1), Capt. C. E. Spencer (1413-1), Capt. J. E. Suazo (7133-2), 1st Lt. R. C. Cranfill (2344-2), 1st Lt. W. L. Hammond (4343-1), 2nd Lt. M. H. Gubbels (7311-1), SFC J. F. Campbell (2344-2), SFC E. G. Paboucek (4411-1), and Sp6 R. E. Craven (4411-3).

During the first week of their encampment, the men trained in infantry combat maneuvers, which included chemical, biological, and

radiological warfare; anti-infiltration and anti-guerilla warfare; survival, evasion, and escape tactics; compass and map reading training; and small arms proficiency.

During the second week, the 321st Group participated in exercise Test Run. Here the men dealt with the safety, health, industrial, legal, financial, agricultural, and commercial problems which faced a mythical occupied country.

In being assigned to a Civil Affairs unit, the men have the primary mission of supporting the combat commander and his military operations. The unit does this by conducting the civil affairs of a conquered people until they are able to govern themselves again. In addition to being civil affairs specialists, the men must be thoroughly familiar with the principles of infantry tactics.



SUPPLIES NECESSARY FOR survival for a family of four living in a fallout shelter for two weeks were recently displayed in various buildings throughout the Tech Area by Emergency Planning Section 3232-1. Inspecting the material are (l to r) Pete Cook (7532), Bill May (1432), and Lee Constants (AEC).

"Why Should I Give to the United Bay Area Crusade?"

"Why should I give to the United Bay Area Crusade?" asks Smokey Maxwell (8225), chairman of the 1961 campaign at Livermore Laboratory. "This is the question I had to ask myself before I agreed to organize and carry out the program.

"What I found out made me a firm supporter of this voluntary movement to help the young, the old, the sick, and the troubled in the communities in which we live. Perhaps the answers I received may help answer some of your own questions."

Q. What does the United Crusade do for me?

A. Four out of five families in the Bay Area benefit directly from the United Crusade; most of them have children who are active in Scouting and other youth activities supported by the Crusade.

Q. What if I don't have any children?

A. Even if you don't have any children, your relatives do, and certainly your neighbors' children benefit. Anyway, youth activities supported by the Crusade help shape our future adult citizens. A municipal judge once said he saw very few Boy Scouts in his court.

The fewer juvenile offenders, the less cost to the taxpayer.

Q. What are some of the other services provided by the United Crusade?

A. UBAC supports 263 health, welfare, and youth services in the five counties making up the Bay Area, including 87 in Alameda County. Seven of these agencies have offices in Livermore and Pleasanton. The services of all these agencies are available to everyone.

Q. What are some specific examples of UBAC services in the Livermore area?

A. United Crusade funds helped provide 47 local visits by the Visiting Nurse Association in the first six months of this year. More than 1200 Livermore and Pleasanton girls in the Del Valle Girl Scout Council and 1045 local boys in the Oakland Council of the Boy Scouts enjoyed activities supported by Crusade funds. The Family Service Agency of Central Alameda County handled an average of 90 counseling calls in Livermore per month last year.

The Council of Social Planning, Livermore Area, provided assist-

ance to 182 Livermore residents last year. More than 50 Livermore youngsters benefited from youth activities provided by the Catholic Youth Organization of Alameda County, a Crusade-supported agency.

The Oakland Council, Camp Fire Girls, arranged programs for 45 Livermore and Pleasanton girls. The Oakland Red Cross Home Service assisted an average of 26 families a month in Livermore and Pleasanton, helping families of armed forces personnel with family and personal problems.

Q. What agencies have offices in the Livermore area?

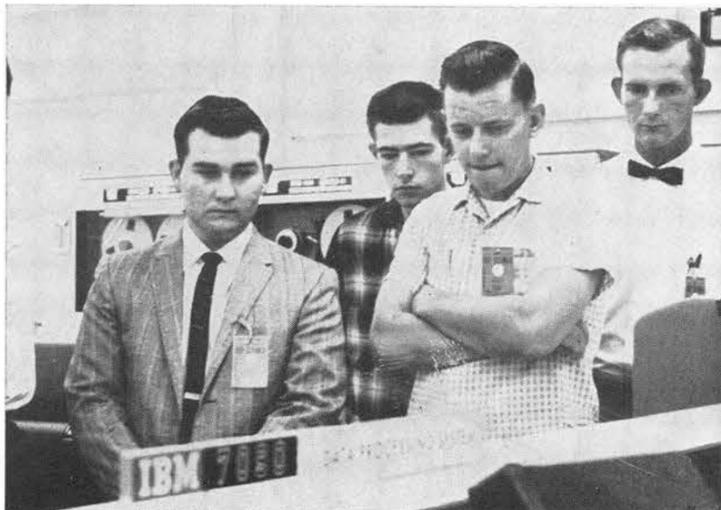
A. The Twin Valley Association for Retarded Children, the Family Service Agency, the Livermore Area Council of Social Planning, Del Valle Area Council of Girl Scouts, the Pleasanton Boys' Club, the Pleasanton Township Welfare Council, and the Salvation Army Service Extension Department.

Q. What are the dates of the Livermore Laboratory Crusade?

A. Oct. 2 through Oct. 7, 1961.

Q. What is the Crusade goal for Livermore Laboratory?

A. \$12,000.



OPERATION OF SANDIA'S IBM 7090 computer in Bldg. 880 is explained to a group of 23 graduates of the Western Electronics Institute during a tour recently. In addition to the Data Processing Center, the group viewed a showing of "The Sandia Story."

Outdoor Living Is Nothing But Pleasure at Northrups

The Clyde Northrups practically live outdoors during the summer. First thing in the morning Clyde (7252) takes a dip in their swimming pool, then there's breakfast on the patio, a mid-morning swim for wife Gladys, dinner beside the pool, and frequent entertaining alfresco.

As a family project, the 16 x 40 ft. pool and the adjoining terracing and landscaping represent considerable hard work.

Three years ago, after the hole was dug, Clyde Northrup, Jr. (who worked several summers in Field Test), Bob Burgess (7213), and neighbor Doug Ballard (2564), put in long hours placing the steel reinforcing wires. Clyde, Sr., missed out on that session; he was in Florida on Corporation business.

The foot-thick gunnite and crushed marble tile plaster were commercially installed, but there was work enough left for all! Gladys and other wives helped place the coping tile, while the husbands — including Clyde, this time — poured concrete for the poolside lounging area and built foot after foot of planter boxes.

The only time there has been a problem with children was when the hole was first excavated. Seven little boys showed up with their suits not expecting to see a dry hole.

"We have a rule," Gladys explained, "that no children may swim here unless accompanied by their parents."

Since the water ranges in depth from five ft. to 14 ft., it really isn't designed for small children.

The water is heated, allowing a comfortable swim season from May to October. There are also underwater lights for night swimming. The aqua and white color theme is carried out in the dressing room, converted from part of the garage and opening toward the pool.

Neighbors expected the pool to become a center for social activities, but admittedly were a little "shook" to hear bagpipes wailing from that direction one recent evening. The Northrups had invited the Shriners bagpipe band for a swim, and the members — in showing their, ahem, appreciation — brought along pipes and drums.



LEISURELY SWIMS are frequently enjoyed by Gladys and Clyde Northrup (7252) in their large backyard pool. Splashing about in the far end of the pool are the children of Doug Ballard (2654).

Horseshoe Springs Summer Home Area in Jemez Mountains Helps Get Sandians 'Away from It All'



REDONDO PEAK, 11,254 ft. high, forms backdrop for "the meadows," in the Horseshoe Springs Summer Home Area. Through the trees are cabins of families who use the mountain retreat.



SUMMER CABIN of John Hobart (4213) is shown in the Jemez Mountains last October. Cabin sites are leased from Forest Service.



"KINGSBROOK" is the name of this cabin built by H. R. Kingsbury (4513) and LeRoy Hassebrook (4423). Scene above was taken recently when the cabin was the scene of a section picnic.



B. C. BROWN and his family stop for a moment on the steps of their log cabin in the Horseshoe Springs Summer Home Area. Pictures on this page were taken by LeRoy Hassebrook.



PICNIC TABLE constructed from sections of logs is enjoyed by E. L. "Tex" Arterburn (4253) and his family. His 20x30 ft. cabin was built in a month in partnership with J. F. Bryson (8223) who has since transferred to Livermore Laboratory.

Horseshoe Springs Summer Home Area is in the heart of the Jemez Mountains some 70 miles northwest of Albuquerque. Surrounded by trees and close to lakes, rivers, streams, the area is a cool retreat for 12 Sandia families.

During the summer, most of the families leave Friday evening after work and head for their cabins to spend a lazy weekend fishing, boating, picnicking, or "just resting."

As Chester Clyde (1422), one of the oldest "settlers" in the area, says, "It's just great to get away from it all—plenty to do if you want to, but relaxing is the primary business." Chester has had a cabin at Horseshoe Springs for eight years.

Most of the cabins in the area were built by the owners. Resting on a concrete and cinder block foundation, construction is of logs and log siding. All the cabins feature fireplaces. Some have second story sleeping lofts and attic storage space. REA electricity is available.

About three years ago, the residents formed an association and financed a water system. Horseshoe Springs provides the water but storage tanks and pipes were installed. It is a gravity system,

practically maintenance free.

R. R. Wynant (2621) is secretary-treasurer of the association and E. L. "Tex" Arterburn (4253) is vice president.

Other Sandia residents with cabins in the area include B. C. Brown (4224), R. A. Vermillion (4224), Winnie K. Cox (3441-1), John Hobart (4213), R. F. Prokash (2311), Clyde Millard (2563), R. W. Durkee (1314), H. F. Kingsbury (4513), and LeRoy Hassebrook (4423-2).

"Kingsbrook" is the name of the cabin that Kingsbury and Hassebrook built in partnership. It features a large 14 x 30 ft. living room, kitchen, bath, and bedroom. The upper level is a 10 x 30 ft. sleeping loft. A covered porch runs along the entire length of the front of the cabin.

"We built ours in about a month," LeRoy says, "during a vacation. We started on Memorial Day and had it livable by the Fourth of July. Since then, we've completed several other projects such as the porch, cabinets inside, and storage space."

Kingsbrook was recently the scene of a Section 4423-2 get-together. "We had about 40 people up here," LeRoy says, "for a real picnic."

The cabin is typical of the Horseshoe Springs style — large, comfortable, rustic, but with all the comforts of home.

During the summer fishing is good in Fenton Lake, only seven miles from the cabin area, or in the San Antonio River which is only a "stone's throw" from the homesite area.

In the winter, hunting is a popular sport of the Sandians. Deer and turkey are plentiful with an occasional grouse or bear.

The cabin area is accessible during most of the winter. Dick Prokash brings a Christmas tree back to Albuquerque during December. However, mud is a problem in the spring.

"For me, it's practically a year round second home," Dick says. "We spend as much time as possible there. No phones, no TV, no clocks, and this is fine with us. We get away from it all."

The cabins are located in the Santa Fe National Forest. The residents lease the sites from the U.S. Forest Service.



BOB VERMILLION (4224) and his wife are putting screens around their chimney flue. Most cabins in the Horseshoe Springs area were built by the owners during weekends and vacations.

Penn State Instructor Spends Summer At Sandia Studying Tolerancing Method

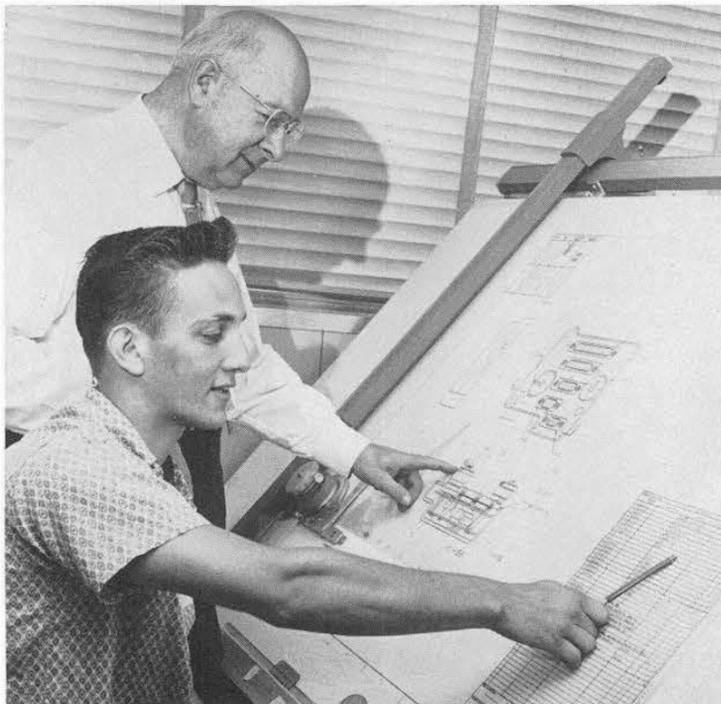
"It's been a pleasant summer," Harold I. Knox said last week as he left Sandia Laboratory to return to Pennsylvania State University. "For a while now I have been the student."

Mr. Knox is instructor of mechanical engineering subjects at the Penn State York campus. In Design Definition Department 4410, where Mr. Knox has been assigned, are 55 Staff Assistants who are graduates of the Penn State technical institute program.

Several of these Sandians are former students of Mr. Knox. He has been at Sandia this summer getting a first hand look at some of the work done by his students and other draftsmen throughout Sandia Laboratory in addition to his regular assignment in Division 4412.

Particularly, Mr. Knox has been studying the Sandia standards of "Tolerances of Position and Form Including the Maximum Material Condition Principle." This is a method, now adopted by the Military, American Society of Automotive Engineers, American Standards Association, AEC, and other industries, to designate dimensional tolerances of parts on drawings.

"While working here this summer," P. A. Nicovich (4412) said, "Mr. Knox was able to gain first-hand knowledge of the latest drafting and design practices employed in industry so that he can incorporate this information into his instruction at Penn State. Eventually we would hope to recruit technical institute graduates who are knowledgeable in these



HAROLD I. KNOX, instructor of mechanical engineering subjects at Penn State University, discusses a drawing with former student Dave Newcomer (4412). Mr. Knox has been at Sandia this summer studying Sandia's method of tolerancing and dimensioning.

principles and practices when hired and thereby relieve us of inflated educational programs now carried out."

Mr. Knox is no stranger to industry. Three years ago he became a full-time instructor at Penn State after teaching in the evening educational program of the

University for 20 years. During this time he was employed by S. Morgan Smith Co., now a branch of Allis-Chalmers, in the hydraulic turbine engineering field. He has had wide experience in other industries, including mechanical design for AMF Corporation in Brooklyn, N.Y.

Welcome Newcomers

Aug. 28-Sept. 8

| | |
|------------------------------------|------|
| Albuquerque | |
| *Mary B. Adair | 3126 |
| Mildred G. Bauers | 4135 |
| Joseph E. Brown | 4233 |
| Theodore Brueggemann | 4254 |
| *Dianne J. Cleveland | 3126 |
| Dythe Colazzi | 3126 |
| James A. Constant | 4233 |
| Evelyn L. Crouse | 7512 |
| Joyce A. Culverson | 3126 |
| Mary R. Dey | 3126 |
| James A. Dyer | 3446 |
| Theodore M. Gemberling | 6041 |
| *Diane B. Holdridge | 5426 |
| Rachel C. Jackson | 3126 |
| James A. Jordan | 4254 |
| Curtis F. King | 4233 |
| Faye M. Lee | 5152 |
| Arlene K. Long | 4333 |
| Vera I. McCullough | 3126 |
| Wanda M. Moon | 4623 |
| Lloyd A. Morrow, Jr. | 3446 |
| Joss E. Rivera | 3441 |
| Blaine E. Shaw | 4233 |
| Thomas S. Stronach | 4233 |
| Edwin D. Sutherland | 4254 |
| District of Columbia | |
| George W. Arnold, Jr., Washington | 5434 |
| Georgia | |
| Robert S. Booth, Atlanta | 3465 |
| Illinois | |
| Donald H. Habing, Urbana | 5431 |
| Jerome E. Truskowski, Chicago | 2564 |
| Iowa | |
| James D. Plimpton, Ames | 5113 |
| Maryland | |
| Charles R. Duvall, Baltimore | 4411 |
| Michigan | |
| Luther K. Horning, Ann Arbor | 5433 |
| New Mexico | |
| James R. Bennetts, Socorro | 3444 |
| New York | |
| Louis C. Brossard, Buffalo | 1121 |
| Joseph F. Dal Porto, Niagara Falls | 1121 |
| Milton D. Waite, Utica | 4411 |
| Oklahoma | |
| Robert M. James, Stillwater | 4315 |
| Pennsylvania | |
| Peter P. Klein, Lebanon | 4413 |
| Guy J. Zazzara, Coatesville | 4411 |
| Texas | |
| Robert L. Ewing, Lubbock | 2563 |
| Gerald W. Smith, Beaumont | 5133 |
| * Denotes Rehired | |
| Returned from Leave | |
| Alvin G. Bytheway | 7321 |

Sympathy

To J. C. Asturias (2542) for the death of his father in California Aug. 28.

To F. E. Bell (3131-1) for the death of his father in Summit, N. J., Aug. 1.

Sandia Service Awards

20 Years
Bell Telephone Laboratories



L. G. Rainhart
1112
Sept. 25, 1941

15 Years



Jack P. Shoup
1413
Sept. 19, 1946

10 Years

Sept. 16-29

Nasario G. Romero 4624, Warren C. Elder 4253, H. H. Brueggemann 2533, Abelio T. Garcia 4573, Guy Denton 4518, W. F. Gamberale 4541, Perfecto Garcia 4621, Antonio J. Mata 4513, Homer R. Messenger 4232, James J. Lang 7183.
Don Williams, Jr. 7311, Robert J. Mueller 4412, Robert F. Masak 4632, Candido C. Montano 4621, Robert R. Harner 7522, Louise Major 3113, Herrmann G. Page 7322, Byrd C. McKay 4221, Franklin Barnett 2323.

SHOPPING CENTER

CLASSIFIED ADVERTISING

Deadline: Friday noon prior to week of publication unless changed by holiday.

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 Corporation and AEC employees only
6. No commercial ads, please
7. Include name and organization.

FOR SALE

- 10 INCH TV, tube okay, needs alignment, \$10; Maytag automatic washer, pump needs minor repair, \$50. Williams, 255-4109.
- BUFFET, 5 ft., oak, heavy duty, one year old, \$75. Padilla, AX 9-0460.
- CAMPER TRAILER and 1961 GMC pickup. Will trade for 1956 or later GMC or Chev. pickup. Arthur, TR 7-1935.
- GIRLS' BICYCLE, 26". Boal, AM 8-8271 after 5 p.m.
- FIESTA DRESS, corduroy, w/lined jacket, gold trim, \$29; two evening skirts, modern print, \$5, black sheer w/silver embroidery, \$8, size 12-14. Joseph, AX 9-6989.
- DIVAN and chair, \$50; baby bed, stroller, swing and car seat, \$50; 8mm movie camera, f2.7 lens, \$20. Moery, AX 9-3630.
- FLUTE, Key of C, made by Pedler, complete with carrying case, used two years. New \$126, take \$75. Stewart, AL 6-9290.
- WASHING MACHINE, GE, \$40; standard size screen door w/guard, \$3. Petrini, AX 8-0433.
- LIONEL "027" freight train, 4 cars, 2 switches, complete w/smoke, graduated trestle, automatic uncoupler, 38 tracks, transformer. Martin, AL 6-6785.
- '47 JEEP, 4-wheel drive, ideal for hunting, new tires, many extras, \$500. Whatley, 215 De Soto, Belen.
- 3 BDR Mankin home, bath and 3/4, carpeting, drapes, 1 1/2 years old. Hannan, 317 Glorietta NE, AX 8-0028.
- 24" BICYCLE and one 26" bicycle, \$18 each. Reed, AX 9-1684.
- 12' BOAT and trailer, will trade for used Ford, Chev., or Studebaker worth approximately \$300. Cox, AL 6-1977.
- '53 CHEVROLET Bel Air sport coupe with '54 running gear, '53 Chev. 6 and '55 Chev. 8 complete, '54 Chev. parts. Shoemaker, TR 7-2053.
- KING SIZE coffee table, antique table, antique painted chest (beautiful in adobe house), school desks, chair, Indian jewelry. Southwick, AL 5-3312.
- WHEELCHAIR, lightweight, folding. Duns-worth, 243-4364.
- '60 FALCON, 11,000 miles, take over payments. Sandoval, CH 3-6957.
- HIGHCHAIR; stainless steel drip coffee maker; outside door and hardware; old polychrome mirror; small antique desk. Mebs, AL 5-1350.
- MARLIN 30-30, Model 336 RC saddle carbine, \$50; 10x13" umbrella tent, \$45. Thomas, AL 6-2371.
- CLOTHES DRYER, Westinghouse, \$50. Mitcham, AX 9-8425.
- USED CAFE equipment, reasonable. Morehouse, TO 5-7665, Los Lunas.

- DACHSHUND PUPPIES, AKC champion stock, available for adoption by end of September, females \$35, males \$50. Norton, BU 2-3165.
- PORTABLE TYPEWRITER, Smith-Corona, \$35 or best offer. Neitzel, DI 4-5509.
- CUSTOM DOG house for small or medium dog. Sargent, AX 9-0427.
- GIRLS' BICYCLE, 24", \$12; bowling ball, bag, shoes 8 1/2, \$15; 12 ga. shotgun, model 12, \$65; poker table, \$20. Otero, 256-6597.
- GE REFRIGERATOR, 10 cu. ft., \$75. Sikora, AM 8-8907.
- '59 TRIUMPH Tiger Cub, less than 400 miles, motorcycle, \$395. Beckedorff, ext. 21176.
- PANELRAY HEATER, 25,000 BTU, \$20. Stromberg, AL 5-6131.
- CANARY, good singer, cage and stand included for \$7. Batchelor, AX 9-4831.
- '54 FORD 2-dr., R&H, overdrive, five regular tires plus two snow tires, new paint, \$425. Sanders, DI 4-0436 after 5 p.m.
- '53 CHEVROLET 2-dr. sedan, Power Glide transmission, \$300. McDonald, AL 5-7938 after 5:30 p.m.
- SERVAL GAS refrigerator, \$20; set for natural gas but adaptable to butane or kerosene. Galbreath, DI 4-4306.
- SELL OR TRADE southeast Michigan farm, 12 room house, 15 acres on main highway, for Albuquerque property. Kostka, AM 8-8793.
- BOAT LADDER, 3-speed, aluminum; foam rubber, Water Speed belt, never used. Geilenfeldt, AL 6-7357.
- 21" TV, Philco console, \$60; Walbilt gas range, \$20; baby feeding table; baby car bed. Harley, 345-0031.
- SEWING MACHINE, Singer featherweight, zigzag attachment, \$70. Sharp, AX 9-3745.
- ELECTRIC SHAVER, Norelco Speedshaver, \$7.50. Metzger, 298-5054.
- KENMORE 30-in. electric range, 1 year old. Golden, 298-3806 after 6 p.m.
- 3-BDR HOUSE, southeast Heights, paneled den w/fireplace, double garage, built-in range and oven. Brinkley, AL 5-2783, after 5 p.m.
- '50 MERCURY CLUB COUPE; stroller; high chair. Wilson, 298-0049.
- BICYCLE, boy's 24", thornproof tubes, kick stand, large basket, \$15. Thayer, 1424 Hoffman Dr. NE, AX 9-3127.
- '58 LAMBRETTA MOTOR SCOOTER, model 125. Sandgren, 1510 Pitt NE, AX 9-5007.
- TWO CUSHION (reversible) divan, chocolate brown and green, \$50; sport coats and suits, size 42 and 44, \$5 and \$10. Collins, AL 6-6886.
- NEW WARD'S WATER COOLER, 4u00 cfm., 2-speed, 25 ft. copper tubing, \$100. Scully, 299-9373.
- MOSSMAN 3-BDR, den, family room, 1 1/2 bath, carpet, drapes, landscaped, double garage. Alhorn, AM 8-4049.
- 15' BOAT, 1961-40 hp motor, trailer, fully equipped, \$800 or trade for house trailer or compact car; dishwasher, \$35. Westman, AL 5-6048 except on weekends.
- 21" TV, blond console, tube guaranteed, \$65; Filter Queen vacuum cleaner, \$16; Sunbeam Mixmaster, \$15. Chandler, AX 8-1976.
- TWO PIECE SECTIONAL studio couch, Turquoise, nylon-backed vinyl, each section makes into bed, used 1 year, \$60. Martin, AM 8-2020.

NEXT DEADLINE FOR SHOPPING CENTER ADS Friday Noon, Sept. 22

- '50 STUDE. Champ, R&H, OD, \$85. Wolf-inbarger, AX 9-4841.
- BROWNIE MOVIE CAMERA, projector, lite bar w/carrying case, filter, 1 roll of film, \$70. Giles, AX 9-3119.
- 3-BDR BRICK, 1-3/4 baths, carpet, drapes, dishwasher, sprinklers, landscaped, ac, patio, near Winrock, Inez School, owner selling \$700 above appraisal. Scott, AX 9-7893.
- '50 STUDEBAKER, runs, \$50; communications receiver, Hallcrafters S-20R, needs repair, \$25; Heathkit chairside HiFi cabinet, mahogany, \$25. Dossey, AL 6-0857.
- LP GAS HEATERS, two 20,000 BTU, one 30,000 BTU, \$15 for the 3. Ogdan, CH 3-4723.
- FOUR MINK SCARFS. Welch, AL 5-4876.
- SNOW EXECUTIVE 3-BDR, 1-3/4 bath, den, fireplace, carpeting, disposal, air conditioning, walled backyard, patio, sprinkler, extra storage, \$17,900, \$1500 down. Porter, AX 9-2788.
- 4 BDR, 2 patios, bar-b-q, 16x28 den w/ fireplace, refrigeration air conditioned, 2000 sq. ft. living area, landscaped, carpeted, drapes, all for \$9 sq. ft. Remholz, AX 9-5107.
- 26" BOY'S ENGLISH BICYCLE, 3-speed, \$20. Sellers, 9000 Zuni SE, Space D-10, AX 8-0696.
- NORGE DRYER, \$75; Norge washer, \$125; bar stools, wright iron, 2 for \$5; Walnut finish shutters, 16 for \$20; Sears Craftsman Deluxe power mower, 6 mo. old, \$85. Campbell, 299-8071.
- 12' Viking aluminum boat, 3 1/2' Evinrude, oars, lifejackets, \$235. Balfour, AX 9-7954.
- '51 PONTIAC CLUB COUPE, \$150. Montette, AX 9-3517.
- '51 JEEP STATION WAGON, OD, rebuilt engine, \$300. Benton, TR 7-0873.
- KENMORE 30" gas range, 1960 model w/ griddle, wide oven, timer. Amos, 298-4470.
- COIN COLLECTORS — have 1896, 1897 silver dollars, uncirculated, best offer or exchange coin of equal value. Williams, AM 8-7159.
- BRADLY-RUNABOUT-KART, low speed, overhauled by owner; Hollywood cast-aluminum electric boiler, indoor or outdoor use, \$10. Dieter, AL 5-8056.
- GE 21" table model blonde TV, \$45. Murray, DI 4-5289.
- GIRL'S small bicycle, recently painted and reconditioned, \$15. Smith, DI 4-8022.
- LA W N MOWER, w/catcher, \$6; men's traveling bag, heavy saddle leather, value \$85, sell \$20; Volkswagen luggage rack, cost \$37.95, sell \$15. Browning, AX 9-6384.
- 2 PAIR LINED DRAPES, 100"x82" and 124"x84", beige with tropical design, \$10; 36" wide screen door complete with grill. Brake, AM 8-8320.
- HOUSE, \$7000 total price, \$500 down with easy terms. Aguilar, 345-0609.
- '55 FORD COUNTRY SEDAN with R&H, Fordomatic transmission. Myers, 1413 Georgia NE, AL 6-0468.
- 99F SAVAGE 308 caliber, flip off mount unertl scope, see at 532 Kentucky SE, Apt. A. Humphrey.

- '59 BUICK LeSabre, air conditioned; aluminum Thunderbird camper fold-out trailer, never used; lightweight waterproof nylon canvas 4'x27', \$7 each. Dollahon, AX 9-8107.
- TRANSISTOR LAB, Knight 10, circuit kit, \$9.50; camera tripod pan head, \$3.50; fluorescent desk lamp, \$7. Johnson, AL 6-9504.
- ROLL-AWAY BED, 39" wide, steel frame, comfortable mattress, \$15. Bueffel, AX 8-1163.
- CONN ORGAN, original cost \$2500, will sell for \$850; typewriter, standard size Allen, \$50; portable Smith-Corona, \$30. Dixon, AX 9-6886.
- '58 PONTIAC Chieftain, 2-dr., big Pontiac engine, straight shift. Newton, AM 5-1042.
- INEZ BRICK, near schools, library, Win-rock, 3 bdr., 1 1/4 bath, carpeted, draped, landscaped, sprinkler system, corner lot. Smith, 7702 Cutler NE.
- STUDENT TRUMPET, Olds Ambassador, \$40; American Flyer freight w/complete gear, \$25; football shoes (9E), helmet and pads, \$15. Krieger, AL 5-8584.
- TRUMPET, Olds; croquet set, 6 mallets. Sandy, AX 9-0980 after 5 p.m.
- BELGIUM F. N. MAUSER, 8mm Sporter Model, open sights, sling, lightweight, \$55. Kasporek, 265-0237.
- 30" ELECTRIC RANGE, automatic timer, \$70; 11' Firestone electric refrigerator, \$35. Miller, 265-0029.
- NEW PHILIPPINE MAHOGANY wall cabinet kits with hardware, 30x18, \$8 each, 24x30, \$10.50 each. Clemons, AX 9-6004.
- SHOTGUN, 16 ga. double barrel Fox Model B, \$69; 8 boxes assorted high velocity shells, \$12. Strome, AL 6-3324.
- MOTOR SCOOTER, Cushman Hilander, many new parts, \$40. Gary, 256-7325.
- BOAT, 16' fiberglass, 60 hp Scott motor, trailer, skis, all accessories, 1840 Saint NE. Sumlin, AX 9-6137.

WANTED

- CHILDREN TO KEEP in my home, closed in back yard, play room, references furnished. Lerke, AL 5-0780.
- RIDE from vicinity of Carlisle and Central or Lomas to vicinity bldg. 802. Langdon, AL 5-3990.
- TO RENT 2-bdr. house in vicinity of Monroe Jr. high, prefer rent under \$85. Weiss, AX 9-0603 after 5.
- CHILD CARE 5-day week, Princess Jeanne area, fenced yard. Armijo, 1011 Marcella NE, AX 9-5836.
- WILL CARE FOR TWO CHILDREN in my home, vicinity Eubank and Menaul. Wolfe, AX 9-2458.
- RIDE from vicinity of N. Fourth and Gene Ave. to bldg. 802. Martin, DI 4-8446.
- FAMILY to help share cost of building fallout shelter, 5 min. walk maximum from 2120 Utah NE. Bray, AX 8-2334.
- RIDE vicinity of San Mateo and Douglas MacArthur to gates 7 or 8. Shortt, DI 4-9868.
- HOME for free kittens. Tatum, TR 7-0997.
- MAPLE CHEST OF DRAWERS and maple desk. Johnson, AL 5-5427.
- BABY CRIB, Used. Milligan, CH 3-2429 after 5.
- FRENCH HORN, second hand, in good condition. Borbely, AX 9-3210.
- BICYCLE, 26 in. boy's in good condition, prefer 2-speed and medium weight tires. Adams, AL 6-7265.
- TWO RIDERS to join car pool vicinity Hendola and Hannett NE, Snow Heights, to gate 4. Taylor, AX 9-2281 or Mills, AX 9-2130.

- NEED RESPONSIBLE lady to do babysitting and light housework in my home. Boespflug, AX 8-5236.
- TO JOIN CARPOOL from the San Mateo, Candelaria vicinity, 4400 San Andres. McDonald, 344-9965.
- BOWLING LEAGUE? Evening classes? Just going out? For a reliable babysitter call Leah, 298-3284, 2901 Christine NE.

FOR RENT

- ROOM FOR GENTLEMAN, clean, quiet, with adjoining bath, \$10 per week, Menaul NE. Jones, 298-5166.
- LARGE DELUXE two bdr. apt., unfurnished, built-in all electric kitchen, SE location near base, \$110. Griffin, AM 8-8991.
- 1-ROOM COTTAGE, furnished, \$12/week, near bus, twenty minutes to Base. Coombs, CH 2-9321.
- FURNISHED BEDROOM and private bath with house privileges included, ten minutes from Sandia Base, female only. O'Neal, AX 9-7918 after 5 p.m.
- 4-BDR HOUSE, \$120 per month, located in NE Heights. Boling, AX 8-1020.
- 3-BDR unfurnished house with gas range, \$65; 3-room apt., \$45, SW Valley, 20 min. from Sandia. Barrett, AM 8-2963.
- ROOM WITH private entrance and bath, Hoffmantown. Bascom, AX 9-1662.

LOST AND FOUND

- LOST — Man's brown plastic raincoat, man's black plastic raincoat, papers in envelope marked N. M. Title, potted unit 4" dia., 4" long. LOST AND FOUND, ext. 26149.
- FOUND — Silver ring, 687th AC&W Sq. lighter, Parker 61 pen, Pearl button earring w/gold trim. LOST AND FOUND, ext. 26149.

FOR SALE AT LIVERMORE

- '58 FORD FAIRLANE V-8, stick shift, 4-door sedan, take over payments of \$52.00 a month. League, HI 7-6639.
- '56 OLDSMOBILE SUPER 88, 2-door hard-top, power steering and brakes, \$800 cash or \$150 cash and take over payments. Baldwin, HI 7-4452.
- '58 ISETTA 300, 50-60 M.P.G., \$299.99. Puckett, HI 7-6322.
- '59 METROPOLITAN, red and white, radio and heater. Ford, HI 7-6142.
- MARBLE TOP TABLE, 16"x20", \$30; men's figure skates, size 5 1/2, \$40, asking \$10. Manrow, HI 7-4512.
- BUNK BEDS, 2 sets, Sears Roebuck, each set cost \$39.95 plus freight new; both sets for \$50. Henderson, HI 7-4417.
- CHILD'S VIOLIN (3/4 size). Strickland, HI 7-5551.
- 35MM ARGUS ELECTRIC EYE camera, 1/500 shutter, film counter, new \$90 — sell for \$50 or best offer. Truitt, Ext. 2433.
- '58 MINISCOOTER SCOOTER, 2 1/2 H.P., 4 cycles, weighs 70 lbs., approximately 100 miles to gal., \$79.50. Var, Ext. 2329.
- PORTABLE AIR COOLER, twin blower, Homart, with stand, \$30. Ludington, HI 7-0106.
- TWO BEDROOM HOUSE, carpeting, insulated, two bath, electric kitchen, fireplace, covered patio, double garage, landscaped. Burns, HI 7-5561.
- THREE BEDROOM, two bath house, electric kitchen, landscaped, sprinkler system, fences, low down payment can be arranged. Clem, HI 7-4044.
- SELL OR TRADE — Complete mobile or fixed rig: Morrow MBR-5 Rcvr.; Multi-Elmac AF-67 Transmitter; M-1050 mobile power supply; Model PS-2V AC power supply. Silva, HI 7-0638.

Polls to Be Open 8 a.m. to 7 p.m. for Special Vote Sept. 19

City and county voting polls for the forthcoming state-wide special election will be open to the public from 8 a.m. to 7 p.m. on Sept. 19. At that time, voters will decide the fate of 12 New Mexico constitutional amendments.

Copies of The New Mexico Voter, a publication presenting unbiased discussion of the amendments, voting instructions, and other election information, are available now in Laboratory booklet racks.

Sandians on Program Of Mountain States R & D Conference

Program for the Mountain States Research and Development Clinic to be held in Raton Sept. 28-29 is complete, according to Arnold E. Bentz (7243), program chairman of the Instrumentation and Testing session of the clinic.

In addition to Mr. Bentz, five other Sandians will be participating in the program of the two-day clinic.

H. D. Finch (7252) will present "Performance Analysis of Telemetry Systems;" N. P. Sinnott (7213) will read "Attitude Measurements on Spin Stabilized Rocket Vehicles." "Tests for Combined Environments" will be presented by W. A. Gardner (7300); "Quality Control Program Techniques" will be presented by J. R. Sublett (2560), and "Automated Test Systems" will be presented by T. F. Marker (2420).

The clinic will be attended by representatives of the Navy, Federal and State governments, universities, and industry. Hosts for the clinic are the State of New Mexico, New Mexico State University, and the Raton Chamber of Commerce. Cooperating sponsors are the states of Arizona, Colorado, Idaho, Montana, Nevada, Oklahoma, Texas, Utah, and Wyoming. The Navy Department is working with the sponsors who manage the event.

Patent Issued AEC in Name of D. F. Wilkes

A patent on an acceleration integrating means has been assigned to the Atomic Energy Commission in the name of Donald F. Wilkes (1322).

The invention covers fluid metering velocimeters from which several Sandia components have evolved. These velocimeters provide a single integration of the acceleration history of a carrying vehicle and are equipped to close an electrical switch after a pre-determined velocity change has been experienced.

Features which cooperate to provide a useful and accurate measurement are: hydrodynamic fluid floatation of inertial mass to reduce friction forces; combination of a linear spring and magnet with a stop action for an auxiliary setback mass which keeps the component in ready condition; and permanently-latched switch closure after pre-determined velocity change has been experienced which may be manually reset for testing purposes.



MICRO-FILMBANKS, such as this one at Livermore Laboratory, have recently been installed to provide rapid reference and print service for engineers. Here document clerk Teresa Pasqual (8232-1), pulls microfilm cards for E. F. Ingledue (8156), as Bill Guntrum (8125-2) studies drawing.

Push Button Prints, Instant Drawings

Micro-Filmbanks Store Thousands of Drawings, Provide Quick Access to Data

Push button prints from "instant" drawings are saving countless hours of effort for engineering and service organizations throughout Sandia Corporation.

Large, bulky reproductions of engineering drawings—once difficult to store, handle, and locate—are now being replaced with postage stamp-size microfilms, stored for easy retrieval in microfilm systems known as Micro-Filmbanks.

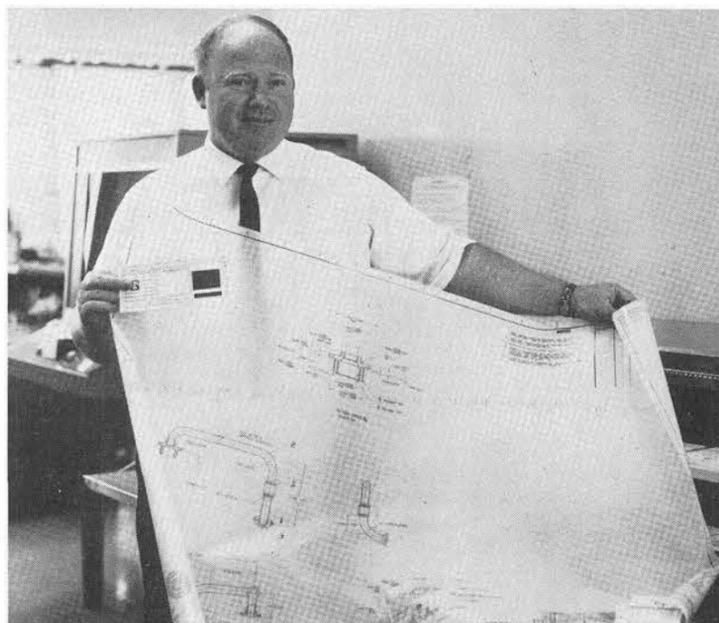
A Micro-Filmbank consists of a microfilm file cabinet plus one or more microfilm printer-reader machines. The cabinet contains a complete microfilm file of each Laboratory's engineering drawings and multilith copies of the latest Engineering Change Orders. To view a drawing, a microfilm card is pulled from the files and placed in a printer-reader which enlarges the image 15 times and projects it on a screen. An enlarged print of the drawing can be obtained in a few seconds by pressing a button on the machine.

The Micro-Filmbank system, an adaptation of a Signal Corps idea, was introduced to Sandia Corporation by Howie Smyth, supervisor of the Livermore Lab Document Control Section 8232-1, who coined the "Micro-Filmbank" phrase. Howie supervises the Micro-Filmbank operation at Livermore Lab and formerly headed a Document organization at Sandia Laboratory.

"The banks are paying off with interest and dividends in speed, convenience, and savings," Howie said.

Replace Bulky Drawings

"Previously, anyone who wanted to see a drawing or get a check print, had to submit a request to a document clerk who would pull the full-size original reproducible from the vault," Howie continued. "Large drawings were bulky to handle, and check prints from any drawing generally took from two hours to



HOWIE SMYTH (8232-1) compares size of engineering drawing and IBM microfilm card which replaces it. Howie introduced the Micro-Filmbank system to Sandia Corporation and supervises its operation at Livermore Laboratory. This Filmbank, the first put into operation, holds 120,000 microfilmed engineering drawings.

a day to obtain, depending on the number of prints requested."

"Now," Howie said, "instant viewing is available from the Micro-Filmbanks by use of the printer-readers, and check prints can be obtained in 10 seconds."

Up-to-the-minute Files

And the files are up-to-the-minute. At Livermore, a microfilm copy of an engineering drawing reaches the Micro-Filmbanks within eight working hours after the drafting group releases the tracing. Multilith copies of Engineering Change Orders are received and catalogued within two hours after release by the Product Control group.

"We also have a complete reference file of drawings which have been supervised, archived, or obsoleted within the past year," Howie said.

Another dividend offered by the system is that only one clerk is required to service a Filmbank of 100,000-plus drawings in a space no larger than 10 by 15 feet.

"The system also eliminates the need for many classified check prints, since engineers can often get their information directly by viewing the microfilmed tracings," Howie said. "This not only eliminates the record keeping and security measures that would go along with such prints, but also relieves the engineer of being held accountable for classified prints which he may not need."

The first Micro-Filmbank was

set up at Livermore Lab last December in the drafting room. Its popularity resulted in the recent addition of another Micro-Filmbank which was placed close to the engineering groups. Together, the Livermore Lab Filmbanks hold over 205,000 microfilmed drawings and Engineering Change Orders.

Compatible systems and standards are used in microfilming engineering drawings at both Laboratories.

The drawings are reduced on 35mm film 16 to 30 times, depending on the size of the drawing. The processed film is then mounted on an IBM "window" card which contains information on size, identification number, and security classification of the drawing. The cards also indicate the number of copies made and issued. All microfilmed drawings are projected at 15 times the photographed size on the microfilm-printer-reader.

When quantities of prints are needed, the microfilm cards are sent to Copyflo machines which are capable of automatically making hundreds of enlarged copies. Both the Microfilming and Copyflo machines are operated by Ozalid Reproduction Section 8232-3.

(In a future issue of the Lab News, the Sandia Laboratory use of Micro-Filmbanks, microfilming facilities, and document storage will be featured. Seven microfilming installations are in operation throughout the Sandia Lab Tech Area.)



THIS LARGE TROPHY no longer is displayed by Sandia Laboratory. Employees of the Dow Chemical Company at the AEC Rocky Flats production facility surpassed Sandia's previous all-time AEC safety record of 14,936,169 employee-hours worked without a disabling injury at noon Wednesday.

Rocky Flats Facility Earns AEC All-time Safety Award Trophy

A display case in the lobby of Bldg. 800 is empty.

The large trophy, symbolic of the highest safety accomplishment of any Atomic Energy Commission contractor, left yesterday for the AEC's Rocky Flats production facility operated by Dow Chemical Company.

Wednesday at noon employees of Dow Chemical surpassed Sandia Laboratory's all-time AEC national safety record of 14,936,169 employee-hours worked without a disabling injury.

Sandia employees achieved the record from July 17, 1959 through Sept. 6, 1960. The large trophy was presented to Sandia Laboratory on July 11, 1960, by the AEC. A smaller replica of the trophy will be presented to Sandia for permanent display.

The Rocky Flats installation is located eight miles south of Boulder, Colo. The 2200 employees of the facility have worked without a disabling injury since Sept. 16, 1957. The record will be audited by the AEC for confirmation.

To Modify Electrical System in Tech Area

Bids were opened this week for modifications to a Sandia Laboratory underground electrical system in Tech Area I, according to an announcement by the Atomic Energy Commission.

Work will include construction of underground ducts, additions to and replacement of existing 5KV feeders, and replacement and installation of other electrical equipment. Work is to be completed within 120 days after the contractor receives notice to proceed from the AEC.

Plant Engineering Department project engineer for the electrical system is V. O. Easley (4543-1).

June Leonard Heads Lab Women Golfers

An organizational meeting was held recently for the Sandia Lab Women's Golf Association. June Leonard (3432) was chosen president, and Rosalie Crawford (1) and Betz White (2641) were elected to the Board of Directors.

First tournament is planned for Saturday, Sept. 16, at the Los Altos golf course. Any Sandia or AEC distaffer is eligible to enter the tournament. For further information, contact Rosalie Crawford, ext. 38264.

Sandia's Safety Record

**Sandia
Laboratory
HAS WORKED
420,000 MAN HOURS
OR 12 DAYS
WITHOUT A
DISABLING INJURY**

**Livermore
Laboratory
HAS WORKED
200,367 MAN HOURS
OR 39 DAYS
WITHOUT A
DISABLING INJURY**