

THE SOUND OF MUSIC from the New Mexico Symphony Orchestra Chamber Players filled the patio during lunch last week. Sandians listened, munched on

sandwiches, enjoyed the sun, applauded enthusiastically. The Players liked it too and promise to return next fall.

LAB NEWS

VOL. 29, NO. 8

APRIL 22, 1977

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

Laser Holography: To Understand Heat Transfer

A new way to study thermal convection in closed containers has been developed by Walt Schimmel of Fluid Mechanics and Heat Transfer Division 1261. Walt is using laser holographic interferometry in an optical measurements laboratory to determine heat transfer coefficients. The research is coupled to an effort to generate computer codes for the prediction of heat transfer coefficients in closed containers.

"We started the work when we were analyzing what might happen if nuclear waste canisters were deposited on the deep ocean floor," Walt explains, "and this led to analysis of convection fields inside nuclear fuel shipping containers.

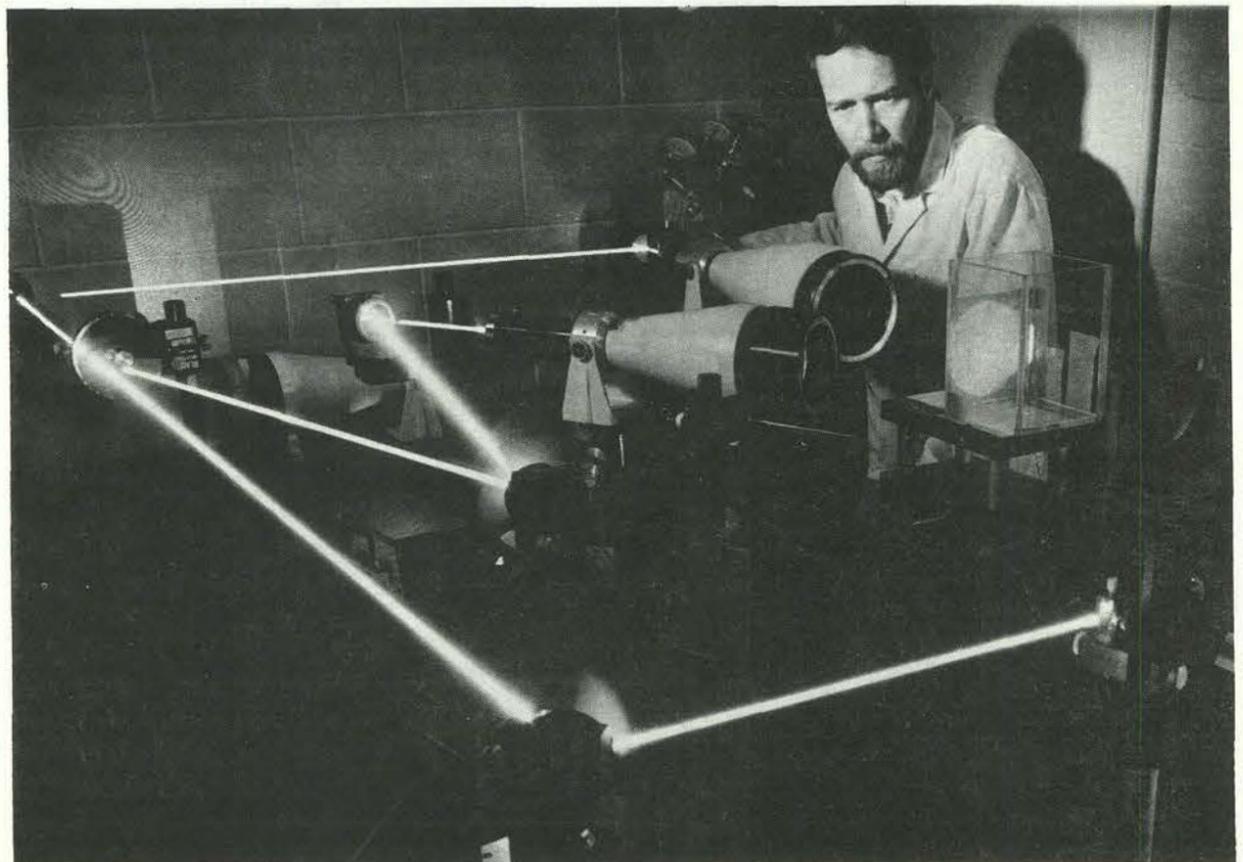
"Heat transfer by convection is not a straight-line process — there is circulation of the coolant medium, either air or a fluid. Laser holographic interferometry enables us to observe the process and to gather data which we use to validate the computer codes."

Applications of the codes could be widespread. Convection processes within and around closed vessels are often crucial in the operation of many energy systems, including nuclear, solar and geothermal. Because vessels associated with these systems are extremely large and expensive, an understanding of their thermal convection characteristics is essential before fabrication.

Walt's lab in Building 809 (located in a remodeled women's restroom) contains a helium-neon laser, beam splitter, a test chamber, and associated equipment. Half of the laser beam is projected through the

heated test chamber. It is joined by the other half of the split beam and, at the critical focus, the resultant image is recorded on a photographic plate. Typi-

[continued on page two]



WALT SCHIMMEL (1261) studies heat transfer coefficients using laser holographic interferometry. Target area is the transparent container.

THE NATIONAL DISASTER SURVIVAL TEST

OFFICIAL TEST FORM	
I. JUDGMENT 1. a b c d 2. a b c d 3. a b c d Score _____	II. KNOWLEDGE 1. T F 5. T F 8. T F 2. T F 6. T F 9. T F 3. T F 7. T F 10. T F 4. T F Score _____
III. ALERTNESS 1. Yes No 2. List the number of potential dangers: _____ Score _____	
IV. STRESS 1. Yes No 9. Yes No 2. Yes No 10. Yes No 3. Yes No 11. Yes No 4. Yes No 12. Yes No 5. Yes No 13. Yes No 6. Yes No 14. Yes No 7. Yes No 15. Yes No 8. Yes No Score _____	V. LEADERSHIP 1. a b c d 2. a b c d Score _____ <hr/> PRELIMINARY SCORE _____ <hr/> VI. SPECIAL SCORING <hr/> YOUR FINAL SCORE _____

Use this test form to indicate your answers, to total your score, and to compare your score with your family, friends, and other groups.



ARE you a survivor? On May 1 at 7 p.m., NBC-TV and the National Safety Council present the National Disaster Survival Test, which poses various disaster and accident situations together with questions testing your reaction to the situations. Object is to show that even in a total calamity being a winner (or loser) is not so much a matter of luck as of coolness and judgment. Use this form to see how you emerge from the accident/disaster/calamity/holocaust (select one).

Congratulations

Mr. and Mrs. Robert Sanchez (2153), a son, Carlos Paul, March 6.

Mr. and Mrs. Pat Murphy (2625), a son, Kevin Michael, March 26.

LAB NEWS

Published every other Friday
SANDIA LABORATORIES
 An Equal Opportunity Employer

ALBUQUERQUE, NEW MEXICO
 LIVERMORE, CALIFORNIA
 TONOPAH, NEVADA
 Editorial offices in Albuquerque, N.M.
 Area 505 264-1053
 FTS 475-1053
 ZIP 87115
 In Livermore Area 485 455-2952
 FTS-469-2952

john shunny is editor
 &
 don graham ass't. editor

bruce hawkinson & norma taylor write
 bill laskar does picture work
 so does russ smith
 &

lorena schneider reports on livermore

Events Calendar

Continuing — "Mimbreno Art," Maxwell Museum of Anthropology.

April 22 — "Kimo Theatre Event," performances by the Albuquerque Civic Light Opera, Albuquerque Dance Theatre, N.M. Symphony Orchestra, Classics Theatre Co., and others, 8 p.m., tickets and information 843-9486.

April 22 - May 1 — "Divorce Me Darling," Barn Dinner Theatre, 281-3338.

April 23 — "Showboat," KHFM 96.3 FM, 6:40 p.m.

April 23 — Albuquerque Youth Symphony and Youth Orchestra final concert, Popejoy Hall, 7:30 p.m.

April 25 — UNM Symphonic Band concert, Rodey Theatre, 8:15 p.m.

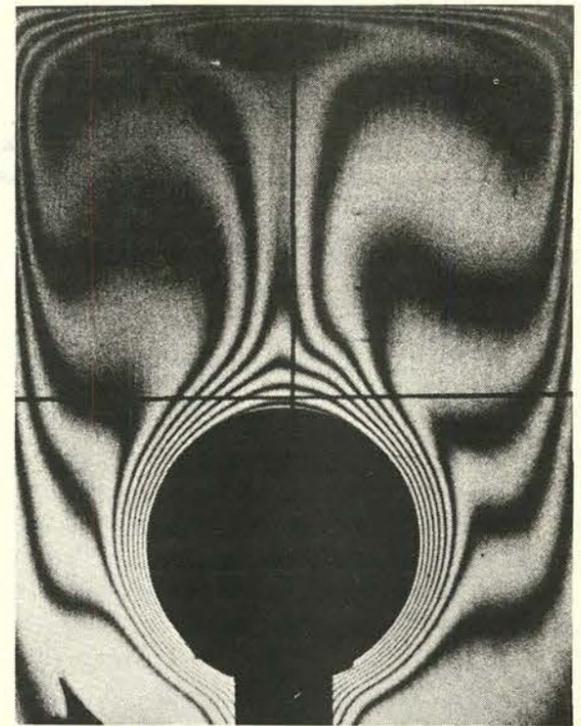
April 29 - May 8 — "The Man," Albuquerque Little Theatre with Maureen O'Sullivan, 242-4750.

April 30 — "Salute to Irving Berlin," Society for the Preservation of Barber Shop Quartet Singing in America, Convention Center, 8 p.m.

May 1 — NM Mt. Club, hike, lower East Sandias, Western Skies, 9 a.m., 268-4771.

May 1 — UNM Jazz Band concert, Rodey Theatre, 8:15 p.m.

May 3 - June 5 — "The Lady Who Cried Fox," Barn Dinner Theatre, 281-3338.



DATA FILM shows results and resolutions achieved with laser technique. Black lines are quantitative isotherms representing constant temperatures around a cylindrical heat source inside a closed container.

Continued From Page One

Heat Transfer Study

cally, this produces a three-dimensional hologram. Walt is not pursuing three-dimensional data as yet because present heat transfer computer codes are limited to two dimensions.

Walt makes a double exposure on the hologram plate — once at the beginning of the heating process and another when the temperature has stabilized. Because the laser light is refracted by temperature changes, the various temperature gradients are recorded as black lines. The holographic interferogram is then photographed with an ordinary camera, yielding a two-dimensional view of the temperature field. Resolutions of .03 K are possible with the technique.

Another approach is being used by Charles Hickox (1262) to study the velocity field in thermal convection using laser-Doppler anemometry. Laser-Doppler anemometry provides a measurement of the local, instantaneous velocity of tracer particles suspended in a fluid. The relation between particles and fluid must be known, but it is possible to trace particles which follow the fluid motion sufficiently well for accurate measurement. It is a particularly useful technique for the study of recirculating flows.

Data from both labs are used to confirm analytical predictions of the computer codes. Dave Larson (1262) is working on a finite difference code, Dave Gartling (1261) on a finite element code. With laboratory verifications, it may soon be possible to predict heat transfer and circulation accurately within many systems incorporating many geometries.

At Sandia the work applies to the spent fuel shipping cask project associated with the Liquid Metal Fast Breeder Reactor. Jerry Freedman (5433) is project manager, and Ron Pope (5433) is heat transfer task leader.

A proposal describing the project and outlining additional research for the universal application of the computer codes to thermal convection systems is now under consideration by the National Science Foundation.

Hartley Serves on International Combustion Project Group

Dan Hartley of Combustion Research Division 8115 is this country's technical representative to the Combustion Project Group of the Conservation Working Party, an office of the International Energy Agency. The Agency includes 15 member countries, and five of them — Sweden, Great Britain, Italy, Germany, and the US — are currently active in the combustion group. Says Dan, "Our basic goal is to encourage cooperation among the various public and private agencies in each country working to improve combustion efficiency. Avoiding unnecessary duplication and pooling our resources should result in earlier solution to important research problems." The Executive Committee of this project group is chaired by Karl Bastress of ERDA Headquarters.

Authors

Jack Dini and Rudy Johnson (both 8312), "Joining Beryllium by Plating," *PLATING AND SURFACE FINISHING*, Vol. 63, pp. 41-46.

John Vitko (8334) and Cornelius Coll (8321), "Comments on the Vibrational Spectra of Hydrogen Dissolved in Vitreous Silica," *BULLETIN AMERICAN PHYSICAL SOCIETY*, Vol. 21, No. 226.

Jim Shelby (8334) and Gary McVay (Argonne), "Influence of Water on the Viscosity and Thermal Expansion of Sodium Trisilicate Glasses," *JOURNAL OF NON-CRYST. SOLIDS*, Vol. 20, No. 3 pp. 439-49.

Bob Carling (8313) and E. F. Westrum (University of Michigan), "Thermophysics of Alkali and Related Azides, I. Heat Capacity of NaN_3 from 5 to 350 K," *JOURNAL OF CHEMICAL THERMODYNAMICS*, Vol. 8, No. 6 pp. 565-574.

Jim Bartel (8313), E.F. Westrum (University of Michigan), and J.L. Haas (U.S. Geological Survey), "Thermodynamics of Fe(II)Fe(III) Oxide Systems, I. Hydrothermal Fe_3O_4 ," *JOURNAL OF CHEMICAL THERMODYNAMICS*, Vol. 8, No. 6, pp. 575-582.

Larry Weirick (8312) and D. L. Douglass (UCLA), "Effect of Thin Electro-deposited Nickel Coatings on the Corrosion Behavior of U-O.75 Ti," *CORROSION*, Vol. 32, No. 6.

Larry Weirick (8312), "Prevention of Liquid-Metal Embrittlement and Stress-Corrosion Cracking in Kovar Leads," *SOLID STATE TECHNOLOGY*, Vol. 16, No. 6.

Rand German (8312) and Z.A. Munir (UC/Davis), "Surface Area Reduction During Isothermal Sintering," *JOURNAL OF AMERICAN CERAMIC SOCIETY*, Vol. 59, pp. 379-383.

Speakers

Ken Wilson (8334), Leroy Haggmark (8341) and R.A. Langley (5111), "Blister Formation in Multiple Energy He+ Implanted Stainless Steel," International Symposium on Plasma Wall Interaction, Oct. 18-22, Julich, West Germany.

Ron Musket (8334), "Surface and Thin-Film Studies Using Combined Proton, Electron and X-ray Beams," and Walt Bauer (8334), "Fusion Reactor Material Studies Using Accelerators," Fourth Conference on Application of Small Accelerators, North Texas State University, Oct. 25-27, Denton, Tex.

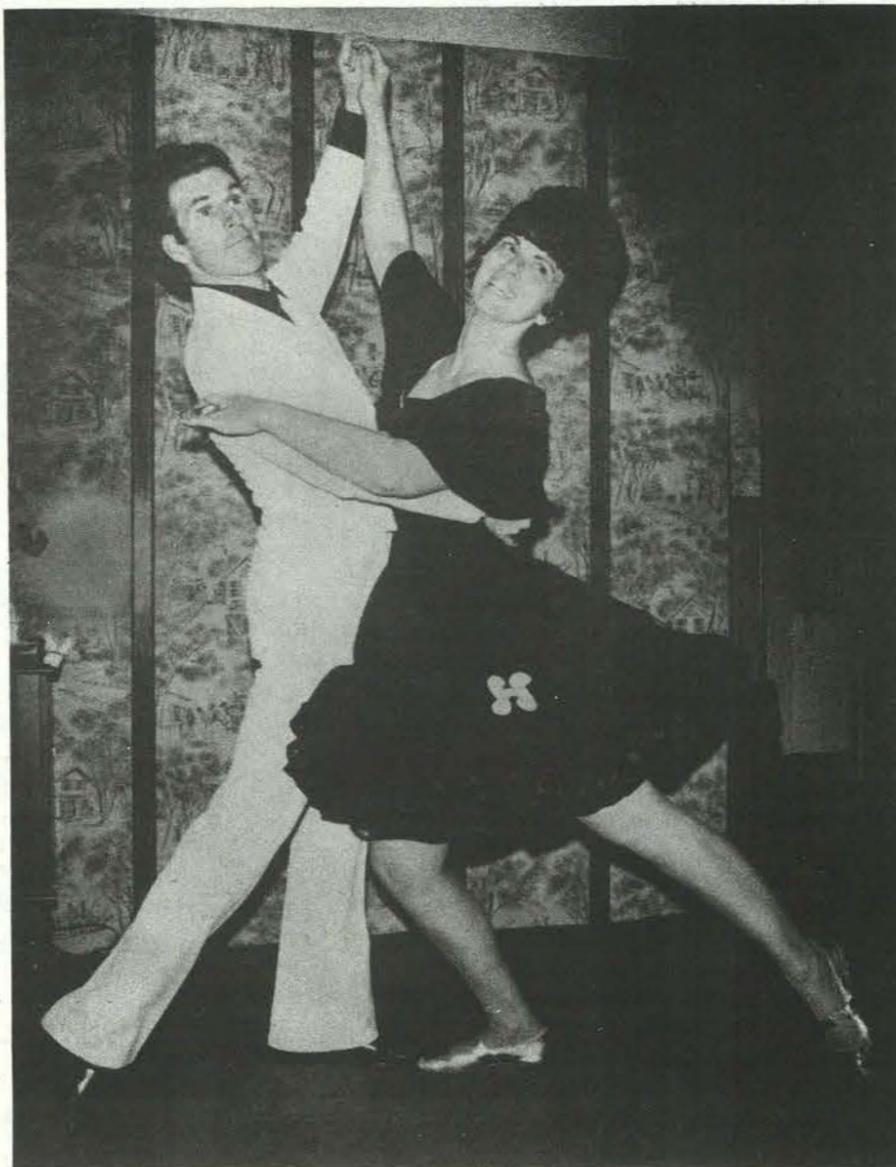
Ken Dolar (8344) and J.S. Chang (5242), "X-Ray Imaging Devices for REB Driven Pellet Implosion Studies," American Physical Society Meeting, Nov. 14-19, San Francisco, Calif.

Rand German (8312), "A Sintering Parameter for Submicron Powders," and Rand German and P.K. Higgins and Z.A. Munir (both UC/Davis), "Variation of the Mechanism-Dependent Exponent with Coordination Number and Neck Size in the Sintering Kinetics of Powders," American Ceramic Society 29th Pacific Coast Regional Meeting, Nov. 1, San Francisco, Calif.

Pat Eicker (8326), "Sandia Solar Storage Systems Studies," National Research Council Meeting on Advanced Energy Storage Systems, Dec. 8, Berkeley, Calif.

Sympathy

To Jim Rogers (8322) on the death of his father in Livermore, Feb. 19.



John (8312) and Shari Helms demonstrate a corte at the end of a round dance.

Dancing By Blueprint — Round Dancing

"A new world was opened for my wife Shari and myself when we learned to round dance about five years ago," says John Helms (8312). "Not only was it something great to do together, but we discovered we had a special knack for the dances."

Now John and Shari are calling for Bay Area dances, doing exhibition dancing and teaching classes weekly. Members of the Northern California Round Dance Teacher's Association, the Helmses have also been chosen to teach at the California State Convention at Sacramento and are on the teaching staff for the first national round dance festival in Kansas City in July.

Explaining the difference between round and ballroom dancing, John says that, "Round dancing is patterned, sequenced dancing — in other words, ballroom dancing with a blueprint. Instructors must have exceptionally good memories because the patterns and sequences are directed, or cued, for every dance. The couples on the floor all dance in the same line of direction to the cues."

Round dancing is taught in three categories — beginning, intermediate and advanced with music keyed to each category. For an evening of teaching, the

Helmses carry along 40 records from each of the categories, plus a microphone, turntable, speakers, amplifiers and a public address system. "I just bought a new \$550 turntable for the sound system, so at this point it's obviously not a money-making hobby," comments John.

When teaching, John handles the microphone and cues, while Shari demonstrates the various floor positions. Shari also makes her own costumes, as well as those of their two teenage daughters, and she spends many hours typing the cue sheets (directions for the footwork for each dance) for use by other instructors.

Both John and Shari play instruments; thus, their musical backgrounds, combined with their footwork ability, contribute to their dancing success. They are also recognized for their talent in creating new choreography to the music of popular songs. In all, the Helmses record for five record labels and, so far, have choreographed 34 dances. The Helmses are quick to reassure would-be round dancers. "Beginning and intermediate levels offer plenty of fun for casual dancers," notes John. "It becomes easy once you learn the basics. And it's also fantastic exercise."

LIVERMORE NEWS



FINAL TESTING and checkout of EMES is underway. Here Parris Holmes (9353, foreground) fastens down one of the hatches that provide power access for the

test area. Behind him is Gary Zinkann (9354) in front of the wave launcher. The bronze screen lining the entire building accounts for the reflectivity.

UNIQUE NEW FACILITY

Sandia's Electromagnetic Environments Simulator

Sandia has thousands of test devices *inside* buildings. One new building (871, east of 880) is a test device. It's called EMES (electromagnetic environments simulator) and its shape is unorthodox because the building structure is a part of the simulator.

Essentially, the building is a gigantic coaxial cable; technically speaking, it's a truncated, triplate, rectangular coaxial transmission line. From east to west, the facility consists of, first, a source of continuous, pulsed, or transient waves; second, a launcher, or feed, that is a sort of transition from the circular coaxial output of the source to the rectangular coaxial geometry of the facility; third, a pyramid-shaped section of transmission line that gradually increases the cross-section di-

mension but maintains constant electrical properties; fourth, a rectangular section of transmission line above the test area; and fifth, a tapered output section that absorbs the energy used to excite the line.

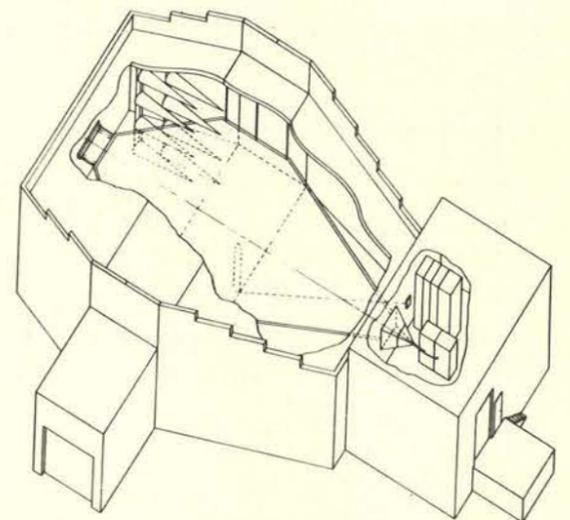
The inner walls, the ceiling, and the floor are lined with two layers of highly conductive bronze screen. Exterior walls, ceiling, and floor serve as the line's insulation so that no electromagnetic energy can radiate outside the building. Together the inner and outer walls are the shield for the coaxial cable.

The major test area is a rectangular space 5 m long by 11 m wide by 4 m high. It's big enough that a weapon can stand vertically and be subjected to any of several electromagnetic environments. One of these, EMR (electromagnetic radiation), comes from radio transmitters, radars, and electronic countermeasure devices. These cover the frequency spectrum from kilohertz through gigahertz.

Another type is EMP, the intense, short electromagnetic pulse generated by a nuclear explosion. A third type is that generated by a near lightning strike in the vicinity of the weapon.

Says EMR/EMP Instrumentation Division Supervisor Neith Pollard (9354), "The new facility will play a major role in

determining the vulnerability of weapons to these environments. Jim Reed, who conceived the idea for EMES, has tested the concept with a fifth-scale model. If the full-size version performs as well, we'll be able to contribute significantly to weapon reliability."



ARTISTS SKETCH illustrates unique facility whose form is dictated by its function. At right, the electromagnetic wave source. Hanging on dielectric rods halfway between floor and ceiling is a coffin-shaped metallic grid that serves as transmission line. The lower dotted shape indicates weapon being tested. Upper left, some RF absorber cones that attenuate the generated waves.



JIM REED with some of the RF absorber cones in EMES. Jim conceived the idea of a building that is essentially a coaxial transmission line.



EVEN DURING CONSTRUCTION, EMES' unorthodox shape was apparent. Building has already attracted the notice of several outside agencies.

Fun & Games

Sandia Bicycle Ass'n. — This is The Weekend for all good bikers and true: show up Sunday morning at 6:30 on the UNM campus at Central & Cornell for the 5th annual Tour of the Rio Grande Valley. Go 50 or go for broke and make the 100 miles. If wind and weather cooperate, it's only mildly excruciating. And besides, you get a patch.

Ralston Barnard (2355) is attempting to persuade the Base military to reopen the Zia Park gate in the morning and afternoon for cyclists. (That's the gate at the end of Ridgecrest SE.) If you would use this gate if it were opened, Ralston would appreciate your letting him know via company mail (no phone, please) so that he can convey to the military some idea of the number of cyclists involved.

Want a traffic signal at Moon and Central? Then come to the *Lab News* office in Bldg. 814 and sign the petition to that effect which will be presented to city authorities. Walt Joseph (1713) is petition honcho.

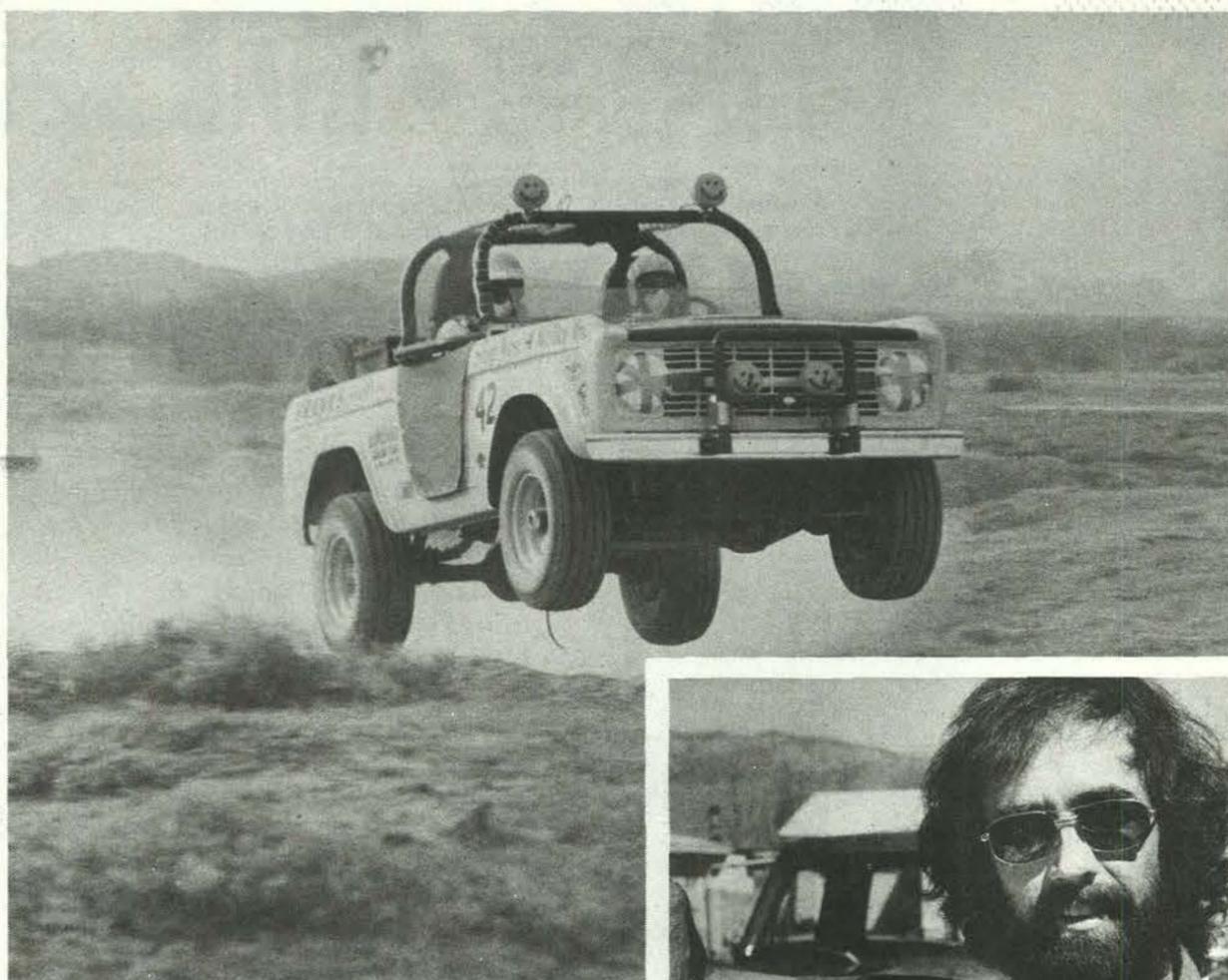
* * *

Running/Jogging — Les Baumann (3430) reports that he has a good supply of the Brooks Villanova running shoe, which was so highly rated in *Runners World*. Les is getting \$18 a pair, and you can find him at the gym daily after 4:30.

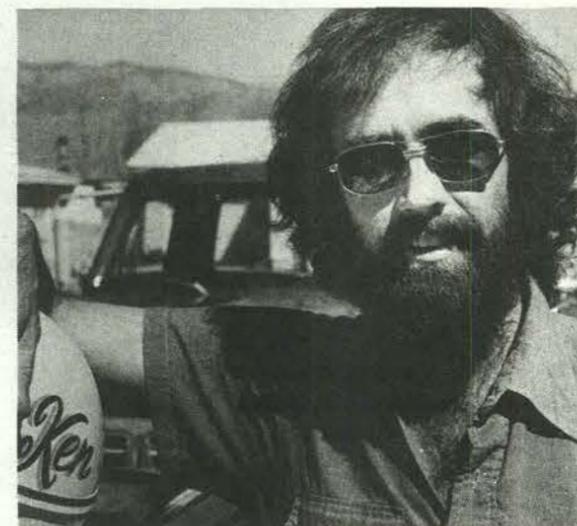
Sympathy

To George (9753) and Virginia Chapman (4338) on the death of his mother in Denver, March 14.

PAGE FIVE
LAB NEWS
APRIL 22, 1977



NEXT WEEK Ken Campbell (9342) will be in Las Vegas racing his modified Bronco across the Nevada desert in the Mint 400. Ken has been engaged in off-road racing for the past three years.



Off-Road Racing

How to Get Your Kicks and Lumps

Bouncing across the desert at a bone-crunching 80 mph in a 4-wheel drive vehicle while breathing dust raised by a score or more other mad racers is Ken Campbell's (9342) idea of fun. For three years he has raced a modified Bronco in a dozen events. Next week he will be in Las Vegas competing in the Mint 400.

"The course is in the desert northeast of Las Vegas," Ken says, "four times around an 86-mile marked course. Last year we averaged about 25 mph and came in fifth

— hope to do better this year."

Ken enjoys working on the Bronco about as much as racing. "Not as exciting," he says, "but more satisfying."

The Bronco is an assemblage of parts from several vehicles. Ken has added reinforcement to the frame, double shocks to each wheel, reinforced axle housings and a massive double roll bar. The 302 V8 is "fully blueprinted" which means all individual parts are micrometer measured, balanced and polished, and as fine-tuned as a piano.

Ken and his partner — Dan Deaver of Frank's Supply Co. — have been building and racing machines, from motorscooters to drag racers, since junior high days. They got hooked on off-road racing (as it's called) while watching cross-country jeep racing during the T or C Fiesta.

"We put our Bronco together that winter (it's been rebuilt several times since then) and entered the fiesta. Broke a drive shaft after the first half-mile. We entered several races that first year but didn't finish a single one," Ken says. "The following winter we did some really serious rebuilding and had better luck in the next couple of years. We've finished every race and placed a number of times. We took third in the Colorado West 200 two years ago," Ken says, "and first in the Oh-My-God 100 locally last year."

Although he will be pit manager and mechanic and still work on the Bronco, Ken will not be driving anymore. His doctor has called a halt to the activity. Ken has developed back problems.

"It's mighty rugged out there," he says.



THEY WORK — Sandia's flashblindness goggles have gained national recognition and a "thanks" from Air Force pilots for protection afforded eyes from flash of a nuclear burst. (One account has it that before goggle development pilots were instructed to wear a lead patch over one eye.) Here Floyd Coppage (4312) and Dick Adams (2531) prepare experiment in SPR II to subject goggle electronics to pulse of neutron and gamma radiation. Floyd reports that goggles continued to perform following pulse "just fine."

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. I have noted an increasing number of unoccupied government vehicles with the engine running. In addition I have noted: 1] Use of vehicles to go to cafeteria in Building 839. 2] Use of vehicles for personal trips to base Post Office. 3] Use of vehicles for short trips, not carrying materials.

The above adds to pollution and generates unnecessary cost.

A. We appreciate your concern over misuse of government vehicles. In the past years we have published numerous bulletins and articles in the Lab News and have attached notes to trip tickets in order to get cooperation from users of vehicles in connection with the energy crisis.

Security Inspectors are now assisting in controlling this situation by turning off the motor, removing keys and turning them over to the Motor Pool.

As for vehicles found parked at the cafeteria, Credit Union and Post Office, it is almost impossible to police this type of misuse. However, on the dashboard of every vehicle there is a sticker indicating the penalty for unauthorized use of government vehicles, and we can only assume that operators are aware of this penalty. Further, any specific reports of misuse are investigated by Motor Pool personnel.

D. S. Tarbox — 3400

Q. Which of the Memorial Days [National or New Mexico] will Sandia observe? In 1977 they will be on the same date. The N.M. Legislature has ruled that Memorial Day will be observed on May 30th every year in this state.

A. As you noted, there is no problem in the observance of Memorial Day in 1977 as both the National and New Mexico observance will be on Monday, May 30, 1977. There have been reports that there may be action by the United States Congress to return Memorial Day observance to its traditional date as the New Mexico Legislature did. If no such action is taken, it is our current intent to observe

Memorial Day in 1978 and future years on the same day as do the Military and ERDA on the Base.

F. P. Prange - 4100

Q. The Sandia Bulletin dated 7-14-76 outlined the holiday schedule for 1977 and succeeding years. It stated that the Christmas holiday would be "6 days beginning with Christmas and ending with New Years." Which days are involved?

A. The Christmas Week holiday period will consist of six workdays beginning with the workday observed as Christmas and ending with the workday observed as New Year's Day. Since both Christmas Day 1977 and New Year's Day 1978 fall on Sunday, these days will be observed on Monday. Thus, the coming Christmas Week holiday period will be December 26, 1977, through January 2, 1978.

F. P. Prange - 4100

Q. Is Sandia considering, or has it considered, a four-day workweek? I ask this in light of President Carter's remarks concerning the fuel crisis.

A. The Laboratories does not have any current plans to implement a four-day week as an energy conservation measure. The amount of energy savings of a ten-hour four-day week compared to the present eight-hour five-day week is debatable. In addition, there are Federal statutes which require the Laboratories to pay overtime to certain types of employees who work over eight hours in a day.

F. P. Prange - 4100

Q. Re: Allowance in lieu of lodging. Please explain the policy of allowing only \$10/night with a maximum of 2 nights/trip.

A. Employees are expected to utilize commercial lodging facilities when performing business travel and to obtain receipts therefor. The Laboratories does not encourage employees to stay with friends or relatives nor does it permit

vouchering for such accommodations at commercial rates, or for more than one or two days per trip. However, the Sandia "gratuitous allowance in lieu of hotel expenses" does permit an employee to stay with relatives or friends, and reimburses the employee for the out-of-pocket cost of a token gift or meal for the host and/or hostess in appreciation of their hospitality. The current allowance of \$10 a night or \$20 a visit should be adequate to cover this type of expense even in today's economy.

C. R. Barncord - 3200

Q. A separate material requisition form [MR] must be prepared for each of the following groups of stock numbers for electronic parts.

100,000 thru 209,999

300,000 thru 359,999

800,000 thru 899,999

600,000 thru 631,999

632,000 thru 649,999

Recently I ordered 32 items of electronic parts. This would or rather should require just two MR's because there are nineteen lines on an MR, but due to the above requirements this order took five MR's. Isn't this excessive?

A. General Stores is relocating the electronic items you mention into two areas, one of which will contain the series Stock Numbers 600000 through 649999 and all other series will be in the second area. This will require just two MRs instead of the five you previously processed.

L. S. Conterno - 3700

Q. Three times recently I've heard of a talk given on the USA vs. Russia arms race. Who is eligible to attend this sort of presentation and how does one get on the mailing list?

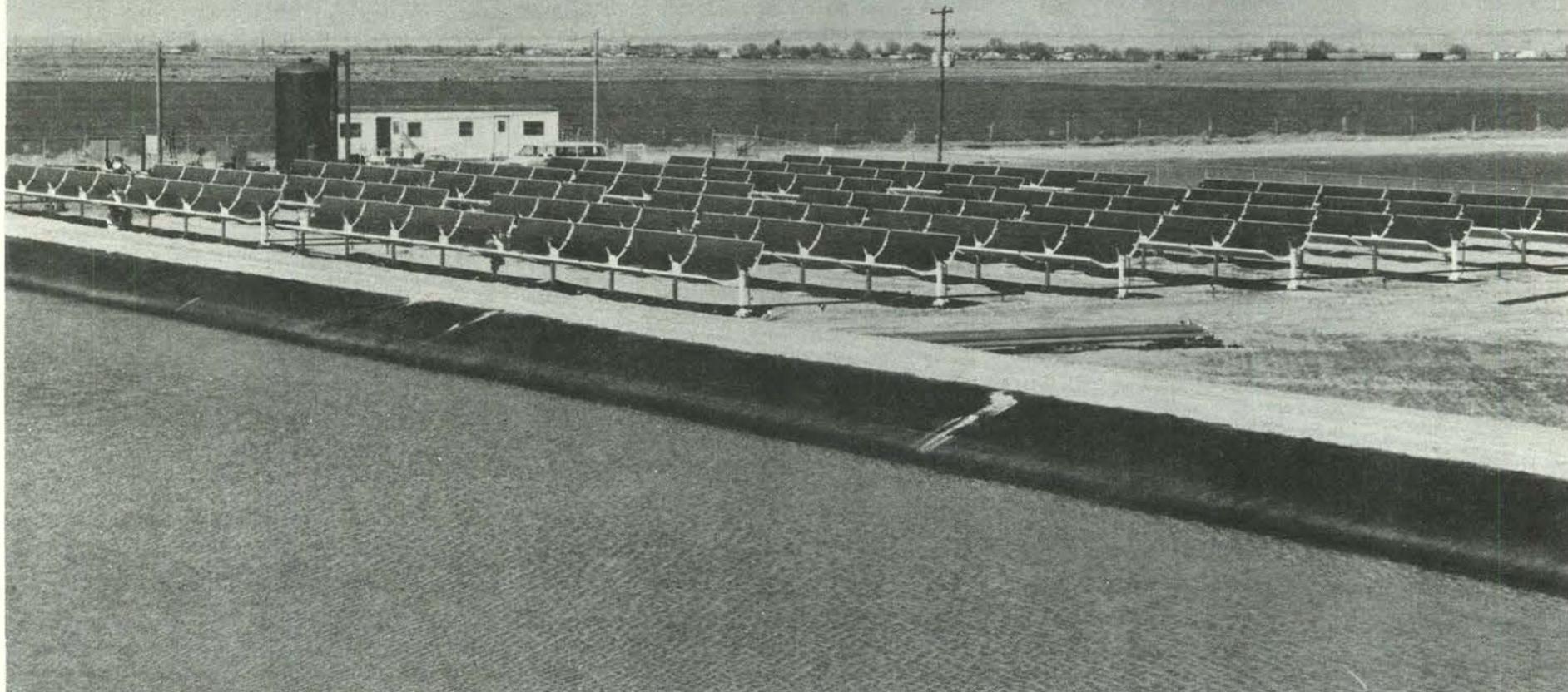
A. Crawford MacCallum of the Sandia Colloquium Committee says that the talk on the arms race has not been videotaped at the request of the speaker. It has been given three times and interest continues, so it's possible that it will be done again. Announcements of Colloquia are sent to all MTSs and all division supervisors and above at SLA. For colloquia that are classified — as the one on the arms race is — tickets are available on a ratio of one to eight, i.e., only one out of eight eligible people will be able to attend because of the size of the auditorium. Your best bet is to ask your supervisor to help you arrange for a ticket.

J. R. Garcia - 3500

SANDIA activities in both the weapons and energy areas are gaining increasing congressional notice, and many of the legislators are visiting the Labs. Here Representative Richard Ottinger (D-NY) of the House Science & Technology Committee listens as Jim Leonard (5712) explains the Solar Total Energy System. Al Narath (VP-5000) and Joan Shorey, legislative assistant, look on. The congressman had briefings on other Labs energy projects as well.

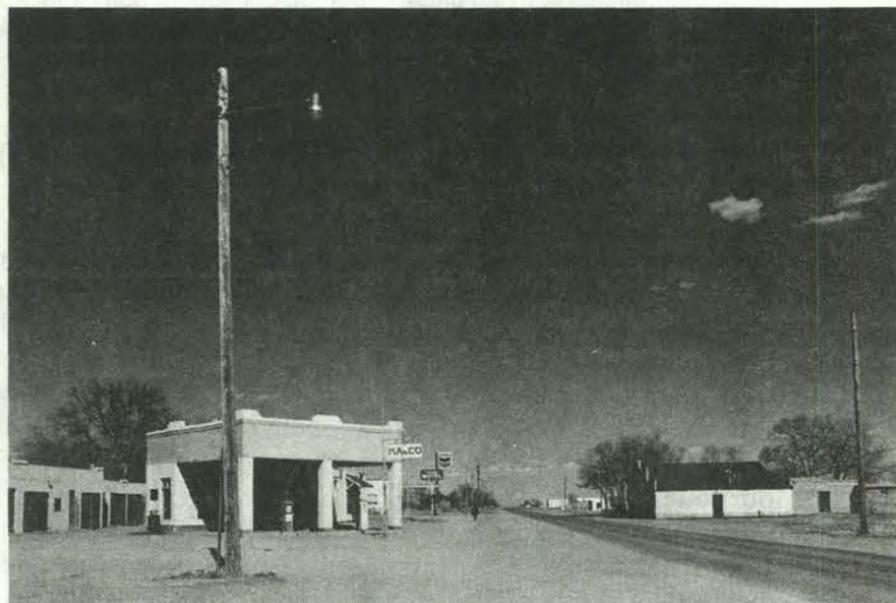
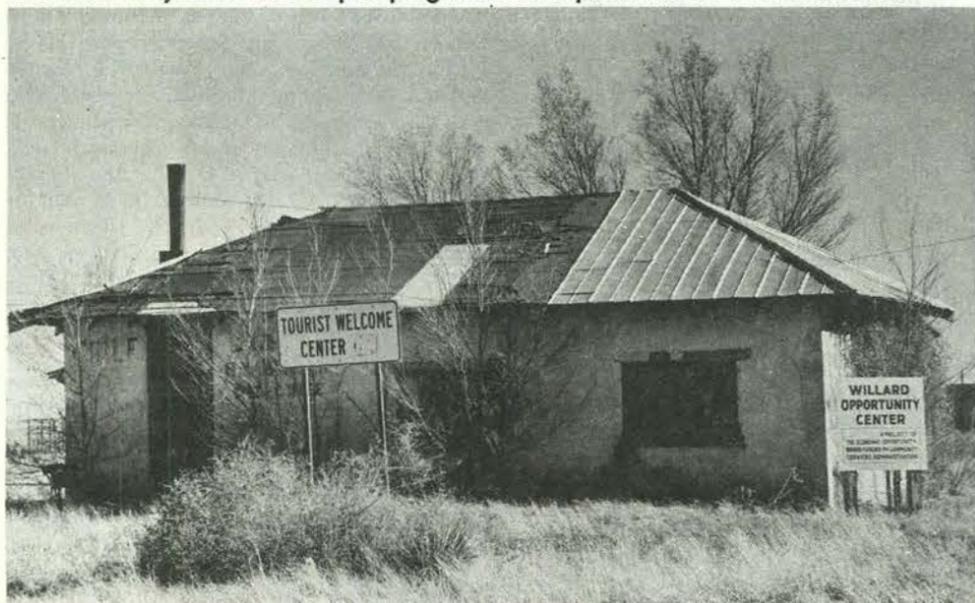


Solar Irrigation Pump



SUN POWER — Water, Willard and the Estancia Valley east of Albuquerque are elements in this solar powered irrigation project directed by New Mexico State University and Sandia Labs. Solar reflectors are source of heat energy that ultimately drives motor pumping water into pond. Water is later used for

irrigation. Willard and other small towns in valley were active farming communities in early 1900's, raising mostly pinto beans, but dry weather and changing farm economics led to decline.



M.J. Norris and W.Y. Velez (both 5121), "Solution of Problem E2554," Vol. 84, No. 1 (1977), THE AMERICAN MATHEMATICAL MONTHLY.

W.Y. Velez (5121), "A Characterization of Completely Regular Fields," Vol. 63, No. 2 (1976), PACIFIC JOURNAL OF MATHEMATICS.

A.B. Donaldson (2513), "On the Estimation of Thermal Conductivity of Organic Vapors: Data for some Freons," Vol. 14, No. 4 (1975), IND. & ENG. CHEM. FUNDAMENTALS.

S.M. Myers (5111) and J.E. Smugeresky (8312), "Phase Equilibria in the Be-Al-Fe System Using High-Energy Ion Beams," Vol. 7A (1976), METALLURGICAL TRANSACTIONS A.

A.C. Watts (1322), "Nonreduced Optimal Observers for Time-Varying Linear Systems," Vol. 300, No. 3 (1975), JOURNAL OF THE FRANKLIN INSTITUTE.

A.J. Toepfer (5242) and H.B. Demuth (LASL), "Use of Image Restoration and Enhancement to Improve X-Ray Pinhole Camera Resolution," Vol. 48, No. 1 (1977), JOURNAL OF APPLIED PHYSICS.

J.E. Houston (5114), "Soft X-Ray Appearance Potential Spectroscopy," McGraw-Hill Year Book of Science and Technology, McGraw-Hill (1976).

D.W. Swain, L.P. Mix, L.W. Kruse (both 5242) and J.W. Poukey (5241), "Measurements of Large Ion Currents in a Pinched Relativistic Electron Beam Diode," Vol. 48, No. 1 (1977), JOURNAL OF APPLIED PHYSICS.

D.W. Lobitz (5431), "Vibrations of Nearly Annular and Circular Plates," Vol. 47, No. 1 (1976), JOURNAL OF SOUND AND VIBRATION; "NonLinear Analysis of Vibrations of Irregular Plates," Vol. 49, No. 3 (1976), JOURNAL OF SOUND AND VIBRATION.

D.M. Mattox (5834), "Coatings and Surface Treatments in Solar Energy Applications," Vol. 67, 55 (1976), PLATING.

Authors

R.A. Kant, S.M. Myers and S.T. Picraux (all 5111), "AlSb Precipitate Evolution During Sb Implantation in Al: Experiment and Theory," *Ion Implantation in Semiconductors and Other Metals*, Plenum Press (1977).

R.L. Ward (5441), "Inactivation of Poliovirus in Digested Sludge," Vol. 31 (1976); R.L. Ward, C.S. Ashley and R.H. Moseley (both UNM), "Heat Inactivation of Poliovirus in Wastewater Sludge," Vol. 32 (1976); R.L. Ward and C.S. Ashley, "Identification of the Virucidal Agent in Wastewater Sludge," Vol. 33 (1977); and R.L. Ward, "Inactivation of Poliovirus in Wastewater Sludge with Radiation and Thermoradiation," Vol. 33 (1977), all appeared in APPLIED AND ENVIRONMENTAL MICROBIOLOGY.

H.T. Weaver (2354), "Aging Behavior of Radiation Damaged Titanium Tritide from ^3He NMR," Vol. 30, 80

(1977), APPLIED PHYSICS LETTERS.

J.R. Brandon (5442), "Sewage Sludge Treatment by Thermoradiation," *Water & Sewage Works*, Scranton Publishing Co. (September 1976); "Inactivation by Ionizing Radiation of *Salmonella enteritidis* ser. Montevideo in Composted Sewage Sludge," Vol. 33, No. 3 (1977), APPLIED & ENVIRONMENTAL MICROBIOLOGY.

J.R. Adams (2144) and F.N. Coppage (4312), "Field Oxide Inversion Effects in Irradiated CMOS Devices," Vol. 23, No. 6, IEEE Transactions on NUCLEAR SCIENCE.

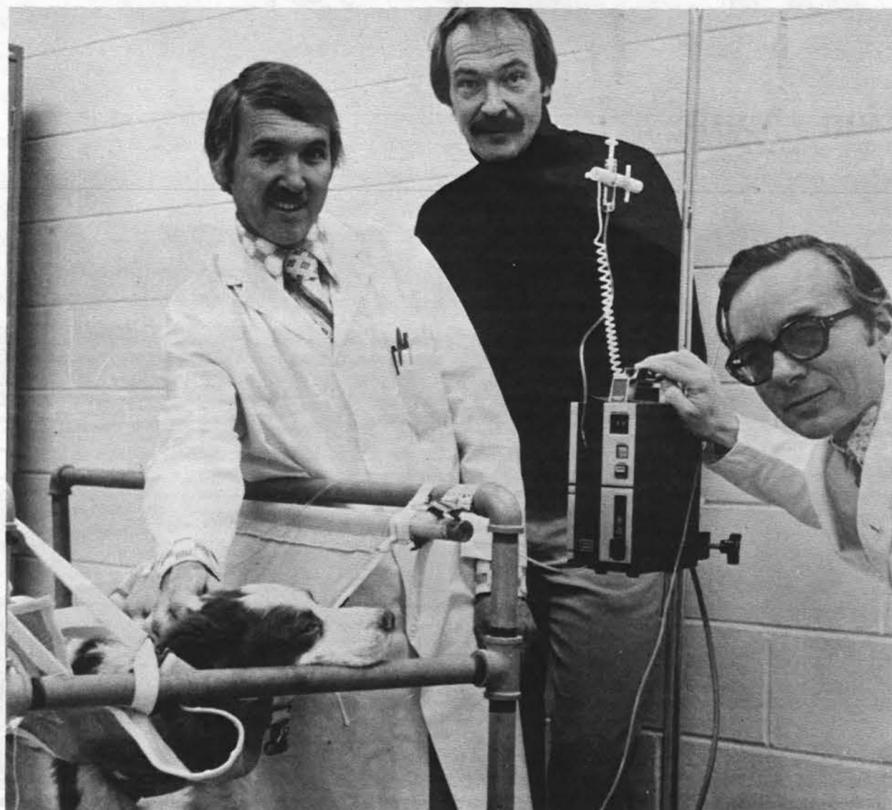
C.E. Barnes (5133) and K.J. Soda, "Application of Damage Constants in Gamma-Irradiated Amphoterically Si Doped GaAs LEDs," Vol. 23, No. 6, IEEE Transactions on NUCLEAR SCIENCE.

W.R. Dawes (2144) and G.F. Derbenwich (2144), "Prevention of CMOS Latch-up by Gold Doping," Vol. 23, No. 6, IEEE Transactions on NUCLEAR SCIENCE.

T.A. Dellin (8342) and C.J. MacCallum (5231), "Analytical Photo-Compton Deposition Profiles," Vol. 23, No. 6, IEEE Transactions on NUCLEAR SCIENCE.

E.P. EcrNisse (5133) and S.T. Picraux (5111), "Role of Integrated Lateral Stress in Surface Deformation of He-Implanted Surfaces," Vol. 48, No. 1, JOURNAL OF APPLIED PHYSICS.

J. Lipkin (5162) and J.R. Asay (5167), "Reshock and Release of Shock-Compressed 6061-T6 Aluminum," Vol. 48, No. 1, JOURNAL OF APPLIED PHYSICS.



INSULIN PUMP — Charlie the diabetic dog is getting his insulin from this laboratory model of the insulin pump. Pump would ultimately incorporate miniaturized integrated circuits and be small enough for human implantation, relieving diabetic patient of need for daily injection. Three of pump's developers are shown: Drs. Phil Day and Phil Eaton of UNM's School of Medicine and (center) Bill Spencer, Director of Microelectronics (2100).

Speakers

A. D. Swain (1222), "Reducing Human Errors in Industry," American Quality Control Seminar, Feb. 24, Amarillo College, Texas.

J. G. Fossum (2144) and E. L. Burgess (5133), "Silicon Solar Cell Development for Concentrator Applications," National Solar Photovoltaic Program Review meeting, Jan. 18-20, La Jolla, Calif.

R. F. Puk (2644), "The Computer Scientist as Businessman," University of Arizona, Feb. 17, Tucson.

J. A. Wisniewski (5122), "A Summary of BLA (Basic Linear Algebra) Subroutine Timing on the CDC 6600 and 7600"; B. L. Hulme (5122), "Pathfinding Algorithms Applied to Safeguards Studies"; R. E. Jones (2642), "IUNFLD: An Interactive Integral Equation Solving Program"; R. J. Hanson (5122), "Carefully Computing a Givens Transformation," and "Comments on the TRIAD Vector Subroutine Library"; Numerical Analysis Special Interest Group Conference, Feb. 17-18, LASL.

J. S. Pearlman (5214), "Fundamental Physics of Fusion Plasmas," Flow Research conference, Feb. 18, Seattle.

J. E. Schirber (5150), "The Role of Pressure in the Study of the Fermi Surface," Seminar at BTL, Feb. 18, Murray Hill, N.J.

W. D. Weart (1140), "Beneficial Uses and Disposal of Radioactive Wastes," Energy and Society: The Next Thirty Years, Feb. 19, Albuquerque.

P. E. McGrath (5413) and D. M. Ericson, Jr. (5412), "The Reactor Safety Study (WASH-1400) and Its Implications for Radiological Emergency Response Planning," International Symposium on the Handling of Radiation Accidents, Feb. 28 - March 4, Vienna, Austria.

P. H. Holloway (5825), "Quantitative Surface Analysis of Homogeneous Binary Alloys"; G. C. Nelson (5825), "Quantitative Surface Analysis of Binary Alloys by Low Energy Ion Scattering Spectroscopy: Cu/Au," 28th Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, March 2, Cleveland, Ohio.

C. E. Hackett (1261), "Laser Velocimetry Measurements in the Cavity of an HF Chemical Laser (Cavity Injectory Type Cl-II)"; D. P. Aeschliman, J. C. Cummings, R. A. Hill and A. J. Mulac (all 5217), "Raman Spectroscopy in a CW Chemical Laser," Tri-Service High Energy Chemical Laser Symposium, March 1-3, Redstone Arsenal, Huntsville, Ala.

G. A. Samara (5130), "Solar Electric Research and Development at Sandia," EE Department Research Seminar, March 3, UNM.

T. V. Nordstrom (5832), "Discontinuous Precipitation in a Nickel-Beryllium Alloy," 106th AIME annual meeting, March 6-10, Atlanta, Ga.

L. F. Shampine (5122), "Solving Ordinary Differential Equations for Simulation," Simulation Software and Numerical Methods for Differential Equations meeting March 9-11, VPI, Blacksburg, Va.

R. P. McCann and C. L. Schuster (both 5733), "Frac Mapping by Surface Electrical Techniques," Massive Hydraulic Fracturing Symposium, Feb. 28 - March 1, Norman, Okla.

J. G. Curro (5813), "Computer Simulation of Polymer Chains," Dept. of Chemical Engineering, March 9, University of Utah.

B. L. Hulme (5122), "Shortest Path Algorithms Applied to Nuclear Safeguards Problems," ACM/SIGNUM meeting, March 9, Albuquerque.

C. P. Ballard (5845), "Glass Ceramic to Metal Seals," SLA-SLL Materials Technology Exchange Seminar Series, March 9, Livermore, Calif.

J. R. Wayland (5413), "General Relativity for Eighth Graders," Hoover Middle School, March 11, Albuquerque.

G. W. Kuswa (5244), "Inertial Confinement Fusion Energy with Particle Beams"; C. L. Olson, et. al. (5241), "Collective Acceleration Investigations with the Ionization Front Accelerator," 1977 Particle Accelerator Conference, March 16-18, Chicago.

D. L. Mangan and J. D. Williams (both 1739), "A Review of Available Physical Security Techniques and Equipment," Safeguards Technology Training Program, March 24, LASL.

J. D. McClure (1282), "Qualification Tests for Radioactive Material Shipping Packages," N.M. Section ASCE, March 25-26, NMSU, Las Cruces.

L. F. Shampine (5122) and H. A. Watts (2642), "The Art of Writing a Runge-Kutta Code, Part I," MRC Symposium on Mathematical Software, March 28-30, University of Wisconsin, Madison.

A. W. Johnson (5216), invited paper, "New Lasers for Laser Fusion," 3rd International Conference on Lasers and their Applications," March 28 - April 1, Dresden, East Germany.

H. O. Pierson (5834), "Aluminum Coatings by the Decomposition of Alkyls"; R. A. Langley (5111), "First Wall Coatings for Fusion Reactors," International Conference on Metallurgical Coatings, March 28 - April 1, San Francisco.

J. E. Kennedy (2513), "Energetics of Ideal and Nonideal Explosives," invited seminar, Battelle Columbus Laboratories, March 30, Columbus, Ohio.

L. C. Beavis, W. G. Perkins and D. R. Begeal (all 2353), "Passivating Vacuum System Materials"; L. C. Beavis, "Helium in Metal Tritides," University of Wisconsin-Madison Materials Science Laboratories, March 31, Madison.

R. A. Hill (5217), invited paper, "Laser Diagnostics for 'Dirty,' High-Pressure, High Temperature Flow Environments," Conference on High Temperature Sciences Related to Open-Cycle, Coal-Fired MHD Systems, April 4-6, Argonne, Ill.

L. C. Bartel (5732), "Remote Monitoring of the Reaction Zone in an In Situ Coal Gasification Experiment Using Electrical Techniques"; L. W. Beckham (5732), "Borehole-Borehole Mapping of an In Situ Coal Gasification Process," the 30th Annual Midwestern Regional Meeting, April 5-7, Oklahoma City.

J. R. Freeman, L. Baker (both 5241) and S. L. Thompson (5166), "MHD Effects in Electron Beam Fusion Targets," the Third International (Kiev) Conference on Plasma Theory, April 5-9, Miramare-Trieste, Italy.

J. R. Freeman (5241), "Applications of Computational Plasma Physics in Particle Beam Fusion," the College in Theoretical and computational Plasma Physics, April 5-9, Trieste, Italy.

J. S. Fishburn (2641), "Sandia's Use of the NOS STIMULATOR," VIM 26 Computer Conference, April 6, Minneapolis, Minn.

L. Davison (5131), "Electrical Response of Nonlinear Piezoelectric Materials to Plane Waves of Uniaxial Strain," Seminar, Dept. of Engineering Sciences, Univ. of Florida, April 8, Gainesville, Fla.

R. B. Jones (5413), "Transferring Concepts in Nuclear Technology with Computer Generated Films," Conference on the Transfer of Nuclear Technology, April 10-14, Persepolis, Shiraz, Iran.

D. W. Bushmire (2152) and J. F. McDowell (2111), "Process Controls to Increase the Effectiveness of Beam Lead Devices in High-Rel Applications," International Reliability Physics Symposium, April 12-14, Las Vegas, Nev.

H. M. Stoller (5730), "An Assessment of In Situ Coal Gasification"; A. L. Stevens (5734), L. D. Tyler (1111) and A. Long (LERC), "An In Situ Oil Shale Fracturing Experiment - Some Preliminary Results"; K. W. Schuler and R. A. Schmidt (both 5163), "Mechanical Properties of Oil Shale of Importance to In Situ Rubblization," ANS Topical Meeting - Energy and Mineral Recovery Research, April 12-14, Colorado School of Mines, Boulder, Colo.

C. A. Pempueller (3140), "Communications for Effective Staff Relations," NMLA-TLA Joint Conference, April 13-16, El Paso, Texas.

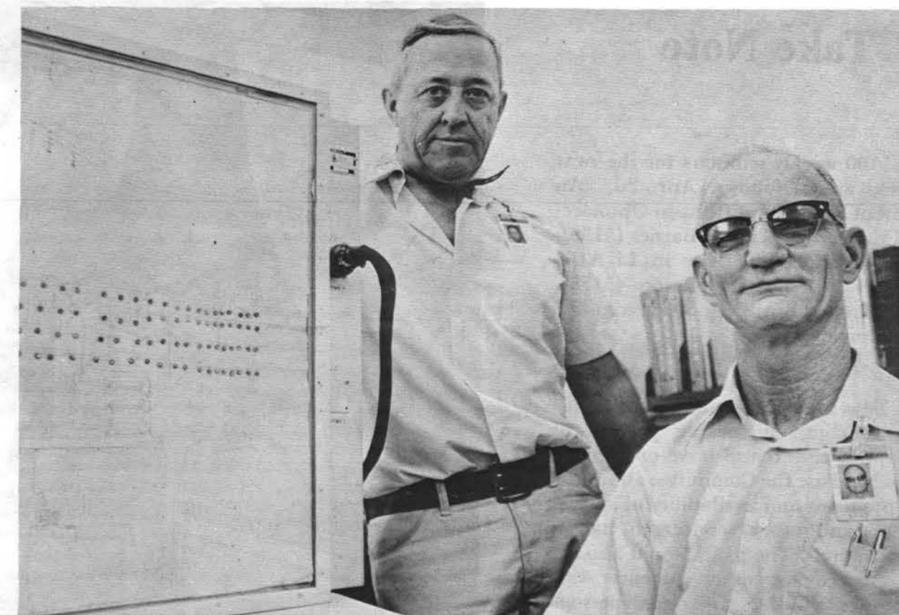
F. L. Vook (5110), "Cultural and Scientific Impressions of a Recent Trip to the People's Republic of China," Caravan Club, April 18, Albuquerque.

A. J. Toepfer and L. P. Mix (both 5242), "Pinhole Imaging Techniques for Hard X-Rays"; J. Chang (5242) and K. W. Dolan (SLA), "Channel Electron Multiplier X-Ray Imaging Devices," Seminar on X-ray Imaging, April 18-19, Reston, Va.

T. D. Padrick (5215), R. E. Palmer (5216) and G. A. Fisk (5215), "Kinetic Processes in the Atomic Iodine Photodissociation Laser," 5th Conference on Chemical and Molecular Lasers, April 18-20, St. Louis, Mo.

R. S. Berg (5842) and R. D. Nasby (5155), "Effects of Structure and Morphology in Thin Film Chemically Sprayed CdS/Cu₂S Photovoltaic Devices"; D. M. Heinze and D. K. Kramer (both 5825), "Surface Analysis of Deactivated Coal Liquefaction Catalysts"; J. A. Borders (5111), "Depth Profiling Using Rutherford Backscattering"; H. H. Madden (5114), "Search for Valence-Band Information in the Auger Spectra of Metals," 13th Annual Symposium of the NM Chapter of AUS, April 19-21, Albuquerque.

R. H. Ericksen (5844), invited paper, "A Technique for Simulating the Strength of Kevlar 29 Yarn in a Woven Configuration" and "Joint Efficiency in Kevlar 29 Parachute Materials"; S. D. Meyer (1282), "Computer Aided Structural Analysis and Design of Ribbon"; W. B. Pepper (1332), "Some Observations and Uses of Kevlar-29 at Sandia Laboratories," Workshop on Superstrength Fiber Applications, April 20-21, Dayton, Ohio.



RECENTLY PATENTED programmable light display system is displayed by inventors Marcel Schiess (1715) and Harry Mason (1732).

Programmable Light Display Invented

A simple solution to a complex display problem has resulted in a patent for ERDA. Harry Mason (1732) and Marcel Schiess (1715) have invented a programmable light display system for use where the display of signals — on, say, a map or diagram — from remote sensors is a prime requirement.

"The problem with any display system on which you want a point on a map to light up when something happens is twofold," Harry says. "You either build your grid of lights to match the scale of your map or draw the map to match your grid. So each display becomes a custom job. There was no flexible universal system. We looked at some very expensive grids before we solved the problem."

Their solution: put a light on the end of a wire with an elongated connector on the other end, similar to a phone jack. Fasten the map onto a sheet of polyethylene foam supported by a metal frame. Punch each connector through the point on the map marking the location of each remote sensor and through the foam backing, pull it taut and connect it to a junction box or radio receiver. Scale is not a problem. Points on any map or any diagram may be marked in this manner.

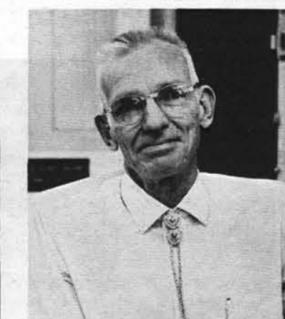
The concept is being used in a number of military and ERDA security systems and in some nuclear safeguards programs. Lightweight portable units are being built for field application.

Retiring

Mary Hall (9411)



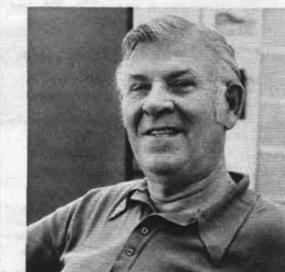
Mildred Hinds (3152)



Gordon Gaskill (9632)



Russ Freyermuth (3711)



John Watkins (1330)

Take Note

Org. 5100 weekly seminars for the next two weeks are as follows: Apr. 26, "An Overview of Radiation Effects in Optoelectronic Devices" by Charles Barnes (5133); May 3, "Ionic Conductivity in Li_5AlO_4 and LiOH " by Ralph Johnson (5155). Seminars are held in Bldg. 806, room 201 at 3:15 p.m.

* * *

The New Mexico Committee on Children and Youth is seeking parents of handicapped children to serve on a panel that would advise the Committee about the needs, problems and availability of special education and other services to handicapped children. The panel would also act as a resource for other parents with handicapped children. Interested persons should call Thomas Griffin, coordinator for the Committee, on 842-3049.

* * *

Patricia Davis (9570) is active in the Vortex Theatre, a fairly new drama group that performs in a small and informal theatre at 106A Vassar SE. Patricia reports that she is directing *Deathwatch* (by Genet) and *The Lesson* (by Ionesco), two one-act plays that will be performed on Apr. 28, 29 and 30 at 8 p.m. This weekend, the 22nd, 23rd and 24th, Vortex presents *Marat/Sade*. Admission is \$2.50.

* * *

If kiddies drive Mom up the wall during summer vacation, consider the Children's Summer Movie Series. Sponsored by the Epilepsy Foundation and the Louisiana Cinema, the Series offers a G-rated movie every Wednesday morning for ten weeks beginning June 15. Cost of a ticket for the entire series is only \$6.50, and proceeds go for a good cause — The Epilepsy Foundation. Call the Foundation on 298-8901 for tickets.



ARTS AND CRAFTS SHOW — Bob Sharp (9751) will exhibit his hooked rug creations and Doug Ballard (9351) his watercolors at the National Arts and Crafts Benefit, sponsored by the Albuquerque Chapter of the Council for Exceptional Children, April 30 - May 1 at the Agricultural Exhibit Hall, State Fairgrounds. More than 100 artists and craftsmen from a six-state area have entered the event. Admission is \$1, and proceeds further the work of the non-profit organization.

A more cerebral outlet for youthful energies is being offered this summer by UNM's Modern Language Department. Summer classes in conversational German for children and young adults will meet twice a week starting June 21. The class is limited to 10 students, cost for the 16 sessions is \$30, and the contact is J. Winter at 294-1369.

* * *

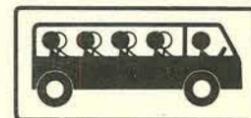
Trout Unlimited, a non-profit fish conservation organization, holds its annual banquet Friday, April 29, at 6:30 p.m. at the Airport Marina Hotel. Speaker will be Ernest Schwiebert, noted fly-fishing authority, who will present "Rivers of Patagonia." Tickets, \$12.50 each, are

available from Bob Kindley (4342), treasurer, or Don Spatz (4341), past president.

Spring Forward

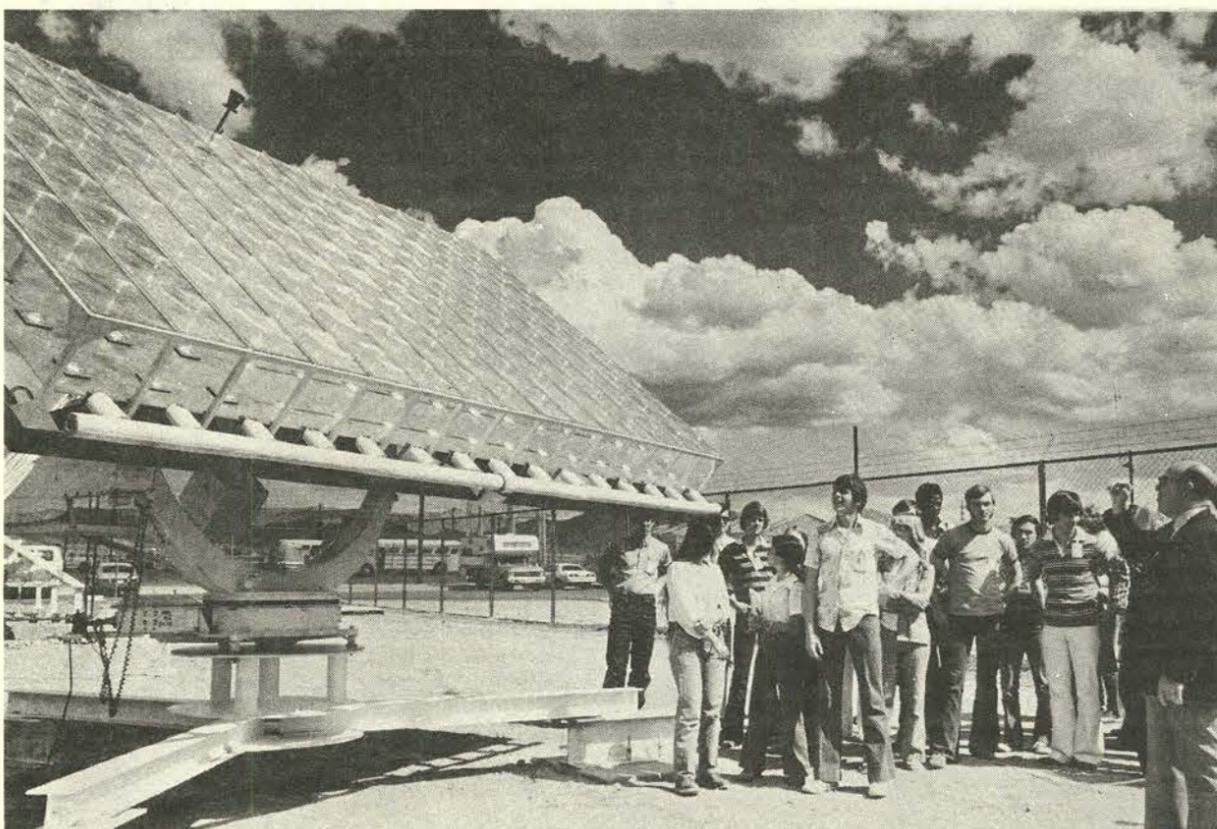
Daylight savings time starts this weekend — at 2 a.m. Sunday. Set your clocks one hour forward.

The conservation world and the Forest Service world are at odds (again) over the issue of wilderness designation for 30,700 acres of the Sandias, and 37,000 acres of the Manzanos. The issue is controversial, but if you are interested in Albuquerque's backyard mountains, you may want to get more information. Little published information supporting the Forest Service position is currently available, but the Cibola Headquarters at 10308 Candelaria NE has copies of the original 1964 Wilderness Act and of the Land Use Plan under which the mountains are now managed. For an advocacy approach to the wilderness designation, come to a Sandia Mountain Workshop tomorrow and Sunday at Sandia School, 532 Osuna Road NE. The workshop includes discussions and hikes to nearby Sandia Mountain areas (bring hiking boots or shoes, water, and sack lunch); registration is at 8:30 a.m. and costs \$1.50.



Bus Note

Good news for Sandia Special #3 riders: Sun-Tran and the Parks & Recreation Department have finally agreed that the Arroyo del Oso Golf Course parking lot can be used as a park-and-ride location. Drive there, ride the bus to work.



SCIENCE YOUTH DAY was observed last week at the Labs, and this group of potential scientists gets the word on this solar facility from Willy Garcia (3163). Nearly 200 youths participated in the tour.

We've Got a Lot of Namesakes Out There

Non-residents (and a few who live here) can't spell it, and it rhymes with jerky, murky and perky, also turkey in case you want to write a song about the place. It's our home is Albuquerque, and a retired Sandian—J.J. Miller—has come up with more data on the name than most people want to know. Save, of course, Albuquerqueans.

Did you know, for example, that the Lisbon phone book lists 350 people named Albuquerque? Strangely, though, Portugal has no place named Albuquerque. Alburquerque, Spain, is the home of the duke for whom our city was named. It's located in western Spain, has about 10,000 people.

J.J. has also established that there's never been a St. Albuquerque. And the Albuquerque phone book lists no Mr./Ms./Mrs. Albuquerque. His collection of maps that somewhere say "Albuquerque" is probably the world's largest, making it a candidate for Mr. Guinness, and we have reproduced a few of them at right.

1. This Alburquerque is a town of 6000 on one of the Phillipine Islands. It was probably named after a Spanish missionary who was active there in the late 1500's.

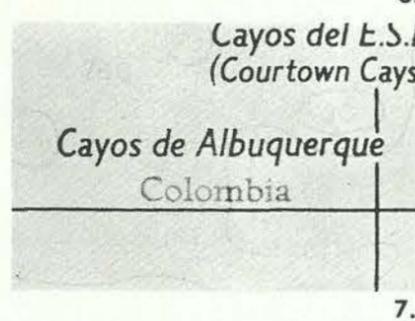
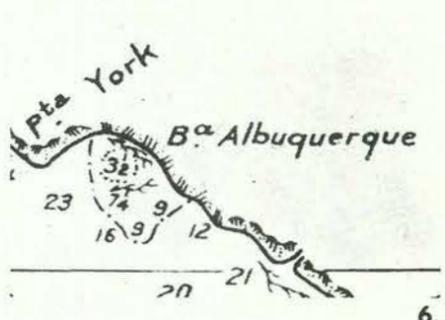
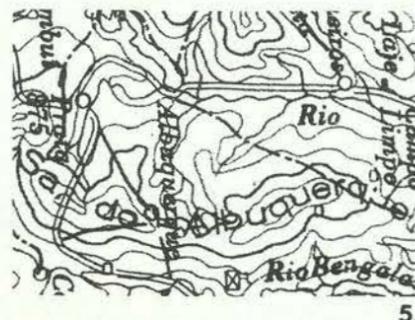
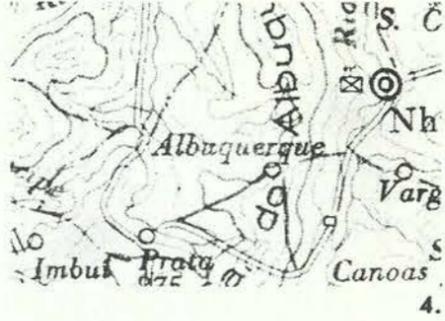
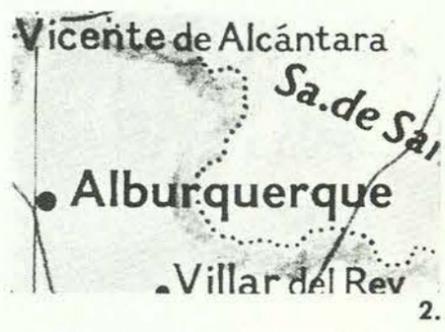
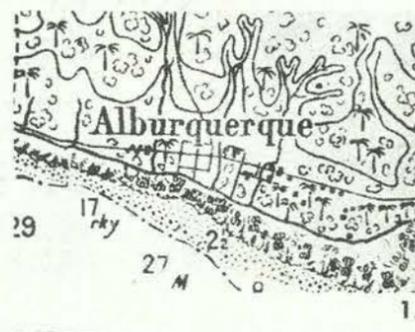
2. Alburquerque, Spain, the duke's home town.

3. A Brazilian encyclopedia lists 70 people-type Albuquerquees, and the country has at least seven Albuquerque place-names. This village is located in the Brazilian state of Mato Grosso. Number 4, another village, is in the state of Rio de Janeiro. And number 5, Sa. do Albuquerque (Sa. = serra = mountain), describes a mountain range 60 miles north of the city of Rio de Janeiro.

6. Bahia Albuquerque is a minor bay on the Strait of Magellan in southern Chile.

7. A "cayo" is Spanish for key or reef, and two Cayos de Albuquerque are located off the Nicaraguan coast. The U.S. Sailing Directions lists them as "two small cays 4' and 6' high, about 300 yards apart."

8. The Britannica in the LAB NEWS office, a venerable 1940 edition, says of this Albuquerque: "The bracing climate and the large proportion of sunshiny days have given it a reputation as a health resort."



Retiree Deaths

Jan - March 1977

Perm Dwyer	Jan. 23
Warren Elder	Feb. 11
Jack S. Embry	Feb. 28
Orvalle Graham	Jan. 8
Marvin Lee Harvey	Jan. 18
John Lambie	Mar. 2
Adam Manzanaras	Mar. 19
Russell Merrell	Mar. 17
Jose Montoya	Feb. 25
Honorato Sanchez	Feb. 14
Donald Saunders	Feb. 7
Alexander Thom	Jan. 1
Hup Wallis	Mar. 2
Henry Williams	Feb. 12
Orval Wray	Mar. 20
Louis Wannoni	Mar. 26

Resident Sandian

In Carlsbad See Joe Magruder

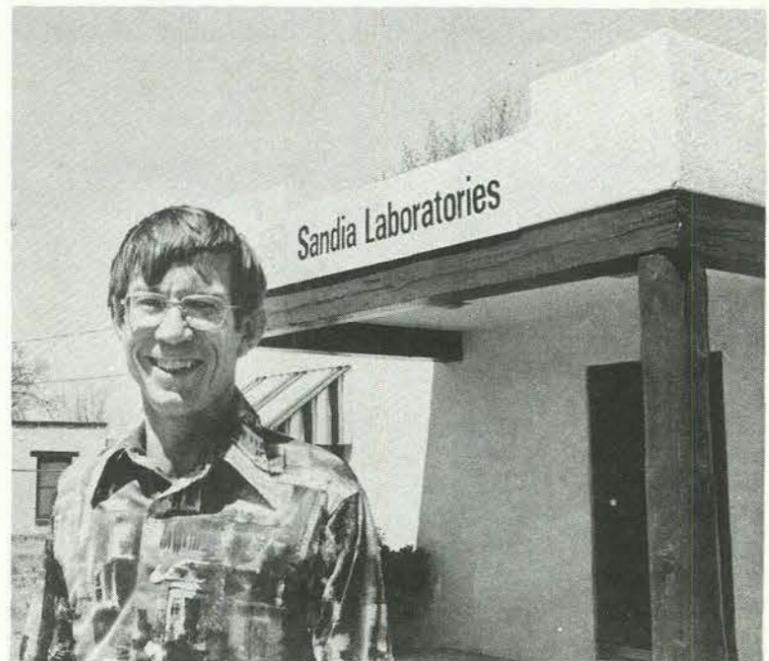
Joe Magruder (1135-1) is our man in Carlsbad. For the past 19 months Joe has been Sandia's Resident Representative for the Waste Isolation Pilot Plant project.

The proposed plant with underground storage facility would be located at a site about 48 km east of Carlsbad. Joe provides administrative and logistic support to the technical effort at Carlsbad. Wendell Weart (1140) is project manager.

Joe does a lot of shipping and receiving of material and handles purchase orders for services and material from local suppliers. In addition to the Sandia office at Carlsbad, Joe is responsible for two warehouse locations. And, for the considerable Sandia traffic to and from Carlsbad, Joe and secretary Rachel Jackson (1135) assist with travel reservations, motels and local transportation arrangements.

Joe is a member of the Carlsbad Chamber of Commerce and is active in Rotary and Elks Clubs.

"This is a PR activity," Joe says. "I meet Carlsbad civic officials and leaders, and I can direct their questions about WIPP to Wendell's group in Albuquerque or ar-



JOE MAGRUDER (1135), Sandia's Resident Representative at the Labs' Carlsbad office.

range for WIPP presentations at meetings."

Joe and his wife Diane enjoy living in Carlsbad, a city of 27,000 people.

"Great people here," Joe says. "We like Carlsbad city pride, the city river park, fishing in the Pecos river and hunting for artifacts in the boondocks."

Joe joined Sandia in August 1956 and has worked in Purchasing and the Medical organization.

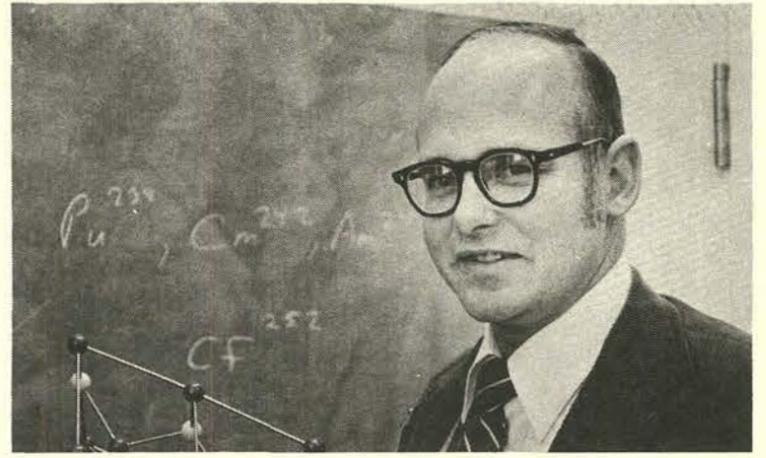
MILEPOSTS

LAB NEWS

APRIL 1977



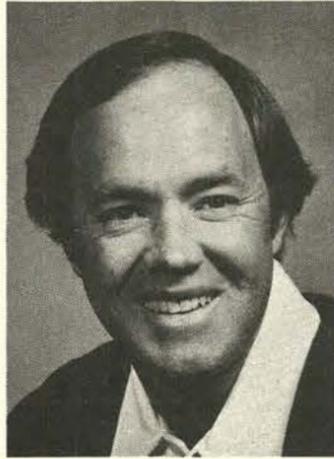
Louis Narvaiz - 2634 25



Clyde Northrup - 5846 10



Eleanor Kelly - 4113 20



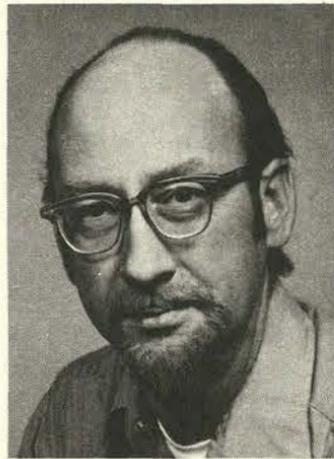
Donald Longcope - 1281 10



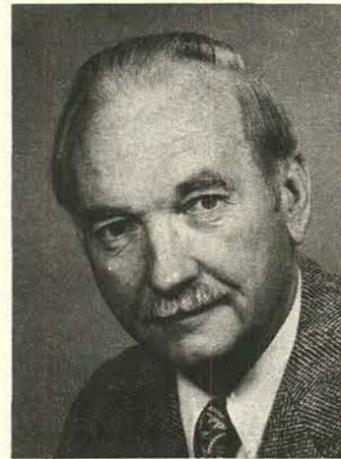
Vern Zipprich - 2623 20



Clarence Huddle - 5163 20



Herrick Lauson - 5166 10



Jack Sivinski - 5445 20



Anita Roybal - 1221 10



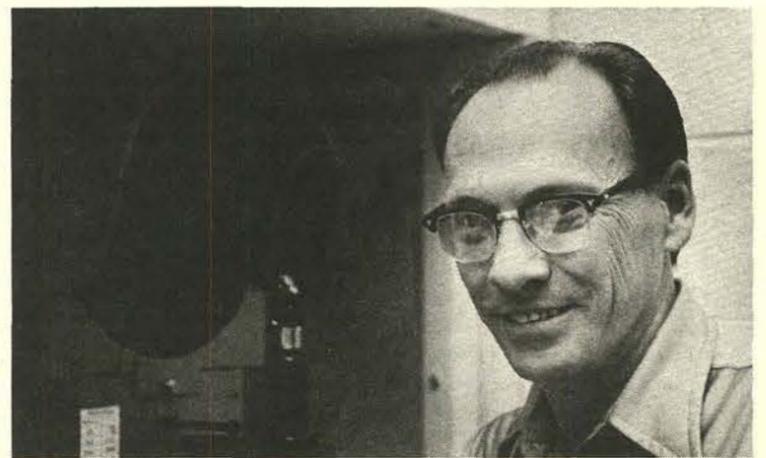
Joe Deveney - 1751 20



John Lewin - 9335 10



John Ulibarri - 9658 10



Charlie Barnes - 2141 20



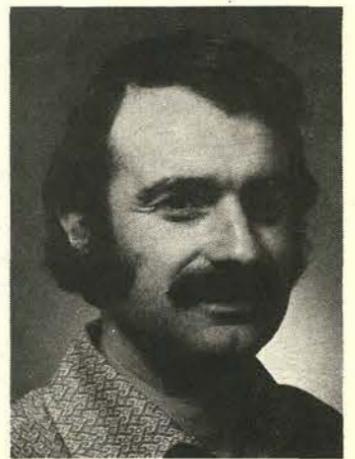
James McClure - 1282 15



Richard Smith - 1233 10



Loren Blakely - 3725 25



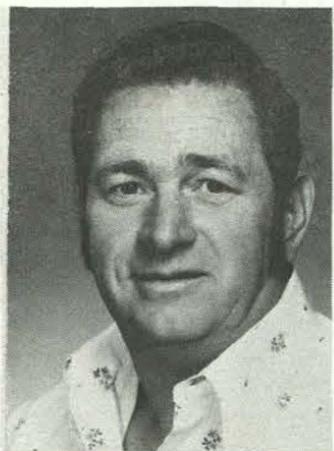
Larry Rollstin - 1335 10



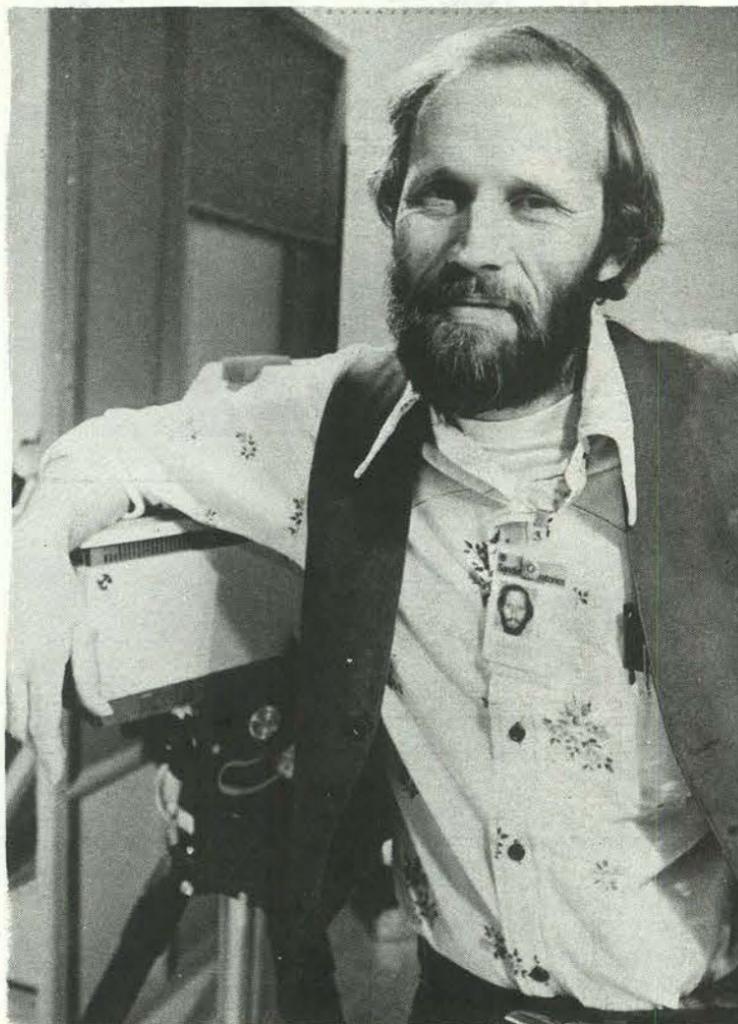
Donald Nissen - 2523 10



Paul Pierce - 2136 10



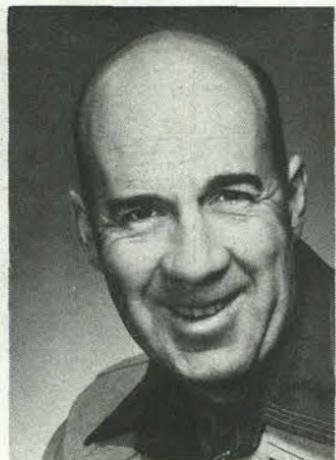
James Davis - 3421 20



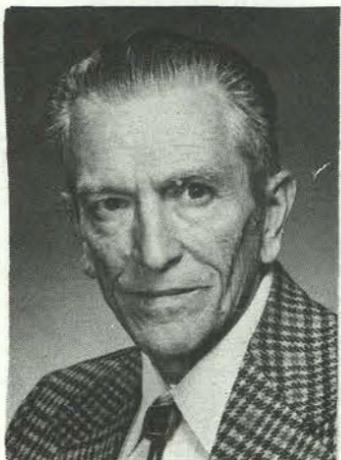
Ken Miller - 3153 10



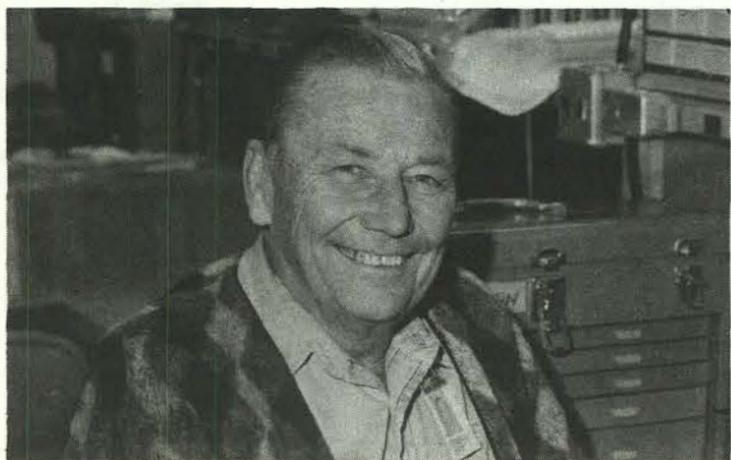
J. B. Baskett - 9632 15



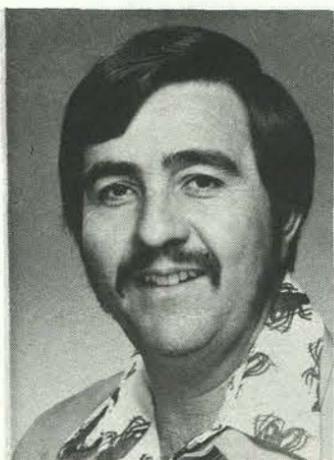
David Lindsay - 1712 20



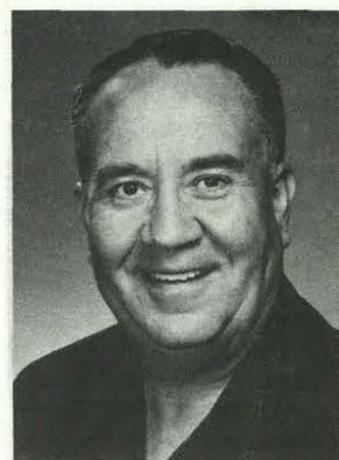
Fred Edwards - 1247 25



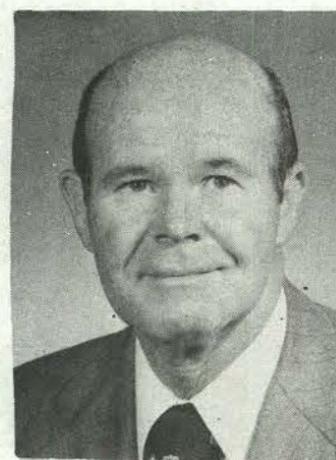
Kermit Nixon - 9471 25



Louis Nogales - 1751 15



John Armijo - 9563 25



John Timmons - 3711 25



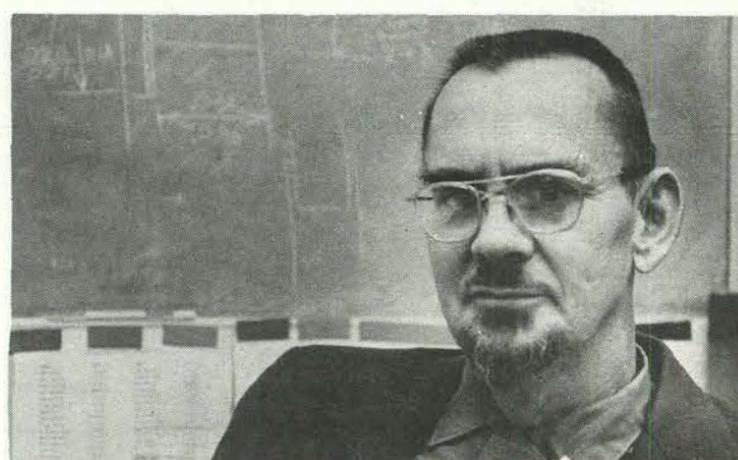
Thomas Mickey - 9582 20



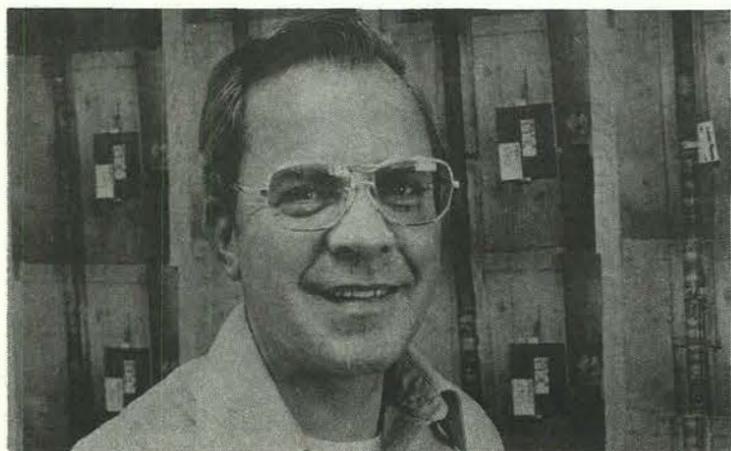
James South - 9572 25



Rogerio Gonzales - 9713 20



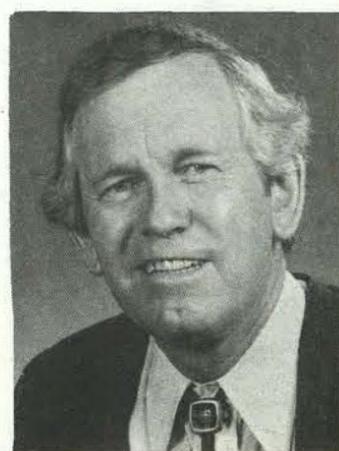
Paul Field - 2325 25



Bob Neel - 5734 20



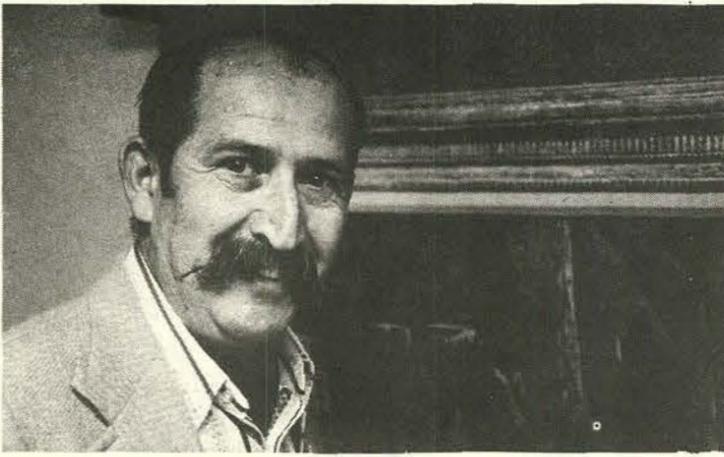
Sanford Erickson - 5821 20



James Simpson - 1734 25

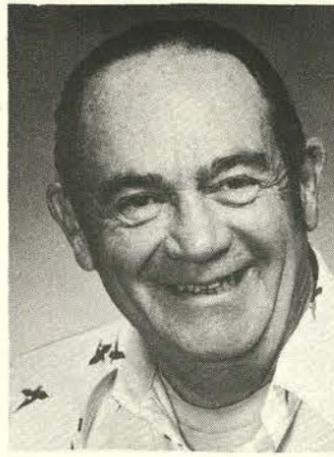


Al Manzanares - 9657 10



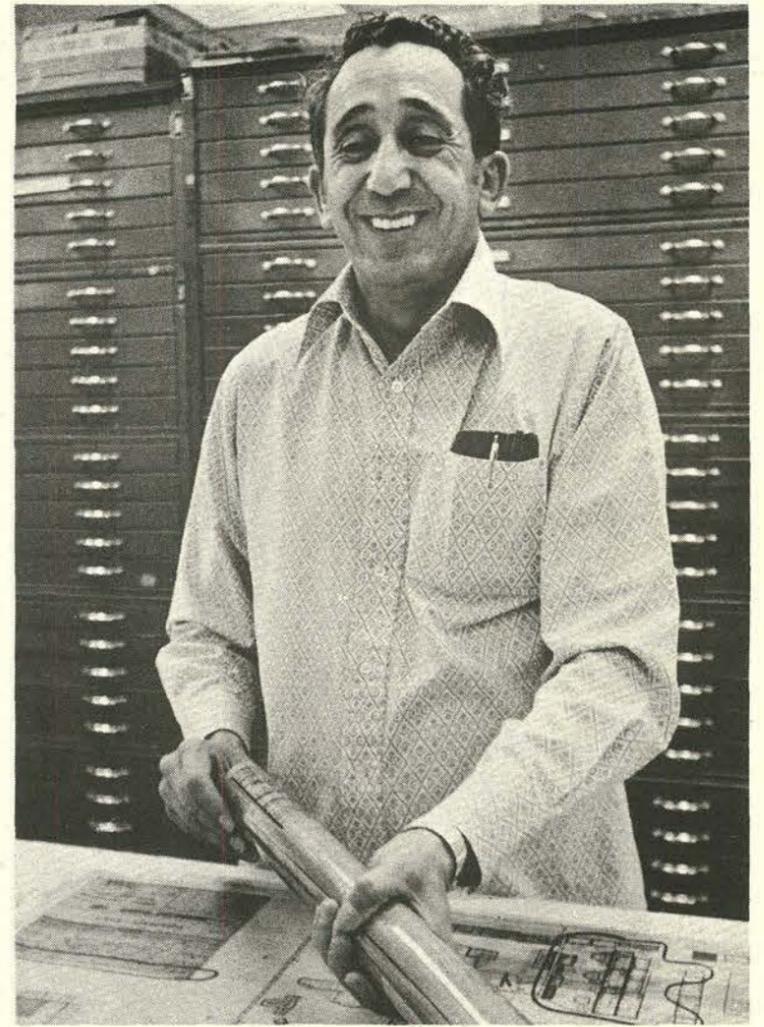
Joe Laval - 3163

10



James Weber - 2351

25



Antonio Torres - 9753

20



Milt Bailey - 2316

25



Eugene Acton - 1245

25



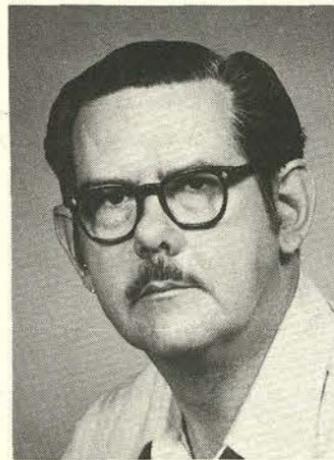
Emily Young - 1125

25



Bob Schuch - 5232

10



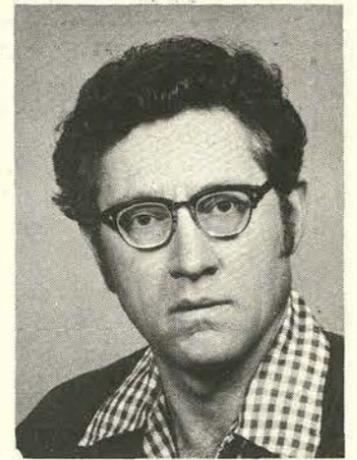
Robert Reed - 9526

20



Walter Hyde - 1737

25



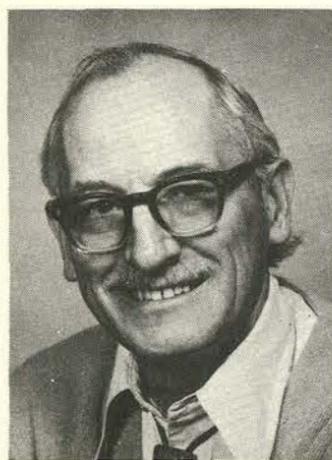
Paul Gammill - 1247

20



Melvin Mattison - 9414

25



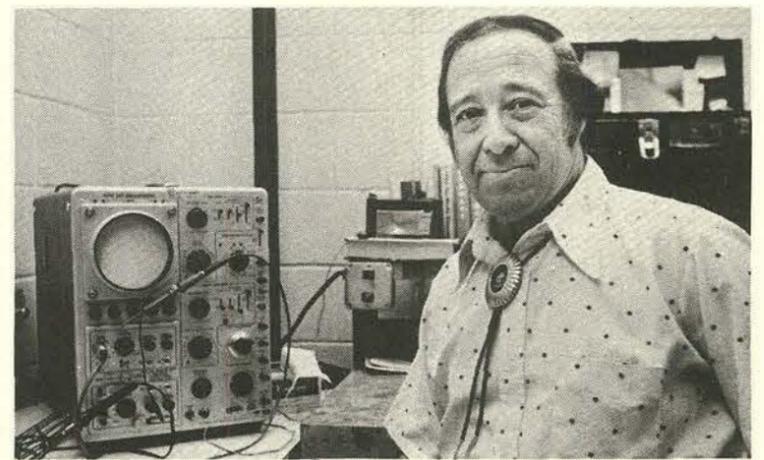
Glen Corbett - 9583

10



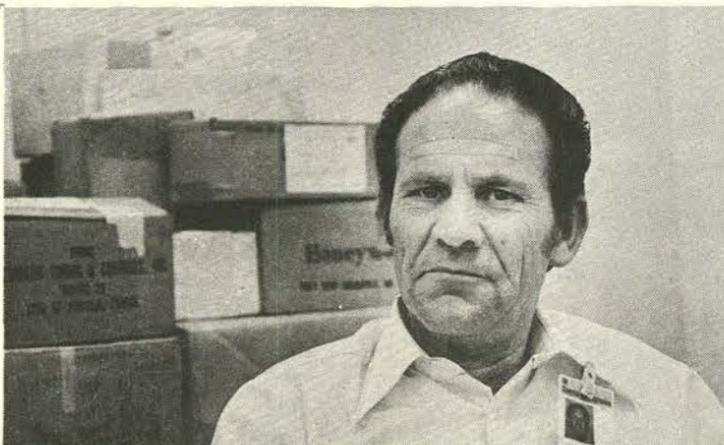
Mike Silva - 9712

25



Sol Chavez - 3171

25



Emilio Torres - 3423

25



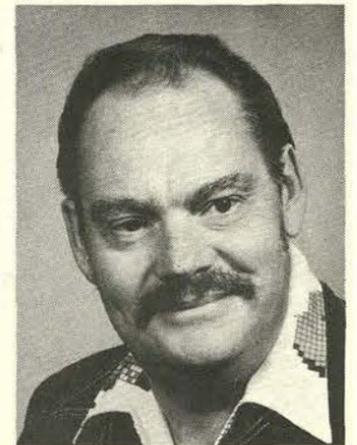
Alvar Anderson - 9344

20



Wallace Green - 4335

25



Otto Simon - 9656

10

Hydroponics — Look, Ma, No Dirt!

Red, luscious tomatoes year 'round — that's the reward of hydroponic gardening. Not to mention lettuce, beans, cucumbers and strawberries.

Tom Pace (9420) grows all his salad vegetables in a 10'x10' green house in his backyard. The system is completely automated — timers and pumps automatically bring nutrients into the hydroponic beds three times a day. Heating and air conditioning systems control temperatures inside the greenhouse. Heat wires in the beds keep plant roots at 70°F. during winter months. Tom adds nutrient chemicals to the 50-gallon submerged water tank once a week — one teaspoon of nutrient per gallon of water.

The hydroponic beds are made from 2x8 lumber lined with plastic and partially filled with a mixture of vermiculite and perlite. Plant roots spread easily in the mixture. Plastic pipe with hundreds of tiny holes is installed over the beds to distribute the nutrient fluid. "Feeding time" is about 45 seconds. Once a year Tom pulls out old plants and changes the vermiculite/perlite in the beds.

"Sand or pea-gravel would work as well as the perlite mixture," Tom says. "Hydroponics is merely gardening without humus soil. Many commercial greenhouses

throughout the world supply winter vegetables to markets. The Middle East has taken to hydroponics in a big way. It makes sense in any area where soil or weather conditions are poor. More plants may be accommodated in a small space. My little setup could provide salad vegetables for a family of four throughout the year."

Tom became interested in hydroponics about five years ago when his conventional garden in the backyard was taken over by squirrels and rabbits.

"Wiped out," he says. "I did all that work for varmints."

"Compared with standard gardening, hydroponics is a pleasure," Tom continues. "No bugs. (Well, an occasional white fly but none of those horned tomato worms.) And no weeds. With the automated controls, I can leave the place and not worry about it."

Tom's wife Elsie gives the greenhouse plants day-to-day care. "I enjoy it," she says. "In the winter I occasionally sit in the warm sunshine inside the greenhouse and read. There's very little care required — prune a few leaves here and there."

Tom plans to add another 10'x10' addition to the present greenhouse. His heater and air conditioning systems can handle it.



TOM PACE (9420) checks tomatoes in his hydroponic garden. Since there are no bees in the greenhouse, Tom pollinates with an electric toothbrush.

"I want to do some experimenting," Tom says. "Some hydroponic gardeners are using closed systems in long black plastic pipe with re-circulating nutrient. The plants grow out of slits in the pipe. And I want to build a solar heat storage system using hot air and rock storage."

Tom is past president and member of the board of the Hydroponics Garden Club of Albuquerque, a group of about 125 gardeners who share their enthusiasms.

"Besides great tasting vegetables," Tom says, "hydroponic gardening is a fun hobby. The Garden Club can help with information and advice to anyone who wants to get started."

JUNK • GOODIES • TRASH • ANTIQUES • KLUNKERS • CREAM PUFFS • HOUSES • HOVELS • LOST • FOUND • WANTED • & THINGS

CLASSIFIED ADVERTISING

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

RULES

1. Limit 20 words.
2. One ad per issue per 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

ADDING MACHINES, \$25 & \$30, Zucskie, 881-4086.
AQUARIUM, salt water, 125 gal with stand, double filtration, 3 heaters, sea anemones, fish & coral. \$450 or best offer, you move. Hudson, 296-3484 or 296-6978.
INNER TUBES, 7.00/7.50-15, spr hvy dty for semi; drop center rims, both for \$7.50. Kavet, 299-1793.
CYCLE EXERCISER, Vita Master, speedometer, odometer, tension control, padded seat. Ludeke, 268-5265.
MOVIE CAMERA, 8 mm, Japanese, \$25; straight chair, antique mahogany, bell pattern, \$18; WWI gas mask. Smitha, 881-1001.
DUMBBELL SET, 110 lb. Challenger, \$20, call or see after 5. Bailey, 4905 Yucatan Dr. NE (Holiday Park), 292-3227.
ORGAN, Baldwin 72L, Panasonic tone, Leslie speakers, \$650. Schindwolf, 897-0470.
ENGINE, 1100 cc, '69 Toyota Corolla, car wrecked, \$125. Butler, 296-8095.
RETRACTABLE STEP for camper or trailer, \$8. Klett, 298-7892.
CARPET, 65 sq yds, wool, lt gray, \$1.75/sq yd, take all \$105; 6 sq yds gray, \$1.75/sq yd; 14 sq yds biege, \$1/sq yd. McKay, 256-3911.
WINCH, TV-1 made, ratio 10-1, powered by Ford starter; Chevy van driver seat. Padilla, 873-0667.
IBM ELECTRIC EXEC. TYPEWRITER, proportional spacer, or will trade for regular IBM electric typewriter. Wallace, 294-2870.
CHAIRS, 2, Swedish modern, \$125 ea; plywood box 25x45x85, \$15; table 20x48, glass top, \$10. Pope, 255-6702.
CRIB, white, mattress & pad, \$40; gate for stairs, \$4. Cropp, 296-1877.
CASSETTE DECK, Teac, under warranty, w/Dolby, Vu meters, dual head, w/2 doz tapes, offer. Patrick,

255-5944.
ELECTRICKBROOM, Regina, \$20; TV Motorola Quasar, \$15, good for spare parts only. Russell, 268-9023 after 6.
TOILET, recreational sanitation, recirculates water through self-cleaning filter. Ward, 869-3580.
HAY, barn stored, \$2.50 bale. Roth, 877-4997.
RANGE, GE Americana, 30", double oven, hood, \$150; GE built-in dishwasher, 2 cycles, \$75. Gauster, 293-8612.
COWBOY HAT, 7-3/8, long, oval, genuine Panama, never worn, pd \$40, take \$10. Rutledge, 281-1155.
WASHER; electric dryer; refrigerator, auto ice; vacuum cleaner; mower. Roberts, 294-3648.
COLT 1903, pocket model, auto, 38 cal, \$85; revolver, S&W 38-44, long action, 4" barrel, \$150. Parks, 293-9598.
LAWN MOWER, 19" rotary, 3 h.p. Briggs-Stratton engine. Nuttall, 821-2895.
WASHER, apt or trailer sz; dryer, electric 110V; \$45 ea; refrigerator, old, working, \$25. Rufsvoid, 881-4358
HONEYSUCKLE PLANTS, 18", Halls variety, 54 plants, 50c ea. West, 345-0165.
CHAIN LINK FENCE, 5' high, 39' long, includes 3' wide gate, 5 posts already cemented, plus all necessary hardware, \$40. Bando, 821-6231.
FISHING FLIES, custom tied; fore & afts and wooly worms, 3/\$1; nymphs and other types 45c ea., Swanson, 299-7833.
SHOTGUN, Remington, Wingmaster, 16 ga, with Herters adjustable choke, \$60. Holmes, 292-0898.
EXERCISOR, Slim Gym, \$10; Childs World, complete set, \$10; camp grub box, \$5. Gravin, 268-6579.
HP 65 w/charger, card pack & case \$225; various access packs, changers & cases, call for prices. Barnette, 298-9227.
LAWN MOWER, Sears Craftsman, manual, 18", reel, \$20; electric edger \$15. Lockwood, 298-9563.
RIFLE, Remington, Mod. 788, .243 Win., new w/4x scope, only 20 rounds fired, \$110; welding & custom wrought iron. Rarrick, 296-2340.
MATTRESS, firm, double; boxspring; frame, \$60; 35 mm Revere 500 w projector, \$20; extra slide trays, 75c ea., 3 for \$2. Atkins, 298-5762.
METAL LATHE, Myford ML-7 Tri-Leva 7-inch throw, chucks, milling accessories, etc.; 1/2" bench drill press. Shoup, 299-6360.
GO-KART, Margay Concept with 91B1 engine, new clutch, plus extras, not for kids, \$500. Johnson, 296-3431.
FACTORY SHOP MANUAL, valve gas-

ket set, 2 valve lifters, for 1964 Buick Special/Skylark. Scheiber, 293-3824.
BEDROOM SET, double bed, springs and mattress, 5 drawer dresser, vanity, \$90. Carson, 898-8847.
SWING SET, 2 swings, slide; lawn glider and glide ride, complete with anchors; floor lamp. Meyer, 821-0123
ELECTRIC MOTOR, 1 HP, Dayton, 3 phase, 5/8 shaft, sell or trade for single phase 1 HP motor. Wilkinson, 299-8327.
HOOVER Upright vacuum cleaner, \$20; baby stroller for 1 or 2, \$10; babywalker, \$3; screen door, \$1; swing set, \$20. Harstad, 298-6551.
10-GAL FISH AQUARIUM, all set up, \$25; ping pong table, \$20; elect train, postage stamp sz, \$15. Davis, 294-0139.
BLOODHOUNDS, blk & tan, red, AKC, championship lines. Glauner, 293-4105.
DINETTE SET, formica top, 4 swivel chairs, \$60; wagon, \$8. Snow, 296-5148.

TRANSPORTATION

BICYCLE, Bertin amateur racer, 54 cm frame, extras, \$150. Shurtliff, 247-9663.
'73 DODGE Dart Swinger, AT, PS, 22 mpg, blue book price. Roberts, 294-3648.
BIKE, 10 speed, Iverson, \$40, Bailey, 292-3227.
VW BEETLE, '68, 4 steel belt radial tires, 2 mag wheels, AM/FM, tuned exhaust, \$700. Mitcham, 299-8425.
BIKE, 10 speed, men's, Suntour, Shimano derailleurs, DiaCompe side-pull brakes, rattrap pedals, kickstand, downtube shifters, 21 1/2" frame, \$50. Joseph, 299-6989.
'72 CHEVY 1/2 T. pickup, auto trans, fac air, cruise cont, aux. tank, power brakes, steering, roof mount CB antenna, camper shell w/boot. \$2700. Silva, 898-6249.
'70 BOSS 302 Mustang, chrome wheels, full race engine with extras. Romero, 881-3597.
1976 HONDA XL 350 Enduro, S&W, rear shocks, 3100 miles, \$850, firm. Miller, 296-4531.
'75 MONTE CARLO Landau V-8, one owner, low mileage, many extras. McClenahan, 294-8454 after 5.
'70 MUSTANG, 2 dr fastback, seat fold down, floor shift, wide oval tires, R&H, recently overhauled, 6 cyl., \$1195. Garin, 243-3473 after 5.
'75 FORD Pinto Wagon, PS, PB, AT, 20,000 miles, one owner, below book. Winblad, 898-9762.
'69 CHARGER, white w/green vinyl,

AT, AC, PS, radio. Follstaedt, 883-1649 after 5.
'75 HONDA CIVIC, CVCC, hatchback, 22,000 mi, 13" Michelins, NADA retail or 7, no trades. Class, 281-3836.
'74 FORD PINTO, 3 dr. Runabout, 2000 cc, auto, air, vinyl top, AM radio, 14,000 mi, \$1800. Warren, 294-5250.
'76 TRIUMPH SPITFIRE, red, low mileage, \$3950 or best offer. Johnston, 296-8459.
'73 HONDA Civic Hatchback, 4-speed, radials, 33 mpg city, \$1500. Vandevender, 298-5097.
'73 1/2 ton FORD pickup, 390 engine, 3 spd trans, AC, PS, PB, 8100 GVW camper special, new 10 ply tires. McClure, 247-3095.
BICYCLE, \$25. Snow, 296-5148.
'72 CHEVY LUV, 4 speed w/camper shell, \$1500; '66 Olds dynamic 88, PS, PB, AT, A/C, \$400; '62 International Scout, 1/2 ton PU, 4 W/D, \$500; '69 Suzuki, 50cc, \$75. Turnbough, 299-3631.
'71 BULTACO TRAIL BIKE, 250 cc, street legal. Dodrill, 293-3487.
'72 OPEL 1900, blue, vinyl top, AT, bucket seats, \$1250. Bargsten, 842-5217 after 5.
'75 FORD GRANADA, AT, 6 cyl, 4-dr, AM/FM 8-trk stereo, 35,000 miles, \$3000. Person, 255-4815 between 6 & 8.

REAL ESTATE

1.2 ACRE cabin site, southwestern Colorado, wooded, borders National forest, across highway from Purgatory ski area. Carson, 898-8847.
APARTMENTS, 12 units on West Central, \$1405 total mthly income, \$58,000, good terms. Watterberg, 294-6759.
11724 TIVOLI Quality 4-bedroom, lg landscaped lot, Holiday Park, walking distance all schools, 6% mortgage. Jones, 294-4914.
3 BR HOFFMAN BRICK, 2250 ft., detached 2 car garage, 1 1/2 baths, formal dining rm, den w/fp, lg bedrooms, 265-2831. Brown, 265-2831.
HOME, SIESTA HILLS, 1 1/2 miles from Sandia, 3 br, den, fireplace, formal dining rm, 4 yrs. old, 2238 sq. ft., lg lot, fully landscaped. DeYoung, 265-4014.
LOTS, 2 acres, water abundant, each lot with well, restrictions for your protection, terms available. McClure, 247-3095.
OPEN HOUSE, 1-5 Sat & Sun, 4 bdrm, open floor plan, \$49,900. Lin, 1636 Robt. Dale NE (1 blk. E of Eastridge, 1 N Indian Sch.)

FOR RENT

1 BDR APT, patio, laundry, furnished - unfurnished, AC, carpet, utilities pd, 541 Espanola SE. Aragon, 242-1651.
3 BDRM HOUSE, 2 bath, near UNM, avail June 1 thru Aug 15, dates negotiable, \$275 mo. plus utilities. Conniff, 842-9694.
2 BDRM condominium, 2 bath, at Purgatory ski area, sleeps 8, fully furnished, summer rates. Carson, 898-8847.

WANTED

HOME, for free puppies, 1/2 Irish setter, 1/2 lab, see at 7112 Patricia NE. Faychak, 821-4833.
MAINTENANCE MANUALS, for '68 Mustang & '70 Mercury. Harstad, 298-6551.
PROPANE TANK, 250 gal LP gas capacity, larger or smaller size considered. Hyde, 268-2885.
16.5 RIMS with 5 hole pattern, Brock, 865-4055.
SOFTBALL PITCHER for men's 2A fastpitch team, more interested in control than speed, urgent, need this coming week. Arnot, 298-0224.
YOUNG FOLKS, 8 to 18, interested in competitive swimming. Contact Wagner, HYAC coach, 821-3164.
CAR-POOL, between Belen & Sandia, hours 8 to 4:30, Roth, 864-4080.
CARPOOLERS from Loma del Norte or Academy Acres area to Area I. Rochau, 4-3730 or 821-9647.
BULLHORN in repairable condition. Johnson, 296-3431 after 6.

LOST AND FOUND

LOST — Cherie, small female poodle, sandy-grey, brown nose, pink collar, last seen Charleston SE, could be anywhere. Marge, 281-5209 evenings; small cross made of nails, on green corduroy rope; five keys in brown case; Mickey Mouse watch with turquoise band; bicycle coil cable with small master padlock; bi-focal safety glasses (AI photo lens) with dark brn rims in blk case; Pres. safety sunglasses with wired black frames in blk case; bi-focal sunglasses with black rims; Timex watch with Hopi band.
FOUND — Silver automatic pencil (Cross); grey raincoat in case; two keys on key ring (picture of drum & five players); nine keys on circular key ring; facet-colored screw-type earrings; small pearl-colored clip-on earring; blue two-hole button, pearl finish.
LOST AND FOUND, Bldg. 832, 4-1657.

FRIDAY	SATURDAY
<p>22 — HAPPY HOUR BEEF/CRAB BUFFET Adults \$3.25 Under 12 1.92</p> <p>SHALAKO</p>	<p>23 — SWIM LESSON SIGN-UPS 9 - Noon TEEN DANCE DISCOTHEQUE 7:30 - 10:30 Mbrs \$.50 Guests \$1</p>
<p>29 — HAPPY HOUR BBQ BEEF & CHICKEN Adults \$3.25 Under 12 1.92</p> <p>LONNIE BRAY & FIREWATER</p>	<p>30 — SOUL SESSION 9-1 CURIOSITY Members Free Guests \$1</p>

BY — one week from today, you can get a good deal on good seats for Lobo football next fall. By waiting around for your tax refund, you'll get just as good a deal but not as good a seat. The price: \$15 per ticket (same as last year). The seating: former ticket holders get their old familiar seats again; new ones get the next best ones available. Pay by check as you order at the office; order as many as you like.

THE — Happy Hour tonight features beef stroganoff, crab newberg and *Shalako* in that order — eat the meat, then beat the feet. *Shalako's* a new group to the Club. Don't confuse them with the Zuni group of the same name. This group lets you do the dancing.

TIME — for some fine Country & Western music next Friday. *Lonnie Bray and Firewater* make like incompetent outlaws and get held up by the stage from 8:30 till 12:30. Sustenance too — barbequed beef, barbequed chicken, corn-on-the-cob, and more.

YOU — have exactly a fortnight and a day to pick up tickets for May's Saturday Night Special — the new, improved,

sit-down, family-style Fiesta Mexicana dinner. It's on May 14, and the menu includes chili rellenos, carne adovada, beef tacos, green chili enchiladas, Spanish rice, pinto beans, sopaipillas with honey, and guacamole salad. It's too much for a tray, so (rather than furnishing pack burros) we'll eat family style — sit with your friends at your table (tables, incidentally, are reserved, but you don't have to be), and you'll have heaping bowls and platters delivered right to you. Enjoy the food and the strolling mariachis simultaneously. Later, dance (from 8:30 to 12:30) to *Manny and the Casanovas*, a group most appropriate for all you super-seductive Latin lovers. The date is May 14, and the member price is \$5.90 (guests: add a dollar).

LEARN — to swim, kids. Sign them up tomorrow, parents. Be at the Club between 9 a.m. and noon with a season ticket (on sale in the lobby), and enroll your tots, teens, or inbetweens in the appropriate Red Cross-approved swimming class. They could learn the butterfly stroke (butterflies love it) or even how to make their skin (Australian) crawl or maybe just how to dare to float face down.

YOUR — whole family can enjoy the twin pools and spacious patio all summer long if you have a season ticket tucked away to enter with. Accept a California-style lawn (brown) this summer and do your recreating where it's lush, green, and wet. Activities for all ages once you're soaked or basted too. Tickets are now available in the office.

FATHER — or mother or both ought to pick up tickets today or tomorrow for their progeny who want to attend the Disco Teen Dance tomorrow night. Emceeding the event will be real live record-spinning professional Ricc Dustin. Come on out, all your real live record-loving professional teenagers!

WAS — you Sanadoes a-thinkin you'd have one of them there fancy dress balls this spring? Nope. It's a-gonna be a jen-you-wine Hillbilly Hoedown from the still to the outhouse and all the places inbetween 'em. Moonshine, vittles, and some of the most bodacious music you ever laid ears on. Yep, the good old *Watermelon Mountain Jug Band's* gonna do it for you and yer old man. Tell old Vicky Clark how bad you wanna go by May 3.

RIGHT — before the Hoedown is something even non-Sanadoes can enjoy. It's the Annual Winrock Mall (in early December it's the Winrock Maul) Art Show and Sale, and it's May 4 through 7. Oils, watercolors, framed and unframed — lots of good stuff on sale and on view.

YOUR — average ordinary everyday Singles Night it's not. It's a big all-Sandia-and-ERDA-singles-invited Patio Party on First Friday, May 6, from 4:30 till 7 or so.

Dancing, listening, munching, talking, competitive games (and others), and a Happy Hour bar. Fifty cents at the door from the Ballroom to the Patio.

SON — of a gun! Travel Director Ed Neidel has just announced four (4) new travel packages to three (3) destinations. Not all the details are available yet, but watch for later announcements. One of the new trips is a 12-days-in-Alaska plane-train-bus-ship jaunt beginning August 28. It includes the Yellowhead Route from Seattle to Prince Rupert by bus; then a ferry up the Inside Passage to Skagway; then narrow-gauge railroad across the mountains to Whitehorse, capital of the Yukon; fly then to Fairbanks and visit all the sights in that fantastic city; then a bus through the McKinley National Park (8 hours) and on to Anchorage. Fly back. Remember Pipeline Paradise forever.

IS — your knowledge of the Grand Canyon limited to a view or two from the South Rim? Get to know it up close (*way* up and *very* close) on a six-day trip through the most magnificent scenery in the

HOT FLASH — 68 of the 100 people needed for four quality tennis courts have signed up and paid \$150 of the \$225 three-year membership. There's room for 32 more before membership closes.

country — the Colorado River from Lee's Ferry to Whitmore Wash by giant white-water raft, then back to your car at Lee's Ferry (the Club will help arrange pools) by horse and plane. Cost is about \$325 and dates are August 17-22.

DISAGREEING — with the notion that all travel has to be rustic or expensive, the Club has two new Las Vegas packages. One (June 13-15) is *really* economical because you're staying downtown (the Hotel Fremont) during midweek. But it includes airfare, lodging, transfers, tips (including the mandatory \$2 bellboy one at check-in and check-out time), two breakfasts, two cocktails, and a keno ticket, all for \$125 (singles add \$16.50). The second puts you on the Strip on a weekend (June 17-19) and includes the above plus a late show, a steak dinner, and more, all for \$155 (plus \$26 single occ.).

WITH — the excitement of the new trips, don't forget the old ones: London/Frankfurt/Amsterdam or Tokyo or Hong Kong. The European one is airfare only, the other two are full packages. But don't wait.

YOU — curious about *Curiosity*? Sate it. Make it to the Soul Session on the 30th.

MORE INFO — 265-6791

PAGE SIXTEEN
LAB NEWS
APRIL 22, 1977

