

TTR Supports Navy Cruise Missile Test Series

In recent tests of the Navy's Tomahawk cruise missile, performance has been remarkably successful—and so has the performance of Sandians and instrumentation systems at Tonopah Test Range where the tests terminated at a dry lake bed target area on the Range.

"Elated" is the way Ron Bentley, TTR supervisor of Division 1172, describes the Navy's reaction to test data supplied by the Range. "The cruise missile tests stretch the capabilities of our instrumentation to its fullest," Ron says, "but the systems are performing without a glitch."

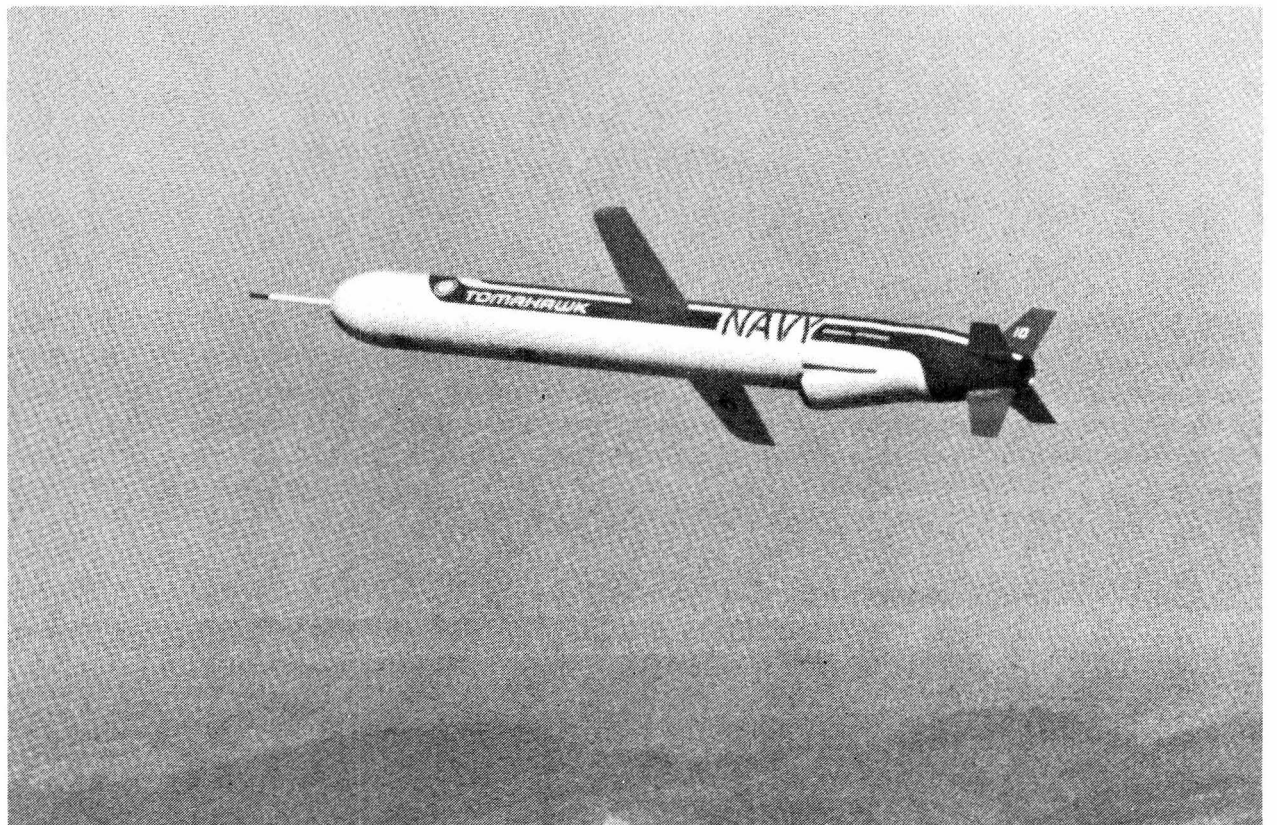
The cruise missile tests start beneath the sea in the nuclear submarine Guitarro submerged off the coast of Pt. Mugu, Calif. The Tomahawk is fired out the forward torpedo tube of the sub and carried aloft by a rocket booster. At about 150-ft. altitude, the rocket drops away, the jet engine fires, tiny wings emerge from the torpedo-shaped missile and a 500-mile zig-zag journey starts across California, over the Sierras and into the dry desert terrain of Nevada. The flight is primarily over government-controlled land away from population centers. The flight of the Tomahawk is at low altitude, making it virtually impossible to detect on radar.

The missile streaks onto the Range at approximately 550 mph, its small turbofan engine remarkably quiet. It comes in at treetop level, and as it approaches the house-size target, it drops even lower. It hits right on target, an awesome performance of the missile and its guidance system.

As the missile approaches the Range, it transmits a signal from an onboard beacon which is picked up by the radars at TTR. Once locked onto the missile, the radar systems' position data are transmitted into the central computer at TTR and automatically relayed to the cinetheodolite, telescopic and tracking cameras. Each camera station has its own minicomputer which processes the radar location data to automatically position, track and focus the optical instrumentation. Data for the missile guidance telemetry link is also processed in real-time by the TTR computers and this is used as an additional target location aid by the Range instrumentation systems.

A long-lensed TV camera, integrated into the radar system, is also focused on the incoming missile to provide a CRT image on screens in the Operations Center at TTR.

Simultaneously, the position of the target is displayed by a graphics system



LAUNCHED from a submarine, the Navy's Tomahawk cruise missile flies at low level, beneath radar detection, at 550 mph. A recent test of the missile at Tonopah Test Range was spectacularly successful. After undersea launch and flying a 500-mile zig-zag course, the Tomahawk impacted on a house-size target at TTR's dry lake bed target area.

incorporating maps of the TTR area. As the missile comes closer to the target, the scale of the maps changes to take over closer looks at the flight course and target. The position and progress of the missile is plotted as a bright line on the screen.

One of the requirements of the cruise missile tests was tracking the missile as well as a chase plane following above and behind the missile. The plane was instrumented to take over control of the missile if it deviated from its programmed flight path. The chase plane had to maintain its position so that a narrow "cone," the space where the control electronics would function, could be precisely positioned during the critical moments before the missile hit its target. This information was continuously visible on the TTR graphics display.

Another requirement for the cruise missile tests was additional displays in real-time of 100 data channels from instruments on board the missile which monitored internal functions—engine and exhaust temperatures, electronic component performance, etc. These data were organized and displayed by TTR's computer in digital form on TV screens and chart printers set up in the operations building where Navy and contractor people, responsible for the various components, could monitor individualized system performance data.

All of the electronic data from the tests

[Continued on Page Three]



COME TO OUR FAIR proclaims Jerry Hood (4360), chairman of this year's ECP Committee, as he steps through the United Way door. Last year's United Way agency fair at the Labs was so well received that a repeat is being set up. The fair will be on the mall near the cafeteria on Thursday and Friday, Oct. 1 and 2, from 11 to 1:30. It includes demonstrations of dance exercise, tests for blood sugar (stop by before lunch), abdominal thrust demonstrations by the Red Cross, blood pressure checks and much more. And Sandia musicians Yolanda Armijo (3543), Pete Gallegos (2544), Denny Gallegos (3743) and Bob Ezell (3155) will provide festive music. All told, 18 agencies will be represented.



RAY BAIR (2120)



DENNIS ENGI (4756)

Supervisory Appointments

RAY BAIR to manager of Micro-electronics Applications Department 2120, effective Sept. 1.

Following graduation from Washington State University with a BS in EE, Ray joined the Labs in 1967 as a member of the Technical Development Program. He earned his MS in EE from UNM and also received an MA in business from the Kirtland branch of Highlands University. Ray's early work at the Labs focused on the development of electronic coded switches; he is co-inventor of the multiple-coded switch. He was promoted to head an engineering division in the computer directorate in 1975. Since 1976, Ray has supervised the Command & Control Division 2335 where he was active in Sandia's work with UNM on the development of the insulin delivery system.

A member of IEEE, Ray also coaches youth soccer and is a student pilot in ballooning. He and his wife Carol have two sons and live in the NE heights.

DENNIS ENGI to supervisor of Geo Energy Systems Analysis Division 4756, effective Sept. 1.

Joining the Labs in 1976 as an MTS, Dennis worked in safeguards methodology development until one year ago when he transferred to his current division.

Dennis earned a BS in math and his MS and PhD in operations research, all from Purdue. He is a member of the Operations Research Society of America, the Society of Computer Simulations, the American Institute for Decision Sciences, the Institute for Nuclear Materials Management, and is director of the local chapter of the American Institute of Industrial Engineers. Dennis enjoys jogging and playing guitar, both folk and classical. He and his wife Ann have three children and live in NE Albuquerque.

YMCA Offers Father/Child Programs

The Albuquerque YMCA is reorganizing its father/child activities to include the Indian Guides (sons, grades 1-3), Indian Princesses (daughters, grades 1-3) and Trailblazers (sons, grades 4-6). The groups meet bi-weekly to participate in organized programs. City-wide events are part of the program and include camp-outs, picnics and various competitions for crafts, model cars and rockets.

For more information, call the YMCA at 265-1388 or call Lloyd Bonzon (4445) about Indian Guides, 296-3022; Earnie Roberts (2456), Indian Princesses, 265-3281; or Pat Walter (1585), Trailblazers, 298-0471.

Sympathy

To Charles Sain (1543) on the death of his father in St. Louis, Aug. 20.

To Thomas Heine (1483) on the death of his father in Albuquerque, Sept. 4.

feedback

Q. Will the Credit Union be able to offer IRA's to Sandia employees, once the new tax law is in effect?

Also . . . are credit unions eligible to handle the all-saver certificates [tied to average rates on one-year Treasury Bills] which will be available at some financial institutions at the end of September 1981? If so, will our Credit Union make them available?

A. Yes, the Credit Union will offer both the IRA accounts and the "All Savers Certificates"; however, final regulations have to be adopted by the National Credit Union Administration before the new programs can go into effect.

The Individual Retirement Accounts (IRAs) will be available to all wage earners beginning Jan. 1, 1982, for that year and future tax years. In the case of an employee who is an active participant in a pension plan, a maximum yearly contribution of \$2,000 will be allowed for an IRA.

The "All Savers Certificates" will be issued beginning Oct. 1, 1981, through Dec. 31, 1982. Savers may claim a tax exclusion of up to \$1,000 (\$2,000 in the case of a joint return) of the dividends earned. The certificates will have a maturity of one year and the yield will be equal to 70% of the average investment yield for the most recent auction of the 52-week Treasury Bills. If the certificates are redeemed before maturity, the saver forfeits any tax exemption for the dividends earned to date. The certificates cannot be used as collateral for a loan if the saver is to retain the tax benefit of the certificate.

We have been assured by the National Credit Union Administration that the final regulations will be issued so that we will be able to implement the new programs on their effective dates. We will officially announce the new programs when all the details are settled.

C. L. Turner, General Manager
SLFCU

Q. Why is vehicle registration at the Badge Office limited to the hours of 1 to 3 p.m.? Surely, the volume of registrations is small enough so that it doesn't significantly interfere with their normal workload!

A. At any time between 7:30 a.m. and 3:00 p.m., forms for vehicle registration may be picked up from racks in the front of the badge office, completed and left. A decal will be mailed to you, so the trip will not have been wasted. In fact, the entire process may be done by mail, if desired, and no trip to the badge office is necessary.

As in the past, the badge office will strive to provide the best service possible. Thank you for your inquiry.

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Two Spanish Solar Plants Now Operating

Two side-by-side thermal power plants have begun operation near Almeria, Spain, the culmination of several years of cooperative effort by member-countries of the International Energy Agency.

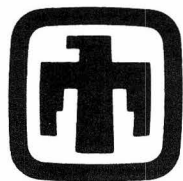
The IEA was created following the international oil crisis in the early '70s and, by 1977, plans were developed for beginning this project—including the use of Sandia people working for the DOE to provide technical support. Along with the United States and Spain, seven other nations participate in the jointly funded and operated program—Switzerland, Italy, West Germany, Austria, Belgium, Greece and Sweden.

The adjoining facilities consist of a central receiver system using sodium as the working fluid. It includes 93 Barstow-type heliostats aimed at a cavity-type receiver on the tower. The second facility, a distributed collector system with single- and two-axis tracking troughs, uses oil as the heat transfer fluid. Both systems have a 500 kW net electrical power output.

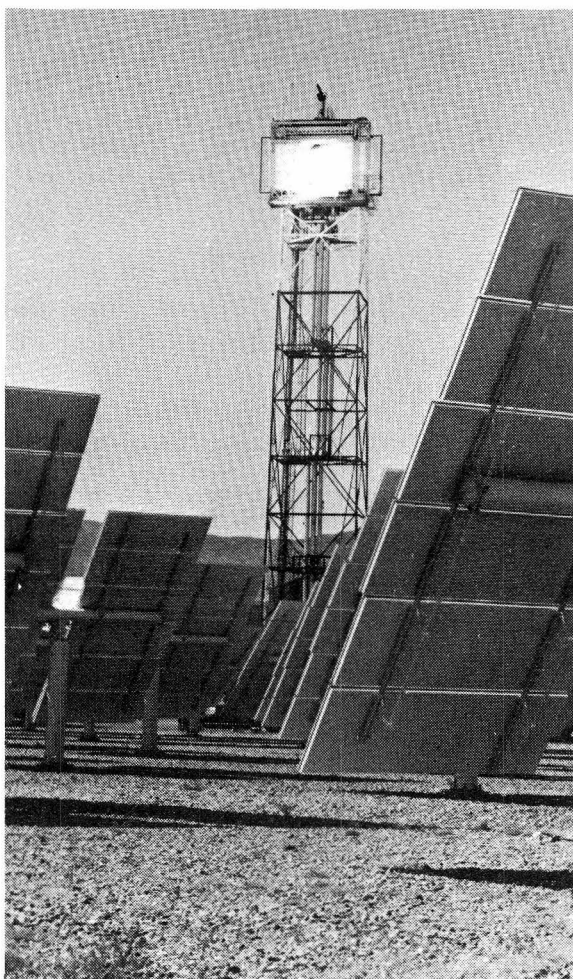
Thermal energy generated in the central receiver of the first system is piped to the hot storage tank of the two-tank storage system and then to the steam generator where superheated steam is produced to drive an electric generator. The second system uses two types of line-focus parabolic trough collectors that collect thermal energy in oil which is pumped to the top of a thermocline heat storage vessel, then into a steam generator and finally to the steam turbine/generator where the electricity is produced.

Sandia's initial participation was through Cliff Selvage (8450) back in 1977-78, plus Al Baker (8452) in 1978, and then Taz Bramlette (8452) in 1980. More recently, Sandians Bob Stromberg (4714) and Bill Wilson (8453) have been at the site, assisting with the functional testing and checkout of both systems. Gerry Braun of DOE/HQ is the U.S. executive committee member. Project control has been vested in this committee with representatives from each participating country, and its decisions are binding on the contracting parties and operating agent.

Al Baker reports that the design and construction phase of the facility has been completed, and that testing and operation, now under way, will continue until late 1983. The United States plans continued activity in the project, and Sandians will be on site to provide support to the project managers. The project will demonstrate available technology, while providing a working demonstration of the technical design and capabilities of the two types of solar power systems. "The operational experience that we gain at this project will help us as well," Al adds.



SOLAR ENERGY project at Almeria, Spain, with solar central receiver system at left, distributed collector system field at right.



CAVITY-TYPE RECEIVER at the Almeria, Spain, solar power facility is surrounded by 93 Barstow-type heliostats.

Continued from Page One

Cruise Missile Tested at TTR

were recorded and processed on site for "quick look" analysis immediately following the tests. Film and cinetheodolite data were processed by Gary West's Test Data Reduction Division 1522 in Albuquerque and were delivered within a couple of days.

The test on July 17 marked the first time that a Tomahawk was launched from undersea by submarine to hit a land target. It was successful on the first try. The missile carried a simulated conventional HE warhead.

Several versions of the Tomahawk exist—one that is launched from the ground, one from a surface ship and another from an aircraft. They carry a conventional HE warhead or a nuclear warhead. Sandia and Los Alamos developed the nuclear warhead for the Tomahawk. The nuclear package is considerably smaller than the HE warhead, and extends the range of the cruise missile to more than 1000 miles.

Additional tests of the Navy's submarine-launched Tomahawk are planned to take place at TTR before the end of the year. These tests will take the missile from development to operational status.

"TTR is designed for this kind of high performance testing," Sam Moore, manager of TTR Department 1170, says. "Our Range modernization program has brought TTR's instrumentation systems to the edge of available technology. We can match the sophistication of the most advanced weapon systems, and provide performance data in depth, plus offering flexible scheduling and extensive support services."

Sympathy

To Judy Hicks (8423) on the death of her father in Livermore, Aug. 22.

To Bob Bradshaw (8313) on the death of his father in New Brunswick, New Jersey, Aug. 27.

Congratulations

Bill (8315) and Christa Even, a son, Joel Christian, Aug. 10.

Dennis and Yvonne (8272) Kludt, a son, Kevin Cory, July 7.

Curt (8272) and Janet Specht, a son, Peter John, July 17.

New Lightning Facility Delivers Big Charge

The ancient Greeks knew that when menacing black clouds roiled the skies, Hephaestus was hammering out white-hot lightning bolts. Then when the sky darkened and winds swept the land, Zeus, the lord of gods, hurled the fiery bolts to Earth, terrifying and scattering the mortals below.

It was quite some time later that we came to understand that the fearsome lightning is produced by a discharge of atmospheric electricity from one cloud to another or between a cloud and the earth. This more prosaic explanation pretty well put Zeus and Hephaestus out of business.

One might say, though, that Electromagnetic Environments Instrumentation Division 1554 is carrying on the work of Hephaestus. Their lightning simulator produces artificial lightning for weapons system testing. "There is a hazard possibility of lightning striking a nuclear weapon," says Jim Bushnell, the division supervisor. "We need to know the effects of such an event and that the protective systems function as they're supposed to."

Lightning in nature has great variability, and Jim's group is producing currents up to levels of severe or extreme lightning. A lightning bolt or flash is composed of a series of "strokes." A stroke is a high current pulse of up to 200,000 amperes which decays into a "continuing current" of several hundred amperes before surging into another stroke. Succeeding strokes may occur at intervals of 35 milliseconds. The continuing current may last for one second. A lightning bolt may exhibit up to 30 strokes, although the average is closer to three.

Jim's group has recently generated two such separate strokes as well as the continuing current. "Each stroke is produced by a Marx generator," says Jim. "They're almost the same as the ones used in the particle beam fusion accelerator. In fact, the PBFA group built them for us. The continuing current phase is provided by modified traction motors from diesel electric locomotives used as generators. They're capable of generating 1000 volts at 1000 amperes for one second.

"There are many lightning test facilities in the United States, but Sandia's is the only one using a "crowbarred" Marx generator circuit. Initially, the crowbar switch is open and energy is transferred from the Marx generator to the inductor. The crowbar switch closes at maximum charge shorting out the capacitor, and the current then slowly decays because of the load resistance. The big advantage of the crowbar circuit is that much less energy is needed."

Other facilities have slower rise times and lack simultaneous continuing current and multiple stroke capability. The proposed use of the crowbar circuit originally came from Frank Neilson, head of Testing Technology Department 1550. "Our project began just over three years ago," says Jim. "We started out in a Kirtland hangar and now we have our own building in Area I. The lightning simulator will be controlled and its data collected by a



AT THE lightning simulator facility, Bill Brigham makes an adjustment to the load ring (the name of the entire apparatus), while Joe Kostas (center) and Jim Bushnell (all 1554) look on. At right foreground is one of the two oil-filled tanks housing Marx generators which generate the simulated lightning charge. The charge rises through the black plexiglass dome (which is filled with oil for insulation). The current is conducted to the top of the electrode where it arcs up to zap a test component which would be suspended above the load ring.

PDP-11/34 computer. Because of the high current and voltage, we'll use fiberoptic links between the test facility and the computer.

"We're developing instrumentation to put inside the system under test to monitor the simulated lightning effects from within. We're also talking about testing aircraft to determine what happens when a plane loaded with sophisticated electronics is struck by lightning. Another purpose of the testing is to understand more about lightning effects by carrying out tests in a

controlled environment."

Others whose participation has been vital to the success of the lightning simulators are Joe Kostas, Roger Goode, and Bill Brigham (all 1554). Bob Parker (1553) conducted the initial experiments showing the feasibility of the crowbar technique. Working closely with Division 1554 in development and use of the facility are Nuclear Safety Department 1230, Weapon Development Directorate 4300, and Systems Development Directorate 8100.

Measured Service May Be Cheaper

LAB NEWS has received a Mountain Bell article on a new wrinkle for residential telephones. Called measured service, it offers to customers the possibility of lower phone bills.

Here's how it works: Instead of paying a flat monthly rate (\$10.14 in Albuquerque), measured service customers pay \$3 a month. This covers the line to the house and all incoming calls. The rest of the phone bill depends on how many calls customers make during the month and the time of day they make them. How long their calls last and the distance from the central phone office also affects the cost.

Mountain Bell studies show that even customers who use their phone more than the average can save money with measured service. The typical customer, for example, makes about three-four calls a day from home. But even those who make an average of five calls a day would probably save with measured service.

Since most calls people make last no

more than two-three minutes and travel less than 10 miles, the typical call costs six cents or less. And it's even cheaper if the calls are made after 5 p.m. or on weekends when the 35 and 60 percent discounts apply. An example of the cost-savings can be shown in Albuquerque, where the flat monthly rate is \$10.14 and the average measured service bill is \$5.07.

If you're interested in measured service, check the box below to see if your prefix is among those for which measured service is available. (Mt. Bell tells us they're aiming at '83 to include all other prefixes in this service.) Then call your phone company business representative (see page 5 of the directory) to arrange the service. And note: if you subscribe by Sept. 30, the \$22.50 connection charge will be waived.

Prefixes for Measured Service

242, -3, -7; 292, -3, -4, -6, -8, -9; 765, -6; 821, -2; 831, -6; 842, -3; 881, -3, -4.

Sandia-Los Alamos Experiment to Fly on Solar Polar Mission

In May 1986, a U.S. space shuttle will carry into space a scientific probe destined for a long, historic odyssey around the solar system. This probe, called the International Solar Polar Mission (ISPM) spacecraft, will be built in West Germany under the auspices of the European Space Agency (ESA), launched by NASA, and carry experiments from a number of different countries.

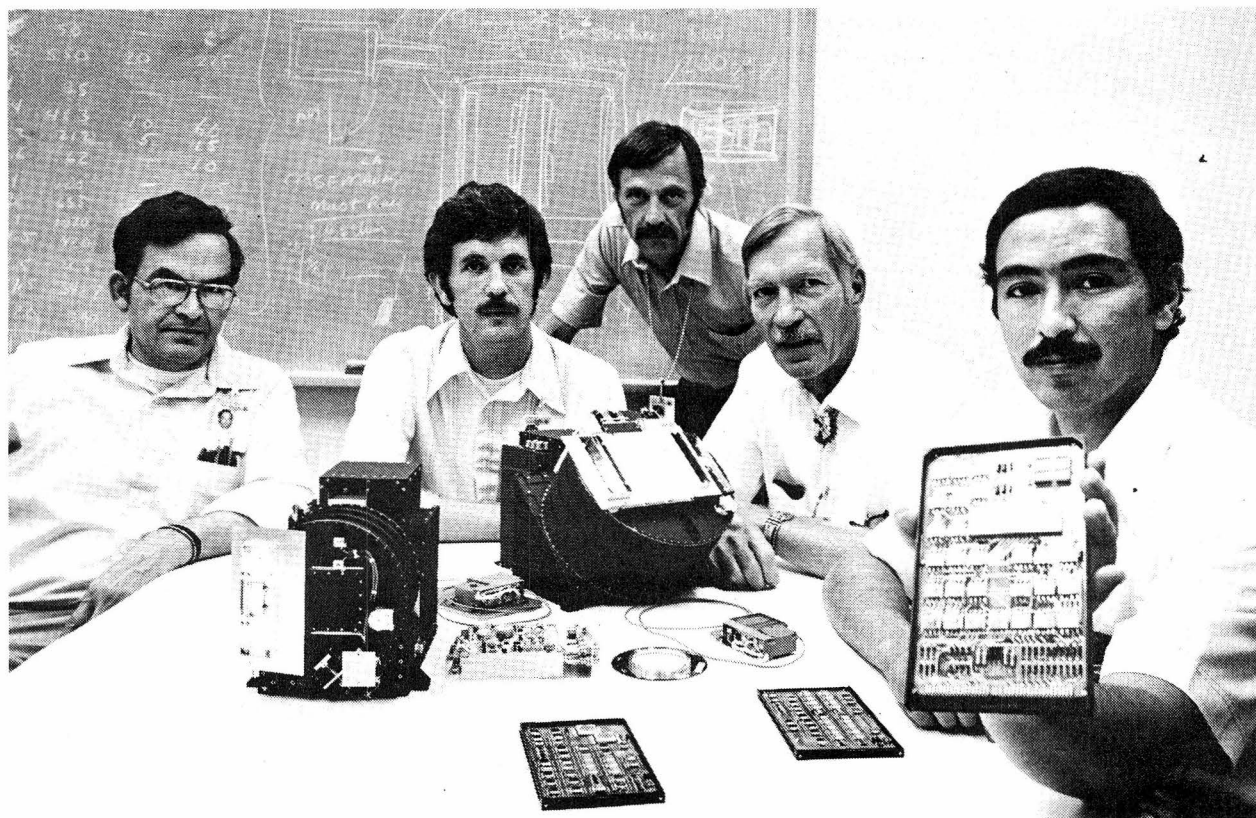
The purpose of the ISPM probe is to study solar radiations from vantage points outside the ecliptic plane—the disk-like alignment geometry about the solar equator in which all the sun's planets orbit, and in which to date all space probes have flown.

One of the key experiments in the ISPM payload will be a joint Los Alamos-Sandia experiment to measure and map the charged particle constituents of the solar wind and interplanetary plasma. The experiment, conceived by Sam Bame of the Space Sciences Office of Los Alamos, consists of two instruments—one to measure electrons and the other to measure heavier ions. Each instrument consists of an electrostatic analyzer, a set of channel electron multipliers, and microprocessor-controlled processing electronics.

An electrostatic analyzer is a pair of spherically curved plates with a high voltage between them. The electrostatic field produced by the voltage causes charged particles entering the space between the plates to move in a curved path. If the electrostatic field strength, particle energy (velocity) and charge are all just right, the particle will follow the curvature of the plates and impact on the cathode end of one of the channel electron multipliers, which then will produce an output pulse, registering the impact. By varying the voltage across the plates, particles of different energies and ionization states can be sorted out. By having the channel multipliers arranged in a fan-like configuration and noting which channel responds to a given particle, the direction of travel of that particle is also determined.

Sandia's role in the experiment is to design and build the programmable high voltage and low voltage power supplies, digital processing electronics and structural assemblies. Los Alamos will provide the channel electron multipliers and associated analog electronics. Sandia also will provide full system test equipment and conduct system environmental tests prior to delivery to the spacecraft.

The ISPM flight profile places great demands on the instrument designs. Following release from the shuttle bay, the spacecraft will be boosted toward an encounter with Jupiter some 16 months later. By carefully controlling its approach course to Jupiter, ESA scientists will use the Jovian gravitational field to fling the spacecraft out of the ecliptic plane onto a course that will take it over the poles of the sun. It is expected to arrive over the north



THIS PROJECT TEAM developed logic systems, electronics and a power supply to fly on the International Solar Polar Mission satellite: (l to r) Harvey Temple (1321), Terry Ellis (1321), Fred Wymer (1321), George Peterson (1247) and Joseph Chavez (1321), project leader. Some of the IC circuits and microprocessors for the Los Alamos designed experiment are fabricated in Sandia's IC laboratory. George Peterson handled the mechanical design of the package.

pole of the sun in October 1989 at a distance of 100 million miles, and over the south pole two months later. After traversing this arc past the sun, the spacecraft will continue on out of the solar system, its mission completed.

In addition to providing the high precision necessary for the measurements, the instruments must survive the intense trapped radiation fields in the vicinity of Jupiter and operate for a period of four years.

To survive the Jupiter radiation fields, instrument electronics will be built of radiation-tolerant components, some of which (including the microprocessors) were developed and built by Sandia's Microelectronics Technology Department 2140.

Several other experiments on the ISPM spacecraft will also use Sandia-produced radiation-tolerant microprocessors and associated integrated circuits.

Originally, the ISPM program planned two spacecraft, one European and one U.S.-built, with complementary but separately developed payloads. However, NASA budget problems caused the U.S. spacecraft effort to be cancelled. Fortunately for the participants, the Sandia-Los Alamos experiment had been selected to fly on the European instead of the U.S. spacecraft.

The Sandia ISPM project is centered in Space Projects Division 1321 under Joe Chavez. Last week, the assembled engineering model was undergoing vibration testing, one of the many environmental tests scheduled before the final flight hardware is ready for launch. Delivery of the engineering model is scheduled for mid-October 1981, with the flight system to be delivered in the fall of 1982.

Events Calendar

- Sept. 19—Laguna Pueblo: annual San Jose Feast Day; eagle, buffalo & corn dances, Old Laguna Village.
- Sept. 20 through Nov. 29—New Images from Spain, multimedia show, nine contemporary Spanish artists, Albuquerque Museum.
- Sept. 21—Travel Adventure Film, "The Canadian Rockies," 7:30 p.m., Popejoy.
- Sept. 25 through Oct. 4—Aspencade '81: events include two square dance weekends, arts & crafts fair, turtle races, fishing contest, trail ride, parade, aspen tours, Mountain Men rendezvous; Red River, NM.
- Sept. 25-26—NM Symphony Orchestra, Mark Zelster, pianist, 8:15 p.m., Popejoy.
- Sept. 26—UNM football, Air Force, 7 p.m., Stadium.
- Sept. 28—Michael Murphy with The Planets, 8:15 p.m., Popejoy.
- Sept. 29—Marine Corps Band, 1:15 & 8 p.m., Kiva Auditorium, UNM.
- Through Oct. 11—"On Golden Pond," The Barn Dinner Theater, Cedar Crest, 281-3338.
- Oct. 1-4, 8-11—Albuquerque Little Theater, "The Importance of Being Earnest," Tues.-Fri., 8 p.m.; Sat., 6 & 9 p.m.; Sun., 2 & 8 p.m., 242-4315.

Congratulations

To Bruce (3723) and Alice Davis, a daughter, Natasha Ann, July 29.

To George (4553) and Carol Allen, a daughter, Tiffany Mae, Aug. 28.

To Ken (1543) and Patricia Miller, a daughter, Amanda, Aug. 28.

***In Situ* Oil Shale Experiment Looking Good**

A recent underground oil shale retorting experiment indicates the feasibility of recovering oil from shale without the cost of mining, surface processing, or spent shale disposal.

Conducted under Department of Energy sponsorship by Geokinetics in Salt Lake City, and Sandia National Laboratories, the experiment is the most completely instrumented *in situ* retorting operation to date, providing considerable data for characterizing the process.

The underground retort contained 8000 tons of shale having a void space of 12 percent. During the three-month experiment, about half the oil in the shale was recovered—the first significant recovery of oil from an *in situ* retort with such a low void.

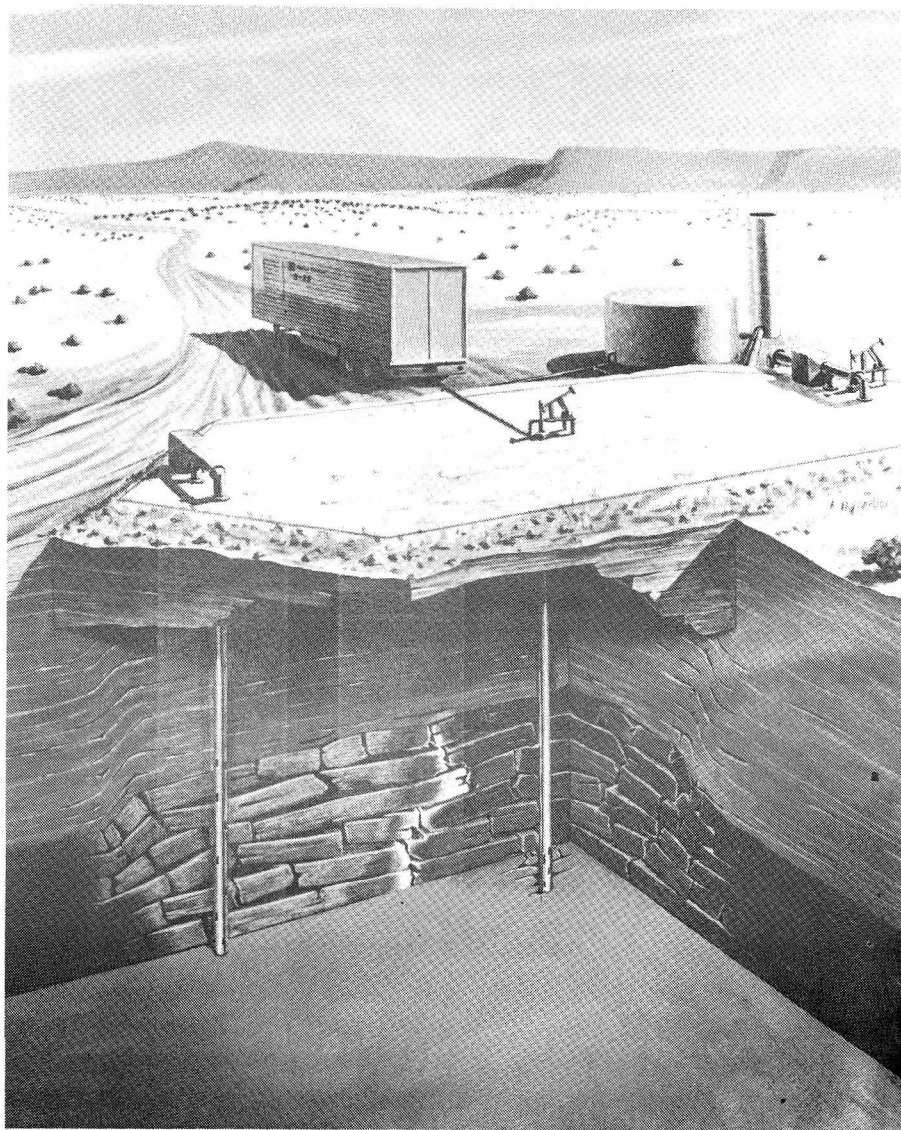
The void space, and thus the permeability, needed to sustain the heat-producing underground combustion required to convert shale's solid organic (kerogen) to oil, was produced by emplacing slurry explosives in blast holes drilled throughout the test bed. Detonation of the explosives fractured the bed and lifted the 40 feet of overburden approximately three feet. This action distributed the newly created void uniformly through the bed, obviating the need to mine 20 to 25 percent of shale as is required for modified *in situ* processing or mining all of the shale as is required in surface retorting.

This technology is best suited to thin shale seams (20 to 40 feet thick) covered with not more than 150 feet of overburden. Thicker overburden would prevent the lifting action needed to introduce sufficient void space.

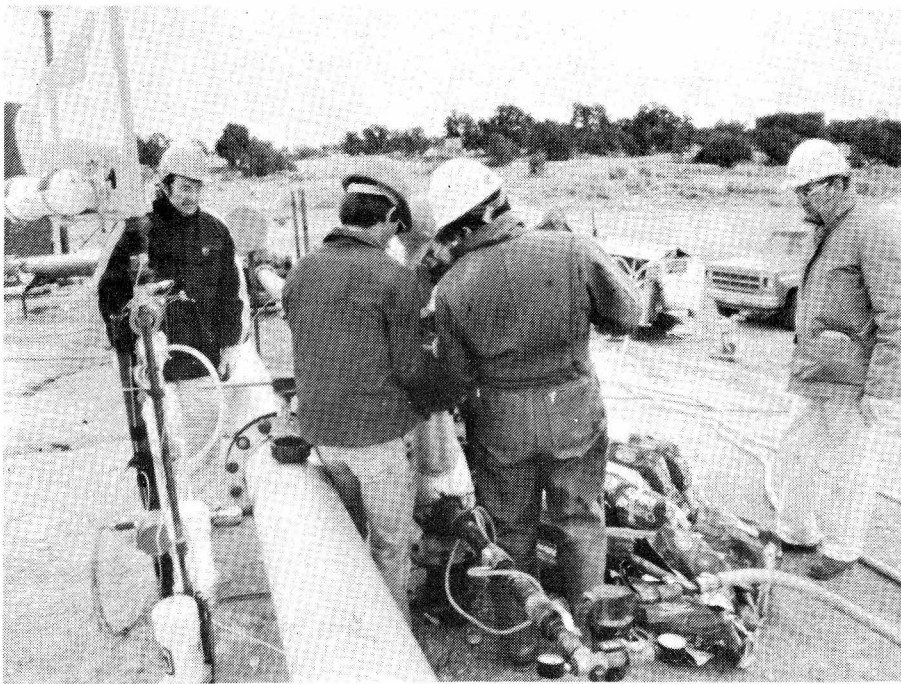
The experiment used a variation of the true *in situ* retorting technology developed by Geokinetics in which the reaction or combustion front travels horizontally rather than vertically through the shale bed. A downward slope in the bottom of the bed, arrived at by controlled explosive fracturing, drained the oil into production wells where it was pumped to the surface. The test bed was 24 feet thick, 50 feet wide, and 100 feet long.

Sandia served as technical director of the experiment's retorting phase, planning and directing retort operations, and gathering and analyzing data. An extensive instrumentation package designed by Sandia was used to obtain data necessary for retort characterization. Twenty-eight instrumentation wells drilled into the bed contained eight to twelve thermocouples each and one or two combustion gas sampling ports to monitor movement and temperature of the combustion front. Surface instrumentation measured overall experiment progress by monitoring flow rates and composition of gaseous and liquid products.

The instrumentation allowed researchers to determine that use of an air/inert gas mixture to sustain combustion had no obvious impact on the percentage of oil produced, contrary to what some laboratory-scale experiments had suggested.



ARTIST'S DRAWING shows an *in situ* retort of an 8000-ton oil shale formation near Vernal, Utah. The formation was first fractured by explosives to create a 12 percent void, then ignited and burned horizontally through the formation to recover about half the oil in the shale—the first significant recovery of oil from an *in situ* retort.



AT OIL SHALE experiment site, Kamp Kerogen about 70 miles south of Vernal, Utah, ignition of the oil shale formation is started by a Geokinetics crew by dropping glowing charcoal briquets into the charcoal-packed air pipes. At left is Sandia site foreman Jack Beyeler (1125). Sandia project leader Leon Parrish (4748) observes from right.

The experiment also was conducted at different retort speeds— one foot a day and 1.7 feet a day—to determine if this affected the percentage of oil recovered. Again, although some small-scale experiments and models had suggested an influence, retorting efficiencies were nearly equal. Production rates, however, were higher at the higher speed.

Other test results confirmed that 1) all except the bottom two or three feet of shale in the seam were retorted and that the burn progressed uniformly, confirming the effectiveness of a low void blast design in optimizing recovery; 2) analysis and material balance calculations provided effective real-time feedback about the retort's progress without extensive *in situ* instrumentation; and 3) retort operation closely paralleled mathematical model predictions.

Still in an early stage of development, true *in situ* retorting is appealing because all processing is done underground, avoiding expensive mining operations and surface disposal of spent shale. Water consumption is less as well.

The Green River oil shale formation in Colorado, Utah and Wyoming contains about two trillion barrels of oil. The horizontal *in situ* retorting technique tested in the Geokinetics/Sandia field experiment may permit billions of barrels of this oil to be recovered economically.

The Sandia project is centered in Geo Energy Technology Department 4740 under Dick Traeger. Leon Parrish (4747) is project leader; Craig Tyner (4748) is technical director. Field support is provided by Field Instrumentation Department 1120.

Take Note

Enough already! Last issue we captioned a radiograph photo as revealing “. . . the delicate inner structure of a tulip and pea pod . . . (and) a tadpole . . .” A dozen phone calls and several letters later (including one from a science teacher at the Floyd High School) we're ready to concede: it's an okra—ugh—pod, a yucca pod and a species of lizard. The streets of New York, whence hail both the writer of this caption and his editor, just didn't have many okras, yuccas and lizards . . .

* * *

WSE stands for Women in Science & Engineering and the New Mexico network of WSE is holding its '81 fall conference, "You and Your Career," on Sept. 26 and 27 at the Los Alamos Inn in Los Alamos. The WSE release states: "We will have sessions on how to handle stress and time management . . . will cover alternative career paths available to technical women: consulting and management. At the Saturday night banquet Gloria Cordova will speak on 'Women and Technology.' Sunday luncheon guest speaker is artist and teacher Jose Ray Toledo from the Jemez Pueblo." Members and non-members, spouses and friends are invited. Reservations by Sept. 22, contact Suzanne Weissman (5821), VP of WSE, on 6-0820 or 294-5626.

* * *

The imbalance between developed and developing nations—the haves and the have-nots—is considered by many to be the most serious problem in the world today, and the Albuquerque chapter of the United Nations Association is addressing that problem and attempting to gain wider understanding of it by offering an eight-week course, "The New International Economic Order," starting Sept. 23 and following Wednesday evenings from 7 to 9. Jefferson Middle School, Lomas and Girard, is the location, the course is free, and the contact is on 298-6258 or 298-4022.

* * *

UNM's Med School is looking for volunteers with high blood pressure to help get a line on a new drug. They should be between 21 and 69 and, aside from high blood pressure, be in general good health and have a diastolic blood pressure (the lower number) between 95 and 115. The study lasts 15 weeks and calls for weekly visits to the Medical Center. Contact: Dr. Spalding, 277-4411.

* * *

Recent graduates of Sandia's apprenticeship program include James Kadlec (3618), Christopher Flores (3612), and Harold Wade (3611). James and Christopher completed training as mechanical technicians, while Harold was trained as an electrician. The five-year programs call for extensive classroom work as well as on-the-job training. Certificates were presented to the three by Ward Hunnicutt, director of Plant Engineering 3600.



Favorite Old Photo

[Got an old photo that means a lot to you? Bring it over to LAB NEWS and tell us about it.]

HONEYMOONING in Venice, Calif., in 1912, my grandparents, Anastacio and Mary Anita C de Baca, posed on the pier in a new Model T. Grandmother was wearing a beautiful emerald green velvet dress. They've been married 68 years now and reside in Bernalillo in excellent health. They had nine children—including three sets of twins. I'm the oldest granddaughter. There are 12 grandchildren and 11 great-grandchildren. (Mary Rodriguez—3418)

Are you one? DoD is still trying to locate the 225,000 military people who took part in atmospheric nuclear tests from 1945 to 1962. If you were there, and you were in the military at the time, you're asked to call, toll free, 800-336-3068. Or write the Defense Nuclear Agency, Washington, D.C., 20305.

* * *

Dorothy Garcia (3531) and Chris Arana (1411) share, with us, an admiration for Goodwill Industries. This redoubtable outfit pretty much makes it on their own and helps many, many handicapped people, including some who are retarded. Dorothy and Chris report that Goodwill is taking part in the Balloon Fiesta (flying a Goodwill banner) and, to note the occasion, is presenting Goodwill balloon pins to persons bringing contributions of useable material to the donation center at 5000 San Mateo NE (across from Allwoods). They accept clothing, furniture, appliances . . . darn near anything that's useable. The pins will be available through the end of October.

* * *

And, speaking of balloons, the Balloon Fiesta is coming up, Oct. 2 to 11, and Ruth Birdseye (2431) is looking for chase crews. She tells us that more than 500 balloon pilots have signed up and there's a tremendous need for people, with or without vehicles, to chase after the rigs, picking them and their occupants up after a flight. It's fun, says Ruth, and you can sign up by filling out a chase crew info form available at three locations: 11109 Towner NE, 21 Winrock Center, and 5720 Zuni SE. More information: Maralyn Adcock, 255-1286, between 10:30 a.m. and 1:30 p.m.

"Sex Stereotypes" is the subject of the next program in Medical's Superwoman series. Kathryn Brooks, who directs UNM's Women's Center, will be the speaker on Friday, Sept. 25, and her presentation runs from 12 to 12:30 in Bldg. 815. She will discuss how women's recent role changes are affecting both men and women. Mrs. Brooks will also give practical suggestions on teaching sex roles to children and discuss how we—men and women—can deal with our changing sex roles.

* * *

The Que Pasa Rec Center on Base has a bunch of things coming up: a flea market this Sunday, Sept. 20, from 1 to 5, cost per table, \$2, call 4-5420; discount tickets for the San Diego Zoo, Knotts Berry Farm, Sandia Crest Tram, Sea World, Disneyland (2), Santa Fe Downs and Busch Gardens and more; and guitar and/or piano lessons, Tuesday and Wednesday nights, respectively, at 7 p.m., \$20 per month, call 4-5420.

* * *

James Dunn of Geothermal Research Division 4743 will discuss magma energy research and possibilities of extracting heat energy from shallow magma at a meeting of the New Mexico Section of ASME on Wednesday, Sept. 23. The dinner meeting will start at 6:30 p.m. at the KAFB O-Club West. Reservations should be made with Dori Miller (1542), 4-6543.



More memorable country lyrics . . .
 "If today was a fish, I'd throw it back in."
 "I'm going to put a bar in my car and drive myself to drink."
 "Don't cry down my back, baby, you might rust my spurs."
 "The work we done was hard. At night we'd sleep cause we was tard."
 —Houston City Magazine

Return of the Prairie Dog

LAB NEWS has received a number of calls recently telling us about the prairie dog colony near the Eubank gate.

"That's nice," is our comment, remembering that in New Mexico the prairie dog is classified as a varmint along with others such as the coyote and rattlesnake.

In the 1920s, the state was infested with them—thousands of acres pockmarked with their burrows and millions of the cute critters eating grass all day long. Ranchers and farmers hate this kind of stuff, and there was a determined federal program to rid the state of prairie dogs.

The program failed.

Only one sub-species of the critter—the Tularosa black tailed prairie dog—is on the state's endangered species list. There are two thriving colonies left, however, east of Elephant Butte. The State Game and Fish Department now keeps a watchful eye on them.

Not that the prairie dog needs much help. He's a social animal with sharp eyes and ears, and the colony is his defense system. There's always a sentinel on duty, but a warning bark from any member of the population instantly sends the entire colony into its deep burrows.

The standard prairie dog, now about as numerous as it ever was, is called Gunnison's prairie dog and has a white-tipped tail. It ranges throughout the

Southwest and into Mexico. It's a plump little devil about the size of a small cat but resembling a fat squirrel.

Rattlesnakes and burrowing owls are sometimes found in prairie dog burrows but this does not indicate a symbiotic arrangement, as these creatures prey on the young dogs. In defense, the prairie dogs destroy young owls and sometimes bury rattlesnakes alive.

The colony north of the Eubank gate has learned to live with the constant traffic and ignore it. Stop and approach the area with a camera, however, and they're gone. It's a long wait before one of them gets curious and sticks his head out of a hole to check the situation.

Although prairie dogs have been a problem in the past on KAFB when they chose to dig up runways and attract birds of prey—owls and hawks—into the area, the ones at the East gate are in no danger from authorities as long as they stay healthy.

The concern is bubonic plague. The plague is in the Sandia mountains and foothills, usually infecting rock squirrels, ground squirrels or rabbits. The fleas which carry the disease are not particular—they could choose prairie dogs. The colony is monitored regularly by the Base veterinarian, however, and he sees no immediate danger for them.



PRAIRIE DOGS in the Rio Grande Zoo, in the children's section, are not camera-shy.

Fun & Games

Running—Sandians did well in the Sept. 5 Sandia Crossing, an accelerated trek over the Sandias from Tijeras Canyon to Placitas, some 28 miles and most of them above 9000 ft. Henry Dodd (4752) was the first Sandian in, finishing seventh in 4:14; 10th, Jim Harrison (4311); 12th, Terry Bisbee (2613); 15th, Bob Rieden (2116); 16th, Al Alvarado (2653); and 35th, Irv Hall (1223).

The 7th annual "M" Mountain 9-Miler is set for Sunday, Oct. 4, at 9 a.m. at NM Tech in Socorro. LAB NEWS has entry forms. We also have forms for a marathon, ½ marathon and 10K event in Clovis on Oct. 3, and for the Showdown in Bear Canyon Wilderness Run on Sept. 26.

* * *

Softball—In the slowpitch league, the '81 season was recently completed with a 17-team tournament that was won by the American Sandwich Shop team, managed by Floyd Salas (2326). They defeated the Deadwood team, managed by Fernando Dominguez (3312), in the final game with a score of 15-8. The American Sandwiches had a season record of 19 wins and three losses. Split league winners were the Fowl Balls (Tom Weimer—1722) with 17 and four, and the Los Borrachos (Dan Reda—5511) with 20 and two records.

* * *

Skiing—Coming up on the calendar of the Coronado Ski Club: Sunday, Oct. 4,

the annual Sandia Peak Walkdown; Monday, Oct. 5, 7 p.m., a presentation on ski touring near Lake City, Colo., by Backwoods, 6307 Menaul NE; and equipment clinics, Oct. 13 and Nov. 10 at 7:30 p.m. at the C-Club.

* * *

Swimming—As part of its recreation program, KAFB is organizing an aquatic club (competitive swimming) for adults and youngsters six and above. Sandians and their families are invited to participate. An organizational meeting is scheduled Tuesday, Sept. 22, at 7 p.m. at the Youth Center Bldg. 201, KAFB-West. The fee (which includes coaching) will be \$5 per month.

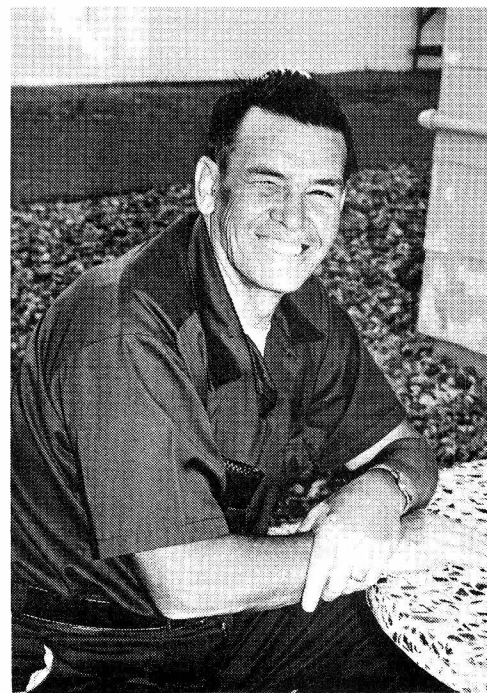
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Aerobic Dance—Enrollment is still open in two aerobic dance exercise classes meeting Mondays and Wednesdays at the Coronado Club. The morning class meets from 9:30 to 10:30 and the evening class from 5:30 to 6:30. Instructor is Donna Ness. For more info, call Tom Lenz, 4-8486.



A young Taiwanese man has written 700 love letters to his girl friend over the past two years trying to get her to marry him. His persistence finally brought results: A newspaper reported the girl has become engaged to the postman who faithfully delivered all the letters.

—Human Nature



Joe Pitti (3423)

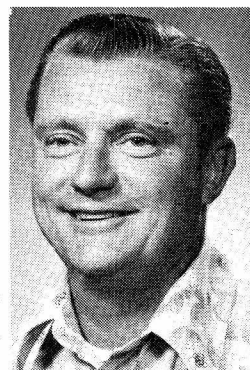
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Death

Leslie Osmond, an ESA-II in Design Development Division 1247, died in an automobile accident Sept. 5. He was 44.

He had worked at the Labs since July 1962.

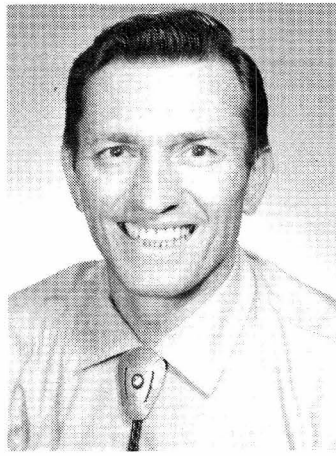
Survivors include his widow, a daughter and a son.



MILEPOSTS

LAB NEWS

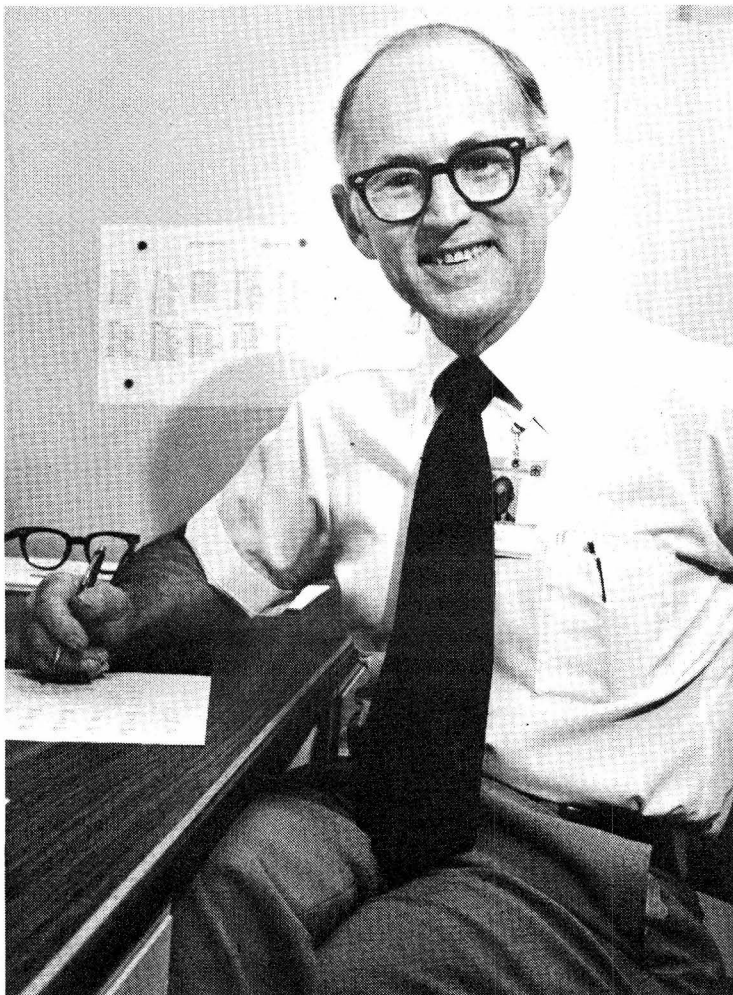
SEPTEMBER 1981



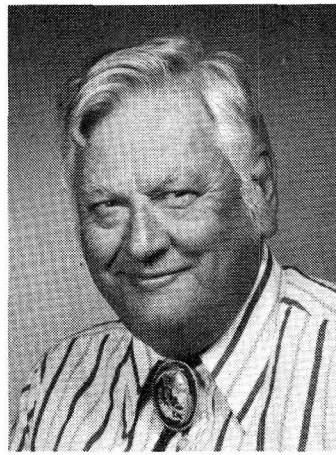
James Lang - 4363 30



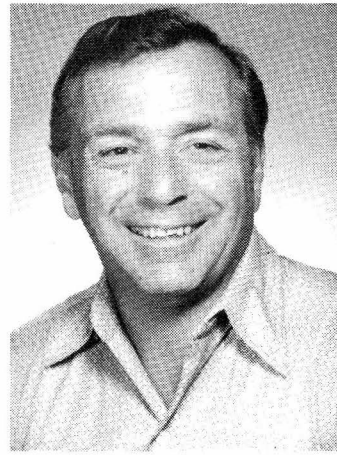
Hazlet Edmonds - 3522 15



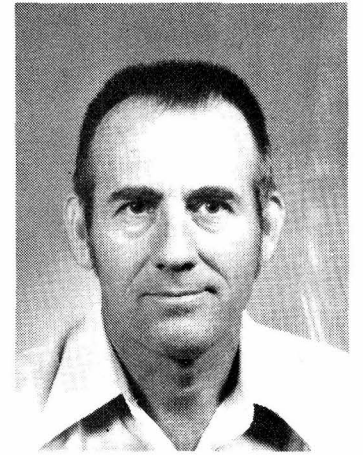
Jim Mogford - 400 20



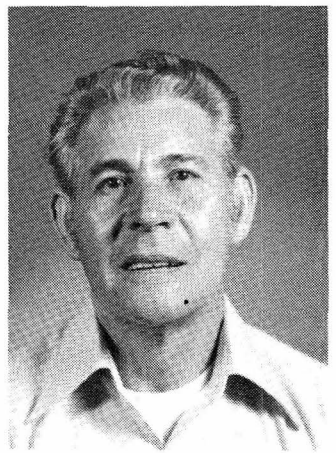
Leonard Nelson - 1485 30



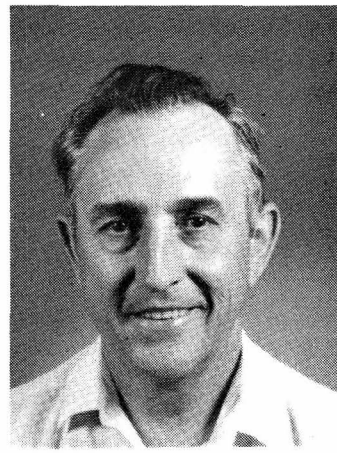
Bill Gamberale - 3651 30



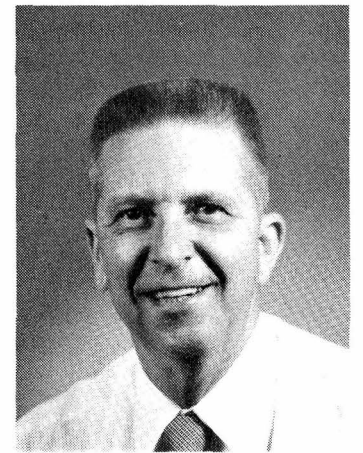
Joe Brown - 3425 20



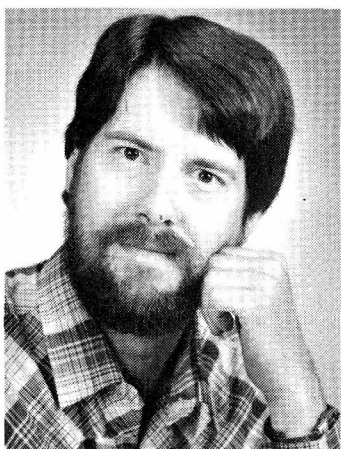
Silverio Lujan - 3613 30



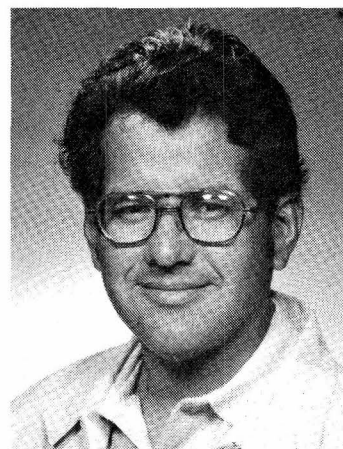
Jim Grier - 3413 30



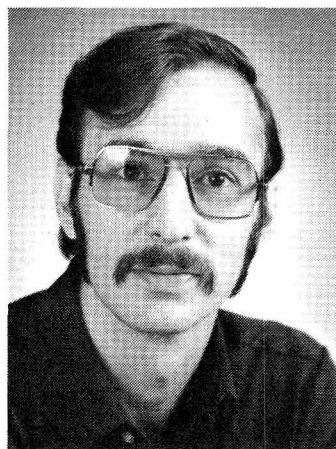
Eddie Walker - 1222 30



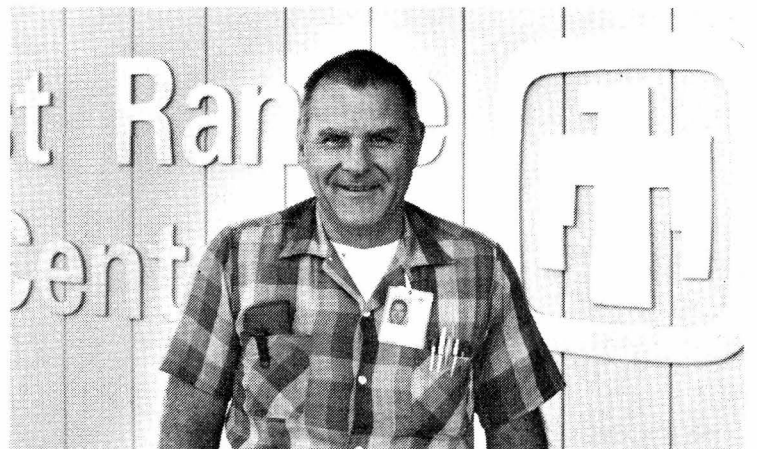
Nick Wittmayer - 8413 15



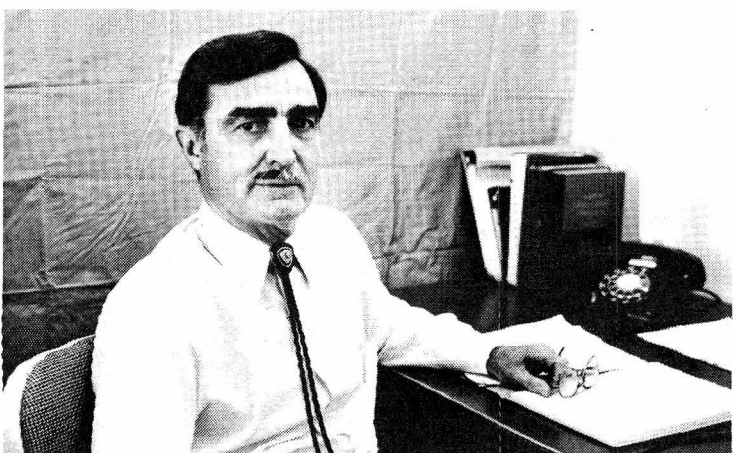
Sam Giron - 1485 10



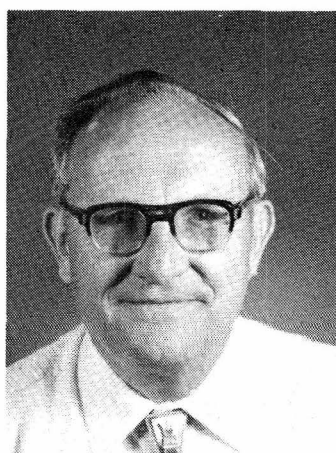
Gerald Giovacchini - 8413 10



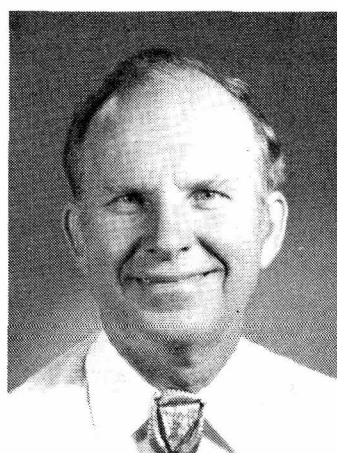
Fred Snyder - 1171 25



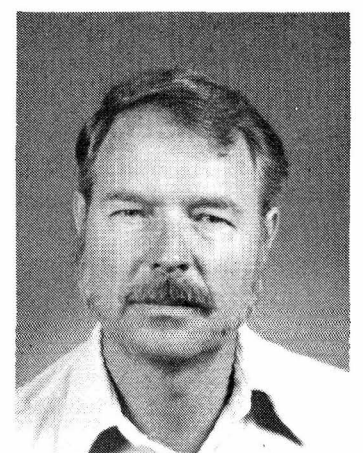
Harold Brueggeman - 2456 30



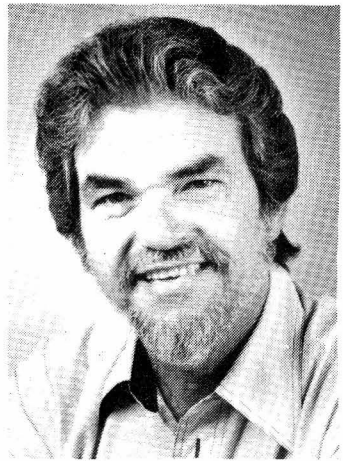
Alden Luhrs - 1411 30



Edgar Schreiner - 2545 25

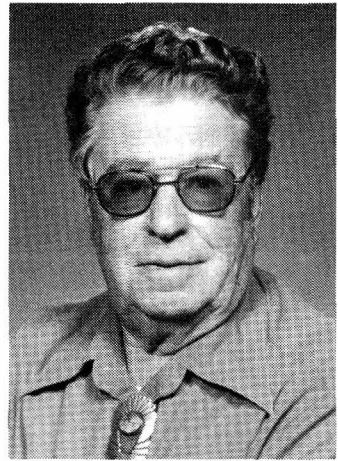


Warren Miller - 4511 25



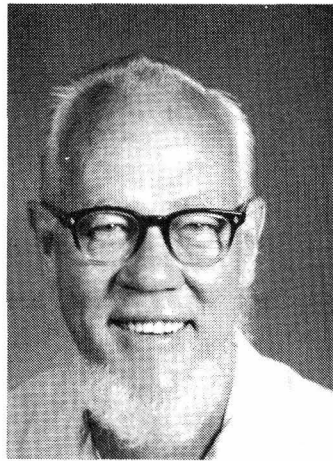
Don Veca - 8413

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Marion Young - 1422

25



Ralph Dalby - 1474

25



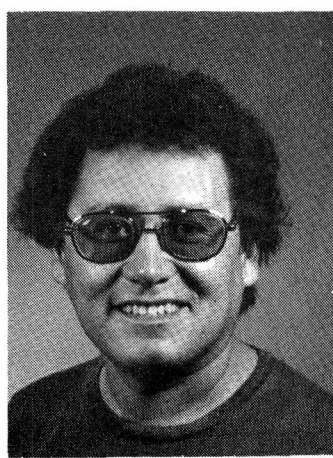
Herb Pitts - 3530

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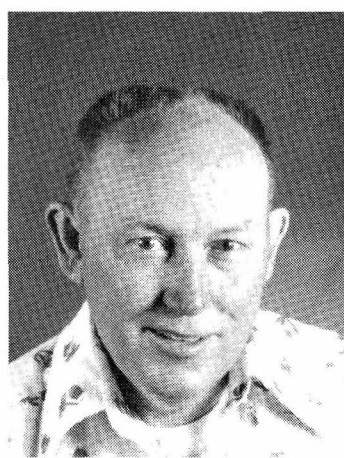
Frank Sayner - 2627

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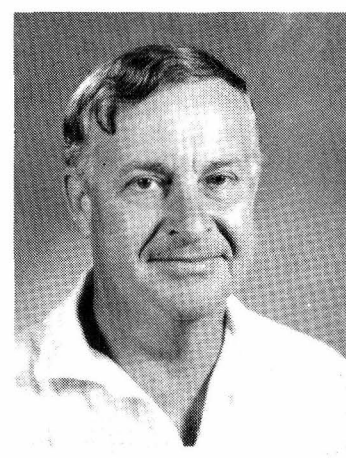
Nestor Perea - 3613

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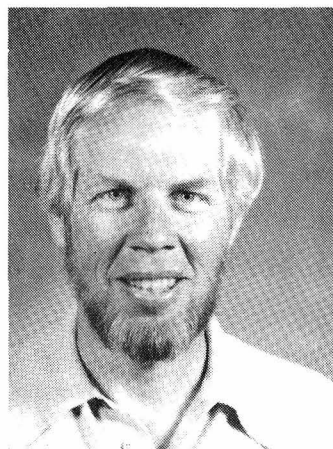
Edgar Boeck - 1211

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Don Sharp - 5833

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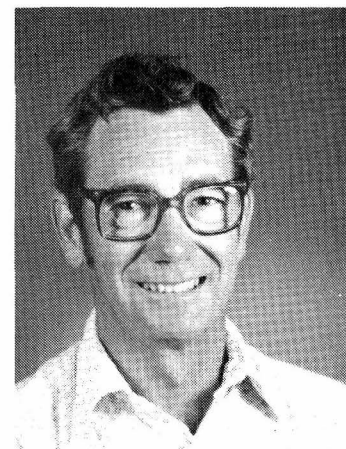
Terry Herther - 1251

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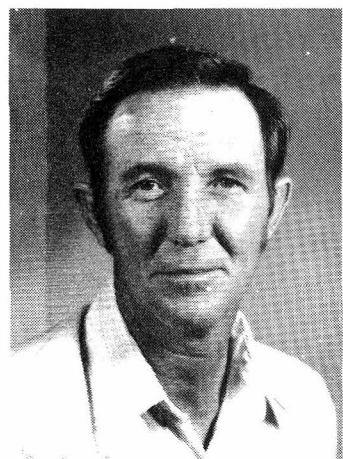
Doris Mortensen - 1716

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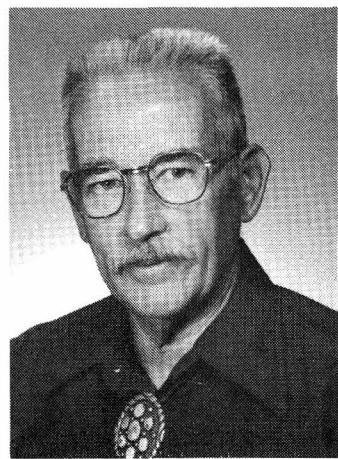
Lawrence Dyer - 1524

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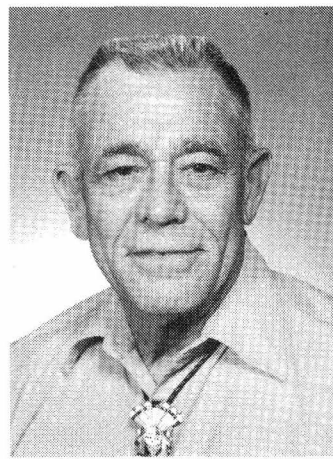
Bob Davis - 1535

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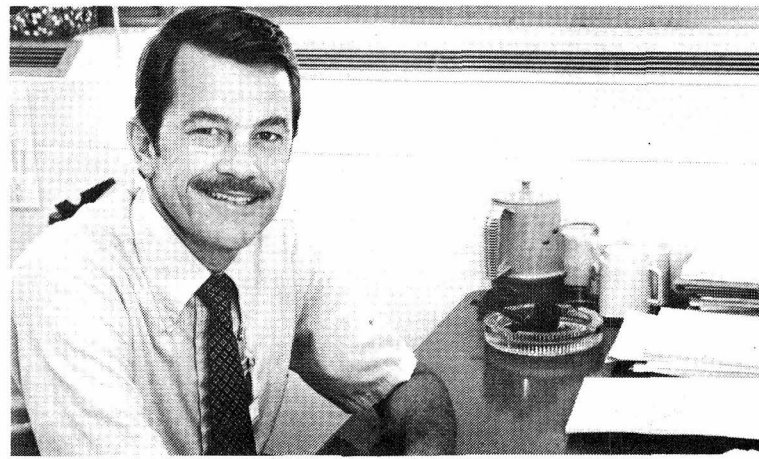
Bob Harner - 1412

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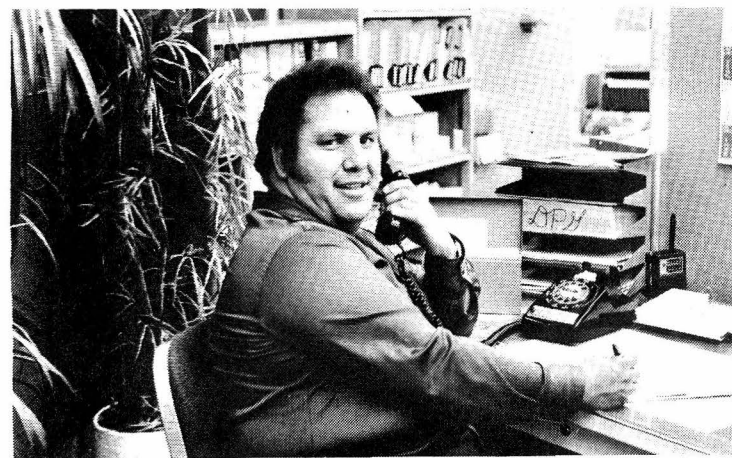
Edmund Buss - 3715

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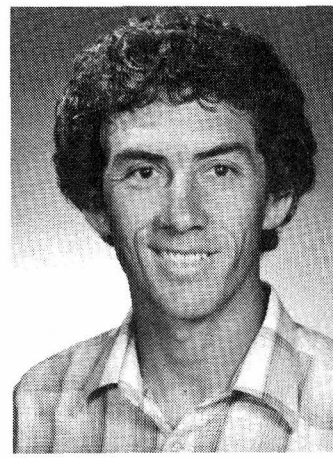
Glen Otey - 4440

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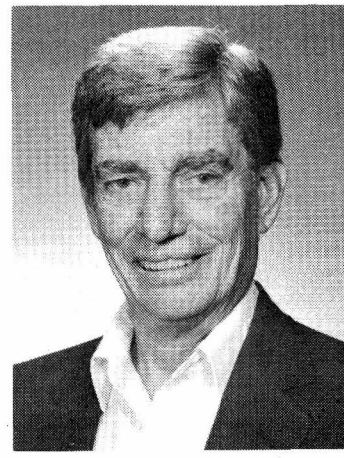
Denny Gallegos - 3743

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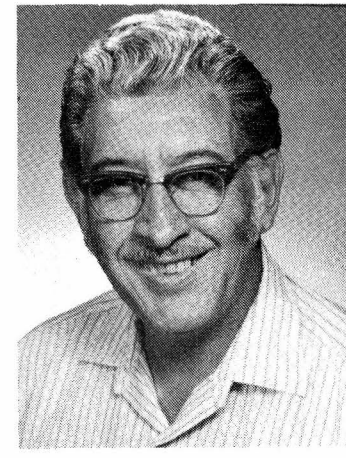
Dick Shaw - 1485

10



Brick Dumas - 1240

25



Jose Luna - 1472

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Favorite Old Photo

[Got an old photo that means a lot to you? Bring it over to LAB NEWS and tell us about it.]

Taken around the turn of the century and made from a glass negative, this print shows my grandmother, Alta Wheeler, at her Santa Fe residence on East Alameda. The bicycle was an accepted and popular mode of transportation for women, though pedaling with ankle length skirts must have been a challenge. It's hard to discern what the stopping mechanism was—more than likely some sort of coaster brake was used. Grandmother Wheeler had a long life, dying in 1972 at age 92. (Jim Simons—2342)

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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 DOE employees.
6. No commercial ads, please.
7. No more than two insertions of same ad.
8. Include name & organization.
9. Housing listed here for rent or sale is available for occupancy without regard to race, creed, color, or national origin.

MISCELLANEOUS

BABY CARRIAGE, collapsible, adjustable, converts to car bed, \$25; car safety seat, converts for kids 7-40 lbs., \$15. Crowther, 821-0172.

SAVAGE 110 bolt action .30/06, new, w/rings & mounts, \$180; 4X scope, \$25; Weaver K6 wideview, \$80. Haaker, 293-1077.

COLOR CONSOLE TV, needs work on color mechanism, make offer, Medit. cabinet. Palmer, 821-8563 after 5:30.

CLARINET, \$75; vinyl pool cover, 18x36, \$125. Zanner, 281-1789.

TOW BAR for VW, \$35; universal bumper type trailer hitch, \$35; fencing wire, 2-strands reel only, \$15. Robertson, 298-1048.

8' SLIDE-IN CAMPER w/icebox, not cabover, \$400. Peeples, 877-3942.

CHAIR, Danish modern styling, high back, arm rests, firm upholstery, green, cost \$75, sell for \$15; matching coffee table, \$10. Orr, 345-0631 after 7:30.

THREE-TON heat pump; 55-gal. elec. water heater, used 1 1/2 years. Smith, 299-8469.

FREEZER, chest, 6.8 cubic ft., \$100 or best offer. Roginski, 296-6494.

DOUBLE bathroom sink, assorted cabinets, assorted light fixtures. Miller, 873-3450.

CLEAN champagne bottles, used to bottle homemade wine, 10 cents/bottle. Peurifoy, 296-5907.

SKI RACK for Jeep CJ5/7, rear tire mount. Cox, 293-5518.

OUTBOARD 9HP twin made by OMC, \$125. Meikle, 299-4640.

ROUND dining table/4 swivel chairs/1 leaf, \$300; smoked hanging swag lamp; 5-light dining room swag. Sisneros, 898-0156.

REMINGTON model 660 .308 cal., 6X Redfield scope, case, dies, ammo, brass, all brand new, \$325. Baca, 299-2036.

CAMPER SHELL for Datsun pickup. Padilla, 831-3500 after 5:30.

SOLID OAK rocking chair, traditional American style, large & comfortable, \$75. Picraux, 345-2032.

VIVITAR 135mm f2.8 telephoto lens, \$50; Remington Sportsman 48 auto. shotgun, full choke, 12 gauge, \$110. Conklin, 883-0427.

AUTOMATIC liquid fertilizer pump, 1000 gal. fertilizer tank; reg. Appaloosa horses, studs, mares, colt & fillies. Ashbaugh, 1-384-2665.

FACTORY REAR BUMPER, will fit most Ford pickups w/34" frames, \$35. Bosworth, 869-6736.

FREE TO good home, white Persian cat, 2 yrs., male, neutered, gentle, must have protected outdoor run. Souder, 344-7406.

ELECTRIC MOTORS: 1/4 HP, 1750 RPM, \$7.50; two 1/2 HP, 1750 RPM, \$10 ea.; 60-cycle, 4 amp. w/fan, \$5. Ashland, 1031 Jane NE, 299-3267.

SHELTY PUPPIES, sable & white females, AKC reg. Reeder, 298-0816.

ANTIQUA mahogany Duncan Phyfe dining table w/leaves & 6 chairs, rose pattern, \$150 or best offer. Weaver, 294-6138.

CABINET w/casters for TV, VCR, tapes, \$65 or best offer; TV antenna. Goldenberg, 821-6209.

GIRLS' BIKE, \$25; indoor slide, \$15; tyke bike, \$5; tyke wagon, \$5; Wonder horse, \$15; assorted toys, \$1 or \$2. Scrivner, 299-0356.

AUDIOVOX AM-FM cassette car deck, ID-685, cost \$170, sell for \$60. Eastman, 268-2891.

SILVER & TURQUOISE watch band, designed by Less Baker. Damrau, 883-8592.

25x16x48' OVAL POOL, needs liner, w/filter & 1 safety ladder & deck, sold as is, buyer will have to take apart. Valdez, 298-2654.

PLAYPEN, \$15. Lee, 299-5418.

COLEMAN tent trailer, sleeps 6, galley, dinette, pull w/small car, \$650. Rowe, 821-1982.

CHAIN SAW, Homelite Super EZ auto., 16", spare chain plus accessories, \$157.50. Womelsduff, 281-1693.

AMMUNITION, .223 cal., 55 gr. hunting loads, \$3.50/box of 20, larger amounts at reduced rate. Haines, 294-5794.

MAPLE, twin bedroom set, bookcase headboards, chest & dresser w/mirror, \$175; garage sale, Sept. 19 & 20, 3619 Colorado Ct. NE. Fleenor, 883-1327.

GROLIER encyclopedia, 20 vols., w/year books, Science ref. library reporting service, 2 yrs. old, \$650. Tessler, 255-0108.

FORD TOT-GUARD child car seat, \$8; charcoal grill, \$12; misc. light fixtures for home ceilings. Bonzon, 296-3022.

DESK, gray metal, 30"x60", \$75; 6-dwr. w/key. Fitzpatrick, 294-4758.

TRUESPOKE wire wheels, 4 ea., 14", 4 1/2" bolt circle, Michelin X radial tires, 4 ea., wide whitewall. Vigil, 296-2590.

ANTIQUA blanket chest, cedar, w/tray & key lock, \$125. Dalphin, 265-4029.

180 AMP Craftsman welder, \$80; aux. gas tank for '73-'78 Ford pickup, \$35; Headman headers for Ford pickup 460 engine, \$30. Weatherbee, 869-2849.

SKI BOOTS, Nordica men's sizes 10

& 11, Heierling ladies' size 7. Durkee, 255-4211.

AUTO. baby swing, wind-up type, swing 20 minutes. Pitti, 256-1629.

PIANO, Yamaha studio console, 3 yrs. old. Dale, 268-2834.

ELECTRONIC speed control by Dana, fits cars & trucks, manual or auto. trans., \$50. Erni, 268-1721.

SEWING MACHINE, Sears port., zig-zag w/cams & many attachments, \$50. Linnerooth, 884-8615.

ORGAN, Conn Caprice, \$350; elec. typewriter, \$60; adult 3-wheel bike, \$100; B&H movie projector, reg. 8mm, remote control. Williams, 296-4490.

WROUGHT IRON & wood chandelier, \$25; gas heater, \$25. Benton, 877-2473.

HAMMOND Sounder organ, bench, music, books, \$450 firm; fp screen, black mesh w/brass trim, 22x32 1/2", \$12. Carlyon, 299-2318.

IMPORTED malachite necklace, 24" long w/29 graduated beads, largest 1.80 cm, retail \$150, asking \$40. Burstein, 821-6688.

SMITHSONIAN magazines, 1970-79, 10 vol., \$10. Madden, 296-1082.

PANCHO'S PUPS, Airedales, purebred from champion stock, good watchdog, playful, don't shed, \$150. Shunny, 265-1620.

BICYCLE, 10-spd. lt. wt. boys, \$100; Little League pitch back, 6'x6', \$15. Kaiser, 296-5215.

ACCESSORIES for Kawasaki KZ650: luggage rack w/lg. trunk, wind-jammer lowers, Denco 4 into 1 header w/removable baffle. Barnard, 831-4114.

VOLLEYBALL regulation net & ball; basketball backboard, hoop & wood poles; exercise on bicycle mounts on back wheel. Waite, 867-5953.

TEKTRONIX scopes, HP signal generators, Telonic sweeper, TV analyst, CRT/tube testers, digital DVM, etc. Belding, 294-7443.

SPEAKERS, Craig, pair 6-8 (ohms), new approx. 5 watts, both for \$14. Stang, 256-7793 after 5.

TRANSPORTATION

'72 HONDA 2-dr. 600, 4 new tires, \$400. Guerin, 299-4677.

'75 CORVETTE convert., 2 tops, 4-spd., PB, PS, new custom paint, turbine wheels, \$8700. Perryman, 294-6113.

'80 VW Dasher stn. wgn., low mileage, 2-way sunroof, AM/FM stereo, SB radials, NADA \$7025 or best offer. Roblyer, 1-864-8036.

'76 FORD 3/4 ton pickup, 4x4, 33,000 miles, insulated camper shell, extras, \$5000. Howard, 255-7846.

'74 PINTO Runabout, AT, radio, new Sears battery, starter, seat covers. Mills, 299-2130.

'72 FIAT stn. wgn., 2-dr., 4-cyl. Sanchez, 877-5231 or 344-9159 after 5.

'73 PINTO Squire wgn., new engine, radials, alum. wheels, AT, \$1850. Fifer, 299-3501.

'51 4-DR. CHEVY, all original, 52,600 miles, \$3400 or best offer. Roesch, 268-0091.

'74 PLYMOUTH 4-dr., needs some work. Brackway, 344-1901, 740 Tyler Rd. NE.

'69 KARMAN-Ghia, 75 HP engine, \$3500. MacInnis, 898-1628.

'77 HONDA 750 four, new tires, new chain, 22,000 miles, \$1300, will negotiate. Atkins, 298-5762.

'77 PLYMOUTH Volare SW, front end damage, inoperative, make offer. Stein, 299-8875.

'74 VOLKSWAGEN BUG, recently overhauled. Archibeque, 898-5215.

'79 VOLKSWAGEN BUS, 14,000 miles, fuel inj., tinted glass, 4-spd., sunroof, AM-FM, \$6800 negotiable. Trudell, 294-6669.

'71 CHEVY 1/2 ton truck, 350, AT, AC, \$2300. Padilla, 836-2279.

'76 VEGA GT, SW, AT, new battery & brakes, \$1890. Lin, 296-1911.

'81 YAMAHA 650, 150 miles, full warranty, \$1950. Gallegos, 344-3290 or 345-7147.

MOPED, Smiley, \$250, 500 miles, 3 yrs. old, 50cc two stroke, auto. clutch. Fitzpatrick, 294-4758.

'69 GTX, H/P 440, 4-spd., 9% dana, posi, PB, AM/FM, front disc, \$1100 or trade; towbar, ball to bumper, used twice; new \$250, best offer. Keefe, 299-0580.

'65 CHEVY Belair, new vinyl upholstery, \$650. Michaels, 821-8362.

'78 BUICK Estate stn. wgn., 23,700 miles, w/many extras. King, 884-7975.

RALEIGH 5-spd. touring bike, 23.5" frame, \$75. VanDenAvyle, 898-6474.

'68 JAGUAR E-type 2+2, 4.2 DOHC six, auto., orig., \$7000. Ewing, 268-6920.

'74 BMW motorcycle, 900cc w/wind-jammer, fairing & Bates jumbo bags & trunk, new battery & parts book. Barnard, 831-4114.

'69 MUSTANG convert., 351C eng., 4-spd.; '68 MG Midget, 4-spd., 35 mpg. Cooper, 298-4570.

'79 OLDSMOBILE Cutlass Supreme, 2-dr., AT, PS, PB, AC, AM-FM cassette stereo, low miles, \$5800. Atwood, 293-6171.

'72 VW POP TOP campmobile, auxil. heater, AM-FM stereo cassette, side awnings, trailer hitch, \$2750. Horton, 883-7504.

REAL ESTATE

'78 28x70 Cameo (Lancer) MH, 3-bdr., 2 bath, den w/fp, unfurnished, pitched roof style, \$35,000 or offer. Fisher, 869-2864.

3-BDR., 1 1/2 bath, fp, stove, dishwasher, garage, landscaped, Taylor Ranch, \$61,000 assumable at 8 1/4%. Finley, 897-3193.

TWO duplexes near base, \$46,000/6K down each duplex + terms on remaining equity to assume current low % RECs. Fisk, 294-7252.

2-BDR., Ridgecrest SE, brick, beamed ceilings, alarm system, huge rooms, 1870 sq. ft., \$85,000 appraisal, owner financing. Whitham, 266-9313.

1-BDR. CONDOMINIUM, 844 sq. ft., LR, den, BBQ, pool, carpet, drapes, Sandia Plaza, low interest. Stuart, 299-9190.

27 ACRES mountain land at La Madera, NE of Sandia ski area, views, wooded; tax sheltered apt. partnership. Clement, 299-2324.

WANTED

MICROPHONE, Sure model PE56D Unisphere or equivalent. Cropp, 296-1877.

SMALL concrete mixer, any repairable condition with or without motor. Meikle, 299-4640.

LIGHT WEIGHT rowboat to handle small outboard motor. Dickerson, Jemez Springs, NM, 829-3667.

TWO travel trailers, fully self-contained, 3 beds. Wilson, 296-5965.

MID OR LATE '60s Ford Mustang or mid-sized GM car, reasonable price. Clark, 296-3924.

METAL DETECTOR in good condition. Ridlon, 298-4729.

CAMERAS: Realist macro stereo, Wollensak model 10 stereo, TDC vivid stereo, Viewmaster personal stereo; Zeiss-Ikon super Ikonta C or Bessa II 2 1/2x3 1/4 camera. Mattox, 821-3945.

SMALL or medium size doghouse; 2- or 3-year-old set of World Book encyclopedias; small non-working color televisions. Hale, 298-1545.

MICROWAVE OVEN, portable. Pierce, 293-2719.

SMITH-MILLER/Doepke model toys, large outdoor toy trucks/earthmoving equipment from the '40s & '50s. Campbell, 294-6000.

SHOTGUN SHELL RELOADER, 20 gauge only. Snyder, 296-5771.

METAL FRAME for twin bed; .357 cal. Thompson Center Contender pistol. VanDenAvyle, 898-6474.

GARAGE DOOR, metal, 10'. Martinez, 865-7009.

HARD TOP for '77 Jeep CJ-5, must be in good condition. Lente, 869-3486.

LENS, photographic 80mm or 3 1/2" focal length; donation or inexpensive for 4-H Bldg. darkroom. O'Nan, 884-4973.

WORK WANTED

STUDENT wants light hauling jobs, afternoons & weekends. Bryan Fisher, 298-0526.

SHARE-A-RIDE

RIDER(S) wanted from Sandia Park or Cedar Crest area, cheaper than vanpool, non-smokers preferred, drivers also welcome. Davis, 281-2429.

New Board of Directors Elected

SEVEN MEMBERS of the Club's Board of Directors were elected at the annual meeting of the membership earlier this week. Elected to two-year terms were Bob Manhart (3151), Keith Mote (1483), Sharon Kurtz (3141) and Ed Gallegos (3223). Elected to serve one-year terms were Bob Banks (5000), Frank Biggs (4231) and Jack Mortley (1521). Officers of the Board and committee assignments will be announced in the next issue of LAB NEWS.

HAPPY HOUR tonight is your standard Friday night blast with a couple of extras thrown in—Marci and the Talkabout play for dancing from 8 to 12 while Gary Waters and guitar entertain in the lounge. Happy Hour prices are in effect all evening. The new menu service is proving popular with all kinds of good words abounding about the quality of the food selections. No reservations are required. Dining is from 5:30 until 7:30.

A LA CARTE service continues on Saturday night from 6:30 until 9 p.m. Selections include super steaks and seafood plus house specials. Wine service also is available.

THE THURSDAY NIGHT Beef 'n Burgundy buffets are getting a good turnout, according to Club manager Tom Ross. The steamboat round of beef is generously served, the Burgundy is hearty and the salad spread is spectacular. The buffet costs \$6.75 (including a carafe of wine) for adults and \$3.25 for kids under 12.

NEXT FRIDAY, Sept. 25, Youngblood is on the bandstand and Gary Waters returns to entertain in the lounge.



A BRIEFING for Sandians who will be manning the Sandia display at the State Fair is conducted by Community Relations Division 3163. At left is Joe McGruder; standing is Willie Garcia. Sandia's exhibit, designed by Mac McHarney (3155), is in a new building devoted to science and engineering exhibits located directly west of the Coliseum entrance. The Sandia display includes this small theater where films of research, development, testing and energy projects will be shown. The exhibit will also include an area where nondestructive testing will be demonstrated. The display will be open from 9 a.m. to 9 p.m. through Sept. 27.

TUESDAY HAPPY HOURS continue to offer a free spread of hors d'oeuvres along with special bar prices. On Wednesdays, it's three for one on draft beer and bar highballs from 4:30 until 6:30.

BASIC ROUND DANCE lessons are offered by the Redondo Round Dance Club starting Oct. 1. The class will meet at 7 on Thursdays for three months. Instructors are Kay and Fred Haury. After the lessons, Club dancing continues until 10. Sign up at the Club office.

CORONADO GRANDSQUARES continue to meet on Mondays with lessons at 7 and Club dancing at 8:30. The group is actively seeking new members and offers what one member calls "the best callers and programs in the city." Information from the Club office.

THE SECOND ANNUAL Coronado Club Links Event tees off Tuesday afternoon, Sept. 29, at Tijeras Arroyo

course. This is a repeat of last year's madcap tourney with very special rules. In addition, there will be three special events with prizes—a putting contest, a short driving contest, and pitching competition. Pay the \$5 entry fee by Sept. 25 and pick up a copy of the rules at the Club office. The tourney wraps up that evening with a party in the El Dorado room. More than 60 competed last year, and co-chairman Ivars Gals (1725) and Pro Padilla (3743) are expecting that many and more this year. It's open to any golfer with Club membership.

TRAVEL—The Sept. 26 Cumbres-Toltec trip is full, but a few seats remain on the Canyon de Chelly trip Oct. 24-25 (\$78). A pre-trip meeting is set for 7 p.m. Oct. 21 at the Club.

An improved version of last year's popular bus tour to the West Coast is offered again this year Dec. 26-Jan. 2 for \$368. The tour includes bus transportation with treats on board, reserved seats at the Rose Bowl parade, a visit to Disneyland, Queen Mary, San Diego Wild Animal Park, a Catalina Island cruise, a beach party, a tour of San Juan Capistrano Mission, Calico Ghost Town, the Power Tower at Barstow, riverside casinos, the Painted Desert and more. Deposit \$100 now and pay the balance by Nov. 24.

Other scheduled trips include: Carlsbad Caverns (Nov. 7-8, \$65), one week in Mazatlan with your choice of departure dates (Nov. 9, 10, 16 or 17 for \$349), Dallas Cowboys game (Nov. 25-29, \$226) and a Caribbean cruise (Dec. 13-20, \$1031).

Travel Director Frank Biggs (4231) reports he's working on a Washington, D.C., Williamsburg and historic Virginia tour for cherry blossom time next spring. He will have details later. You can talk with Frank in the Club lobby tonight between 5 and 7 about scheduled trips and future plans.

"Oh, I don't know. What would you like to do today?"

