

Sandians Eligible — Stock Ownership Plan Announced

AT&T has announced it intends to set up an employee stock ownership plan which would make most Bell System employees (including all Sandians) with 3 years service share owners of AT&T at no cost to them.

The plan is based on provisions of the Tax Reduction Act of 1975, as amended by the Tax Reform Act of 1976, that allows companies to elect an extra one percent of investment tax credit if an equivalent amount is applied to the issuance or purchase of securities to be held in trust for

employees.

Details of the proposal will be submitted May 16 for review by the Internal Revenue Service.

The stock allocation to eligible employees would be roughly 1 share per \$10,000 of annual pay.

"Although relatively few shares would be allocated to any individual employee," said H. Weston Clarke, Jr., AT&T Vice President of Human Resources, "the concept of an employee stock ownership plan is important because it gives many

Bell System employees a new and more personal stake in the business they work for.

"In addition," Clarke said, "it would further broaden the base of what has long been a very large family of individual AT&T share owners and provide additional equity capital to help us meet growing telephone service needs of the public."

[Ed. Note — *An Employee Bulletin*, issued today, carries full details on specifics of the Stock Ownership Plan.]

LAB NEWS

VOL. 29, NO. 9

MAY 6, 1977

SANDIA LABORATORIES • ALBUQUERQUE NEW MEXICO • LIVERMORE CALIFORNIA • TONOPAH NEVADA

New Accelerator to Advance Ion Implantation Research

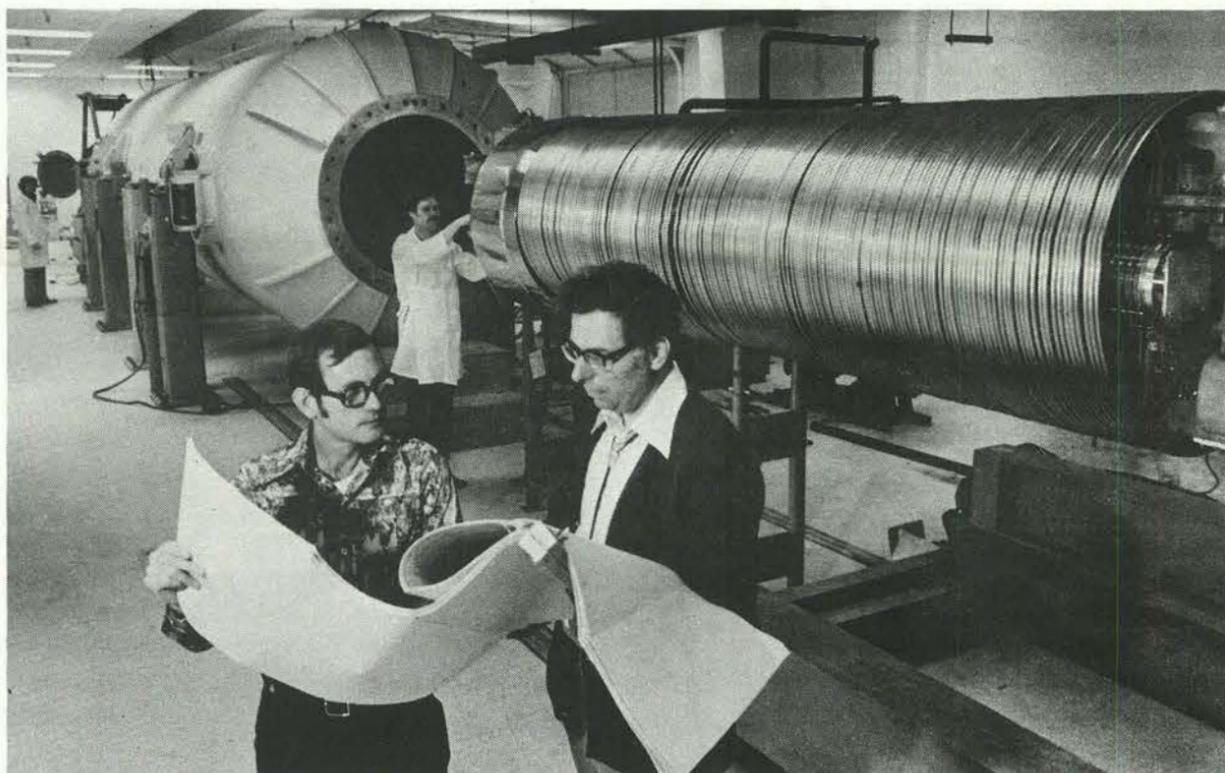
A new high voltage accelerator is now being assembled in Bldg. 884. The tandem Van de Graaff will produce voltages up to 6 MV and multiply-charged heavy ion beams with energies up to 24 MeV. It will be used by Radiation and Surface Physics Research Department 5110 in a number of programs.

Long a leader in ion implantation studies, Sandia will use the new accelerator to advance research in:

- Ion backscattering analysis at micron depths with applications in the fields of microelectronics and solar energy materials, fusion reactor "first wall" materials and catalysts for use in coal liquefaction. (Backscattering is the use of ion beams to determine properties of substances.)
- Heavy ion implantation simulation of radiation damage to materials, as well as the study of ion implanted surface alloys
- Nuclear reaction analysis at micron depths (sensitive detection and depth profiling of light isotopes for weapons and energy applications)
- Ion backscattering of light ions at high energies (applications include neutron tube development and fusion energy materials studies)

The new machine will be used in combination with an existing 300 keV accelerator. Supervisor Paul Percy (5112) explains: "Two accelerators used in combination are a great advantage — one is used for ion implantations and the other for subsequent ion beam analyses of the implanted samples."

Department 5110 operates several other accelerators in its research, but as Fred Vook, 5110 manager, explains: "The highest voltage of our other accelerators is 2.5 MeV. The much higher voltage of this new accelerator will permit the sensitive detection of isotopes and deeper depth



NEW HIGH VOLTAGE ACCELERATOR is now being assembled in Bldg. 884. Foreground, Paul Percy (5112) confers with Fred Vook (5110). The new machine will be used in advanced ion implantation research.

profiling than was previously possible. This accelerator will enable us to expand our research in ion beam studies of solids into new areas."

In recent years the emphasis of Department 5110 research has shifted from semiconductors to metals, insulators and thin films. Ion backscattering techniques are now used routinely for analysis of implanted materials and thin film performance.

Assembly of the new accelerator should be completed in late July with initial testing to begin in August. Bldg. 884 is being remodeled to house the new machine and new laboratory areas.

VP Gets State Service Award

Dick Bice (VP-9000) was one of nine New Mexicans chosen to receive the New Mexico Distinguished Public Service Award. The award is presented annually in recognition of outstanding public service.

Since the mid-40's, Dick has been active in many civic organizations and, from 1954 to 1962, served on the Albuquerque City Commission. More recently, he has been chairman of the board of the Museum of Albuquerque.

Presentation of the award was made by Gov. Jerry Apodaca in a dinner ceremony at the Hilton Inn.

Afterthoughts

Commuting economics--It's difficult to determine the true cost of a vehicle, but having recently sold a motorcycle that I've used for commuting in the past six years I performed some arithmetic to see what the thing cost. Briefly, total mileage was 20,000 while total cost (purchase minus resale price, repairs, and maintenance, etc.) was about \$1300. That comes out to 6 1/2¢ per mile. I haven't decided if that number is a fiscal argument for motorcycles. In any event, man does not live solely by fiscal wisdom and I quickly replaced the old with a gleaming new machine.

* * *

And some tennis economics--Tennis has taken off. Two decades ago when we came to Albuquerque, there were a couple of courts on Coal, a few down by the zoo and not much more--of courts or players. Today tennis is The Game and, though our town's courts have multiplied, it can be pretty tough finding an open one on, say, Sunday morning around ten. Which is why some thoughtful people in the Coronado Club propose to construct four courts next to the Club and, further, to offer the facility to members for a fee that is paltry by comparison: \$75 per year total vs \$300 per year (plus a \$500 initiation fee) at the two tennis clubs. And the \$75 includes swimming privileges, which normally cost \$15. The grand plan is foundering, however, for want of sign-ups. One hundred are needed, 68 have signed up. Without enough, there won't be any tennis courts. If tennis is your game, or if your youngster(s) are getting into this sport, then give the C-Club proposition some hard thought.

* * *

"Our nation is facing a challenge for which we have no precedent. We must shift our intricate, highly developed economy, institutions and life styles from a basis of cheap, convenient energy to one of greatly increased energy costs. To do this in a time compatible with the disappearance of existing supplies, and without severe economic and social impacts is an awesome task. It is a task that should not be compared with the Manhattan Project or men on the moon. Both of these magnificent technical accomplishments were conceived and carried out with a relatively small participation by the total populace. The decisions were in the hands of a few, as were the means to carry them out. In contrast, our energy problem will require first recognition, then understanding and involvement by each citizen, and it will demand our best."

--James Kane, Director of ERDA's Division of Physical Research



GLENN KUSWA (5244) receives ERDA's Special Achievement Award.

Glenn Kuswa Receives Award

Glenn Kuswa, supervisor of Electron Beam Research Division 5244, recently received ERDA's Special Achievement Award.

The certificate (and a \$950 check) recognized "services performed in connection with electron beam fusion and ion beam fusion as part of the national laser fusion program, and in particular for the scientific judgement which led him to recognize and encourage the development of a new approach to fusion which utilizes energetic beams of heavy ions."

Glenn spent 27 months at ERDA headquarters on a Professional Team Appointment, working for the Division of Laser Fusion. He provided program guidance administration to the ERDA laboratories and to universities and private industry under ERDA contract for fusion research projects.

Glenn joined Sandia in March 1970, and has been engaged in electron beam and plasma studies at the Labs. He served with ERDA in 1974-76.

Retiring



Samuel Salazar (3422)



Chet O'Neal (9484)

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MAY 6, 1977



LAB NEWS

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so does russ smith

&

lorena schneider reports on livermore

Events Calendar

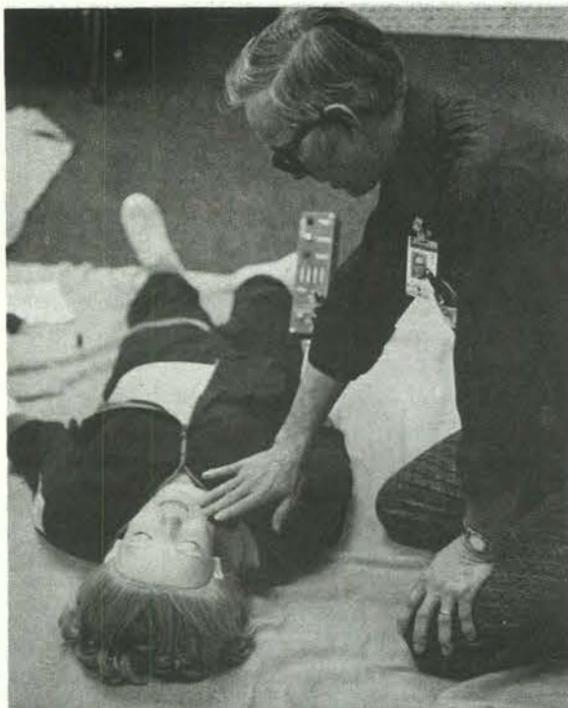
- Through May — "Lady Who Cried Fox,"
Barn Dinner Theatre, 281-3338.
- May 7 — Strawberry Festival, arts and
crafts, fleamarket, etc. to benefit the
Serendipity Day School, 801 Girard NE,
10-5 p.m.
- May 8 — Indian Pueblo Cultural Center
presents a program of pueblo dances.
Dances will be held on weekends
throughout the summer. 12th Street
north of I-40.
- May 8 — N.M. Symphony Orchestra "Zoo
Concert," Rio Grande Zoo, 1:30 p.m.
- May 12, 13, 15 — "Cavalleria Rusticana"
and "Pagliacci" performed by the
Albuquerque Opera Theatre, Popejoy
Hall, 277-3121.
- May 12-14 — Albuquerque Dance Theatre
Spring Dance Concerts, UofA Stage I,
8 p.m., 247-3771.
- May 17 - June 12 — "Abie's Irish Rose,"
Ole Henry's Dinner Theatre, 293-5060.
- May 17 — Dr. Joyce Brothers, Popejoy
Hall, 8 p.m.

LIVERMORE NEWS

VOL. 29, NO. 9

LIVERMORE LABORATORIES

MAY 6, 1977



CPR INSTRUCTOR Wil Vandermolen (8123) uses training manikin to demonstrate how to locate the victim's carotid pulse to see if heart is beating.

CPR Course May Save a Life

"About half the deaths from heart attacks occur within the first two hours of an attack and most often outside of a hospital. This is why CPR instruction is so important as a lifesaving measure," says Dorothy Hagen, a nurse in Medical Division 8214 who coordinated the nine-hour, three-day training course recently given to 16 employees.

Short for cardio-pulmonary resuscitation, CPR is a combination of mouth-to-mouth respiration and external heart compression. The correct use of these techniques can sustain life until medical help arrives. And CPR training enables people to recognize the symptoms and warning signs of heart attack.

Four Sandians, all certified instructors, taught the course — Ed Kuroski (8257), Verne McNabney (8252), Wil Vandermolen (8123) and Jack Wilson (8413). Their 16 students represented various SLL organizations. Now, as trained practitioners, the graduates are available throughout the Labs should CPR help be needed.

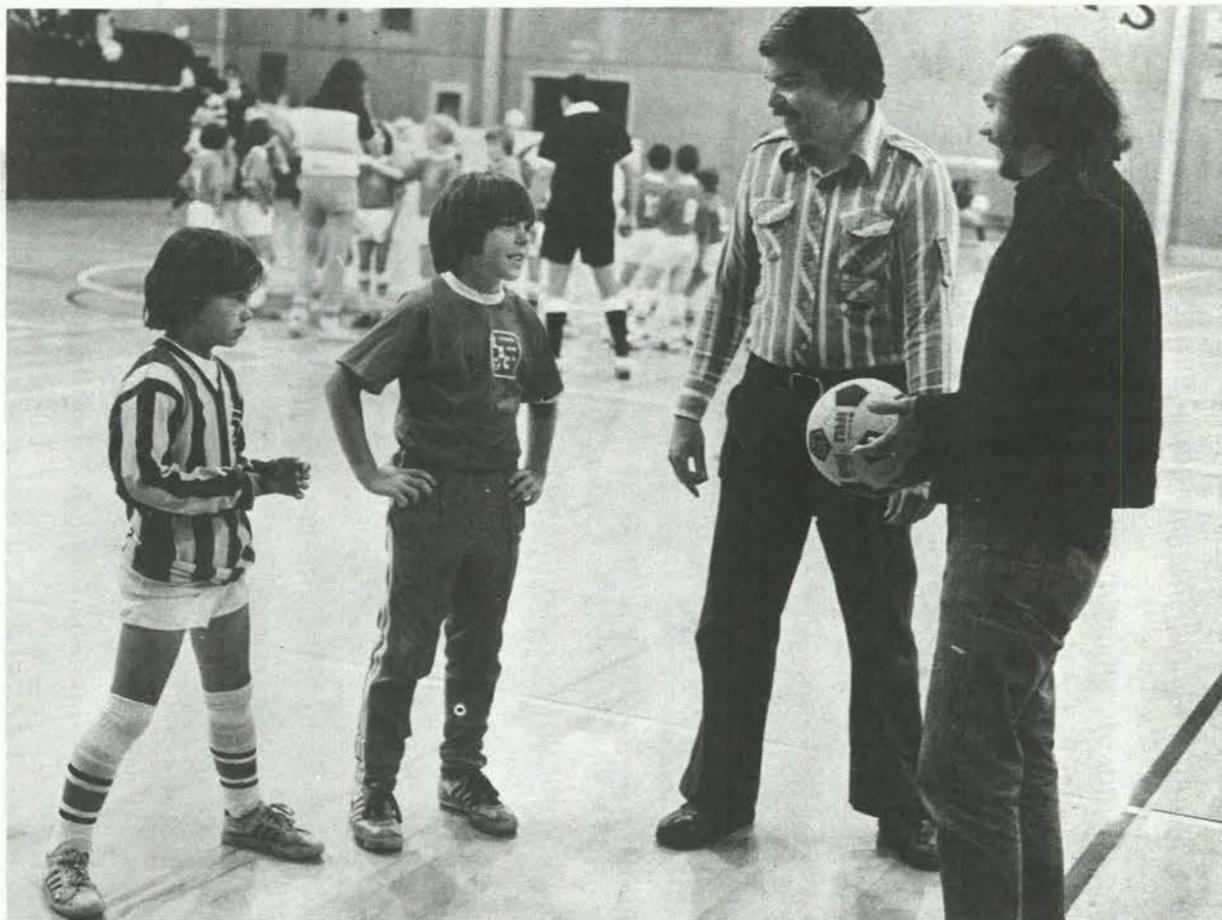
Dorothy emphasizes that everyone should be aware of the early warning signals of heart attack: prolonged pain in the center of the chest behind the breastbone; pain that may radiate to the neck, jaw, shoulder or arm; nausea, vomiting and shortness of breath. Should these symptoms occur, medical help is needed.

Sympathy

To George Perry (8257) on the death of his mother-in-law in Fresno, Calif., Apr. 16.

To Gordon Kibby (8424) on the death of his father in Fremont, Calif., Apr. 20.

To Lorraine Stamer (8266) on the death of her father-in-law in Paulinna, Iowa, Apr. 19.



SOCCER COACHES for the Livermore Clippers Jack O'Connor (8314), right, and Dave Havlik (8332) give last minute pointers to sons Jeff and John. The Clippers are the champion under-ten soccer team in California. Over 40 Sandians are active in Livermore youth soccer.

Soccer Big in Livermore

Some 2700 boys and girls play soccer in Livermore — that's about 125 teams. One of the team coaches is Jack O'Connor (8314), who began playing adult soccer eight years ago. Jack has since been director of the East Bay Soccer League, as well as state director of the California Soccer Association. He began coaching junior soccer three years ago when his oldest son became eligible to play and, last month, his Livermore Clippers won the State Cup in their class.

Authors

Pete Witze (8116) and Prof H. A. Dwyer (UC/Davis), "The Turbulent Radial Jet," JOURNAL OF FLUID MECHANICS, Vol. 75, Part 3, pp. 401-417.

Bill Ashurst (8116) and W. G. Hoover (LLL), "Microscopic Fracture Studies in the Two-Dimensional Triangular Lattice," PHYSICAL REVIEW B, Vol. 14, No. 4.

Jack Dini and Rudy Johnson (both 8312), "A Case of a Joining by Plating Application," SAMPE Quarterly, Vol. 7, No. 4, pp. 11-17.

John Helms (8312), "Plating on Nickel," METAL FINISHING, Vol. 74, No. 36.

Ken Wilson, George Thomas and Walter Bauer (all 8334), "Reduced Erosion in Helium Implanted Aluminum Coatings," JOURNAL OF NUCLEAR MATERIALS, Vol. 61, pp. 113-116.

Jack Dini and Rudy Johnson (both 8312), "Some Property Data for Nickel-Cobalt Electrodeposits," JOURNAL OF MATERIALS SCIENCE, Vol. 11, pp. 1779-80.

Rand German (8312) and Z. A. Munir (UC/Davis), "Systematic Trends in the Chemically Activated Sintering of Tungsten," HIGH-TEMPERATURE SCIENCE, Vol. 8, pp. 267-280.

"Lots of work," says Jack, "but our boys have great knowledge of the game for their ages (under 10). Some have played since they were four and have greater skill than most of the older boys. If their interest continues, several could become Olympic material."

Jack views soccer as great recreation. "It's a tough game. But you don't get bored. Spirit and determination made our boys winners. When we were practicing four nights a week, I wasn't sure if the boys would hang in there. They could lose interest or just get physically tired. Turns out they have a lot more energy than I ever thought."

Jack feels his best learning experience came with his own soccer playing. John Moore, now a professional with the Earthquakes, coached their team. Much of what he taught Jack now passes on to his young athletes.

Dave Havlik (8332) is manager and assistant coach for the Livermore Clippers. He also coaches a girls' team and is co-directing the International Soccer Tournament for boys and girls to be held here next October.

Both Jack and Dave consider soccer especially great for kids. Says Dave, "It's a fluid game, so no one player gets undue pressure. And players get lots of exercise, especially running. Not much equipment is required and we have few injuries."

IT'S SPRING. We'd say it's time to spruce up the approach to Building 800, but these are junipers. Luberto Ortiz and Willie Lucero of Building and Grounds Section 9713-4 are the planters.



WILLARD RANDLE and his weight wagon

Willard Randle Solves Weight Problem

Used to be that Willard Randle of Structural and Custodial Section 9718-2 had to transport test weights, one at a time, with a forklift. That's because one of his jobs is to ensure that Sandia's many cranes and hoists are safe at their rated load capacities. With the old forklift system, he could check perhaps two cranes in a day. Most of his time was spent on the road.

Then Willard saw a radar antenna

trailer in the salvage yard and got an idea. He welded half-inch steel plate across the hole in the middle and beefed up the suspension. And now he has a trailer that allows him to carry up to 30,000 pounds of test weights wherever he needs to go.

"I don't have to spend so much time just going back and forth getting the weight I need anymore," he reports. "Now I can check as many as eight cranes in a day."

The LAB NEWS T-Shirt Contest

Well, actually, it's not a T-shirt contest — it's a T-shirt *emblem* contest.

Consider: what more do we as employees need? We've got health plans, insurance plans, vacation, education aids, sick leave and all the rest. But we don't have a Sandia Labs T-shirt, and it's time to redress this omission.

Here are rules governing the once-in-a-lifetime *Lab News* T-Shirt Contest:

1. Entries shall be sketches of designs adaptable to T-shirts that associate the wearer of the T-shirt with Sandia Labs, e.g., "Sandia Labs" and/or the thunderbird. Sketches need not be finished art work.

2. The winning entry will be that which meets rule no. 1 with humor, cleverness, whimsy, subtlety and class.

3. More than one entry per employee is ok.

4. Winning entry will be adjudged by a *Lab News* panel selected for its humor, cleverness, whimsy, subtlety and class.

5. All entries must be in by June 1. Send to *Lab News* office.

6. Winner gets a \$25 Savings Bond *plus* his/her picture in the *Lab News* (but not necessarily wearing the winning design).

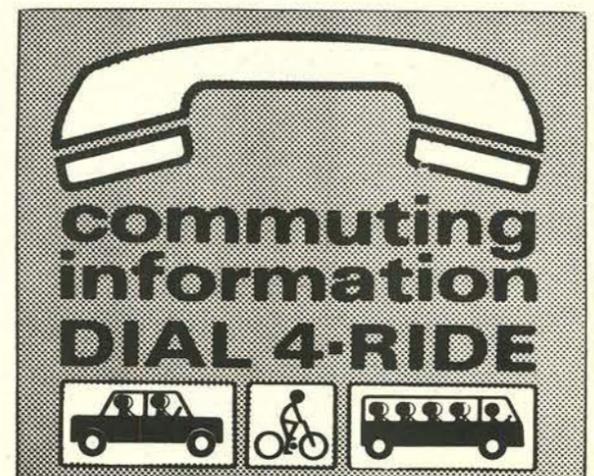
Assuming we get a winner, *Lab News* will then publish the design in the paper life-size, using a special ink that makes it possible for you and your household iron to create your very own Sandia Labs T-shirt.

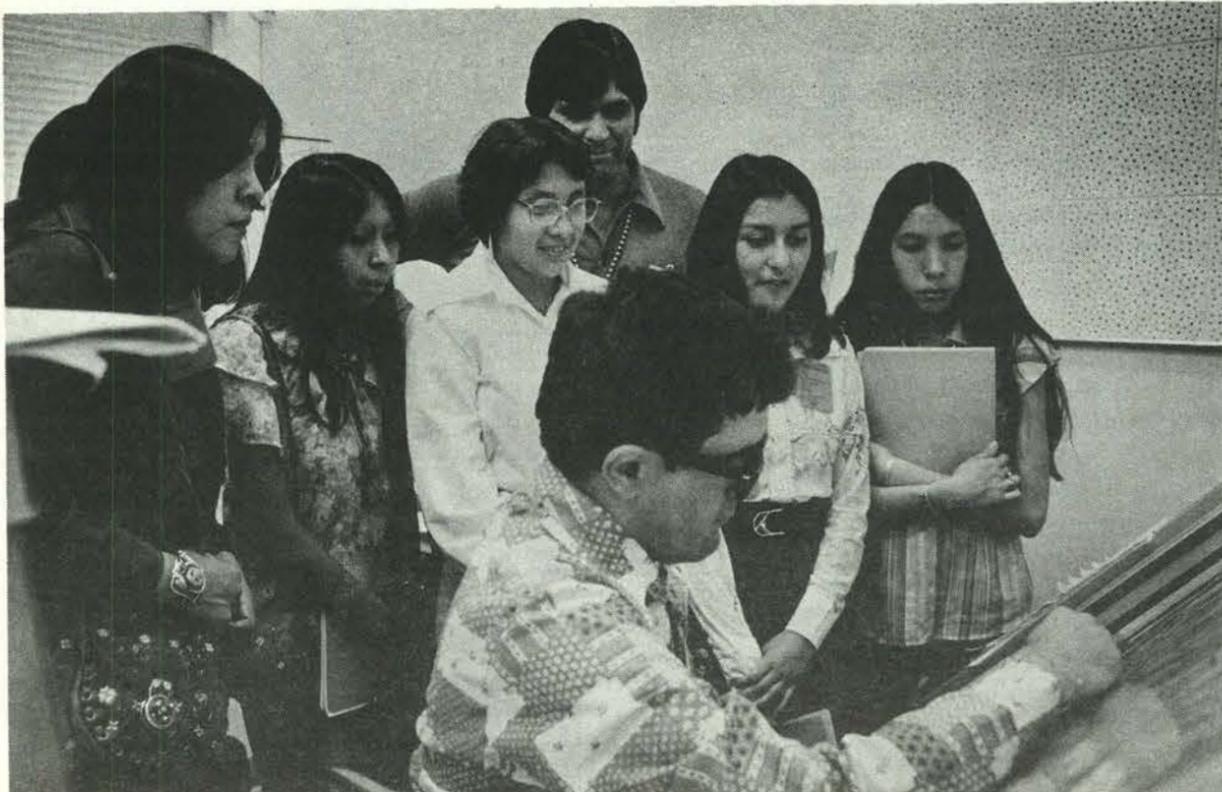
Sympathy

To Mr. and Mrs. Joe Tillerson (5162) on the death of their infant daughter April 19.

To Glen Baker (3522) on the death of his mother in Woodward, Okla., April 20.

To James Sanchez (9712) on the death of his son in Belen, April 20.





THESE YOUNG American Indians were among a group of twenty that toured the Labs recently, viewing various facilities relating to their school studies. Here Bob Miera of Precision Graphics Division 9627 demonstrates some automated graphics equipment as Al Artiaga (3511, in background) looks on.

Take Note

In the *Lab News* story on the new EMES facility (Apr. 22), it was stated that EMES is the only Sandia building with a shape dictated by its function. Turns out that's not entirely accurate — several fit that description, e.g., the shock tube facility. Sorry about that.

* * *

Kathy Pitts (3512) reports that a new EEO/AA Resource Center is now available in Bldg. 832, room 80. The Center contains books, magazines, newspapers and federal publications dealing with all facets of current EEO/AA information. Periodicals and other materials are available for check-out to Sandia employees.

* * *

Is your vehicle doing bad things to your wallet and to the atmosphere? Find out tomorrow at the Exhaust Emissions Analysis at Coronado Center from 10 to 6. It takes only a couple of minutes, and it's free. Look for the signs along Menaul.

* * *

The Albuquerque Civic Chorus will present "A German Requiem" by Johannes Brahms at Holy Ghost Church, 900 San Pedro SE, on Saturday, May 14, at 8 p.m. Advance tickets may be obtained by sending a self-addressed stamped envelope to A.C.C., P.O. Box 13108, Albuquerque, N. Mex., 87112. Further information from 298-5979 or 821-0378.

* * *

Maj. Gen. Thomas Aldrich, commander of the 22nd Air Force (MAC) at Travis AFB, is guest speaker at the Armed Forces Day lunch on May 17 at the Officers Club, Kirtland East. Outstanding ROTC students from city high schools and UNM will also be recognized. The lunch begins at 11:30. Reservations, by May 13: call 842-0220.

Last December *Lab News* carried an article about typist Rose Ann Schultz who works in the Tech Library transcribing tapes and other recorded material, in itself not particularly remarkable except that Rose Ann cannot see. Rose Ann was the invited speaker last week at a luncheon meeting of clerical and secretarial people at the Air Force Weapons Lab. Her topic: "Attitude Can Be A Handicap."

* * *

If you enjoy chamber music, the New Mexico Symphony is again sponsoring the June Music Festival: six chamber music concerts from June 1 to June 17 at UNM's Woodward Hall, featuring the Fine Arts Quartet from Milwaukee and other distinguished musicians. Season tickets are \$12 until May 15, \$15 after that date. The box office is at 120 Madeira NE.

Fun & Games

Sandia Runners — Two events are coming up on Sunday, May 22. The Thoreau Minimarathon (13.1 miles) is a well organized run over high mesa trails, very scenic. Here in town, City Parks offers The Five or Ten Mile Run, starting and finishing at San Gabriel Park. The course goes out Rio Grande to Montano and back. Entry forms for both events are available at the *Lab News* office.

* * *

Music & the Savage Beast — The New Mexico Symphony will give a concert this Sunday, Mothers Day, at the Rio Grande Zoo. It starts at 1:30 in the picnic area near the Bear Grotto, so bring a lunch and enjoy selections by Strauss, Rodgers, Sousa and more.

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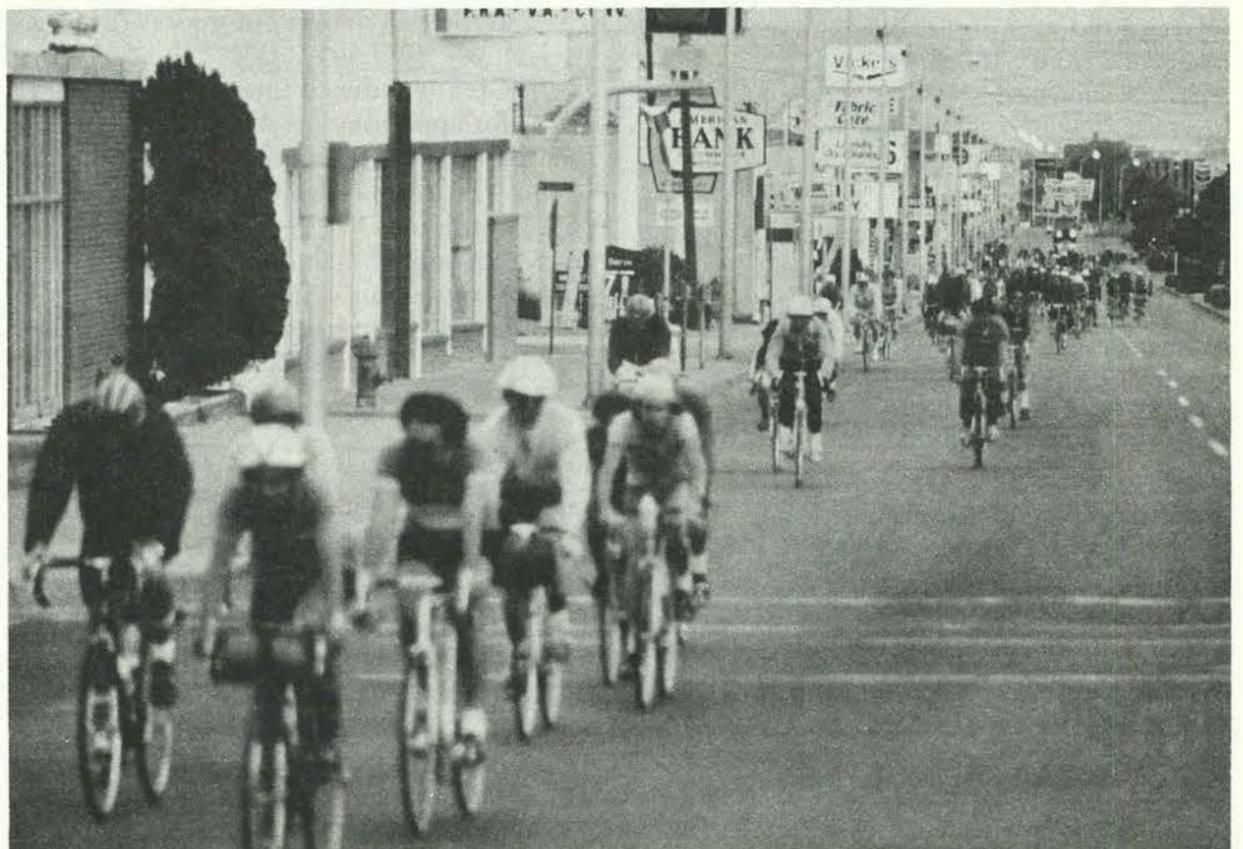
Swimming & Base Gym — If you wish to swim at the Olympic Pool between May 30 and Labor Day, the cost is 25c per dip. Or you can buy a season patch for five bucks at the Morale Office, Bldg. 20414 after May 15. Pool hours are 11 to 7 (lap swimming 11 to 12), Wednesday through Sunday.

Summer hours at the gym started last week: Monday to Friday, 8 to 6; Saturday, 9 to 5; and Sunday, 1 to 5.

* * *

Sandia Tennis — A singles tournament is being sponsored by the Tennis Association during the week of May 16 to 20. Play will be after work at the Tennis Complex. The entry fee of \$4.50 covers trophies, court fees and a new can of balls for each match (loser keeps). Players play only one match per day. Entry deadline is 9 a.m. May 10; call Joe Tillerson, 4-5575 or Lloyd Melick, 4-1917 to enter.

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MAY 6, 1977



BIKERS, many of them Sandians, are shown at the 6:30 Sunday morning start of the Century ride. Official Walt Joseph (1713) says 230 showed up for the ride; 173 finished 100 miles while 55 completed the 50 mile circuit. Ride was 5th annual Tour of Rio Grande Valley.

feed **back**

To get a response to your comments and questions about Sandia Labs, complete a Feedback form [available near bulletin boards] and return it to the Feedback administrator. The substance of questions and responses of wide interest is published in LAB NEWS.

Q. If the Labs is truly interested in conservation of energy, it should retain numbered slots for car poolers.

A. Sandia does have a real concern for energy conservation, and as a result, has provided incentives (special commuter buses, bicycle accommodations, reserved car pool parking) which might encourage employees to save energy. However, we are confronted with increasing numbers of drivers (employment is rising), and less parking area because of new construction; even with some poaching, there was a 10-20% vacancy rate in the reserved areas under the old system. It seems improper for the Labs to provide policing and punitive measures to control the use of incentives for this societal problem. It's now a matter of conscience and peer pressure determining who will park where. We hope you will give the new system a try.

W. J. Howard - 2

Q. Enclosed please find one original MR Form 6470-H [pink] and thirteen new MR's with the same information as the pink original. Why is it necessary to use thirteen more SA6470H forms, which list

each item backordered separately, to convey the same information as received on my original MR request?

A. A separate four-ply MR form for each different stock item is prepared for backordered items. One copy of the MR is sent to the computer for update and then to the requester for his record. The other three copies are retained in the storage bin until the backordered item is received. When the item is received, it is delivered to the requester along with two of the remaining three copies of the MR form. One of these copies is retained by the requester with the delivered material and the other copy is signed by the requester acknowledging receipt of material and returned to Stores. The remaining copy goes to the computer for update.

Different methods for expeditious filling of back orders have been considered by Stores. The existing method has proven to be the most efficient method to assure expeditious filling of back orders and dissemination of stock item information to the required locations.

L. S. Conterno - 3700

Q. I've encountered long lines twice when obtaining glasses from the contract optician. Could some form of scheduling be set up?

A. A new optician took over in January 1977. At the same time, and as a result of a survey, the following improvements are in effect:

- Increased on-site time from two to three days a week
- Improved delivery of glasses (average is now 7-10 days)
- Greatly reduced internal paper work.

As for appointments, it has been tried in the past with little success - the problem being the casual drop-in during normal optician hours. We regret the delays you have encountered and plan another customer survey, once the new contractor is established, to again determine the adequacy of the system.

D. S. Tarbox - 3400



INVENTOR DAN HARDIN (4362) displays his gas injected vacuum switch.

Weapon Switch Patent Received

ERDA was awarded a patent recently for a gas injected vacuum switch invented by Dan Hardin, supervisor of Advanced Electrical Systems Division 4362.

Essentially, the tiny ceramic device is a vacuum chamber between two parallel electrodes. An explosive squib ruptures the chamber wall and injects combustion gases into the chamber. This provides a conductive path for electrical current. It is a one-shot switch designed for weapon applications.

The device has a pinch-off tube which is sealed during fabrication after a vacuum (10^{-6} torr) is established in the chamber. The detonator contains only two milligrams of explosive and is epoxy-bonded to the switch.

"The switch may be non-destructively tested for hold-off capability," Dan says. "Its hold-off capability is 20 Kv. We can achieve very rapid high voltage switching in a very small space. The device is mechanically simple, immune to moisture absorption and insensitive to radiation. It is also immune to extraneous noise which might trigger other switching devices."

Dan has worked at Sandia 24 years in component, firing systems and systems development programs.

Congratulations

Mr. & Mrs. David Wesley (9337) on the birth of a daughter on April 17.

Mr. & Mrs. Valente Medina (9331) on the birth of a son on March 24.

Mr. & Mrs. Richard Johnson (9337) on the birth of a son in December.

Credit Union Reporter

The Board of Directors took the following action at the April board meeting:

1. Authorized loan terms up to 36 months for loans secured by motorcycles when the amount financed is \$2500 or more.

2. Increased the minimum deductible on required comprehensive and collision insurance from \$100 to \$250.

3. Authorized a service charge of \$3 to be imposed in connection with checks returned by the bank for "insufficient funds."

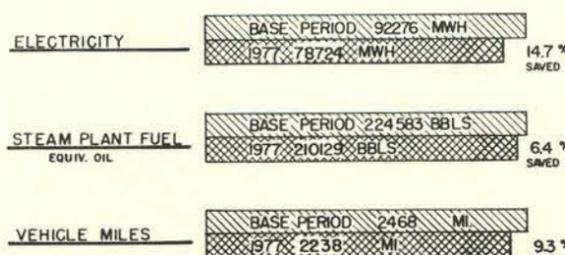
4. Cancelled plans to act as a paying agent for the purpose of redeeming Series E Savings Bonds. To act as such agent would subject the Credit Union to the regulatory authority of the Department of the Treasury which, among other things, would provide for examination and investigation by the Treasury Department. The Board feels any benefits derived from this service would be far outweighed by this additional regulatory interference.

5. Authorized issuance of a revised and updated version of "Your Credit Union," the Credit Union informational booklet.

6. Went on record as noting that Sandia Laboratory Federal Credit Union now has total assets of just under 32 million dollars, placing your credit union ahead of six of Albuquerque's twelve commercial banks.

ENERGY SAVINGS

COMPARED WITH USAGE IN BASE PERIOD - JULY 1972 THRU JUNE 1973
CURRENT REPORTING PERIOD ENDING MAR '77



New Glass, New Uses: Sandia's Glass Lab

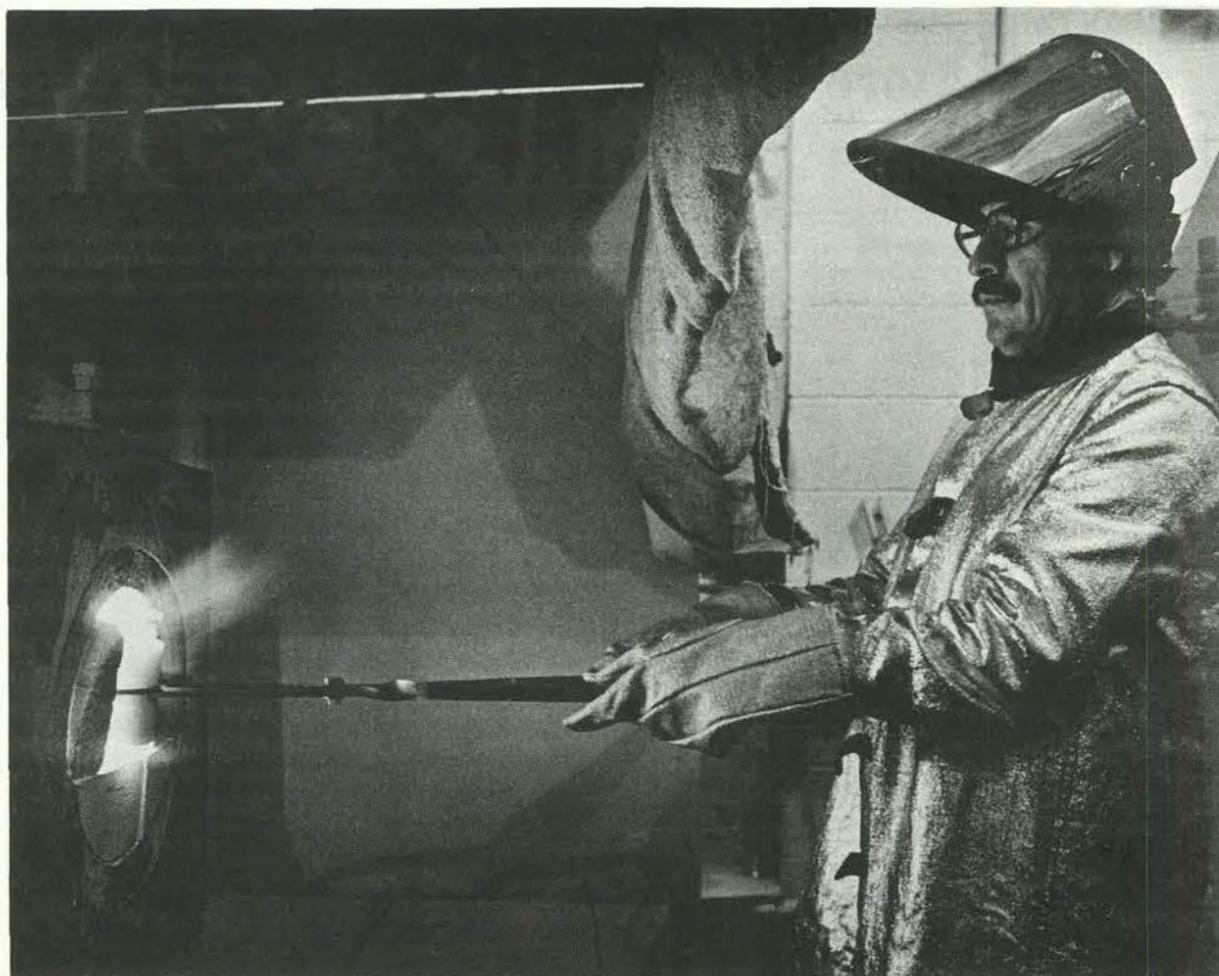
Most Sandians who have been around the Labs for several years think of the Glass Lab (more properly, Glass Formulation and Fabrication Section 3621-4) as the place where the glass blowers work. That's still an accurate description, but it's certainly not a complete one anymore.

Today the lab staff can not only blow glass into desired shapes and sizes, but they can also *make* glass—from scratch, as it were—to meet a variety of requirements. "Many of the glass materials Sandia scientists and engineers need," says section supervisor Ron Snidow, "are simply not available commercially. Until we developed our melt facility, we were unable to meet their needs. Now we can formulate a new glass, weigh its constituents out, mix it, melt it, then characterize it."

The latter step takes place in the lab's diagnostics area, where a thermoanalyzer and a dilatometer characterize the new glass: annealing temperature, nucleating temperature, crystallization temperature, crystal melt temperature, and the like. With that information, the user can decide whether the new glass meets requirements. If so, the glass lab makes the molds and the glass (or glass-ceramic) preforms, and finally the trial component itself.

"Only recently," says Ron, "has Sandia Labs discovered the potentials of glass-ceramics. Their physical, chemical, and electrical properties can be tailored to meet a wide range of design criteria; they can be fabricated more quickly than conventional ceramic components; and they are many times cheaper than metalized and brazed components."

The glass-ceramics Ron is talking about are the kind your cookware or even your range top at home may be made of. They differ from true glasses in that they are heat-treated in such a way as to produce nucleation and crystallization; a crystal forms from each nucleus and produces an opaque glass-ceramic. An additional ad-



GLORY HOLE commands warm respect of Al Herrera. Temperature inside furnace can reach 1550°C. (Protective mask was raised for photo.)

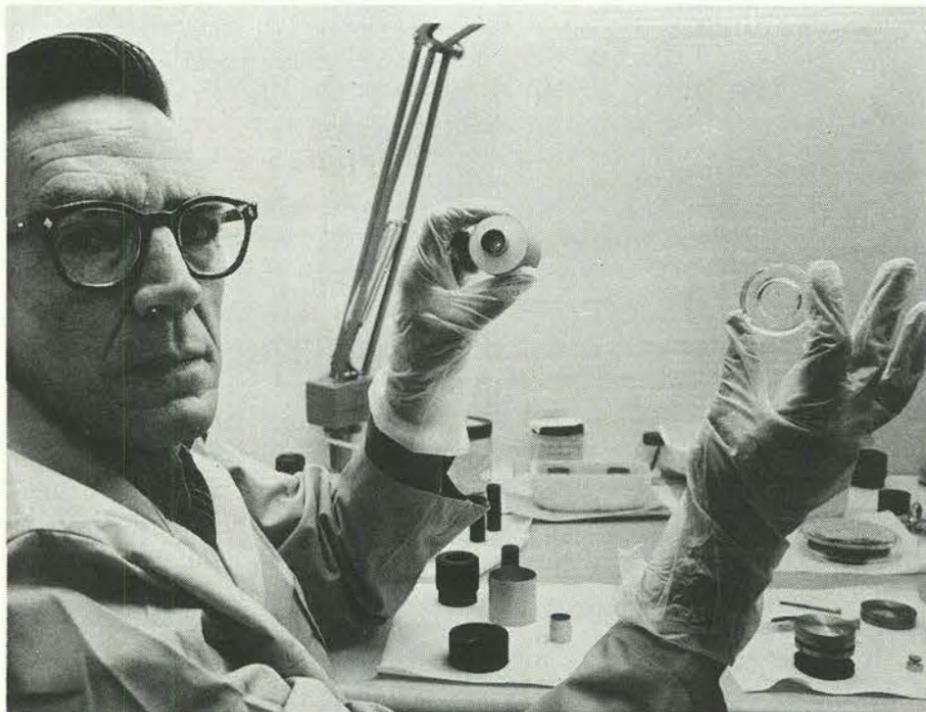
vantage is that their rate of thermal expansion can be made to match that of many metals—stainless steel, platinum, aluminum, copper, molybdenum, etc.

For its advanced work, the glass lab is well stocked: an RF-powered high-temperature melt furnace, a complete Class 100 cleaning facility, and a variety of vacuum systems. "Some equipment we had to design ourselves," says Ron. "For example, Donn Stewart built a device for drawing glass fibers as small as 0.018 mm in diameter—a human hair is about four times thicker. He is also working on a new drawing tower and on a very high temperature—2500°C—RF powered melt furnace.

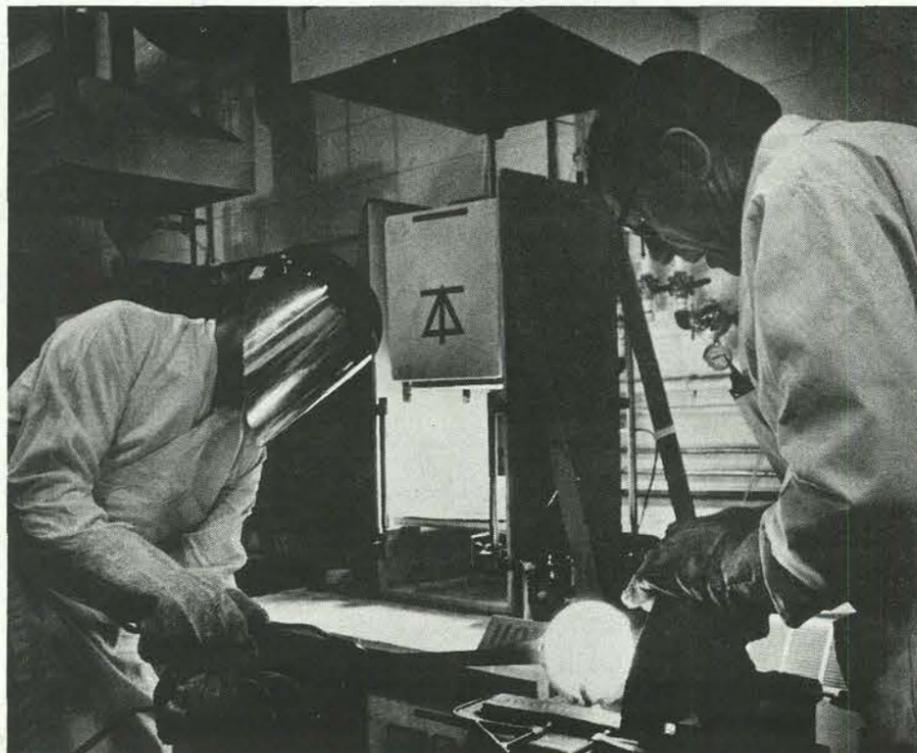
"Probably the most fruitful of our facilities is the total containment mold technique developed by Ray Bland. It can

fix in place metal pieces, either feed-throughs or flanges, and then in a controlled atmosphere heat, melt, and apply a precise fluid pressure to a molten glass-ceramic material. The pressure forces the molten material to fill the cavity and come into intimate contact with the metal components. Thus we get both a chemical and a mechanical bond between the two, forming a dielectric or mechanical shape. Vacuum furnaces with fast rise times—45°C per minute—melt the glass and achieve a glass-to-metal seal before the glass nucleates and crystallizes. The whole process takes place in an inert argon atmosphere." •bh

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COMPLETED GLASS CERAMIC-TO-METAL SEAL is held by Ken Peters. The glass ceramic preform in its vitreous state is shown in his right hand. This seal is made with a process built on the total containment molding concept.



MOLTEN GLASS is poured by Al Herrera into mold steadied by Ed Vauro.

More Coal Research, Breeder Reactor Deferred, Solar & Geothermal Emphasized

[Ed. Note — Following are excerpts of particular interest to ERDA and Sandia from the detailed fact sheet issued by the White House in connection with the President's Energy Program recently presented to the Congress.]

NUCLEAR POWER

The United States will make a concerted effort, in association with other countries, to find answers to the problems of nuclear proliferation. As part of this effort, the U.S. will defer indefinitely commercial reprocessing and recycling of spent fuels produced in United States civilian nuclear power plants.

In addition, the President has decided to defer indefinitely construction of the Clinch River Liquid Metal Fast Breeder Reactor Demonstration Project and to cancel all component construction, commercialization, and licensing efforts; revise the U.S. breeder program, and redirect efforts toward evaluation of alternate breeders, fuels, and advanced converter reactors with emphasis on non-proliferation and safety concerns.

The U.S. has asked other countries to join in examining alternate methods of meeting future needs for nuclear power. As part of this program, the U.S. must restore confidence in its ability and willingness to supply enriched uranium services. The U.S. is, therefore, taking three steps to restore that confidence:

1. The U.S. is re-opening the order books for uranium enrichment services.
2. The President is proposing legislation, in a separate submission, to guarantee the sale of enrichment services to any country which agrees to comply with our nonproliferation objectives and is willing to accept certain conditions.
3. The U.S. will expand its enrichment capacity. Current capacity consists of gaseous diffusion plants. A centrifuge plant uses only 10 percent as much electrical power as a diffusion plant of equivalent capacity. Accordingly, the next plant that the United States will build, for which funds are already in the proposed fiscal 1978 budget, will be a centrifuge plant.

To resolve uncertainties about the extent of domestic uranium resources, ERDA will modify its National Uranium Resources Evaluation (NURE) program to improve its uranium resource assessment and to include thorium.

Nuclear Safety & Storage

Light water reactors, the type now being built, are not a proliferation hazard.

Although light water nuclear reactors have had a good safety record, the President will request the Nuclear Regulatory Commission to expand its audit and inspection staff, to increase unannounced inspections and to assign a permanent inspector to every nuclear site.

The President will request the NRC to

make mandatory the current voluntary reporting of minor mishaps and component failures.

The President also will request the NRC to develop firm siting criteria that contain guidelines to prevent siting in densely populated areas, in potentially hazardous locations, or in valuable natural areas.

The current licensing process is unsatisfactory to utilities, intervenors, and the Government. Therefore, the President will direct a thorough review of the entire process. As part of this review, he has proposed that reasonable and objective criteria be established for licensing and that plants which are based on standard design not require extensive individual licensing.

The President will direct a review of ERDA's waste disposal program.

SOLAR & GEOTHERMAL

To stimulate the development of a large solar market, a tax credit of 40 percent of the first \$1,000 and 25 percent of the next \$6,400 (maximum of \$2,000) paid for the installation of qualifying solar equipment would be provided. The credit would decline over time to 25 percent of the first \$1,000 and 15 percent of the next \$6,400. The credit, available between April 20, 1977, and December 31, 1984, would be supported by a Federally supported joint Federal/State program of standards development, certification, training information gathering, and public education.

The Federal Government will, in addition, spend up to \$100 million over the next three years to add solar hot water and space heating to suitable Federal structures to help demonstrate the commercial potential of such measures.

To stimulate geothermal drilling, the President will propose a tax deduction for intangible drilling costs comparable to that now available for oil and gas drilling.

The Departments of Interior and Agriculture will streamline their leasing and environmental review procedures to remove unnecessary barriers to development of geothermal resources.

COAL R&D

The President has directed ERDA, EPA and the Department of the Interior to undertake a major expansion of the Government's coal research and development program. The program will focus primarily on meeting environmental requirements more effectively and economically, and will seek to expand the substitution of coal for gas and petroleum products.

The program will include research on more effective, economical methods to meet air pollution control standards, including flue gas desulfurization systems ("scrubbers"); fluidized bed combustion systems; coal cleaning systems; solvent refined coal processes; low Btu gasification processes; synthetic crude technology; and coal mining technology.

In the long run, synthetic high Btu gas produced from coal may provide a substi-

tute for declining natural gas supplies. The Government does not plan to subsidize existing technologies. The administration will pursue an active R&D program for advanced high Btu coal gasification. The program will be conducted with the urgency required to ensure that the new technology will be ready when needed.

DECENTRALIZED SYSTEMS

A new Office of Small-Scale Technology is proposed within the Department of Energy in order to tap more fully the great potential of the Nation's individual inventors and small business firms.

The Government will provide increased funding for photovoltaic systems, solar space cooling and other solar buildings technologies, small wind energy conversion systems, and demonstration projects on wood-derived biomass. The Government will also fund programs for additional work on gas-fired heat pumps and small fuel cells with residential and commercial heating and cooling. Additional funding will be provided to identify new hydrothermal sources which could be tapped for near-term generation of electricity and for direct thermal use. The Government will also support demonstration of direct, non-electric uses of geothermal energy for residential space conditioning and industrial and agricultural process heat in areas where this resource has not previously been exploited.

MISCELLANEOUS

Federal Staff Cars

The President will direct Federal agencies to alter their auto purchasing practices so that new cars purchased by the Government will, on the average, exceed the average fuel economy standard under the Energy Policy and Conservation Act by at least 2 miles per gallon in 1978, and by at least 4 mpg in 1980 and thereafter.

Synthetic Natural Gas

Current policy discourages construction of synthetic natural gas facilities. A Federal task force will be established to identify areas where additional SNG plants should be built. The FEA will ensure that plants built in those areas will receive priority for SNG feedstocks.

Gas Development

Federal research and development programs on gas from geopressurized zones will be greatly accelerated. Efforts to develop gas from Devonian shale will also be expanded.

Vanpooling Program

Legislation will be proposed to initiate a Federal vanpooling program. This program will demonstrate the energy conservation and pollution control potential of this form of commuter transportation by the largest employer in the Nation. About 6,000 vans will be purchased by the Government and made available for use by Federal employees. All costs of the program will be repaid to the Federal Government by the riders.

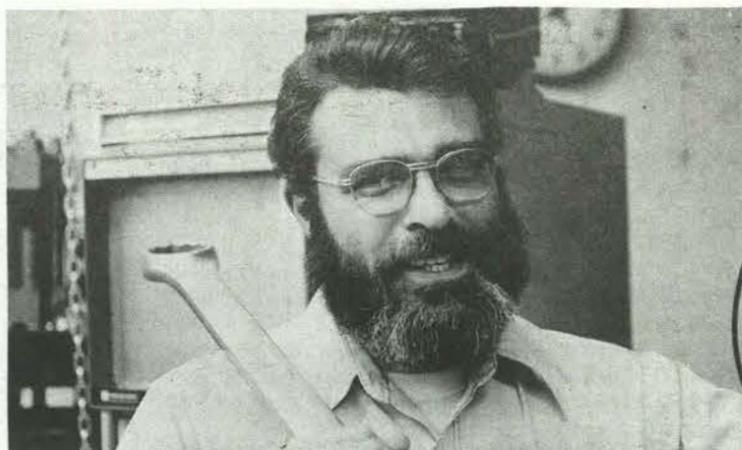
MILEPOSTS

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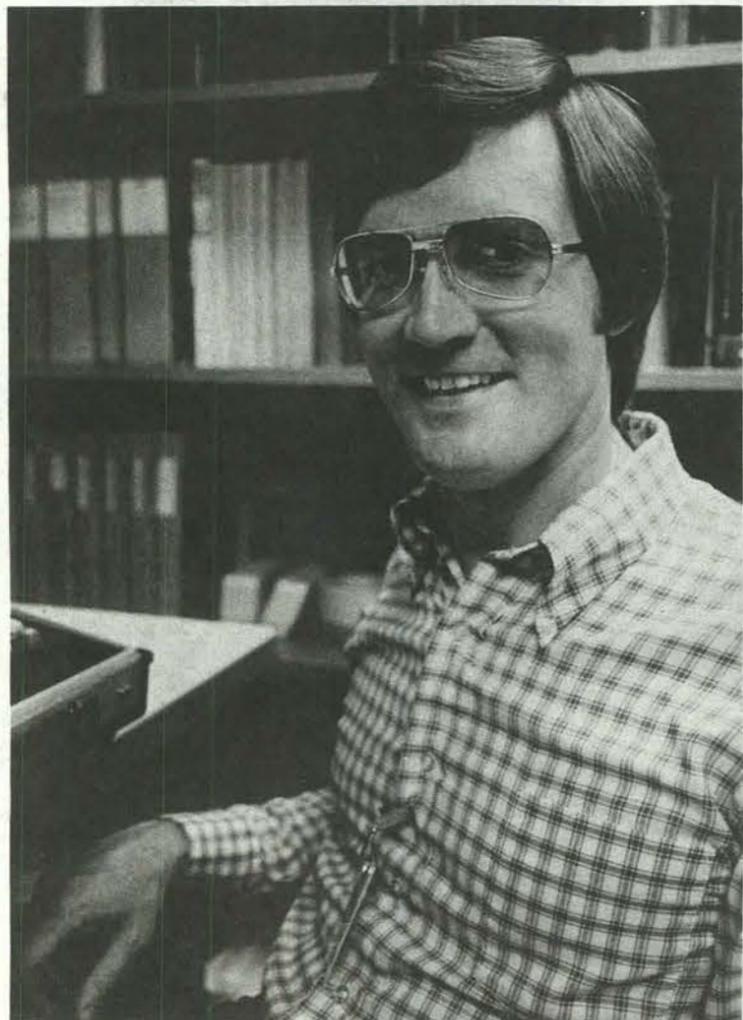
MAY 1977



Luis Martinez - 3413 25



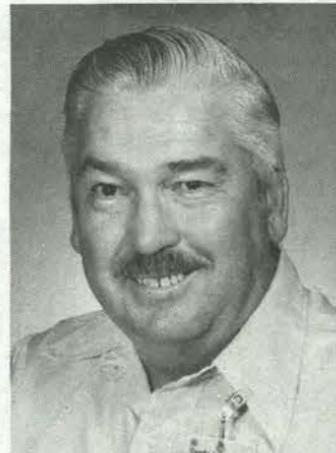
Karl Schuler - 5163 10



Tom James - 1712 10



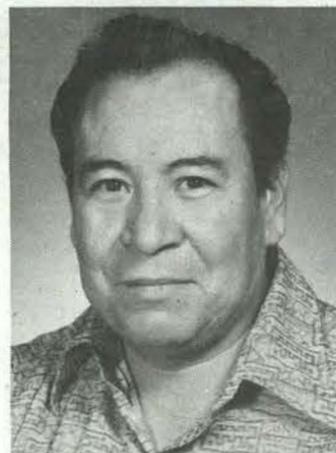
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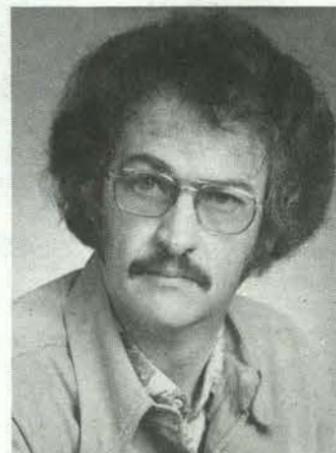
Joseph Gonzales - 9712 20



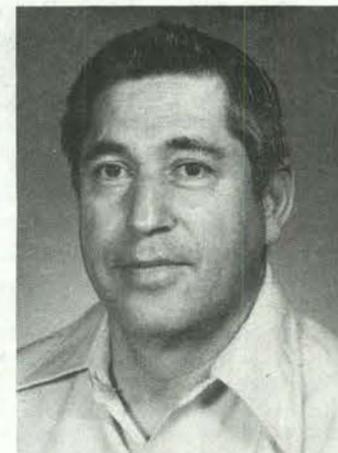
Harry Olson - 8413 20



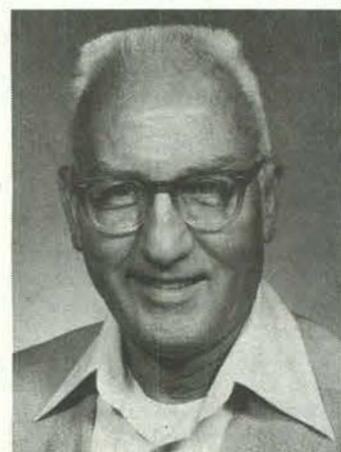
Gilbert Leyba - 9563 25



Dave Pierce - 8166 15



Mike Barela - 3725 25



Clarence Sandy - 2553 25



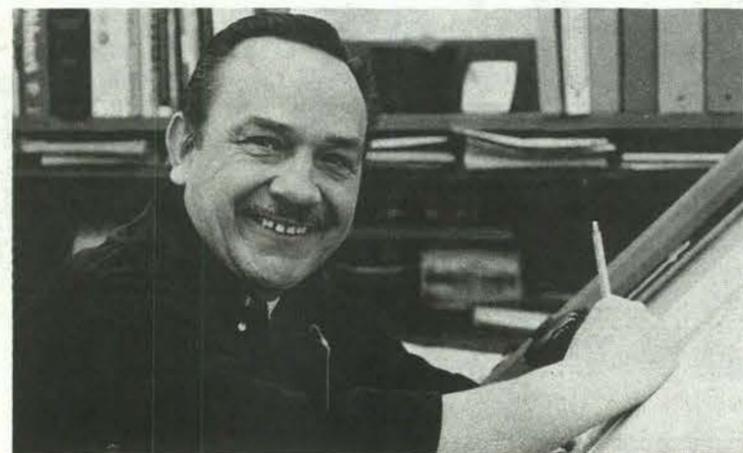
Merle Snyder - 8412 15



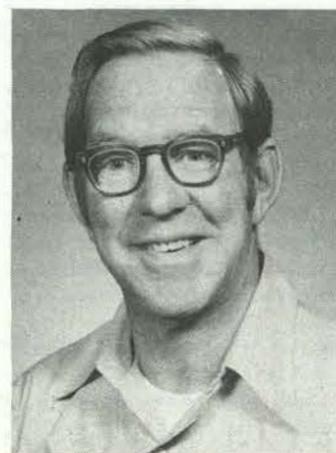
Donald Lloyd - 9484 20



Ada Kozlowski - 2632 15



Gerald Hastings - 9655 20



Walter Henderson - 1734 10



Bill Whalen - 2643 15



William Warren - 5162 15

Speakers

A.D. Swain III (1222), "Human Reliability Analysis with Applications to Nuclear Power Plants," Colloquium Series, Spring 1966, EE Dept., Marquette Univ., Feb. 8, Milwaukee, Wis.

P.J. Slater (5121), "A Note on k-critically n-connected Graphs," American Mathematical Society meeting, Jan. 27-28, St. Louis, Mo.

R.M. Jefferson (5430), "The Energy Crisis: Fact or Fiction?," Highland H.S. chemistry class, Jan. 5; and "Our Powerless Society," American Businesswomen's Assn., El Segundo Chapter, Jan. 25.

G.W. Hughes (1243), "The Metric System and the Citizen," Opti-missus Club, Jan. 7.

T.F. Marker (6010), "The Oil Industry: Fact and Fiction," Emerson Elementary School Parent-Faculty Club, Jan. 11.

T. F. Marker (6010), "The Oil Industry: Fact and Fiction," Feb. 1, St. Paul's Methodist Church and Hoover Middle School science class, Feb. 28, Albuquerque.

J. A. Kenagy (9580), "Working with Stained Glass," Manzano H.S. art class, Feb. 3.

L. P. Robertson (1756), "Brazil - A Sleeping Giant," Emerson Elementary School Parent-Faculty Club, Feb. 8.

L. Wetherholt (5700), "Sandia's Solar Energy Program," Belen Rotary Club, Feb. 9; "Solar Energy Research," Hoover Middle School science class, Feb. 15.

G. W. Hughes (1243), "Astronomy," First Presbyterian Church, Feb. 20.

R. M. Jefferson (5430), "The Nuclear Fuel Cycle," Public Interest Research Group, UNM, Feb. 23.

J. L. Watkins (5719), "Solar Energy Research," Northwest Optimist Club, Feb. 24.

T. A. Green (5231), "Charge Exchange Between Highly Stripped Impurity Ions and Hydrogen Atoms in Tokomac Fusion Reactors," UNM Physics Colloquium, Feb. 4.

P. J. Slater (5121), "Using Associated Threes to Count the Spanning Trees of Labeled Maximal Outerplanar Graphs," 8th Southeastern Conference on Combinatorics, Graph Theory and Computing, Feb. 28 - March 3, La. State Univ., Baton Rouge.

J. S. Pearlman (5214), "Observation and Discussion of Plasma Absorption," A-Y Seminar, March 2, LLL.

N. J. Magnani (5831) and P. H. Holloway (5825), "The Correlation Between Oxidation and Stress Corrosion Cracking of U-4.5% Nb Alloys"; W. H. Smyrl, L. L. Stephenson and J. W. Braithwaite (all 5831), "Behavior of Candidate Canister Materials in Deep Ocean Environments"; S. H. Pohlman (5831), "Corrosion and Electrochemical Behavior of Boron Aluminum Composites," NACE/Corrosion '77, March 14-18, San Francisco.

R. K. Quinn (2516), "Electrochemical Oxidation of Titanium Thin Film Electrodes and Their Characterization by Auger and X-ray Photoelectron Spectroscopies"; D. S. Ginely and M. A. Butler (both 5154), "Correlation Between the Electronegativities and Zero Bias Operation of Photoanodes for Photoelectrolysis of Water"; R. R. Lagasse and K. B. Wischmann (both 5813), "Castable Thermoplastic Urethane Elastomers II. Structure-Property Correlations"; Wischmann and Lagasse, "Castable Thermoplastic Urethane Elastomers I. Formulation and Application as Removable Encapsulants"; R. M. Biefeld (5154), M. M. Karnowsky (5831) and R. P. Clark (2523), "Phase Diagrams for the Binary Systems K_2CrO_4 - $CaCrO_4$, K_2CrO_4 - Li_2CrO_4 and Li_2CrO_4 - $CaCrO_4$ "; R. R. Rye (5144), invited talk, "Interaction of Hydrogen with Single Crystal Surfaces of Pt and W"; D. M. Haaland and J. M. Freese (both 5825), "Development of a Self-Contained, Solid-Electrolyte Oxygen Sensor Using Null-Point Detection"; W. B. Gauster (5111), invited paper, "Positive Muon Diffusion and Trapping at Defects in Metals," ACS meeting, March 20-25, New Orleans, La.

K. T. Stelher (2541) and J. G. Kelly (5423), "Time Resolved Coded Aperture Imaging System for Nuclear Fuel Motion Measurements," SPIE/SPSE's Technical Symposium on X-ray Imaging, April 20-21, Reston, Va.

D. Engi (5741), "Nuclear Facility Safeguards Systems Modeling Using Discrete Event Simulation," Eighth Annual Pittsburgh Conference on Modeling and Simulation, April 21-22, Pittsburgh, Pa.

R. Rodeman (1281), "Wind Energy Research," Hoover Middle School Science Class, March 4, Albuquerque.

G. W. Hughes (1243), "The Switch to Metric," Construction Specifications Institute, March 8; "General Astronomy," Hoover Middle School science class, March 30, Albuquerque.

R. M. Jefferson (5430), "Our Powerless Society," National Assoc. of Accountants, March 8; Hoover Middle School science class, March 8; Sandia Civitan Club, March 11; and Men's Club, Monte Vista Christian Church, March 25; "Transportation of Spent Fuel and Nuclear Waste," American Nuclear Society, Trinity Section, March 18, Albuquerque.

J. W. Reed (5443), "Uncertainty and Hazards in Weather Modification," Hoover Middle School science



THE General Advisory Committee, ERDA's top level advisory panel, visits the weapons laboratories periodically, and several members were at Sandia last week. Here Don Schueler of Photovoltaic Systems Division 5719 describes solar device; from left, Ruth Patrick, Fisher Howe - Executive Secretary, Jim Scott (5700), Charles Hitch - GAC Chairman, Schueler, and William Woodard - Asst. Executive Secretary.



ARMS & THE US — Ass't. to the Secretary of Defense Don Cotter addressed the staff last week concerning the magnitude of Soviet military forces. A Sandia alumnus, Don is also Chairman of the Military Liaison Committee.

class, March 15, Albuquerque.

H. C. Monteith (5411), "UFO's and Their Mission to Earth," Parent-Teacher-Faculty Club, Cortez Elementary School, March 17, Albuquerque.

L. Wetherholt (5700), "Solar Energy Research," Science Teacher Section, SE District Teachers' Convention, March 18, Roswell.

A. D. Swain (1222), "Motivation of the Volunteer Worker," Knights of Columbus, Rio Rancho, March 22, Albuquerque.

H. T. Weaver (2354), "Structural and Magnetic Properties of PrN"; S. M. Myers (5111) and H. J. Rack (5832), "Low-Temperature Diffusivity and Solubility of Sb in Fe Using Ion Beams"; J. E. Schirber (5150), "Relativistic Ferromagnetic Band Structure Calculation of Gd"; A. C. Switendick (5151), "Energy Bands for Chromium Hydride"; D. Emin (5151), "Small-Polaron Hopping Transport in Magnetic Semiconductors"; K. K. Murata (5151), "Effects of Finte Ion Vibrational Amplitudes in APW Metals"; W. J. Camp and J. P. Van Dyke (both 5151), "Series Studies of the Crossover Behavior of Anisotropic Heisenberg Correlation Functions"; G. E. Pike (5155) and R. M. Biefeld (5154), "Percolation Model of Li Ion Conductivity in the $LiAlSiO_4$ Glass-Ceramic System"; M. L. Knotek (5155) and H. T. Weaver (2354), "Magnetoresistance of Impurity Conduction in Transmutation-Doped Ge to 110 KOe"; P. Richards (5132), "Correlated Hopping in a One-Dimensional Superionic Conductor"; E. L. Venturini (5132) and B. Morosin (5154), "Evidence for a Low Temperature Phase Change in Scandium Dihydride"; J. E. Schirber (5150), "Pressure Dependence of the Fermi Surface of Thorium"; C. E. Barnes (5133), "The Effect of Gamma Irradiation on the Properties of Amphoterically Si Doped GaAs LEDs at 4.2 K"; D. M. Follstaedt (5151) and A. Narath (5000), "NMR Study of Local-Moment Fluctuations in CuMn"; D. K. Brice and R. A. Langley (both 5111), "Energy Straggling of Protons in Carbon"; J. E. Smaardyk (5167), "A New Calorimeter for Organic Liquids Utilizing the AC Heat Capacity Technique"; J. P. Van Dyke (5151), "Spurious Roots in the LAPW Method"; C. H. Seager and T. G. Castner (both 5155), "Electron Transport Studies of n-Type Polycrystalline

Silicon Thin Films"; R. C. Hughes (5814), "Excess Electron and Hole Transport in SiO_2 "; H. H. Madden (5114), D. M. Zehner and J. R. Noonan (both ORNL), "The L_3 VV and MVV Auger Spectra of Cu"; W. R. Wampler (5111), "Investigation of the Scattering of Conduction Electrons in Copper from Interstitial Hydrogen Using the de Haas-van Alphen Effect"; G. A. Samara (5130), "Pressure and Temperature Dependence of the Ionic Conductivity of PbF_2 ," American Physical Society meeting, March 21-24, San Diego.

P. J. Chen (5131), "Can One Really Determine the Nature of the Materials from Wave Propagation Studies?"; R. T. Walsh (5166), "A Wave-Propagation Vocabulary for Computers"; W. Hermann (5160), "Current Problems in the Difference Solution of Stress Waves"; R. A. Graham (5131), "Technique for Measurements of Plane Waves of Uniaxial Strain," Nonlinear Waves in Solids Workshop, March 21-23, Chicago.

R. S. Berg (5842) and R. D. Nasby (5155), "Low Cost Thin Film Chemical Sprayed $CdS-Cu_2S$ Solar Cell Evaluation," National Solar Photovoltaic R&D Program Review Meeting, March 22-23, Washington, D.C.

M. J. Forrestal (5233), "Some Recent Experiments on the Dynamic Response of Elastic-Plastic Structures"; P. J. Chen (5131) and S. T. Montgomery (2315), "Normal Mode Responses of Linear Piezoelectric Materials with Hexagonal Symmetry," 15th Midwestern Mechanics Conference, March 23-25, Chicago.

L. D. Bertholf and M. E. Kipp (both 5162), "Two-Dimensional Stress Wave Calculations of Kinetic Energy Projectile Impact on Multi-Layered Targets," 3rd International Symposium on Ballistics, March 23-25, Karlsruhe, Germany.

L. C. Beavis (2353), "Using a Mini-computer to Collect, Reduce, and Plot Gas Analyzer Data," AVS, April 14, St. Petersburg, Fla.

D. E. Mitchell (2513), "Shock Sensitivity of Porous Hexanitrostilbene (HNS) Explosive," technical meeting JTCG/MD Working Party for Explosives, April 19, White Oak, Md.

L. C. Beavis (2353), "Design of Systems and Equipment for Ultra-high Vacuum," N.M. Chapter, AVS, April 19, Albuquerque.

Bill Palmer Builds Winning Race Car

"It was a great night," Bill Palmer (9573) says. "My kid Dean won his first race at Speedway Park in our car. We spent 18 months building that machine."

Bill is the announcer for Speedway races. He was doing his commentary when Dean finished first in the 10-lap race. "I had to tell the audience that I was proud of my son," Bill says. "I got a little carried away."

Bill can't estimate the number of hours they spent working on the car. "We started with a \$40 wreck," he says, "what was left of a '68 Barracuda. It contains pieces from my old race car — a Dodge Lancer. But mostly we started from scratch and worked every part over for maximum performance. We use a '76 Plymouth 340 engine, and it has the full treatment — balancing,

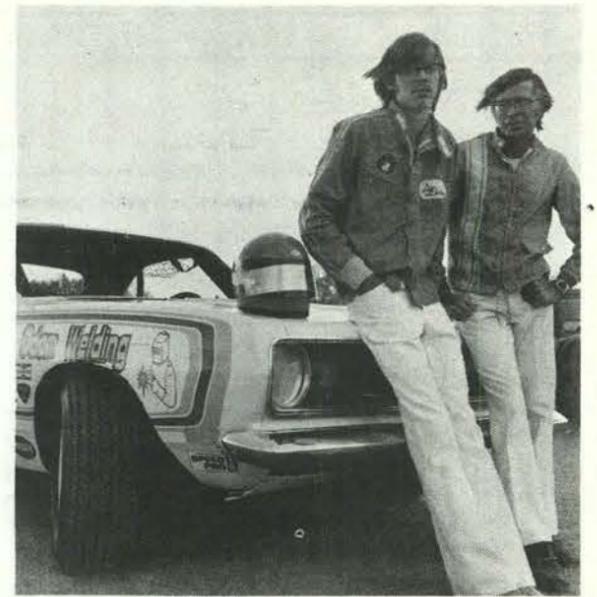
pop-up pistons, full race cam, headers, big heads — the works."

Finishing touch is the paint job. Bill works in Sandia's paint lab, and the car reflects his specialty. The car is painted a pearlescent white with orange and yellow metal flake trim. Bill also did the lettering on the car which credits the sponsors — people who contributed parts or services to the building of the car.

Bill has been the announcer at Speedway since he gave up driving in 1972. "I raced for years," he says. "Won one race."

The races — late model stock cars and older stocks — are held at Speedway Park on South Eubank every Saturday night through Labor Day. Sprint cars and sportsman races are held on Friday nights. Bill announces all events.

Bill tried to discourage his 19-year-old



BILL PALMER (9573), right, with his son Dean and their '68 Barracuda race car. They spent 18 months building the machine.

son from racing. "Didn't work," he says. "I guess all those years he worked in the pit on my car got to him. Oh well, so far he's a winner."

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RULES

1. Limit 20 words.
2. One ad per issue per category.
3. Submit in writing. No phone-ins.
4. Use home telephone numbers.
5. For active and retired Sandians and ERDA employees.
6. No commercial ads, please.
7. Include name and organization.
8. Housing listed here for rent or sale is available for occupancy without regard to race, creed, color, or national origin.

MISCELLANEOUS

- DISHWASHER, Frigidaire, built-in, needs valve. \$30 or best offer. Finning, 298-0743.
- WASHER & DRYER, Frigidaire, 9 yrs. old, copper-tone, both good working order, \$80 for pair. Hollingsworth, 298-8283.
- GUITAR, electric, black, two p/v's, tone & volume controls, p/v select switch, \$80; radio, Chevy AM push button, 12V, \$30. Ingram, 255-0592.
- TIRES, 2 ea. 950 x 16.5, below retread price; tire, 950 x 16.5 Goodyear Hi-miler, never mounted. Asturias, 299-1175.
- MAYTAG WASHER & KENMORE DRYER, \$40 ea. or \$75 for both. Archuleta, 255-6781.
- TONNEAU COVER for Ford Ranchero, white fiberglass, key lock, \$100. Lewis, 296-7896.
- BAR, White Nara, solid wood, mahogany color, w/casters, brass rail, length 5'10", w/5 swivel stools, glass top, value \$1200, sell \$800 or trade for Spinnet piano; 360 Rogers snare drum w/stand & case, \$100; wrought iron gate, 52" x 36", \$25. Balsonado, 821-5016 after 5.
- CANON FTQL, 500 mm telephoto, 200 mm telephoto, strobe flash, Canon booster, & misc, \$400; Columbus apt stove, propane or natural gas, \$50; GE Fashionette air conditioner, \$75. Preble, 294-0497.
- HALF ARABIAN MARE, registered, grey, 5 yrs. old & sound, 14.3 hands, experienced youth rider, \$700. Lambert, 344-9012.
- SHINGLES, 2 1/2 sqs "T" lock, white, 1/2 sq. ridge, white, \$5 bundle; plastic roof cement, 5 gal, \$5. Elskes, 1304 Georgia NE.
- APOLLO Electronic Visual Aid, closed circuit TV system; camera, scanning table, Industrial TV monitor, 24" screen. Suitable for person with limited vision. McCallum, 268-1158.
- RIDING LAWN MOWER, 32" swath, electric start, 8-hp, 7 forward & 3 reverse speeds, \$295. Shaffer, 836-1610.
- CAMPER TRAILER, 15'. Gonzales, 294-8696 after 5:30.
- EQUALIZER HITCH ASSEMBLY, frame receiver, head, torsion bars & connectors. Danclovic, 293-6663.
- HIDE-A-BED SOFA, Sears, \$110; baby crib \$8; metal frame window, approx 4 1/2 x 3 1/2, 9 panes. Lee, 294-3002.
- DISHWASHER, O'Keefe & Merritt, \$150, still in box. Sanchez, 344-6931.

- TRAILER HITCH, heavy duty. Martinez, 298-8812.
- SLIDING GLASS DOOR, 6' with frame, \$50. Hudson, 296-3484.
- RIDING ROTARY MOWER, Mow-Trac, 30", heavy duty, 6HP, 4 spds, forward/reverse differential, 16 x 6.50 tires, clutch, brakes, hitch, \$145. Bassett, 898-1840.
- GAS DRYER, G.E., harvest gold, automatic sensor & timer. Jeffery, 298-1231.
- FREEZER, small horizontal type, 7 cu. ft. Laskar, 299-1024.
- CHICKEN RAISING EQUIPMENT, feeders, waterers, barrels, buckets & more. Rutledge, 281-1155.
- AM/FM STEREO RECEIVER, 2 speakers, record changer. Stuart, 265-7315.
- TIRES & RIMS, Uniroyal, 4, H78 15, approx. 15,000 miles, \$140 for set, Wallace, 294-2870.
- PUPS, German Shepherd, AKC, blk & silver, males, 8 wks old, \$35. Martinez, 293-1578.
- PATIO COVER, Sears, aluminum, 10' by up to 20', an adjustable dimension, paid over \$250, sell \$88. Hymer, 298-2232 after 4:30.
- BOOK SHELVES or china display, pecan wood, Mediterranean styling, 3 units, ea 34" wide, 81" high, \$195. Smitha, 881-1001.
- CAMPER, 8' cab-over Mitchell, fully equipped, suitable for 1/2 or 3/4 ton truck, \$1900. Guerin, 299-4677.
- CAMPER, Coleman Valley Forge, fold down, sleeps 6, many extras. Hensinger, 821-4675.
- '65 APACHE TENT CAMPER; camper shell for S.W.B. 3' high, with dome light, insulated. Padilla, 873-0667.
- WATER SKIS, 2 pr., \$25 for both; boat ladder, \$10. Falacy, 293-2517.
- LAWN MOWER, 22" rotary, \$50. Hall, 881-0885.
- DINING RM SET, Danish modern, table, 6 chairs, hutch, \$250; fireplace grate, record rack, new Sony AM-FM radio, 3-sp speed phonograph, new beige loose-weave drapes, 96 x 54. Prevender, 299-5253.
- DINETTE SET, all walnut, 4 captain chairs, \$125; swing set, \$10; patio table & umbrella, \$25. Chapman, 294-0437.
- LAWN MOWER, Sears Craftsman reel type, gas engine. Schmitt, 296-3267 after 6.
- TIRES, 2 F78-14, Firestone on VW rims, \$20 ea., two 6.95/7.35-14 recap snow tires, \$2 ea. Madden, 296-1082.
- TOT GUARD Car Seat, Ford, \$15. Padilla, 345-7660 after 5:30.
- CAMPER, 8 1/2' cab-over with jacks, water tank, sink, 3 burner stove with oven, ice box, \$600. Kendall, 298-2196.
- REFRIGERATOR, 7 cu. ft., \$60 or best offer. Johnson, 298-1011.
- CITY GARBAGE BAGS, \$3.25 box; telephone cradle, dial type, green, \$14; two truck tires, \$5. Koletar, 255-4751.
- REFRIGERATOR, GE, 14 cu ft, including 3 cu ft freezer below, swing-out shelves, & lazy susan crisper, \$100. Orear, 256-1941.
- FOLK GUITAR, steel string, & case, cost \$55, sell \$20. Barnes, 898-2375.
- SWIMMING POOL, 8' x 20'; sidewalk bike with training wheels 20"; wood

- screen door 80" x 36". Widenhoefer, 298-2510.
- RANGE, GE, self-cleaning oven, 30" wide, matching hood & blower, \$140; Dilly boat trailer fenders, \$10 pr. Barham, 298-7304.
- DINETTE SET, hexagonal shaped, blk & wht, 5 swivel chairs, \$45. Steele, 299-9117.
- SEWING MACHINE, Viking, portable model 33-10, hvy duty, \$50. Baczek, 255-3429.
- SOFA, Decor, \$150; maple captain chairs \$25 ea; Ward's stereo \$30; RCA 8-track \$20; Kodak 500 slide projector \$35. Dalphin, 265-4029.
- BICYCLE CARRIER, auto bumper type. Brock, 299-2934.
- PERSIAN CARPETS, 11.4' x 8.2', Isphan Jewel-Medallion; also area Kermans & Tribal rugs. Dollahon, 265-6123 after 6.
- GARAGE SALE, Saturday, May 7, 9 am - 3 pm, rugs, imported knick-knacks, Duncan Phyfe table, fabrics, children's clothing, more. 4421 Glenwood Hills Drive NE. Scott, 293-2536.
- STRETCH WIG, Elura, frosted, Ortega, 344-3776.
- GOLF CLUBS, 3 woods, irons, cart, 200 practice balls, \$75; G.E. 11.5 cu ft frost free refrigerator, \$100. Kass, 268-5922.

TRANSPORTATION

- '75 280 Z, 4 spd., white with black vinyl top & interior, AC, wire wheels, 16,000 miles, \$5,500. Shaw, 296-2531.
- TRAVEL TRAILER, 19 1/2 ft Komfort, fully self-contained, \$2650. Navratil, 293-5527.
- '61 CORVAIR, parts or rebuild. Colgan, 344-3776.
- '72 CHEVY, 1/2 ton truck with extras, V8, 51,000 miles, camper shell, blue book or better. Silva, 898-6249.
- SAILBOAT, AMF Force 5, olympic-type racer, built for high performance, crews 1 or 2, \$850. McConnell, 255-2488.
- '75 JEEP Wagoneer V8, AT, PS, PB, AC, quadtrac, AM/FM stereo, radials, many extras, best offer. Bruss, 897-0255.
- '70 MALIBU, 4 dr, 1 owner, 307 engine, AC, PS, good rubber. Stickler, 299-6843.
- '71 VISTA CRUISER WAGON, all pwr., air, hvy dty trl. hitch & brakes, new radials, \$300 below book. Cianciabella, 268-7150 or 299-0689.
- '75 YAMAHA Enduro 400, very low mileage, \$975. Hall, 299-0009.
- '76 CHEVY P/U, 4 x 4, PS, PB, AC, auto, fully loaded with many extras, below book. Lackey, 345-5474.
- '72 BUICK, 455 GS, air, PS, PB, AT, elect windows & bucket seats, center console, \$570 below book, \$2200. Kent, 299-4150.
- '73 YAMAHA TX 650, \$800, consider trade for dirt bike plus cash, leave message. Green, 293-9629.
- '71 BULTACO Trials Bike, 250 cc, street legal, low mileage. Dodrill, 293-3487.
- '72 CHEVY CAPRICE, 4 dr., AT, AC, AM/FM radio, \$1800. Martinez, 293-1578.
- '71 SUZUKI T-250 Hustler, best offer. Young, 842-1938.
- PIPER COMANCHE/250 IFR, half

- share, \$8,000 less TSMOH. Alaska to Panama at 175 mph and 14 mpg, Sandia Business flying insurance coverage. Hopkins, 299-7394.
- '69 PONTIAC Firebird, 350 CID, V8, AT, \$1100 or offer. Heard, 294-4967.
- '66 MERCEDES 200, 4-cyl, gas, rebuilt engine, clutch, transmission, body damaged but frame ok, asking \$450. Hawkinson, 281-5239.
- '73 CHEVROLET Impala, 4 dr, AT, PS, PB, factory air, very low mileage. Cox, 255-4763.
- '61 IMPALA, 283-V8, well maintained, one owner, auto trans, \$325. Philbin, 292-1352.
- '76 MONTE CARLO, approx 19,000 miles, air, power, AM/FM/8-track, cruise control, \$5095. Syme, 898-3532.
- '66 FIAT 1100 Wagon, \$295. Svensson, 898-3078.
- BICYCLE, Schwinn, 27", 10 spd, \$65. Saavedra, 877-9185.
- '72 CAMARO, A/C, P/S, A/T, new paint, 57K miles, \$2250. Caruthers, 296-5953.
- '74 SUZUKI, T-250, 2000 miles, sissy bar, \$550; '73 Suzuki 500, 9000 miles, fairing rack, \$650. Tobyas, 877-0354.
- '76 SAAB Wagonback, 4-sp, AC, AM/FM, cassette, E.M.S. equipped. Neiswander, 293-0694.
- '69 CHEVELLE Wagon, AC, radio, power steering. Holmes, 299-6371.
- '63 PORSCHE, 356B coupe, best offer over \$3000. Patrick, 268-6558.
- '63 FALCON, V8, AT, Michelins, new battery & seat covers, 99,000 miles. Gerstle, 298-7854.
- '69 OLDS 98, power windows, antenna, locks, brakes, steering, AM/FM radio, factory air, \$800. Kelly, 298-6035.

- YAMAHA motorcycles, 1974 RD 350 with fairing, rack & 6400 miles, \$695; '69 CT 175 Enduro and rack, \$250. McConnell, 255-2488.
- '65 MUSTANG, notch back, 6 cyl, 4 spd trans, new paint, metallic blue, new dash, leopard upholstery, \$995. Baker, 898-3206.
- '73 PONTIAC Gran Prix, vinyl top, SJ option, AC, PW, PB, PS, AM/FM stereo, radial tires, \$2900. Boverie, 255-1071.
- '74 LAVERDA SF 750, below blue book. Forsythe, 298-4034.
- '71 CHEVELLE Malibu V8, vinyl hard top, sports coupe 2D, low mileage, AC, below book, \$1775. Reynolds, 299-5157.
- BICYCLE, Schwinn Breeze, girls, 20", cost \$74, sell \$55. Robertson, 299-7561.
- BICYCLE, Raleigh, 10 speed, 27", auto carrier, many accessories. Shelves, 821-9285.
- BICYCLE, Schwinn, girls 16", chrome fenders, make offer. Drumheller, 296-1023.
- BICYCLE, mens 10/spd, still in box, will assemble, \$80; Datsun 510 header with gasket, new, \$30. Cave, 299-5066.
- VISTA-LINER Cabover Camper, self-contained, on GMC 3/4 ton pickup, AC, 4 spd., crawl through, \$2450. Fisher, 881-8072.

REAL ESTATE

- 2 1/2 ACRES, wooded mountain land, 4 miles on N. 14 & 1/2 mile E., Sierra Vista area, \$4800. Harris,

- 881-0262 after 5.
- 3 BDR Stucco Frame, 1200 sq. ft., garage, 1 1/2 bath, large kitchen, Princess Jeanne, nr. schools & transportation. Olmstead, 294-3486.
- ROSWELL: 2 bedroom, den, 1500 sq. ft., \$17,500; duplex, spacious, Ft. Walton Beach, Florida, 2016 sq. ft., \$39,500, trade, lease. Smith, 298-7365.
- TAOS, lot, view, walking distance of ski area lift, \$7,800, 20% down plus REC. Cropp, 296-1877.
- 4 BDR, open floor plan, 1 1/2 yrs. old, \$49,900. Assuming 8% loan, \$12,900 down, \$355 monthly payment. Lin, 296-1911.
- MODERN MT CABIN, located in wooded Brazos area, 720 sq. ft., fireplace, partly furnished, all-weather road, will finance. Hahn, 299-9157.

FOR RENT

- APARTMENT, 2 bdr, 1 1/2 bath, unfurnished, garage, enclosed patio, fireplace, W/D hookup, A/C, cats OK, no dogs, \$245 mo. Haskell, 265-7120.
- LAKE FRONT CABIN, Vallecito Lake near Durango, 3 BR, furnished, fireplace, hiking, fishing, horseback riding, reserve for vacation. Croll, 881-7235.
- 3 BR, 2 B, FF, draped, carpeted, dbl. garage, fenced yd, Moody, 292-2975.
- 3 BR HOUSE, N.E. Martinez, 298-8812.
- ACADEMY PLACE, 4 BR, 2 B, new, carpeted, NE heights, \$350 mo., first and last, deposit. Johnson, 298-9926.

WANTED

- LEICA ELMARIT LENS, 28 mm, F2.8, serial no. greater than 2314921. Mattox, 821-3945.
- FOLD-DOWN tent trailer or camping trailer. Stuart, 265-7315.
- CHILD'S PLAYHOUSE. James, 294-6837.
- SHOP MANUALS, '71 Buick, body and engine. Bahlman, 881-9251.
- GERMAN SHEPHERD DOGS, 2 to 4 yrs. old, male or female, AKC preferred. Martinez, 293-1578.
- WORK — teenager will haul trash \$6 per load; rototilling, reasonable, by the job. Mark, 881-3812.
- LENSES, telephoto & other lenses to fit Miranda RE bayonet mount, Esch, 292-0754.
- SERVICE MANUAL for Toyota 3 RC engine. Scheiber, 298-0904.

LOST AND FOUND

- LOST — Eyeglasses with shell frame in black leather case; silver ring with shadow box turquoise set; red and blue glasses case; brown wool muffler; silver Parker automatic cartridge-type pencil (gold clip & pushbutton); heavyweight grey herringbone wool shirt jacket, "Wool-dridge" label; two brass keys nos. 77D, LL410; plain silver key ring with numerous keys.
- FOUND — screw-back silver dangle earring with small silver bird; Mastercard card (T. White).
- LOST AND FOUND, Bldg. 832, 4-1657.

WHEN — 4:30 rolls around today, roll around to the Club and play roles around the lounge or ballroom. Or show up at 6 for a half-pound of deep-fried shrimp, cocktail sauce, baked potatoes with sour cream, a new tossed salad bar, and (you guessed it) rolls around the whole thing for \$4. There's enough shrimp for only 300 so don't wait till 8:30. (No seconds on shrimp; kids' prices — \$1.92 — mean four shrimp.) At 8:30 *Smoothie* hits the stage and your ears with the smooth sounds of country and top 40's. (Ever wonder what the bottom 40 sounds like?)

THE — big Single Mingle for all the Sandia/ERDA singles is TODAY in the lush green patio. Whether or not you're lush or green, show up and enjoy competitive games (volleyball, horseshoes, pin-pong, shuffleboard), non-competitive games (dancing, talking, sunning), a Happy Hour bar featuring a 50-cent keg, other Good Things. Admission is only 50 cents.

ALARM — struck the Board: no mariachis for the Mexican Fiesta! But then, ecstasy! Gypsy Flamenco singer El Pelete from Spain, and Flamenco dancer Isabel Lujan are in town, and bookable, and booked. It's going to be a great show. Great Mexican food too — served family style. Then some great music by *Manny and the Casanovas* served Latin Style. Purchase your tickets *today or tomorrow*; members \$5.90, guests \$6.90.

CLOCK — your salivary reaction time next Friday, and it will probably measure in picoseconds! That's because old favorite roast beef *au jus* leads the Happy Hour menu (adults, \$3.25; under 12, \$1.92). New contender for favorite in the musical field *Gold Rush* will do the hits of 1849 for dancing at 8:30. Come out and stake a claim or claim a steak (well, a slab of roast beef).



THE EARLY BIRDS get the worm. But there are plenty of other attractions at the Single Mingle after work today in the C-Club patio. Nina Salazar (3242) and Paul Rosenkoetter (2626) are the early birds.

RINGS — and things and buttons and bows. It's that kind of Nostalgia Night for all C-Club retirees again on Friday, the 13th. So the cactus won't hurt your toes, it'll be held in the El Dorado (French perfume that rocks the) Room from 4:30 to 8:30. Music, hors d'oeuvres, a Happy Hour bar, hospitality by Frank Loomis. So bounce your buckboard Clubward next Friday or you'll be bemoaning the fact that the wrong one you have chose.

THE — mighty (young) hunter today needs an approved Hunter Safety Course to be legal. If your youngster-hunter is over 12 but under 18, get him or her a certification card by attending and passing a June 7, 8, and 9 course being taught by Sgt. Jim McNabb, a certified instructor, at the KAFB firing range. Class is limited to 30; sign up soon at the Office. Free to members. Non-Club members should join the waiting list.

BEST — coverage of the Colorado River ever. That's what you'll say after Ed Neidel's movies at Travelogue Night at 7:30 on the 18th: Canyonlands, Glen Canyon, Lake Powell, and the depths of the Grand Canyon. Bring your life jacket; the last part goes pretty rapidly.

PART — of the fun of seeing Ed's movies of the Grand Canyon is knowing you can be there in the flesh August 17-22 — riding a giant raft, marveling at the scenery, hiking the side trails, dipping in the pools, and quaking at the rapids. It's \$325 from Lee's Ferry including horse and plane back to your car.

OF — course you can still make it to Tokyo, but don't delay. The 2-week tour is filling fast, and it leaves July 26. Enjoy the metropolis from the fantastic Otani Hotel, or take one of the optional tours into or out of the country. It's \$899 (dbl. occ.) and you

can stopover in Hawaii on the return leg at no increase in plane fare.

THE — Hong Kong tour has yet to gain momentum, but it's not till November 12-28 so you've still got time to decide. The Club has full info — or see Ed in the lobby any Friday evening from 6 to 7.

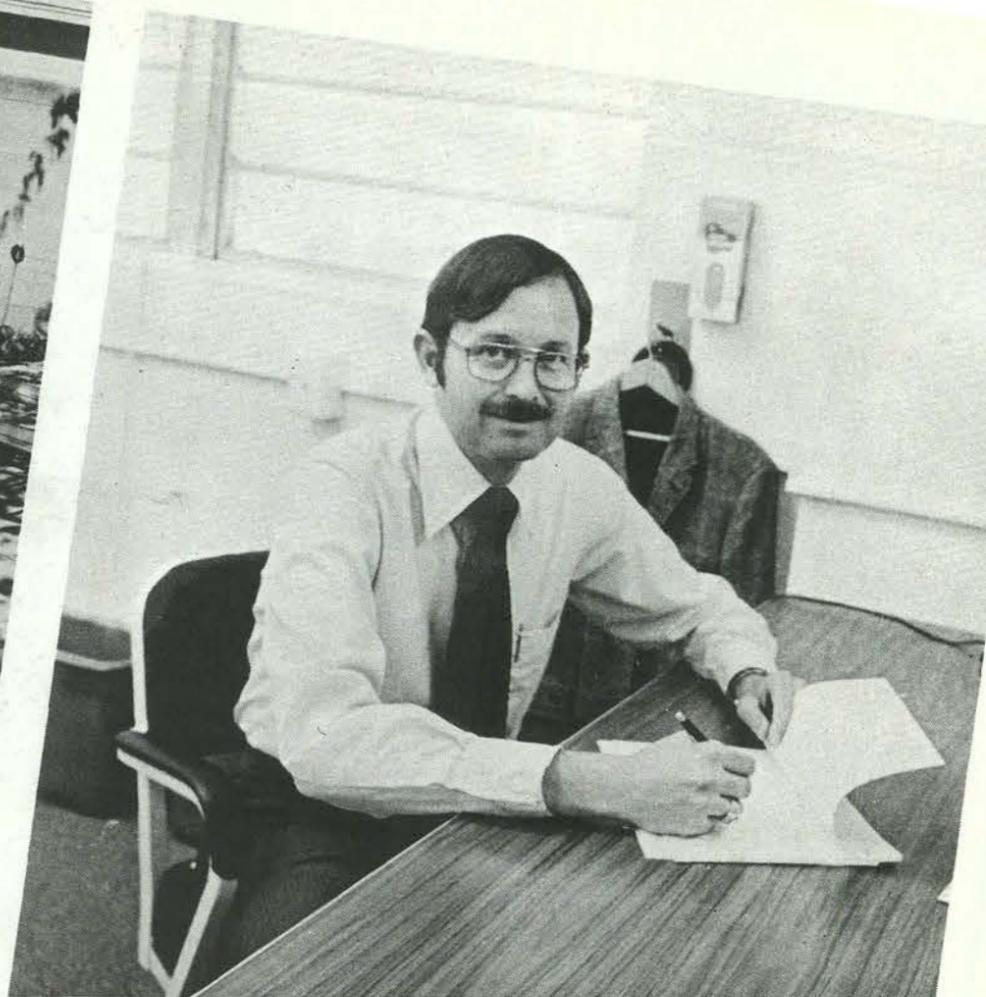
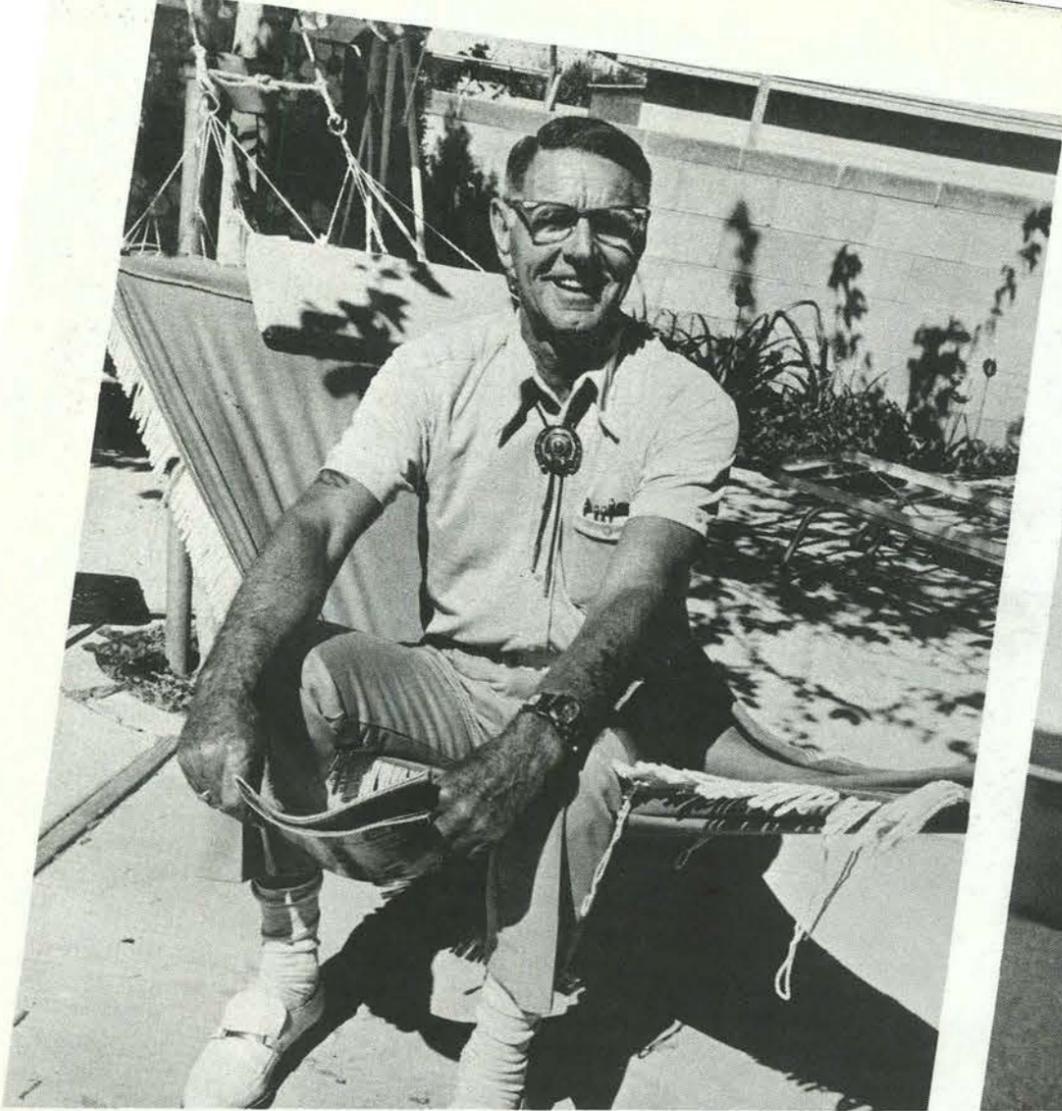
DAY — of decision for both of the Las Vegas packages draws nigh. Don't wait — unless you want to wait till next year. The Capers is June 17-19; it's on the Strip, on the weekend, about \$155 (\$26 single supp.). The Anti-Inflation package is June 13-15; it's downtown (at the Fremont), during the week, about \$125 (\$16.50 single supp.).

IS — Alaska one of those places you've always wanted to see but never got around to? Here's the way to get around to getting there — by plane, bus, train, ferry. It's a fantastic 12-day trip to a fantastic state. ("My brother lives in Alaska." "Nome?" "Know him? He's my brother!") The Office (or Ed) has more info — costs, etc.

ABOUT — all that's left now on the ABC (Super Cheap) flights to London, Amsterdam, and Frankfurt are the late summer and early fall trips. They're airfare only (you're on your own over there) but the price is right — not much over \$500 for round-trip fares.

OVER — seventy people are now signed up for Club (tennis) Courts. Call the Club for the latest info sheet, then get your money in. (In tennis, money is everything — love means nothing.) Waiting till they're built will just get you a case of acute envies as you peer forlornly through the fence hoping one of those bronzed athletes might deign to let you play a match sometime. (A tennis pro has a sweet racket.)





Bond Drive Starts May 23—See Page 4



Retiring



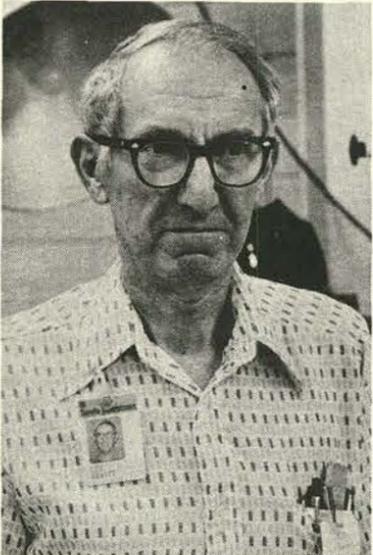
Otmar Stuetzer (2540)



Dorothy Parker (3431)



Alan Pope (1400)



Leo Savitt (3171)



Selma Savitt (3252)



Lou Hopkins (9300)



Jim Meikle (2550)



Lillian Hayes (1135)



Melody Laffoon (3733)

Mene, Mene, Tekel, U-pharsin

Ron Iman in the Statistics and Computing Division (1223) is a fast man with a figure. And he's interested in Vitamin C. The latter is why he read an article by two-time-Nobel Prize winner Linus Pauling and Ewan Cameron, M.D., on prolonging the lives of terminally ill cancer patients by administering 10 grams of ascorbate (Vitamin C) daily.

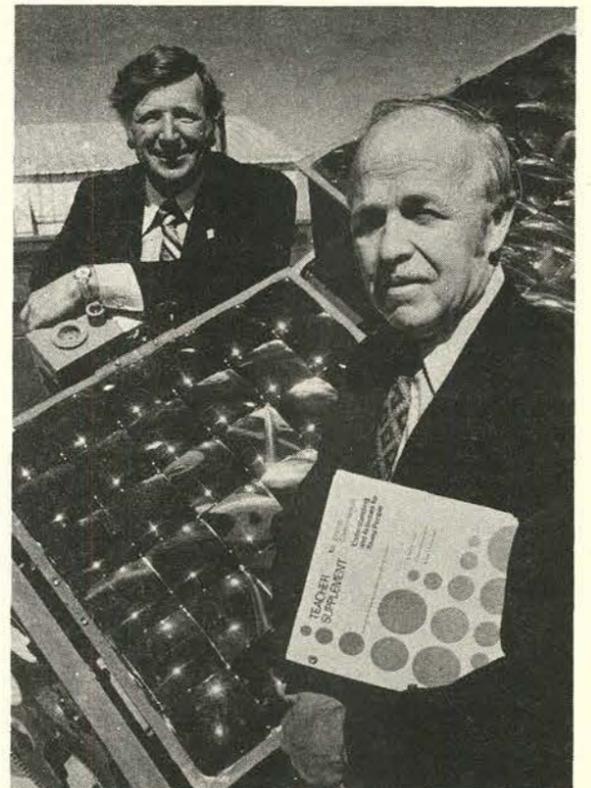
The former is why he detected several errors in the data summary table that supported the authors' thesis. "It wasn't a case of their falsifying the data to make them look good," Ron quickly points out. "In fact, many of my corrections advanced their theory.

"I also saw the need for an analysis of the 'blocking effect' present in their data. (Each terminal patient on ascorbate was matched with 10 other terminal patients with similar cancers and ages so that survival days could be contrasted. Each group of 11 is called a block.) So (on my own time) I re-analyzed their data and found several areas of statistically higher significance than they had presented."

Ron put his findings into a brief report and sent it off to each author. Pauling took the blame for the errors: "I myself made the statistical calculation, and it is clear from your recalculations that I should have taken more time," reads his reply.

Dr. Cameron's response noted that further data is now being gathered and asked permission to have Ron review the statistical analysis before publication. Ron tentatively plans to accept Dr. Cameron's invitation.

Note: The headline, loosely translated from the Aramaic, means "numbered, numbered, weighed, and found wanting." It comes from Chapter 5 of the Book of Daniel, usually is referred to as "the handwriting on the wall."



ENERGY UNDERSTANDABLY—That's the aim of a new textbook for technical-vocational students written by Paul Robertson (1756) and Don Hosterman (3522). Their book surveys the range of energy sources and explains the theory, advantages, and disadvantages of each.

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&

lorena schneider reports on livermore

Retiree Picnic

The 12th annual Retiree Picnic will be held on Wednesday, June 1. As before, the picnic will be held on the Coronado Club patio and will last from 4 to 7 p.m. Besides the C-Club parking lot, the NCO Club parking area on "B" St. may be used and shuttlebus service will be provided. Members of Large Staff will be joining the festivities. Last year over 800 attended. Retirees now reside in 39 states and number over 1500.