Sandia Labs Completes 'Crash' Testing Program for Apollo

Sandia Laboratories is completing a sixmonth crash program of analysis and safety testing of a cup-sized radioactive heater scheduled for use in Project Apollo.

Sandia's job is to ensure that the heaters, which contain plutonium, would survive atmospheric reentry and earth impact if the mission were aborted.

"This accelerated program is a prime example of how we are able to respond quickly to the needs of a new project," says Gene Blake (1520), former manager of the Aerospace Nuclear Safety Department 9510.

"It shows how, in a short period of time, Sandia can make significant contributions to the safety of a design through analysis and environmental testing."

The heaters are designed and built by AEC's Mound Laboratory in Miamisburg, Ohio, and will control the temperature of an instrument package to be left on the moon by the Apollo astronauts. Since the intense cold of the lunar night — as low as 250 degrees below zero — would cause the electronic instruments to stop operating, this additional heat source is required. NASA selected the radioisotopic-fueled heater, which gives off heat as the radioactive material decays.

The two heaters used in the package will keep the electronic instrumentation at temperatures between -65 $^{\circ}$ to +160 $^{\circ}$ — a range within which the instruments will function properly.

Sandia's safety evaluation produced aerothermodynamic information which helped engineers at Mound Laboratory arrive at the final design. Safety questions were answered by mathematical computations backed up by testing of models and components in Sandia's environmental testing facilities.

The shape of the heater, and its path and velocity through space were used to determine the heat, pressure, vibration and shock which it might experience. In turn, the design of the package itself — particularly its ability to withstand shock and heat — was analyzed to ensure that it could also survive these conditions.

Dynamic shock machines, rocket sleds, reentry arc tunnels and other facilities in Sandia's environmental test area were used to obtain this data. Heater packages were "re-entered" in a supersonic stream of gas which subjected them to temperatures approaching 3500°F. The packages were also accelerated by rocket sleds into a variety of targets to determine their survivability.

Small size of the heat source posed some problems. In an air drop test over Sandia's Tonopah Test Range, for instance, radar tracking of the falling module was not possible because — at a height of two miles — the target was too small to detect.

To overcome this problem, the aircraft's position was precisely fixed by radar, a radio signal was transmitted at the time of the drop, and the impact of the module was recorded by a geophone — a microphone-like instrument which picks up vibration transmitted through the earth. With this data, Sandia mathematicians were able to compute the speed of impact —about 120 miles an hour.

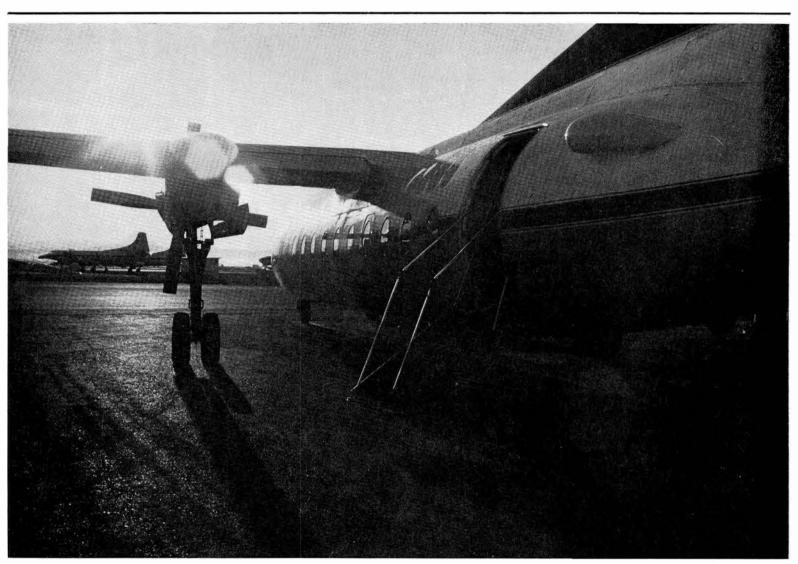


DIMINUTIVE A POLLO HEAT SOURCE is shown with stainless steel outer container and aluminum mounting plate. The heat source is riveted onto the Apollo lunar surface instrument package.



SANDIA LAB NEWS

VOL. 21, NO. 7, MARCH 28, 1969



BUS STOP—This is the "shuttle bus" that a group of Sandians ride each day on what must be the longest daily commuting run. Living in Las Vegas, they ride to work at Tonopah Test Range in the comfort of this Fairchild F-27 airliner. The 200-mile trip (each way) takes about 50 minutes. The F-27 went into service for Sandia earlier this month and is operated by Carco. TTR people, who previously

commuted from the small town of Tonopah about 40 miles from the range, began moving to Las Vegas shortly after the first of the year. About half of the group of 40 now live in Las Vegas and the remainder are scheduled to make the move soon. LAB NEWS went along on a flight and talked to Don Anderson (7231) about what it's like. More pictures on page six.

Judges, Programs, Demonstrations

Sandia Will Participate in Science Fairs

Sandians will again participate — primarily as exhibit judges — in both regional and forthcoming state science fairs.

Dean Buckner (2355), Billy O'Neal (3312), and Daniel Aeschliman (9341) will serve as judges for the Southeastern New Mexico Regional Science Fair being held today and tomorrow in Roswell.

The 10th annual northwestern regional fair, being held in Albuquerque today and tomorrow, has Sandians judging in the

fields of chemistry, mathematics, aerospace physics, biology, chemistry, electrical engineering, physics, radio biology, and chemical engineering.

They are: Jean Antoine (2315), Dick Basinger (1712), Carroll Coonce (1211), Robert Dosch (5421), Jerry Everett (9515), Al Goodman (1224), Edgar Gilbert (1713), Curtis Hines (1712), Wesley Holley (9515).

Richard Hildner (1711), Bernard Kenna (5421), Samuel Levy (2343), Michael Parsont (9515), Rod Quinn (5154), Ben Roscoe (1711), Calvin Smith (2314), George Samara (5132), Daniel Sasmor (9511), Ben Seely (5421), Bruce Van Domelen (100), and Curtis Mueller (9515).

Community Relations Division 3433 was responsible for lining up the judges and for making arrangements for programs and decorations for the awards banquet. Ken Sutton (3433) will present awards to students at the banquet tomorrow evening at the New Mexico Union Building.

In addition, "The Magic of Fire," an hour-long demonstration by two Sandians on the dangers from fire and static electricity, will be shown before high school science students and teachers attending the State Science Fair in Socorro, April 19. Harvey North and Marshall Tippy (both 3351) have given this demonstration more than a dozen times before audiences in several cities.

"We emphasize the 'fire triangle'," Harvey says. "Take away any one of the three elements — fuel, air, or heat — and the danger is reduced, but when all three elements are present, you'll have a fire."

During the show, the men use a plastic popular to emphasize the danger from vapor concentrations, a glass frying pan to show how to extinguish a fat fire, and cans of hair spray or insect repellent to demonstrate what happens when pressurized products are used near an open flame.

A dramatic part of the show occurs when gasoline in a approved safe can is intentionally set afire. The self-extinguishing feature of the container carries its own message.

"The whole point of the show," Harvey and Marshall agree, "is to make people think about potential hazards."

In Out-of-Hours Program

Sandians Earn TI Certificates

Wallace Hunt (4613) and Bob Kehl (2491) are the most recent Sandians to receive certificates for earning the equivalent of a technical institute degree in Sandia's out-of-hours education program.

Wallace, a stock analyst in General Stores Division 4613, is the first person to complete the 20 courses in the administrative technology curriculum. He started the program in 1962 and averaged completion of two courses per semester.

Included in the administrative curriculum are such courses as economics, administrative statistics, basic computer principles, survey of data processing machines, and principles of industrial accounting.

Wallace has worked at Sandia since 1953 and was previously assigned to vouchering investigation and chemical stores stock analysis.

Bob Kehl completed the mechanical technology curriculum in the out-of-hours program, transferring four courses previously completed at the University of New Mexico.

He was recently promoted to staff assistant and assigned as a technical field representative to the Midwest and Rocky Mountain Field Area Section 2491-3.

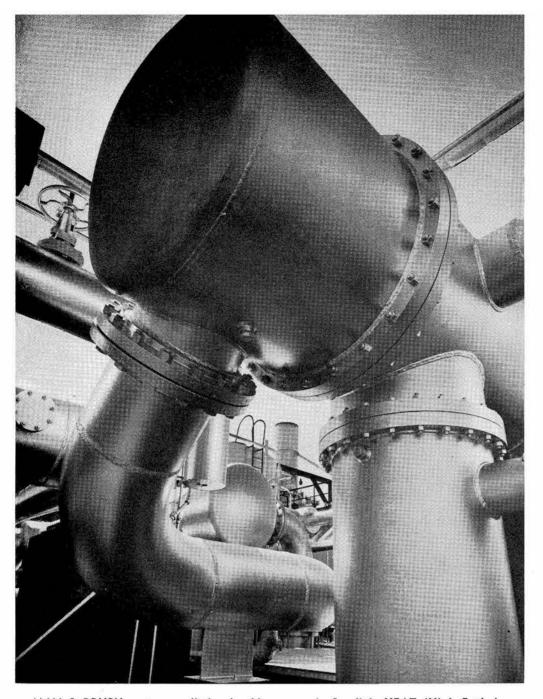


Wallace Hunt

A graduate of Sandia's machinist apprentice program, Bob took his first outof-hours course in 1963 and has averaged completion of two courses per semester since that time

Bob Kehl

Employee Training and Education Division 3132 offers technical institute level courses in electronics, drafting and design, mechanical, industrial and administrative technology. Classes are conducted during noon hours and after work. Students study on their own time and must maintain satisfactory scholastic standing.



MAN & BRUSH met surrealistic plumbing array in Sandia's HEAT (High Enthalpy Arc Tunnel) facility to produce this striking three-dimensional art. A softly shining silver was selected as simpatico with environment. Painter Herman Gower (left below) and plant technician Harold Neuhaus stand in the midst; not shown are plant technician Donald Hansen and painter Frank Ridlon who also worked on the project. All work in Remote Areas Maintenance Division 4518.



SANDIA LAB NEWS

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SANDIA LABORATORIES ALBUQUERQUE, NEW MEXICO LIVERMORE, CALIFORNIA

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John Shunny is Editor, Don Graham Ass't. Editor Cherry Lou Burns & Don Wolfe are Staff Writers Matt Connors & Lorena Schneider are Staff Writers in Livermore Bill Laskar is Photographer Norma Taylor/ All The Rest



Credit Union Statement

As part of its normal audit procedure, the supervisory committee of the Sandia Credit Union recently mailed statements to members with account numbers from 7000 to 7999. If your account number is in this series and you have not received your statement, please notify Earl Simonson (4122), committee chairman.

HOW'S THE EXCAVATION?

I THINK I'VE

Self-Starting Thermal Battery Invented by Samuel Levy

Most thermal batteries are activated when a pyrotechnic mixture is fired by means of an impulse or signal. A Sandia chemist has invented a self-actuating battery which operates when a specific temperature is reached.

Samuel Levy (2343) relies on the behavior of lead-tin and lithium which melt and alloy when a temperature of 186°C (265°F) is reached. Heat generated by this action is sufficient to activate the thermal

The external heat can be from any source and can be applied at any rate. These characteristics make the batteries suitable for use as signals in sensing fire, overheating of components caused by friction or proximity to a hot object, or heating of a reentry vehicle in the atmosphere. The thermal battery can also be used as a combination heat-sensing device and power source for the safing of explosive devices involved in a fire.

The heat generators consist of a disc of lithium pressed between two discs of leadtin foil. When heated to 186°C, a large pulse of thermal energy is released instantaneously. The entire battery is sealed in a stainless steel case. The temperature of activation may be altered somewhat by varying the location of the discs in the battery and by the use or absence of thermal insulation in or around the bat-

A patent for this invention has been assigned to the U.S. Atomic Energy Commission in Samuel's name.

Manuel Chavez Elected To Head O & PE Union



Office and Professional Employees International Union. Local 251, AFL-CIO, recently elected Manuel Chavez (4151) to be president for a two-year term. The Union represents approximately 1300 employees in the Albu-

querque area. Other Sandians elected to various offices in the union include: Peter Olguin (7635), Herman Perea (4151), Hilda Cruz (7631), Rose Gonzales (7631), Maxine Stephenson (7631), Edward Gullick (4573) and Del Gutierrez (7333).

Labs Men Give Time To Construct School

Thanks to the efforts of some 50 men, including 10 Sandians who donated more than 250 man-hours, the Jemez Baptist Indian Mission now has a new educational

The new facility, built entirely by Albuquerque area volunteers, contains four classrooms plus utility space. Marwin Austin (4513), who is associate director of the Mission Brotherhood Association which organized the expansion project, served as he construction crew. Another Sandia volunteer, Clyde Hughes (4254), is the association director.

Among Sandians who gave time to the project, which took 11 Saturdays to complete, was Jerry Fragua, a Jemez Pueblo Indian who works in Janitor Service Division 4574. Jerry's three sons, Jerry Jr., David and Erwin, also worked on the building.

Other Sandia volunteers were Leon Luke (4151), who lives in Jemez Springs, Charles Boal (9413), Gordon Gaskill (3428), Robert Boyd (4512), Bill Thompson (4575), Donald Mackenzie (9322) and Ray Bishop



INVENTOR Samuel Levy (2343) displays a lithium, lead-tin generator which energizes a battery when a specific temperature is

Events Calendar

March 28-30-"Volpone," a satire on greed. University Theatre, for reservations tel. 277-4402.

March 31 - Grand opening Albuquerque Sports Stadium, major league exhibition baseball game, San Francisco Giants vs. Cleveland Indians, 3 p.m. Ticket office, tel. 243-1791, Stadium and University Blvds. SE.

April 1-Old Town Studio presents the San Francisco Mime Troupe. Program includes the Farce of Patelin (a satire on commercialism), monster puppets, and gorilla marching band. UNM Popejoy Hall, for reservations tel. 242-4602.

April 3-Albuquerque Symphony Orchestra, Jose Iturbi conducting. UNM Popejoy Hall.

Easter Weekend - Indian dances at most Pueblos.

Easter Weekend - N.M. Mountain Club trips to Big Bend National Park (leader Hank Taylor, tel. 282-3254), Marble Canyon of the Grand Canyon (leader Stan Logan, tel. 256-9703), and Guadalupe Ridge Caves (leader Dick Meleski, tel. 277-2331).

April 25-27-YWCA trip to Lake Powell including all-day cruise. Reservation deadline April 10. For information tel.

Promotions

Promotions

1. N. Schowers (2443) to Staff Associate Technical
2. L. Schafer, Jr. (7232) to Staff Assistant Technical
3. J. Kehl (2491) to Staff Assistant Administrative
3. J. Willis (5000) to Secretary (Executive)
4. J. Strascina (4221) to Technician
5. J. Strascina (4221) to Technician
6. Glasscock (4511) to Boiler Plant Operator
7. L. Spindle, Jr. (4222) to Specialties Technician
7. M. McGinnis (3126) to Stenographer Clerk
8. Gurule (3521) to Stenographer Clerk
9. M. McSesersmith (4333) to File Clerk
9. D. Messersmith (4333) to Record Clerk
9. W. Fenstermacher (3415) to Mail Clerk
9. J. E. Perea (3415) to Mail Clerk
9. A. Cowboy (3126) to Secretarial Stenographer
9. M. M. Lachance (3126) to Secretarial Stenographer
9. M. E. Garcia (4315) to Stenographer Clerk
9. Reinhardt (3126) to Typist
9. L. Sloan (3421) to Library Assistant
9. R. Perea (3428) to Record Clerk
9. P. Neff (4612) to Travel Clerk
9. J. Oldman (4212) to Travel Clerk
9. J. Oldman (4212) to Service Clerk
9. P. Adilla (4363) to Traffic Clerk
9. B. Miller (1612) to Editorial Assistant
9. L. Baser (3453) to Travel Clerk
9. B. Miller (1612) to Editorial Assistant
9. L. Baser (3453) to Travel Clerk
9. G. Larsen (8245) to Chauffeur
9. A. Jordan (8222) to Laborer
9. A. Jordan (8222) to Laborer
9. J. Alle (8255) to Secretarial Stenographer
9. H. J. Johnson (8242) to Messenger
9. H. Hall (8255) to Secretarial Stenographer
9. K. J. Medeiros (8332) to Secretarial Typist
9. J. J. Medeiros (8332) to Secretarial Typist
1. J. J. Kersey (8212) to Receptionist
1. J. Johne (8253) to Secretarial Typist
1. J. J. Kersey (8212) to Mail Clerk
1. J. Mueller (8242) to Mail Clerk
1. J. Mueller (8242) to Mail Clerk
1. J. Mueller (8242) to Mail Clerk
1. J. J. More (8253) to Service Clerk
1. J. Jacobs (8233) to Service Clerk
1. J. Jacobs (8233) to Service Clerk
2. J. Jacobs (8233) to Service Clerk
3. C. Barbour (7340) to Secretary
4. S. Riley (3463) to Chartist



WOW! THE RIB





AN HONEST

EDSEL GRILL.

TO GOSH





ON THE ISLAND OF TAHAA, the Skoogs stayed in a fare' (above). The small church and school at the right were built for the natives by the French who own the island.

Paradise Found

Sandian Recommends Vacation on Polynesian Island of Moorea

"If you've ever dreamed of escaping to some palmy paradise, try the Polynesian island of Moorea," advises Cliff Skoog (8333). He and his wife Stephanie spent a three-week vacation in the French Society Islands, two weeks of which they lived in a thatched bungalow on Moorea.

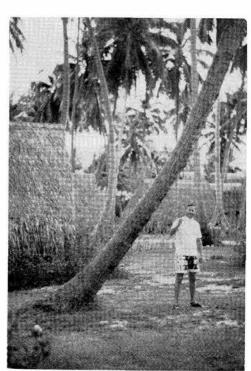
"Paradise is something people search for and rarely find," Cliff says, "and if they do, it's usually a picturesque tropical island — with nothing to do except sink into boredom.

"But we found much to do — there never seemed to be a dull moment," he says. "Our 'grass shack' was one of 150 set in an old coconut plantation. Next to us was over a mile and a half of white, sandy beach on a beautiful lagoon, where we swam and sunned daily. We found plenty of companions and enjoyed water sports and sight-seeing, and especially enjoyed the Polynesian music, food and native dancing."

All of this was part of the Club Mediterranee's village in the South Seas. "Club Med," as it is commonly called, has become one of the world's largest travel clubs. Cliff says that originally the club was predominately in Europe, but several years ago it began building vacation spots in the western hemisphere. These vacation spots aim at simplicity, with informality, a friendly atmosphere, and a wide choice of activities. "After what we experienced, I can easily understand the club's popularity and why it has expanded," he comments.

The Skoogs arrived at Papeete on the island of Tahiti, after a jet flight from California, and took a launch directly to Moorea. "Almost immediately you're given a snorkle, mask and fins, and we all had fun floating over the coral in the lagoon, watching the fish in the clear water, and diving for shells," says Cliff. "I brought home quite a collection of shells and pieces of coral. One of these days, I'll cast these and make them into a table for the patio."

Cliff says that sailboats and water ski equipment are available for the asking, scuba and skin diving are taught by experts, and horseback riding on the beach is very popular — but the chance to get



CLIFF SKOOG (8333) pauses near the "grass shack," set in a grove of coconut and palm trees, in which the Skoogs lived while on Moorea

in some deep sea fishing was the highlight for him. "This type of fishing is usually so costly that I generally put it off," says Cliff. "But here I fished two afternoons, and on the second trip out I reeled in a 40-pound mahimahi. We used a 35-foot, two-chair, deep sea fishing boat. With highly skilled Polynesian fishermen aboard, things are pretty well controlled — they know the area, and spot the fish. In any event, I felt very fortunate because I know it will be some time, if ever, before I again have such an opportunity."

Another highlight for Cliff was the excursion to the neighbor islands of Bora Bora, Raiatea, and Tahaa via small plane and boat. "I felt the scenery on Bora Bora was the most beautiful of all of the islands we visited," he comments. "The water in the lagoon here was incredibly clear and the bluest color I have seen anywhere. I took over 300 colored slides on the trip and some of my best were shot on Bora Bora. There are several hotels on the island now, including Hotel Bora Bora where we lunched.

"We remained two nights on Tahaa, staying in a grass bungalow built out over the water, called a fare'," Cliff continues. "There was no electrical power and we used gas lanterns for light. Although there are not many natives on the island, the French have built a small church and school. The total tourist capacity of the entire island of Tahaa is only 24 people, so I was thoroughly surprised when I met the wife of an Albuquerque Sandian there. She was enjoying Club Med while her husband, Al Gruer (7430), and son were on a more ambitious trip through various other South Seas islands and Australia.

"Before our return flight to California, we stayed over in Papette, a city with a population of probably over 20,000. A considerable number of luxury-type accommodations are available here, but it appeared to us that most of the guests there were not inclined to venture to the smaller, more primitive areas."

Because of the differences in language, Cliff found it difficult to assess just what the natives really think of the tourists who are coming in ever increasing numbers. "I got the impression, however, that they merely tolerate them," says Cliff, "although they were always very friendly and helpful when they understood what was needed. They seem to have little care for money except maybe to buy a motor scooter and gas to keep it running.

"Motorcycles and scooters are most popular in these islands, and have become the main means of transportation," Cliff notes. "At 6 o'clock in the morning when we arrived in Papeete and were on our way from the airport to the dock, there were already hundreds of cycles and scooters in the streets. The city has a good number of automobiles but few are seen on the other islands. On Tahaa, for instance, where there is a total of eight miles of roadway, there were only two automobiles.

"The thing that was so unique about our vacation was the complete contrast with our everyday life," Cliff concludes. "The accent was on life in the open air and sunshine, French cuisine (sometimes Polynesian dishes), and not a worry in the world."

Congratulations

Mr. and Mrs. Ken Marx (8334), a son, Arnold Kenneth, March 8.

LIVERMORE NEWS

VOL. 21, NO. 7

SANDIA LAB NEWS

MARCH 28, 1969



ANDREW CARDIEL (right) discusses drill grinder operation with visiting apprentices.

Apprentice Machinists Visit Sandia Laboratories Model Shop

Over 40 apprentice machinists from the Bay Area along with instructors from the Vocational Skills Center in Hayward and executives of California's Division of Apprenticeship Standards recently visited Sandia Laboratories Livermore's model shop. Purpose was to acquaint the apprentices with the machine shop technology used at Sandia. The visit, which was specially arranged, was one of a number set up by the Vocational Skills Center with Bay Area machine shops.

Operation of equipment was demonstrated by Rodney Aguilar, Andrew Cardiel, Joseph Marques and John Spoonemore — all apprentice machinists in Sandia's Model Shop, Manufacturing and Shop Liaison Division 8223. In addition, several of Sandia's machinists and model and instrument makers volunteered their services



JOSEPH MARQUES (center) operates con-

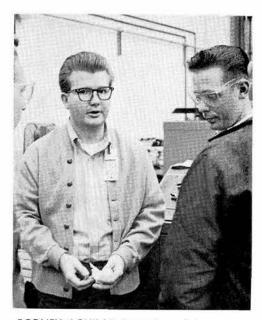


JOHN SPOONEMORE adjusts Bridgeport mill.

to answer questions and demonstrate the operation of the numerically controlled lathe and mill and other shop equipment.

All of the apprentices are enrolled in a four-year program — administered by the Division of Apprenticeship Standards — to qualify them as journeyman machinists. The program is 8000 hours of on-the-job training and includes 640 man-hours of technical and vocational training at the college level.

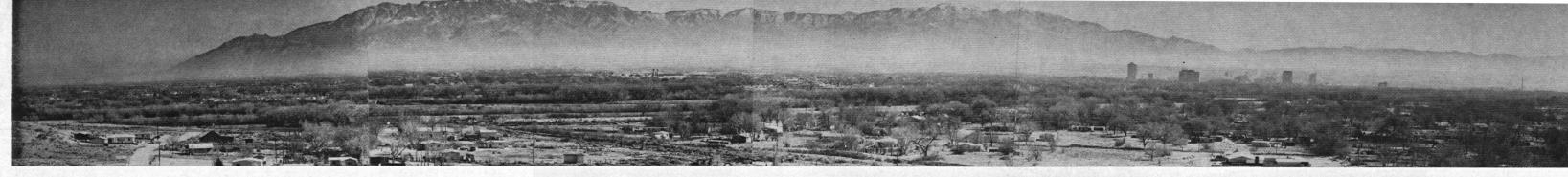
Members of the State Division of Apprenticeship Standards attending the briefing included Robert W. Clottu, assistant chief of the division for northern California; Laurence B. Taylor, business agent of Local 284, IAMAW, AFL-CIO; and John J. King, area supervisor located in Oakland. Also present were Terry D. Downey and Francis O. Bacon, both apprenticeship consultants.



RODNEY AGUILAR (center) explains operation of numerically controlled drill press.



JOHN BRYSON, supervisor of Division 8223 (left), describes job scheduling of shop to Robert Clottu, assistant chief of California's Division of Apprenticeship Standards.





WOULD YOU BELIEVE Albuquerque smog? Both pictures were taken from Pat Hurley Park on Albuquerque's west mesa. On top, the result when over 500 tons of pollutants are pumped into the air each 24 hours: dirty air,

unpleasant to look at, uncomfortable to breathe, and eventually hazardous to health. City's characteristic temperature inversion entraps pollutants. Lower picture, for whose clear vista our photographer waited several days,

shows salubrious alternative— available through legislation and technology upon public demand. Clean air or dirty air. Albuquerqueans do still have a choice, but the choice must be made soon.

A Question of Health (Part 2)

Smog --- Here Today, More Tomorrow

About 2000 years ago, the playwright Seneca left Rome partly because the polluted atmosphere interfered with his ability to work. After leaving his hometown he

"As soon as I had gotten out of the heavy air of Rome, and from the stink of chimneys, thereof, which, being stirred, poured fourth whatever pestilent vapors and soot they held enclosed in them, I felt an alteration of my disposition."

A few months ago Frank Sanitra quit Los Angeles for the same reason — too

So air pollution has been with us for a long time, and it has some effect—not good —on a person's well-being. Present day smog is different from that of Seneca's because much of it comes from internal combustion engines, and its threat to health derives largely from the heavy loading of carbon monoxide, hydrocarbons, and oxides of nitrogen.

Rise in Lung Cancer

Speaking before a congress of the American Medical Association in 1965, Dr. Donald E. Rounds, a medical researcher, said . . large levels of air pollution can produce physiological reactions ranging from eye irritation to bronchitis and emphysema. There is also considerable evidence that low chronic levels of air pollutants are associated with the increased incidence of lung cancer during the past four decades."

A 1967 report of a U.S. Department of Commerce committee on air pollution states that "Air pollution presents a serious threat of increasing significance to the health and welfare of this country and all industrialized areas of the world. Without prompt and effective action to control this contamination of the atmosphere, living conditions within and around the cities of the Nation will continue to deteriorate. Automotive vehicle emissions . . . are a principal contributor to this pr

In 1966, at hearings before the Subcommittee on Air and Water Pollution,

HEW Secretary John W. Gardner testified that "The main thrust of the evidence is clear and conclusive—the types and levels of air pollution which are now commonplace in American communities are an important factor in the occurrence and worsening of chronic respiratory diseases and may even be a factor in producing heightened human susceptibility to upper respiratory infections, including the common cold.'

"Killer Smog"

Tragic results of air pollution hazards were evident in 1952 when an estimated 2500 to 4000 persons died in a four-day "killer fog." On the Thanksgiving day weekend of 1966, an estimated 80 deaths were attributed to the heavy smog blanket that descended on New York City.

A recent LIFE magazine article relates that on the northern end of Staten Island. N.Y., which is heavily polluted by industrial smoke, respiratory cancer annually kills 55 men per 100.000 over age 45. On the southern end, which is relatively free of smog, the death rate is 40 per 100,000.

Similar examples of the health hazards of air pollution are abundant. In general, pulmonary emphysema and chronic bronchitis are the diseases most often associated with air pollution. One medical study indicated that the mortality rate for those diseases more than quadrupled between 1952 and 1962. While it is true that other factors, such as smoking, contribute to this increase, it is also true that atmospheric pollution is a significant cause, particularly in crowded urban areas.

Of course, not all effects of smog are as severe. But even the less serious effects, such as eye, nose, and throat irritation, headaches, offensive odors, and reduced visibility, can make life fairly unpleasant.

What does all this mean for those of us fortunate enough to live in Albuquerque? Are the 30 or so pounds of air each of us breathe each day poisoning us? Is polution a threat to our health?

Available evidence indicates that air pollution has not reached hazardous levels in

Albuquerque. Yet the emerging pattern is clear-more urbanization and more industry means more people more automobiles more smog and, consequently, more potential health hazards. Nationally, about 61 percent of all air pollutants emanate from automotive sources. Locally, nearly 90 percent of the gaseous pollutants are from transportation sources (dust particulates from roads and other sources are not measured in the Albuquerque emissions inventory).

It is evident that only firm regulatory action backed by strong civic demand. along with new techniques for smog abatement and elimination, can change the pattern of contamination which has already overtaken many of our larger cities.

Bill Kingsley, manager of Environmental Health Department 3310, says "As yet, I haven't seen sufficient technical evidence to indicate a health problem exists here. On certain days, however, the air pollution level is high enough to be dangerous if it persisted for a long time."

Bill is a member of the eight-man Metropolitan Environmental Health Advisory Board which advises the Albuquerque Department of Environmental Health.

"We should bear in mind," Bill says, "that if industry continues to come into this area and if stringent anti-pollution ordinances are not upheld, we can't escape really serious smog-health problems.' Qualifying his remarks on the present picture, Bill says "There we are talking about healthy persons. For those already suffering from respiratory ailments, such as emphysema, it may be a more serious situation."

CO by the Ton

Much of the Albuquerque smog is made up from automobile exhaust fumes of which a large part is carbon monoxide (CO). In 1967, automobiles pumped nearly 150,000 tons of CO (about 400 tons each day) into the air of Bernalillo County.

The effects of CO on the human body are well documented. CO is absorbed by

tion work, and agricultural operations

in blood) much more readily than oxygen. As a result, less oxygen is delivered to the brain cells in CO-polluted air. Air containing 80 parts per million (ppm) of COnot uncommon in heavy traffic conditions breathed over an eight-hour period will render useless about 15 percent of the body's hemoglobin. This oxygen loss is about equal to the loss of one pint of blood. For the frequent freeway traveler, constant concentrations of carboxyhemoglobin (CO absorbed by hemoglobin) may have cumulative ill effects. Some traffic safety researchers have suggested that these effects range from increased irritability to an impairment of some physiologic functions such as vision and coordination.

hemoglobin (the oxygen transporting agent

Levels to Rise

The intensity of CO levels in some cities has been known to reach as high as 370 ppm during heavy traffic conditions. According to the Albuquerque Department of Environmental Health, the average in this area is about 4-5 ppm on calm, clear days. In moderate traffic the level is about 10-20 ppm, and during peak traffic hours CO levels reach as high as 40 ppm under adverse meteorological conditions.

These levels, however, are rising as our metropolitan area grows. Not only are there more people, but more people are acquiring two and even three automobiles. And while anti-pollution devices on autos of the '70's will be designed to eliminate 95 percent of pollutant emissions (vs. the present 50 percent design), these devices will operate at maximum efficiency only when regularly serviced and when the engine is properly tuned. Even if we assume maximum efficiency, the anticipated number of vehicles in Albuquerque will be so great that the CO level is still predicted

Two other major pollutants originate from the auto exhaust-hydrocarbons and oxides of nitrogen. In Bernalillo County, about 90 tons of hydrocarbons and 20 tons of oxides of nitrogen are emitted daily from transportation sources, again mostly from

Hydrocarbons and oxides of nitrogen react to ultraviolet rays (in sunlight) to become photochemical smog. The photochemical smog is usually present when there are a lot of automobiles (Bernalillo County has about 180,000), temperature inversions (Albuquerque normally has inversions 15 to 17 hours each day), and a lot of sunlight (Albuquerque averages about 360 sunny days a year).

One of the elements of photochemical smog is ozone (O3), a highly noxious gas which is lethal in concentrations of 50 ppm during a 30-minute period. The generally accepted threshold level of O3 (i.e., the point up to which the atmosphere is considered safe for a healthy person to breathe over a prolonged period of time) is 0.05 ppm. According to Don Parker of Industrial Hygiene Division 3311. Oa levels as high as 0.4 ppm have been recorded in Los Angeles. "In every major city with a prolonged inversion (lasting 24 hours or more), the On level is known to exceed 0.1

ppm," Don says. "However, because Albuquerque inversions rarely last more than 17 hours. Og concentrations have not vet reached those levels."

Ozone, acting in combination with other air contaminants, has been identified as one agent responsible for significant damage to crops around metropolitan centers.

This is a bleak picture. Yet air pollution should by no means be considered an inevitable and invincible threat. It is the creature of a technology that achieves minor miracles with such frequency as to be a commonplace. To breathe clean air would seem but a modest challenge to this technology.

Next: Air pollution measuring and abatement techniques.

Authors

L. C. Bartel (5131), "Theory of Strain Induced Anisotropy and the Rotation of the Magnetization in Cubic Single Crystals," February issue, JOURNAL OF AP-PLIED PHYSICS.

G. Carli (2442), J. Marcon and J. R. Rosborough (both 2451), "A Read Only Memory (ROM) for the Read in Mode (RIM) Loader for PDP8 and PDP8/S Computers," February issue, CONTROL EN-GINEERING.

R. J. Chaffin (2623), "The Effect of Neutron Radiation on an Impatt Diode.' February issue, IEEE TRANSACTIONS ON MICROWAVE THEORY AND TECH-NIQUES.

M. J. Clauser (5151), "Pseudoquadrupole Shift and Asymmetric Line-Broadening of Recoilless Nuclear Resonance Spectra," Feb. 15 issue, PHYSICAL REVIEW. D. M. Garst (1742), "Five-Year Forecast for Contamination Control," February is-

sue, CONTAMINATION CONTROL JOUR-R. A. Hill (9342), "A New Plane Grating Monochromator with Off-Axis Paraboloids

and Curved Slits," March issue, APPLIED OPTICS R. L. Kruse (1713), "Joint Continuity of Monotonic Functions." January issue.

AMERICAN MATHEMATICAL MONTH-LY; "On the Join of Subnormal Elements in a Lattice," February issue, PACIFIC JOURNAL OF MATHEMATICS. F. R. Norwood and W. E. Warren (both

1721), "A Note on the Generalized Dynamical Theory of Thermoelasticity," February issue, JOURNAL OF MECHANICS AND PHYSICS OF SOLIDS. D. E. Amos (1722) and W. G. Bulgren

(University of Kansas), "A Note on Representations of the Doubly Non-Central t Distribution," September issue, JOURNAL OF THE AMERICAN STATISTICAL AS-SOCIATION.

E. H. Beckner (5240) and D. R. Smith (5242), "The Source of Soft X-Radiation from Coaxial Discharge Tubes," January issue. PHYSICS OF FLUIDS.

J. P. Brannen (1741), "Concerning Reversible Denaturation of RNA and Memory." Vol. 20, page 358, JOURNAL OF THEORETICAL BIOLOGY; with R. E. Haymond (University of Alabama), "Non-Iterative Solutions to Functional Equations," Vol. 3, pages 318-333, COMPUTING.

A. R. Champion and W. B. Benedick (both 5131), "Detection of Strong Shock Waves with Plastic Tapes," Vol. 39, page 377, REVIEW OF SCIENTIFIC INSTRU-

R. G. Dosch (5421), "Determination of Tantalum and Its Separation from Niobium and Other Closely Associated Elements Using Tetra-n-pentylammonium Bromide.' January issue, ANALYTICAL CHEMIS-

R. M. Elrick (5271), "Measured Brownian Anistropy of Particles in a Temperature Gradient Gas," January issue, PHYSICS

F. L. English (5153), "Capacitance and Resistance Measurements of TiO2 Rectifying Barriers," Vol. 11, pages 473-479, SOLID STATE ELECTRONICS.

R. L. Fox (9342), "On the Form of Inelastic Transport Cross Sections," December issue, PHYSICS OF FLUIDS.

N. S. Gillis (5151), "Response of a Many-Particle System to Quasi-Static Changes in Volume," Vol. 9, page 2007, JOURNAL OF MATHEMATICAL PHYSICS; "Ferroelectricity in IV-VI Compounds," December issue, JOURNAL DE PHYSIQUE.

T. A. Green (5232) and J. A. Peek (5121), "Use of Electron Scattering Data to Obtain Accurate Born Cross Sections for Atom-Atom and Other Heavy-Particles Collisions. II. Break-up of Fast H+2 Upon Collision with He," Vol. 169, No. 1, page 37, PHYS-ICAL REVIEW.

R. D. Hermansen (5439), "Molded Rigid Urethane Foams: Dimensional and Physical Characteristics," December issue, JOURNAL OF CELLULAR PLASTICS.

E. D. Jones (5114), "Observation of the Tm¹⁶⁹ Nuclear Magnetic Resonance in Thulium Gallium Garnet," Vol. 29, page 1305, JOURNAL OF PHYSICS AND CHEMISTRY OF SOLIDS.

O. E. Jones (5130) and R. W. Rohde (5133), "Mechanical and Piezoelectric Properties of Shock-Loaded X-Cut Quartz at 573° K," Vol. 39, page 313, REVIEW OF SCIENTIFIC INSTRUMENTS.

F. O. Lane (5242) and C. L. Julian (5132) "Calculation of the Piezoelectric Constants of Quartz on Born's Theory," Vol. 39, page 2316, JOURNAL OF APPLIED PHYSICS.

P. C. Lysne (5133), "Measuring Shock Arrival Times with Anodized Aluminum Switches," Vol. 39, page 754, REVIEW OF SCIENTIFIC INSTRUMENTS.

H. A. Mackay and R. L. Courtney (both 5412), "High Carbon Char Forming Systems Bases on Synthetic Resin Polymerizable Coal Tar Pitch Blends," Vol. 45, No. 10, pages 147-150, MODERN PLASTICS.

D. E. Merewether (2625), "The Arbitrarily Driven Long Cylindrical Antenna," November issue, and "Synthesis of an Electromagnetic Pulse Generator," March (1969) issue, IEEE TRANSACTIONS ON ANTEN-NAS AND PROPAGATION.

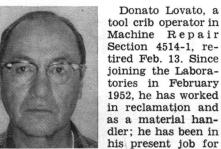
Retiring



of Janitor Service Section 4574-5, retired March 4. He was employed by Sandia in April 1957. Before that time he had worked with the Bureau of Reclamation. Mr. Armijo will

Donato Lovato, a

continue to reside at 2202 Foothill Dr. SW. He has been ill for some time and his immediate concern is to "get to feeling better soon." He likes to watch almost any type of sporting event and is looking forward to the time when he can again work in his yard and



1952, he has worked in reclamation and as a material handler; he has been in his present job for

about 10 years. Donato and his wife have three children and seven grandchildren. They own a 28-acre farm at La Joya and Donato says he is anxious to resume farming and ranching.

"I've enjoyed working at Sandia," he says, "and now I just want to settle down, enjoy myself and take life easy."



Larry Platt, a staff technician in Special Test Equipment Design Division 2441, is retiring March 31. Since joining Sandia in February 1953 he has worked with this same organization. Before that time, he was a con-

struction superintendent in Alaska. Larry and his wife Margaret, who works in Employee Benefits Division 3122, have

five daughters and 15 grandchildren. "Margaret plans to continue working for a few years before she retires," Larry says. "but we still have some very definite plans. One of the first things I'm going to do is take care of all the neglected things around the house and yard. I'll do this during the week and on Fridays I'll make preparations for a weekend at our cabin site at Deer Lake, nine miles east of Cuba. We are in the process of building a cabin with reclaimed logs from a 100-year-old house. In a couple of years when it is completed, it will be completely comfortable and modern.

"During the winter weekends we will continue to go to the cabin. We own two snowmobiles and when the snow is deep snowmobiling is really a lot of fun. The cabin is about a half mile from the main road. We will drive to the turn-off, I'll snowshoe in to the cabin, return on a snowmobile and pick up Margaret and our supplies. Our grandchildren love this activity."

When Margaret retires and the Platts are free to travel, they plan to make an extended visit to the Hawaijan Islands perhaps rent an apartment and stay for a season



Maxine Schafer a clerk in Medical Administration Division 3341, is retiring April 8. She was employed by Sandia in May 1956 and worked in the personnel organization until four years ago when she transferred to her

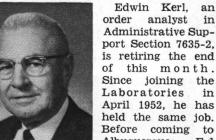
present job.

Maxine is taking advantage of Sandia's early retirement option. "I consider myself to be very fortunate to be able to retire at this time," she says. "My husband recently retired from Civil Service and my leaving now works out very well."

The Schafers are moving to Sun City. Ariz "We will spend the winters there and hunt for higher elevations during the summer." Maxine says. "We expect to do a lot of traveling, beginning with a trip to Europe in June."

The Schafers have four children — two

married and living in Albuquerque, and four grandchildren; and two sons serving with the New Mexico Air National Guard in Vietnam. "The boys will both be home in May and we are planning a great re-



Edwin Kerl, an order analyst in Administrative Support Section 7635-2. is retiring the end of this month Since joining the Laboratories in April 1952, he has

Albuquerque, Ed had been a production superintendent for 25 years at a Wisconsin woolen mill.

Mr. and Mrs. Kerl's retirement plans are indefinite. They do plan to travel around, "shopping" for a retirement home site. One of their favorite places is Colorado; in the past they have made a couple of trips a year to that state to fish and drive about just to enjoy the scenery. They also plan to visit relatives in Florida

Research Scientists' Papers at APS Meet

A number of Sandia technical papers were presented at the American Physical Society meeting held March 24-27 in Philadelphia

A. Narath (5100) and H. T. Weaver (5151) presented two papers: "Nuclear Magnetic Resonance in Dilute AlV, AlCr, and AlMn Alloys" and "Knight Shift and Spin-Lattice Relaxation Rate of Cesium Metal at Low Temperatures."

Members of Radiation Effects in Solids Research Department 5110 making contributions were: G. W. Arnold, "Modification of Luminescence in Annealed Electron-Irradiated GaAs:Cd"; D. K. Brice, "Photo-Luminescence in GaAs:Zn"; K. L. Brower, "ESR of Electron-Irradiated Al-Doped Si"; R. C. Powell and R. G. Kepler, "Energy Transfer in Tetracene Doped Anthracene Crystals"; G. C. Smith, "Photo-Hall Effect in Anthracene, Sulfur, and Alkali Halides"; J. C. Bushnell, "The Effect of Phase Deviations on Mode-Locked Optical Pulses"; and W. B. Gauster, "Electronic Volume

Effect in Semiconductors." From Physical Research Department 5130: G. A. Samara, "Effects of Pressure on the Magnetic Properties of Magnetite"; R. T. Johnson and B. T. Kenna (5421), "Induced Conductivity from Radioactive Decay in Fast-Neutron Irradiated CdS"; and R. C. Wayne, "Effect of Hydrostatic

Pressure on the Magnetic Moment of YIG."

Representing Solid-State Research De-

partment 5150 were: J. E. Schirber and W. J. O'Sullivan, "Effect of Hydrostatic Pressure on the Fermi Surface of Sb"; A. G. Beattie, "Quantum Oscillations in the Acoustic Velocity and Attenuation in Al": N. S. Gillis, "Lattice Dynamics of SnTe": A. C. Switendick, "Electronic Band Structures of AuAl2, AuGa2"; D. C. Wallace, "Dependence of the Calculated Phonon Spectrum of Aluminum on the Pseudopotential Form Factor."

Deaths

Jesse W. Mitchell, a model and instrument maker in Machine Shop Division 4253 died suddenly March 12. He was 51. He had worked at Sandia Laboratories in the Development Shops since May 1952. Survivors include his widow and one daughter.

Harold C. Andrews, a staff assistant in Quality Operations Division 2491, died suddenly March 8 while on special assignment

in San Diego. He was 59. He had worked at Sandia since December 1956.

Survivors include his widow, two daughters and two sons.

Rudolph Lovato, a millwright in Plant Maintenance Division 4512, died March 2 after a long illness. He was 42. He had worked at Sandia since Septem-

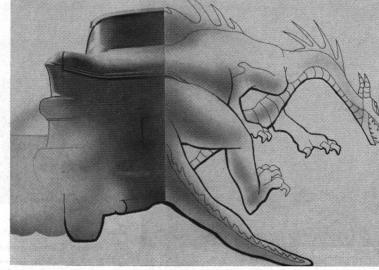
ber 1955. Survivors include his widow and two sons.

* * * Everett Cowan, a mechanical assembler in Metals and Assembly Division 4232, died suddenly Feb. 21. He was 52.

He had worked at Sandia Laboratories since June 1948.

He is survived by his widow

A DETROIT DRAGON DOES ITS THING. Ever wonder where all that smog comes from?





Source of Emission	Tons Emitted in 1967	Percentage
Transportation Sources (fuel combustion)	193,541	92.01
Gasoline	(179,897)	
Diesel	(4,107)	
Jet fuel	(2,068)	
Turbojet fuel	(31)	
Reciprocating engine		
aircraft fuel	(1,450)	
Other	(5,988)	
Stationary heating	7,616	3.62
Industrial operations	5,275	2.51
Refuse Disposal	3,780	1.80
Agricultural	118	0.06

*The Albuquerque Emissions inventory does not include dust from unpaved streets, construc-





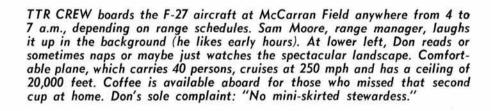
LV to TTR: Sandia's High Flyers

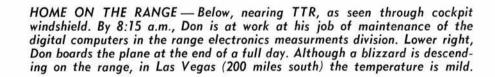


For Sandians at TTR, the move to Las Vegas from the small town of Tonopah means a considerable change in living conditions. Housing at Tonopah, though adequate, falls far short of the convenience and comfort of new, modern suburban homes in Las Vegas. To be sure, the new housing is more expensive but there are compensating factors—more extensive shopping, medical, and educational facilities. Generally, Range people are pleased about the move. Nancy, wife of Don Anderson (7231), says, "We're delighted with our new home. Everything—particularly shopping and medical facilities—is a lot more convenient here, and that makes a great deal of difference." Grace, wife of Ken Johnson (7232), says, "We just love it. We've been here a month and we're enthusiastic about the move."



THE OLD AND THE NEW—The Tom Laws (7233) family had to dig their way out as they prepared to move to Las Vegas. Below, Don Anderson (7231) leaves his newly-built home in northwestern Las Vegas 10 minutes from airport.



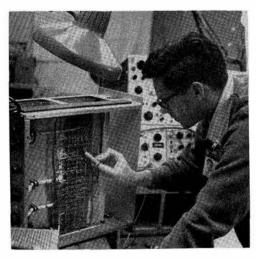








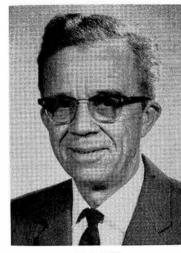






SANDIA **SERVICE AWARDS**

25 Years



20 Years





William Fears 7414



Dale Massey 7221



Henry Moculeski 7626





John Roach 8223



Joe Sanchez 3454

15 Years



Oscar Goodwin 3455



William Shoemaker 1512

10 Years

March 28 - April 10

7612. Kenneth Johnson 7232, Elizabeth Bodie 8232, Morris

Lester Harris 7223, Hubert Gilbert 7333, Margalee Hertzler



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Congratulations

Mr. and Mrs. Robert Lowery (7422), a son, David Charles, Jan. 31. Mr. and Mrs. J. G. Bartlett (7333), a son,

Todd Graham. Mr. and Mrs. George W. Treadwell

(1545) a son, Michael, March 15. Mr. and Mrs. J. A. Gilbert (5442) a son,

Vincent, Jan. 15.

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Speakers

E. P. EerNisse (5112), "Solid-State Microwave Sources and Their Nuclear Radiation Tolerances," Purdue University Spring 1969 Seminar Series, Feb. 27, Lafayette, Ind.

P. J. Roache (9343), "An Experimental Comparison of an In-Hours and an Outof-Hours Continuing Education Course," 1969 meeting of the ASEE Gulf Southwest Section, March 20-22, Houston, Texas.

B. L. Gregory and H. H. Sander (both 5112), "Defect Annealing in Irradiated Devices"; C. W. Gwyn (5112), "The Radiation Tolerance of MOS Devices," 1969 IEEE International Convention and Exhibition, March 24-27, New York City.

J. W. Reed (9111), "Airblast from Plowshare Projects," Symposium on Public Health Aspects of Peaceful Uses of Nuclear Explosives, April 7-11, Las Vegas,

L. J. Vortman (9111), "Nuclear Excavations"; J. W. Reed (9111), "Airblast Levels and Effects," University of Arizona Symposium on Education for the Peaceful Uses of Nuclear Explosives, March 31, Tucson.

B. Morosin (5131) with E. J. Graeber (5422), "Crystal Structure of the Hexanitroazobenzene Molecule"; with J. Hawatson (AWU professor at the University of Wyoming), "The Crystal Structure of the Sulfate and Selenate Monohydrates of Bis (1, 2 Propanediamine) Copper (II)," American Crystallographic Association meeting, March 24-27, Seattle, Wash.

W. W. Allison (3351), "The Technical and Economical Control of Hazards," American Society of Safety Engineers, March 7. Albuquerque.

J. M. Wiesen (100), "Are We Qualified to Handle the Job," Amarillo Sub-Section, American Society for Quality Control, Feb. 20, Amarillo.

J. H. Spitzer (9426), "Storing the Directory for an Inverted List System," Rio Grande Chapter, Association for Computing Machines, Feb. 14, Socorro.

Sandian Attends Security Conference

Merlin Manteufel (3511) was one of a number of AEC and contractor organization security representatives to attend a three-day technical security conference at the commission's Albuquerque Operations Headquarters recently.

The conference, sponsored by the ALO Security Division, was designed to acquaint security personnel with recent innovations in the field of electronic security.

Highlighting the sessions were demonstrations of clandestine listening devices and practical exercises in electronic and physical search techniques.

L. D. Taylor (9341), a seminar on Numerical Investigations of Compressible Fluids, Feb. 20, University of Kentucky.

W. J. Whitfield (1742), "Environmental Contamination Control," ASTM, and ASMsponsored 1969 Wester Engineering Conference, and "Clean Room Design," Western Chapter, Association for Contamination Control's special educational training series, March 13, Los Angeles.

C. J. McGarr (4600), "United Businessmen," Exchange Club, March 19, Albuquerque.

C. J. Miglionico (5422), "Electron Fractography Study of the Uranium Alloy, Mulberry," Los Alamos Chapter, American Society for Metals, March 11, Los Alamos.

C. B. Bailey and R. D. Halbgewachs (both 9422), "Sandia Mathematical Program Library Project," Semi-Annual AEC Computer Information Meeting, March 17-18, Palo Alto.

R. A. Matthews (3454), "A Suicide Prevention Center for Albuquerque," Feb. 2 Central Methodist Church, Feb. 16 First Presbyterian Church, Feb. 18 National Cancer Society, Feb. 23 First Congregational Church, Feb. 26 Montezuma School PTA, Albuquerque.

Take Note

Several Sandians and wives of Sandians will participate in the cantata "The Crucifixion" to be performed at the Sandia Base Protestant Chapel on Palm Sunday, March 30, at the 9 and 11:15 a.m. services.

Among the choir members are Otis and Mrs. Wright (4610), Marie Ream (3100), Sue Gum (3251), Mrs. Simpson (William Simpson, 7637), Mrs. Poteet (Horace Poteet, 1912), and Mrs. Walker (Andrew Walker, AEC). Mrs. Simpson is the choir director.

Hank Willis (3130), newly-elected member of the Albuquerque Board of Education, was named president of that board in a recent election. His nomination was made by outgoing president S. Y. Jackson who had held the post for the past 28 years. Hank previously served as chairman of the APS Citizens Finance Study Committee.

In the recently completed Albuquerque Men's Bowling Tournament, the team of Harry Olson (1513) and John Nakayama (1513) won the city's doubles crown. Their completed total handicap score was 1380 pins.

In the same tournament, Harry took first place in the all events category with a total series score of 1974.

Anyone interested in participating in a noon-time soccer game is urged to contact Norris Rose (3111), tel. 264-4145.

SHOPPING CENTER

Mote 8312, and Frank McMurtrey 8223.

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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

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

8. Housing listed here for rent or sale is available for occupancy without regard to race, creed, color, or national origin.

FOR SALE

MISCELLANEOUS

TWO 14' Umbrella trees \$15/ea. Beroldi, 344-5802 after 3. CANON FL200mm F3.5 telephoto lens, w/carrying case, bayonet ring mount, new never used, cost \$175, sell for \$140. Larsen, 265-0004.

MACHINISTS TOOLS. Anderson, 877-9065. FLYING CLUB SHARE, Cessna 172, dual omni, marker beacon receiver, full panel, student pilots acceptable, wives can fly club plane. Roberts, 242-2026, Fox. 299-9332.

CYLINDRICAL BIRD CAGE, 12" dia., 28" high, on 18" stand, \$7. Langston, 268-6933. TIRES: 8:45x15, w/w, 4-ply tubeless, used but w/several thousand miles of wear left. Bartlett, 299-4861.

PIANO, upright, mahogany finish, w/bench, \$200. Miller, 268-5992.

'64 24-volume set Colliers encyclopedias, plus 4 year books, \$125 including book case, cost \$350. Konnick, 296-3906. SELL OR PLACE ON SHARE BASIS of litters,

seven chinchillas. Lewis, 299-2322. BELT GRINDERS, 2 6" wheels, new Crattsman for 1/3 LP motor, 1725 rpm w/2 pulleys & belt, \$15. Shepherd, 299-9066.

'61 DEVILLE CAMPER TRAILER, 15' long, new tires, \$850. Davis, 636-2874 Peralta, N.M., after 6.

F70-14 WIDE OVAL TIRE, white stripe, used about 2,000 miles, \$10. Mumm, 256-3177. FREEZER, Coldspot, upright, 18 cu. ft. Smith, 265-3250. CARPET & FOAM PAD, gray wool, 2 pieces, approx. 14 x 20' & 11 x 11', \$80. Winter, 296-3584.

SAW, Sear's 9" radial arm saw, complete, w/ stand & casters. Crass, 282-3889.

'57 CHEVY PARTS, engine parts for 265 c.i. & lots of body parts, 2' (57) SW hodies. Bolton, 265-5444. OVAL RUG, 5'x9', candy stripe w/red fringe, \$20 or make offer. Harrison, 296-3235.

DINING TABLE, 4 chairs, Mediterranean style, pecan, additional chairs available; electric range, \$50; 8mm B&H movie camera, \$10. Venner, 268-8703.

DRILL PRESS, 15" Rockwell, new ½HP, pedestal, production table, No. 2 taper, spindle, 6-step pulley, below cost, \$220. Courtin, 298-6934. KITCHEN & laundry appliances; bedroom furni-ture; dinette set; misc.; new power mower. Vaughan, 299-5676.

HAIR DRYER, stand-up floor model, Universal w/ 2-yr. guarantee, \$20. Bascom, 299-3500. FOUR-PIECE vinyl corner sectional, black w/gold print, used 3 months, \$200. Gary, 256-7325. PARTNERSHIP in a concrete mixer, electric powered, mixes 2½ cu. ft. Everett, 298-3994.

USED Ward's deep-well jet pump, 1HP electric motor, 5" jet, 42-gal. tank. Whiston, 877-2124. PAIR metal clothesline poles, 4 line, 4" diameter base, 3" diameter cross member, \$10. Marrs, 299-3865.

BICYCLE, Sear's Boy's 24", big basket, puncture resistant tires, \$10. Stevens, 299-6086.

CAMERA, Kodak 35, Anastigmat Special f:3.5 50mm lens, range finder, instruction manual, leather carrying case, \$10.50. Sims, 255-6967. GE frost-free refrigerator w/separate 75-lb. freezer, \$100; GE deluxe dryer, \$75; Slenderette, \$75. Grimes, 265-6234. er, 3

UTILITY TRAILER, large capacity. Rakoczy, 256-

REGRIGERATOR, Westinghouse, coppertone, frost-free, 14 cu. ft., 121-lb. freezer, 6 mos. old. Garcia, 296-5207.

KITTENS, free to good home. Rand, 299-1048. 30" GAS RANGE, (large oven), Merrit-O'Keefe, top grill, \$100. McIlroy, 299-4977.

MAGNAVOX 24" TV, '65 model, console, walnut; GE filter-flow washer. Hackard, 255-9604 after

TA33JR, \$25; NC-2-40D, \$20; Heath DX 100, \$40; Heath tube tester, \$25; Philco scope, \$20; 6' rack, \$5. Anderson, 268-0934.

SOFA BED, white naugahyde, 83'' long, \$65; bedspread, single, hand crocheted, popcorn stitch, \$25. McKinley, 296-7015.

14' FIBERGLASS BOAT w/cover, 40hp Mercury, 1000-lb. Dilly tilt trailer w/2 spare tires & 1 extra wheel, \$735. Cook, 296-1097 after 5.

8MM REVERE movie camera, projector & editor-splicer, all for \$50; Argus C-3, \$10. Browne, 296-1036.

LIVING ROOM drapes & valence, 14', fully lined, beige color. May, 299-2624.

**60 FALCON ENGINE, trans., radiator, differential, \$45; McCulloch chain saw, gear drive, model 35, \$60; Remington saw, \$50. Ernst, 344-8694.

STATIONWAGON TENT, 9'4" square, \$40; vacuum action rotary mower, \$45; Craftsman push mower, \$10. Light, 265-5454.

30" GE electric range, \$80; Silvertone 21" B&W console TV, \$25. Erne, 299-0565. 19' TROJAN, grey marine inboard engine, full convertible top, sleeps four, \$1395 trailer in-cluded. Miller, 282-3268.

'57 15' CAMPING TRAILER, electric brakes, new tires, \$645; axle-type equalizer hitch, no weld-ing required, \$50. Workman, 298-8312.

MOBILE HOME, '59 FRANKLIN, 8'x25', 1 bdr., full bath, shower, AC, carpeted \$1195. no trades. Geibel, 299-0275 after 5:30.

BLACK MINIATURE POODLES, 3 female, 4 male. Blain, 298-7717 after 5:30. BUFFET, w/3 drawers, solid maple, Early American, \$40. Moore, 298-8909.

GRAVITY TYPE wall heaters, 1 35,000 BTU, front-rear discharge w/wall thermostat, 2 ea. 35,000 BTU bottom control. Fjelseth, 298-2452. HARLEY DAVIDSON model 45 parts, including transmission. Shock, 877-3728.

NIKONOS all weather camera, waterproof, new, \$100; RCA phonograph, will trade for guitar. Harris, 299-6664.

CARS & TRUCKS

'60 METROPOLITAN. Tyson, 2519 Gen. Marshall NE, 298-2561 after 5.

'67 BUICK Sportswagon, 6-passenger, factory air, power disc brakes, PS, many other extras, \$2445. Schmierer, 299-2352.

'62 FORD GALAXIE, R&H, AT, AC, PS, 390 V8, \$425. Schelby, 344-5522. '50 GMC, completely rebuilt 4-spd. trans. front & rear end; new shocks new windows & paint, 2 spares, 12-volt system, \$300. Breeden, 877-9703. SAND BUGGY w/wide tires, 6-cyl., \$75 or trade for economical transportation, Heidrich, 344-7669 after 5:30.

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755 CHEVY, HT, AT, R&H, nearly new 283 V8; 759 Rambler 10 series, AT, R&H, rebuilt 6-cyl., needs minor work, either car \$200, both for \$375. Breitenbach, 344-7584.

'62 CHEVY II, 2-dr. sport coupe, \$400. Davis.

'63 CHEVROLET Belair wagon, R&H, AT, one owner, V8, make offer. Reid, 344-0521.
'68 ROYAL CDACHMAN camper, 11', self-contained; '67 Dodge truck, 13,000 miles, \$4000 or will consider trades. Brooks, 345-0495.

'66 DODGE MONACO sta. wagon, 9-passenger, dual a-c, PB, PS, 440 cu. in. AT, best offer. Winter, 344-8160, after 5:30.

'59 FORD pickup, 3-spd., V8, R&H, alum, shell. Young, 268-0489.

'62 GMC Suburban 3-spd., AC, equalizer hitch, \$950. Johnson, 255-5427. '58 PICKUP, 4-wd Willys. Coffman, 299-1767

'59 BUICK LeSabre 2-dr. HT, PS, PB, \$250. Dostert, 299-9682. '57 TR-3, \$500 or best offer. Anastasio, 299-7012.

REAL ESTATE

ASHCRAFT Addition, 3-bdr., den, screened patio, formal DR, landscaped, sprinklers, dbl. garage, hw/floors carpeted. Martin, 268-2020.

3-BDR., 234 baths, basement finished, suitable for rumpus room, work shop & storage space, near Base. Stover, 298-8219 after 7. 59 ACRES in Sandias, on County road, includes 20-lot subdivision, will sell all or part. Clement,

298-4994.

ASSUME 51/4 loan, 3-bdr. Roberson, \$19,250 value; Glenwood Hills lot, 220 x 150, \$6600. Zimmerman, 296-1058. LARGE LOT in Glenwood Hills w/view, choice of three, will discount equity, assume payments. Pliner, 255-1550.

3-BDR., den, 134 baths, Holiday Park, 51/4% VA loan w/\$18,200 balance, price \$22,200. Crutcher, 298-2171.

ROBERSON 3-bdr., den, fp, nylon carpeting, de-corator colors, dbl. garage. patio, landscaped, 534 % FHA, \$18,500, \$3600 equity, \$138/mo. Meyer, 298-4825.

MOSSMAN, 3-bdr., study, assume 41/2% loan for less than appraisal or refinance. LeRoy, 2804 Dakota NE. 296-2953.

FOR RENT 2-BDR. ADOBE, $1\frac{1}{2}$ acres, pueblo style, 2 fire-places, electric kitchen, lg. rooms, Hwy. 47, Tome, \$85/mo. Connally, 299-1887.

ONE 2-bdr. furnished & one 3-bdr. unfurnished, near both bases. Bolton, 265-6061 or 265-5444. NEAR BASE, 3-bdr., 2 bath, drapes, carpet, AC, built-ins, fp. lg. covered patio. Crass, 282-3889.

2-BDR. unfurnished apt., clean, AC, carport, washer rough-in, lots of storage, corner Kathryn & Palomas SE, adults. Pliner, 255-1550.

00M w/private entrance, patio, refrigerator, car-pet, walnut paneling, \$45. Bascom, 299-9044.

WANTED

ONE PERSON to join car pool from South Valley, near Blake & Foothill, to Gate 5. Benton, 877-GOOD CELLO for advanced student. Vancil, 299-

BULLET MOLDS for .38, .22 & .45 calibers. Adams, 268-5943.

RIDE to and from Sandia — from second & Griegos NW to 800. Nelson, 345-0440. STOCK RACK, prefer wood, for 3/4 ton step side Chev. pickup. Gregory, Bernalillo, 867-2432.

CAMPER SHELL, lightweight, cab-height, for pick-up w/long, wide box. Walker, 299-9425. PORTA-CRIB in good condition. Foor, 298-4980.

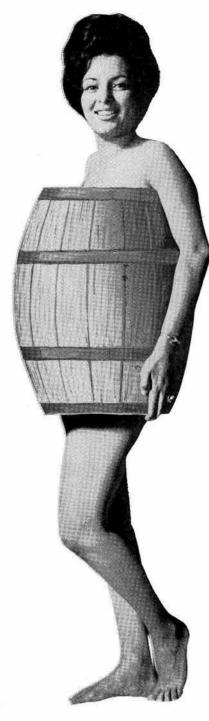
CHILD to care for in my home. Hart, 256-2811. TO RENT or lease year or longer 3-4 bdr., den, or study, require possession on or about June 1. Swiss, 298-1665.

LOST AND FOUND

LOST—Rx sumplasses w/black frames. Rx sunglasses w/brown frames in tapestry case, Rx sunglasses w/brown frames/larpe lens, green loose
leaf notebook w/Xerox copies of Master Thesis,
brown owl brooch, approx. 7 keys on ring,
brown leather shoe buckle. Men's right hand
black fur-lined glove, tournament ping
paddle w/red soft face & chamois handle. LOST
AND FOUND, tel. 264-2757, Bldg. 610.

FOUND—Single key on ring, men's brown cotton glove, multi-color drop stone earring. LOST AND FOUND, tel. 264-2757, Bldg. 610.

Taxpayer's Bawl Scheduled April 12



A CASE of Overdeduction-If taxes and surtaxes have reduced you to this, then join Lucille Vigil (1516) at the Taxpayer's Bawl at the Coronado Club April 12. The soup kitchen will be serving mulligan stew while Frank Chewewie plays the blues.

Sandia **Safety Signals**

There's just no stopping you.

> (if you don't wear seat belts)



Published to save lives in cooperation with The Advertising Council and the National Safety Council. For free copy of Seat Belt Fact Sheet write: N.S.C., 425 No. Michigan Avenue, Chicago, Ill. 60611

Top event on the April Coronado Club calendar is the Taxpayer's Bawl scheduled Saturday, April 12. Designed to make you forget the surtax, the Bawl features a free bourbon taste from 7 to 8 p.m., a soup kitchen serving mulligan stew from 8 to 9 p.m., and dancing from 9 to 1 a.m. to Frank Chewewie's aggregation. Wear your old clothes and forget form 1040. The cost is a nominal two bucks (\$2.50 for guests).

Social Hours

Tonight the Rhythm Masters will make the happy music while the Club's kitchen staff wheels out the Mexican food buffet.

On April 4, the Club will be closed to observe Good Friday.

The TGIF crowd will return renewed to celebrate Social Hour on Friday, April 11, with the Club's famous chuckwagon beef buffet and Sol Chavez and the mighty Duke City Brass on the bandstand.

Easter Egg Hunt

On Easter Sunday, April 6, the Club will be the bunny rabbit for an egg hunt on the back patio for kids aged six and under. Free to children of members, the fun starts at 2 p.m. with plenty of prizes and surprises.

Teenage Go Go

A group called "The Gertrude Blues" will be on the bandstand Saturday, April 5, for the monthly teenage bash. The sound will be turned on at 7:30 and amplified until 10:30 p.m. Tickets should be picked up by member parents.

Luncheon Special

The Club offers its 99-cent special luncheon on Thursday, April 10. The menu reads luncheon steak, tossed salad, oven brown potatoes, coffee or tea, and apple spice cake. The special will be at the Club, Bldg. 839 cafeteria, and the Area III cafeteria.

Bridge

Ladies Bridge meets Thursday, April 3, at 1 p.m. Duplicate bridge meets Tuesdays at 7 p.m.

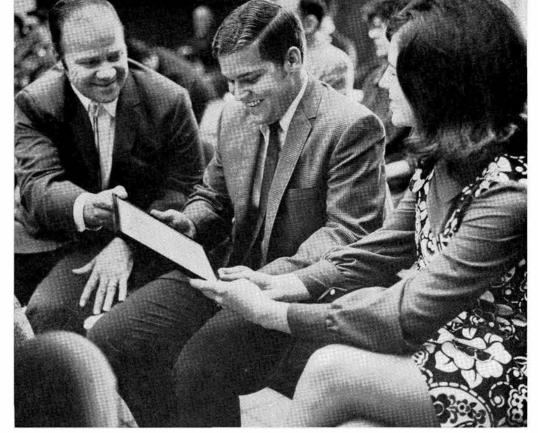
Baton Twirling Classes

Beginning, intermediate and advanced baton twirling classes will be offered by the Club on Saturday mornings starting April 12 at 11 a.m. Youngsters age six and up may participate. Ten week courses are offered for an \$8 fee. Instructor will be Marsha Folts, New York State Champion Baton Twirler in 1965. Enroll at the Club office before the starting date.

Sympathy

To Harry Warrick (7322) for the death of his father in Colfax, Iowa, Feb. 23.

To Salomon Baca (4614-1) for the death of his father-in-law, in Albuquerque, March 14.



GARY SCOTT (center), son of Bill Scott (3428), left, was awarded a certificate of appreciation by the Albuquerque Chamber of Commerce recently for "exceptional courage and initiative." Gary rescued a woman from a burning building at great personal risk. At right is Mrs. Gary Scott.

Supervisory Appointments



JOHN KANE to supervisor of Exploratory Systems Studies Division 1012, effective March 1

John joined Sandia in 1960 and worked in the Product Acceptance Equipment Division 2451 for two years.

He then worked in Advanced Electromechanics Components Division 1322 for four years before moving to Exploratory Systems Studies Division where he was a staff member for three years before assuming the supervisory post

Flapper Girl to Speak

While an undergraduate student, John



With all of the discussion about today's generation styles, tone and trends, the guest speaker for Sanado Woman's April 8 meeting should be of special interest to everyone - Miss Colleen Moore, silent

screen movie star who added the word "flapper" to the American vocabulary and whose own generation caused no small amount of concern, will speak on "The Evolution and Revolution in Hollywood." Included in her lecture will five minutes of film clips from "Lilac Time."

worked as a junior engineer for the Bendix Corp. in Kansas City and for the Consumers Public Power Co. of Nebraska.

John has a BS degree in electrical engineering from the University of Nebraska. After joining Sandia, he earned an MS in electrical engineering at UNM through the TDP Program. He since has done advanced work at UNM.

During the Korean conflict, John served aboard the U.S.S. Boyd as an electronic technician. He was in the Navy from 1953 to 1955.

John and his wife, Alberta, have four children, two boys and two girls. The Kanes live at 3221 Betts NE.



SHARY HOLMES supervisor of Plating Section 4222-5, effective April 1.

Shary first joined Sandia in 1948 while the Labs were still being operated by the University of California. He began work in the

Photographic and Reproduction Print Shop. During his 20 years at Sandia, Shary also worked in the Organic Castings Laboratory and, for the past seven years, in the Plating Laboratory.

He has taken at least 10 in-hours and cut-of-hours courses relating to his field, including chemistry, metallurgy and engineering materials.

Shary is a member of the American Electroplaters Society.

A Korean conflict veteran, he served two years with an air freight unit of the U. S. Marines.

Shary and his wife Jan have three sons. They live at 2605 Christine NE.



TOM WORK-MAN to supervisor of Timers Division 2326, effective April 1. Tom joined Sandia in 1960 as supplier liaison in manufacturing development where he worked for three years. He then worked four years

in Coded Switches and Controls Development Division and, in 1967, moved to Timers Division where he has been investigating high accuracy time base devices using crystal oscillators.

Hired under the TDP program, Tom received an MS degree in electrical engineering from the UNM. He also holds a BS in EE from Ohio State University.

Tom and his wife, Donna, have four daughters and live at 4717 Westridge Place NE.



SHADES OF BURMA SHAVE! Security information organization uses a new-old approach to focus attention upon the importance of wearing your badge so it can be seen at all times. Badges are a means of identifying individuals and also denote access authorization. Dorothy Miller (left) and Millie Copeland (both 1612) heed the advice on these signs near Bldg. 892.