

# New Lab Produces Radiation-Hardened Microelectronics

A Center for Radiation-Hardened Microelectronics (CRM) has been established at Sandia to develop the technologies and design capabilities needed in production of large-scale integrated circuits that operate in high radiation environments.

The Center, an outgrowth of the Labs' earlier design and fabrication efforts in microelectronics, for weapons, was established primarily to transfer radiation-hardening capabilities to private industry so that the circuits can be produced commercially.

"In radiation-hardening technology, we also aim to stay in step with advances made in non-hardened integrated circuits," says Bob Gregory, manager of Sandia's Microelectronics Technology Department 2140.

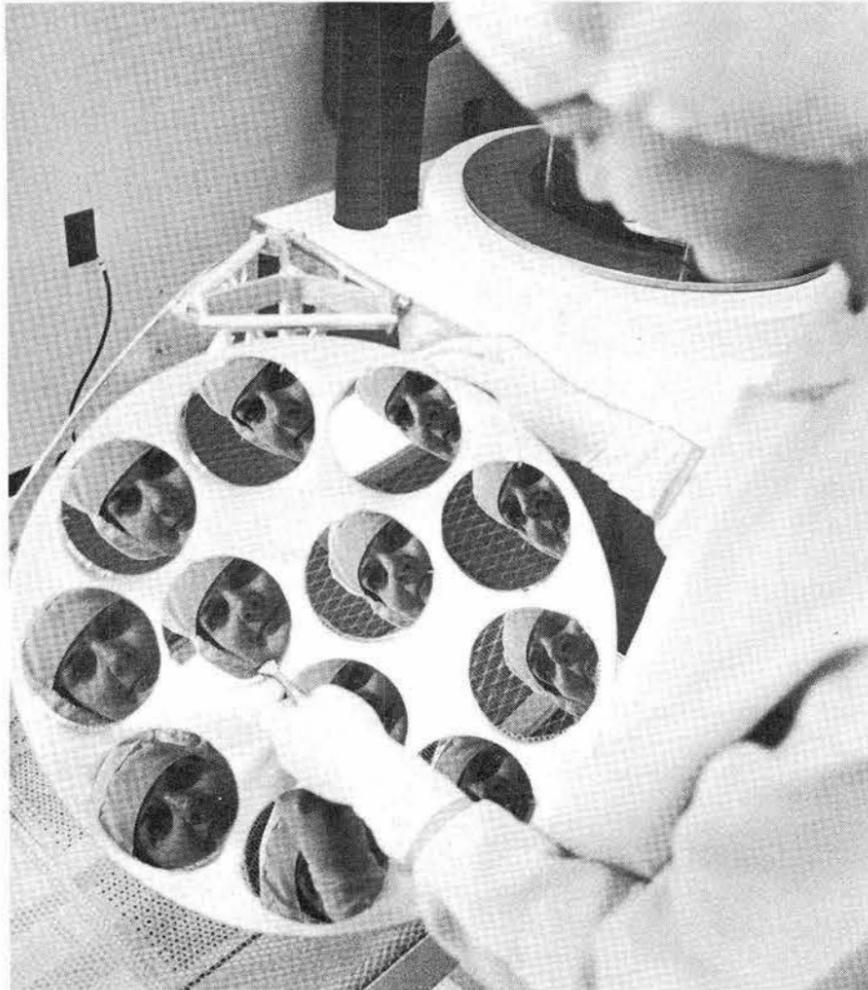
"For instance, radiation-hardened large-scale integrated circuits—individual circuits with a thousand to 100,000 transistors—now using four- to seven-micron geometries should be scaled down to two microns in the next several years."

Radiation hardening, accomplished by use of special process sequences and design criteria, permits integrated circuits to operate in radiation environments anticipated with nuclear weapon usage as well as in environments experienced by satellites and other vehicles that operate in space.

Because weapon systems require a high level of reliability in their components, the Center emphasizes development of high-reliability processes.

Complementary Metal Oxide Semiconductor (CMOS) circuitry is the major radiation-hardened IC technology under development. These are high-performance ICs which consume little power, are

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WAFER, WAFER on the wall, which will become the base for a radiation-hardened large-scale circuit? The answer, says technician Judy Odinek (2141), is darn near all. She's loading the silicon wafers prior to the next step—metal deposition in the vacuum furnace. Photo was taken in Sandia's Semiconductor Development Lab.

## LAB NEWS

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MARCH 20, 1981

SANDIA NATIONAL LABORATORIES • ALBUQUERQUE NM • LIVERMORE CALIF • TONOPAH NEV

## Project Deep Steam Goes Underground in Long Beach

Project Deep Steam people are in Long Beach this week beginning one of the most important experiments in the enhanced oil recovery program. Sandia plans to operate a Labs-designed steam generator at the bottom of an oil well some 2500 ft. beneath the surface. This has never been accomplished before.

If successful, the experiment will point the way toward recovery of billions of barrels of "heavy oil" remaining in America's oil reservoirs—estimated to be twice the amount of oil ever pumped. Heavy oil is a tar-like substance that can be pumped to the surface if enough steam can be injected into the reservoir, reducing the

oil's viscosity.

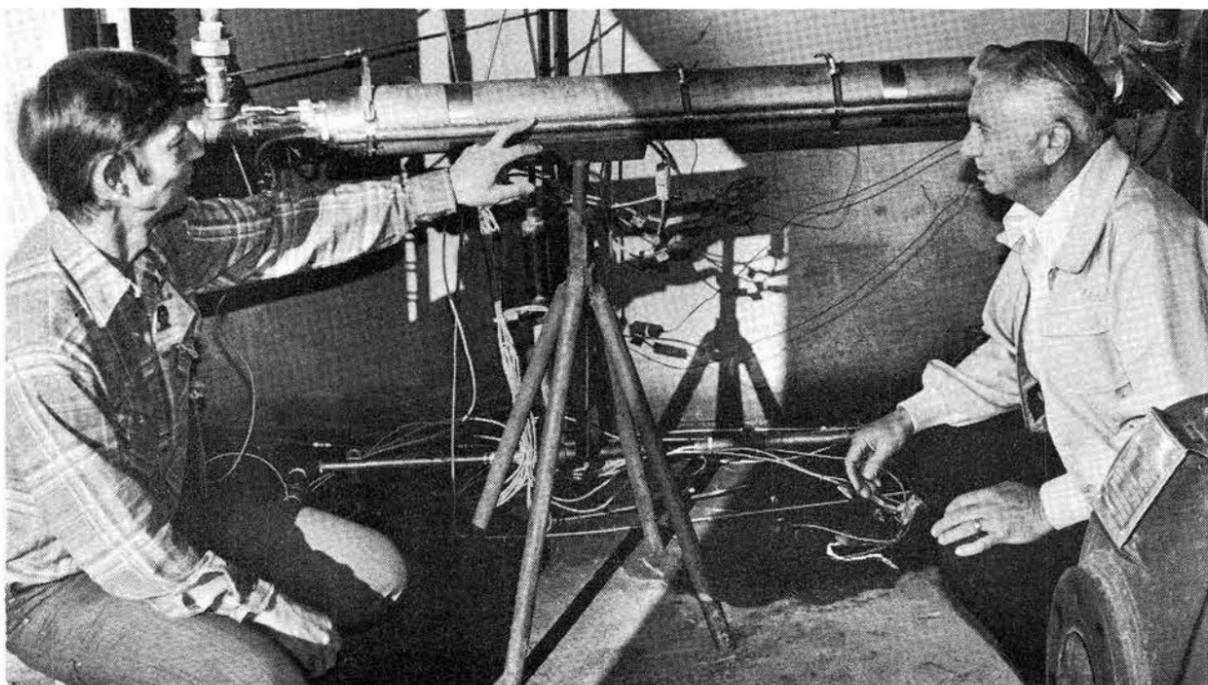
In shallow wells, less than 1000-ft. deep, steam generated at the surface level can be used, and such operations have been conducted for years. A Sandia prototype steam generator unit was tested in a shallow oil field near Bakersfield last year and performed successfully on the surface.

"We achieved all of our goals in the earlier experiment at Bakersfield," says Ron Fox, supervisor of Enhanced Oil Recovery Division 4755. "All results were affirmative."

An important part of that experiment was the injection of all combustion wastes into the reservoir. First of all, this practice helps eliminate air pollution—a considerable problem with conventional boilers burning oil to produce steam at the surface level. Very expensive "scrubbers" are required to clean the exhaust gases. Secondly, injecting the combustion gases into the reservoir actually aided oil recovery and there was no chemical contamination nor adverse effect on the permeability of the reservoir formation.

"What we learned at Bakersfield has been integrated into our new generator units along with the results of our current research," Ron says. "We're looking

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DEEP STEAM GENERATOR, slated for 2500-ft.-depth operation in an oil reservoir at Long Beach next month, is readied by Burl Donaldson and Bob Clay (both 4755). The unit produces four million BTU per hour at 1300 psi.

# Supervisory Appointments

**DOUG WEAVER** to supervisor of Semiconductor Processing Division 2141, effective Feb. 16. Since September 1976, Doug has supervised the Semiconductor Development Laboratory Section 2141-1 which has now evolved into his current division. He joined Sandia in 1967 as an ESA. His assignments have included radiation effects studies, thermonuclear studies at NTS and SNLA, device analysis, and semiconductor development.

Doug earned his associate in applied science degree from the Bell and Howell School (formerly DeVry Institute). His off-the-job activities include camping and gardening. Doug and his wife Sue and their two children live in NE Albuquerque.

\* \* \*

**DENNIS KRAMER** to supervisor of High Reliability Assembly Section 2147-1, effective March 1.

Joining Sandia in January 1972, Dennis worked for four years with a hybrid microcircuit group. He then transferred to a surface analysis division and, for the past three years, has worked with the photo-voltaic group.

Dennis earned an associate degree in electronic technology from DeVry Institute. He enjoys camping, backpacking, hunting, fishing and photography. Dennis and his wife Julie have two children and live on the northwest mesa.

\* \* \*



**JERRY ESCH** to supervisor of Scientific Computing Operations Division 2631, effective Feb. 16.

Before coming to the Labs, Jerry was with WE in Denver. He joined Sandia in February 1976 as a systems analyst in the engineering and quality assurance design division. Subsequently, he was named project leader of the group.



**NEW SUPERVISORS:** (back row, l to r) Bob Hewes (3742-1), Herman Baca (3618-5) and Dennis Kramer (2147-1); (seated l to r) Ernie Nevada (3613-4) and Doug Weaver (2141).

Last year, Jerry completed a temporary assignment performing data-base analyses in the benefits organization. He returned to his former division and again was the group's project leader until his recent promotion.

Jerry earned a BS in math from Kearney State (Nebraska) and an MBA in management science from the University of Colorado. In his leisure time he coaches a youth soccer team, plays basketball, and enjoys camping and photography. He and his wife Debbi have two children and live in the NE heights.

\* \* \*

**BOB HEWES** to supervisor of Stock Control Section 3742-2, effective March 1.

Since joining Sandia's shipping and receiving organization in 1951, Bob has been an expeditor and an order analyst. He's also worked with a field support group and has held several buyer positions. Most recently, he's been a buyer in the Small Value Procurement Section 3741-2.

Bob's favorite leisure time activities are hunting and fishing. He and his wife Evelyn have three daughters and one grandson. They live in NE Albuquerque.

\* \* \*

**ERNIE NEVADA** to supervisor of Support Section 3613-1, effective March 16. Joining the Labs in September 1970 as a mechanical apprentice, Ernie completed the five-year program and was then assigned work in the outside utilities group. Since 1978, he's been a standards analyst in Maintenance Operations Planning Division 3615. Responsibilities of his new position include providing labor support—grounds maintenance, furniture moving, etc. Following completion of his apprenticeship, Ernie was an instructor in the program for three and a half years, teaching pipefitting.

During 1968-69, Ernie served in the U.S. Navy in Vietnam. He enjoys softball,

camping and hunting with a muzzle-loader, and is active in a youth soccer league. Ernie and his wife Theresa have three children and live in Taylor Ranch in northwest Albuquerque.

\* \* \*

**HERMAN BACA** to supervisor of Material, Custodial, and Support Services Section 3618-5, effective March 1. Herman's group is part of the Remote Areas Maintenance and Test Support Division; his section is responsible for Areas III and V.

Since coming to Sandia in January 1964, Herman has been a janitor, a laborer and, for the past 10 years, has been a labor leadman. He served in the U.S. Army in Korea and Germany from 1948-55. Away from the job, Herman enjoys fishing, dancing and basketball. He and his wife Lucy have four children and two grandchildren. They live in southwest Albuquerque.

## Aging and Identity

"Aging and Identity" is the topic of Medical's next program in their "Let's Talk About Aging" series. Guest speaker is David Bennahum, M.D., director of Medical Education, Presbyterian Hospital. Dr. Bennahum will address the following issues: What are the biological and sociological aspects of aging? Do we lose our identity as we age? How can we deal with the aged and our own aging? The program is scheduled for Tuesday, March 24, from 12-12:30 p.m. in Bldg. 815 (outside the Tech Area).

### Congratulations

Scott (1471) and Denise Reed (3332), twins, a son, Brandon Scott, and a daughter, Melanie Brook, March 8.

## LAB NEWS

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# Let's Hear It For Cancun . . .

*Last issue we carried an Unusual Vacation article about Cancun that took a different tack—it knocked the place in no uncertain terms. When the paper appeared, the phones started ringing. Seems that the Cancun Anti-defamation League is strongly represented at Sandia, and the staff of LAB NEWS has finally learned where that place is that they described in Sunday School [not the warm spot, the other one]. So, in the interest of fairness, we'd like to placate Cancunophiles by running this letter from retiree Nick deLollis on the subject.*

\* \* \*

The Editor, LAB NEWS:

After reading of Tim Leonard's experience on his honeymoon in Cancun, I felt I had to write to comment that it need not be that way. We have been to Yucatan twice and both times I think we beat the high cost of living south of the border. Admittedly, if we were honeymooning we might not have been concerned with costs.

First, we did most of the preparation and planning ourselves. Our timing was based on the availability of airline peanut fares from Albuquerque to Cancun. For hotel information and reservations we took full advantage of SATO's worldwide hotel directories. We ended up staying in the city of Cancun at the Maria de Lourdes Hotel in a pleasant room with bath for about \$25 a day. Buses leave the city for the Zona Turista, the expensive beach hotels, every ten minutes (five pesos, about 23 cents, one way). All beaches are public in Mexico, even those in front of the hotels.

While we ate lunches in the deluxe area, we ate our dinners in the city where there are several excellent restaurants with reasonable prices. We noticed that many of the obviously affluent guests of the Zona Turista hotels enjoyed riding on the

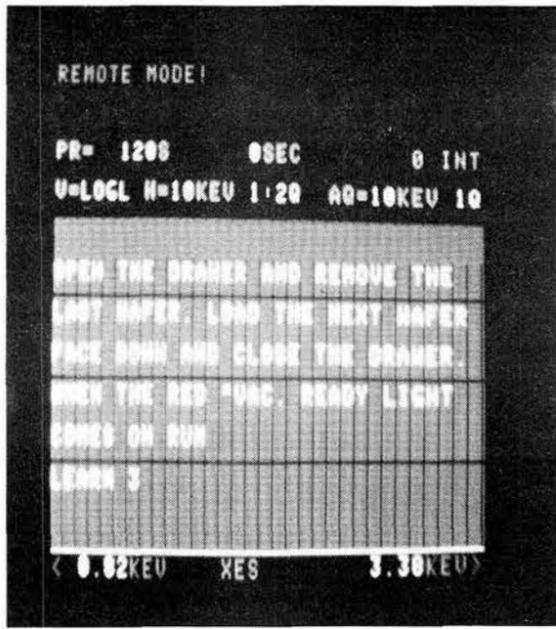
convenient public buses and were the principal patrons of these better restaurants in the city.

From Cancun we went to nearby Isla Mujeres with no hotel reservations and found a tightwad's paradise. We found a room with bath at the Hotel Martinez at less than \$10 a night. There were lots of reasonable restaurants, good beaches, and good snorkeling at Garaffon Beach. We did not live in the lap of luxury but we had clean, pleasant hotels and had a nice trip at a reasonable cost. This trip was in November, 1980.

During an earlier trip to Yucatan we visited the pyramids. We took a day trip by bus from Merida to visit Uxmal and then rented a small car to drive to Chichen Itza. Instead of staying at the resort hotel there, we drove on a few miles to the town of Valladolid and stayed at a good hotel for about \$10 for the night. On the island of Cozumel, we had reservations at the inexpensive Hotel Barracuda. Unfortunately, they had no dining room and were about a mile from town. Apparently, there are small family-run hotels in town, like the Martinez on Isla, which are not listed in hotel directories.

Now for the bad news. We did get Montezuma's revenge on the last trip. Fortunately, it hit us after we had just about completed our visit and we recovered en route back to Albuquerque and at home. When we talked to friends who had just returned from Cozumel, it turned out that they also had Montezuma's revenge after vacationing at the most expensive hotel. For what it is worth—Montezuma strikes the rich and poor alike. Medication is available by prescription to take to Mexico to ward off that problem, so call the doctor before leaving home.

/s/—Nick



BY THE NUMBERS, '81 style. Fabrication of radiation-hardened microelectronics is a complex, multi-step process, with recipe programmed into computer. Explicit instructions (some technicians say "too explicit") come up with each operation.

*Continued from Page One*

## Radiation-Hardened Microelectronics

amenable to hardening, display good noise immunity, and have many applications for logic and memory.

Metal Nitride Oxide Semiconductor (NMOS) circuitry, CRM's other major technology, provides non-volatile memory (if power is lost the information already gathered and stored in the circuit is not lost). Its memory and program storage capabilities are also relatively inexpensive.

The Center will devote a smaller effort to development of hardened N-Channel Metal Oxide Semiconductor (NMOS) and bipolar technologies. The dominant non-hardened IC technology that is commercially available, NMOS permits more transistors per circuit than most other ICs and can be combined successfully with CMOS. Bipolar technology is reserved primarily for radiation-hardened linear applications and high-speed logic requirements.

The Center includes a computer-aided design system—a variety of computers, interactive graphics systems, and extensive software—that has been used to design more than 50 custom ICs.

The 5500-square-foot Semiconductor Development Laboratory houses the Center's complete process line for 100-mm-diameter silicon wafers. The 24 diffusion furnaces and other process equipment are under direct computer control and all processing is performed interactively at terminals.

The Center's production capability in radiation-hardened microelectronics will be used to meet emergency needs. This year, for example, the Center is supplying NASA with hardened circuits, microprocessors, and memories for Project Galileo and the Solar Polar Mission, both planned for the mid-1980s.

In Project Galileo, two spacecraft will orbit Jupiter and probe its atmosphere. Solar Polar's two craft will be sent to Jupiter and then deflected by its gravitational field into orbits around both poles of the sun.

### Sympathy

To Dennis Kramer (2147) on the death of his father in Phoenix, Feb. 27.

To Fred Harper (4412) on the death of his brother in Albuquerque, Feb. 28.

To Dave (5523) and Jim (3416) Davidson on the death of their mother in Albuquerque, Feb. 27.

To Robert Altherr (1471) on the death

of his mother in Indiana, March 2.

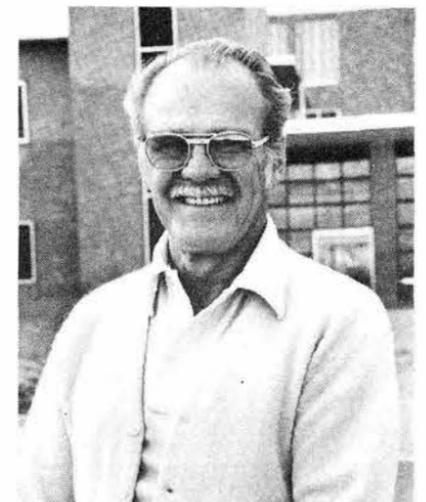
To Patt Shea (2611) on the death of her mother (and the wife of Timothy Shea, General Manager of Sandia 1952-54), Feb. 23.

To Mary (1250) and Paul Stang (1587) on the death of her father in Albuquerque, March 10.

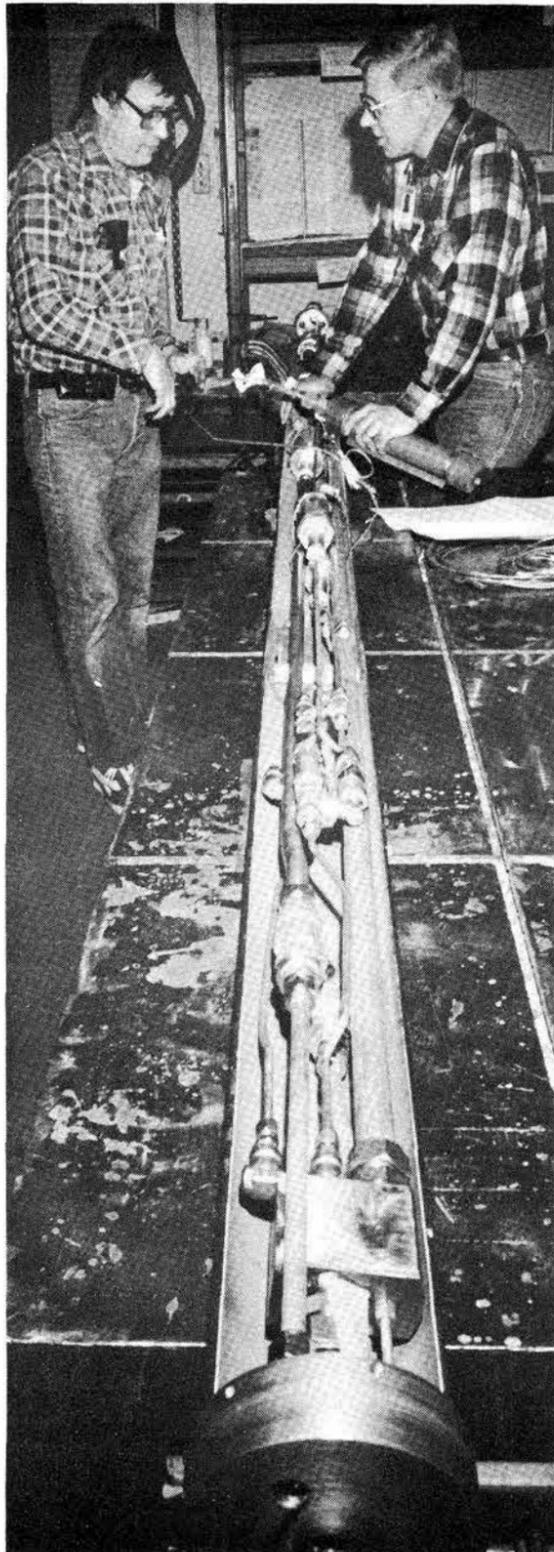
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Merrill Murphy (1731)



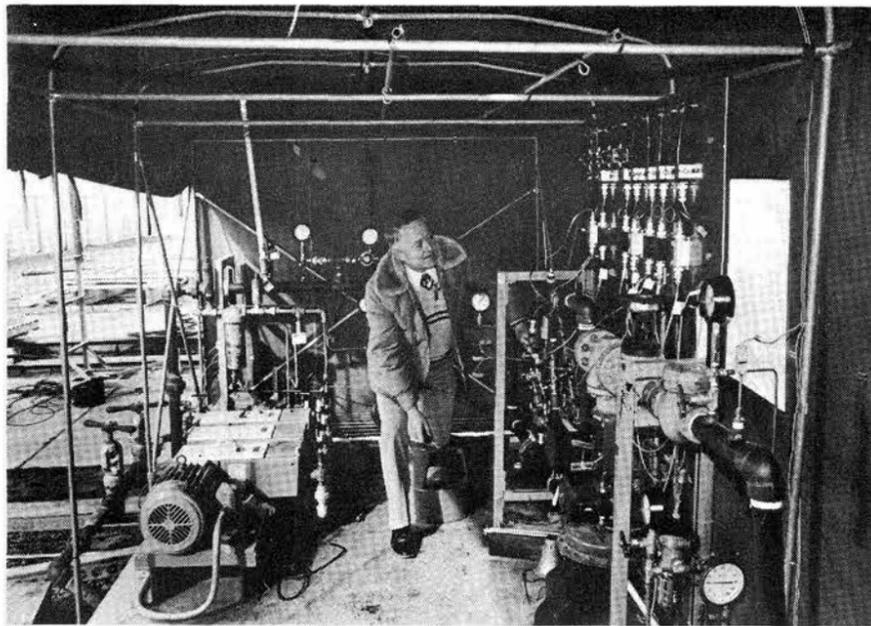
Ray Foster (1131)



DEEP STEAM instrumentation package, with hoses, one-way valves, filters, temperature sensors and electronics, is assembled in the welding shop. The package, which monitors pressures and temperatures, will be mounted directly above the steam generator unit at the bottom of the oil well. It is designed to operate continuously in a 500°F environment. John James and Dave Paul (both 2166) assemble the package prior to its being sealed and welded.



NORB SISKA (2166) contributed programming and automation of computer control to Deep Steam project.



RUSS MAXWELL (2165) inspects pumping system and valves for air, fuel and water for Deep Steam. This equipment, mounted on a skid, will be moved to Long Beach site along with another module which contains the control equipment.

*Continued from Page One*

## Deep Steam Goes Underground

forward to the upcoming underground test with optimism."

Sandia will field two steam generator units at Long Beach. The first uses air and diesel fuel for combustion; the second, oxygen and diesel fuel. The units differ from the one used at Bakersfield which burned propane. Also, at 2500-ft. depth, the new units will be operating under pressures ranging from 1300 to 1500 psi.

Site of the experiment is the Long Beach waterfront, an island not more than 200 yards from where the Queen Mary is berthed.

The reservoir has been producing oil since the late '20s. It is adjacent to the famous Signal Hill field, one of the largest oil-producing fields in the nation. The area has yielded so much oil that the land at one time had subsided about 17 ft. Secondary oil recovery operations, where water is injected into the wells to force the oil out, has stopped the sinking and has actually reversed the process—the land has risen some five feet in the last few years. No steam has been used previously in oil recovery at this site. Surface boilers would be out of the question because of air quality standards.

Sandia's units will burn underground. Hoses from the surface will inject air, diesel fuel and water into the combustion chamber of the generator. Two electrical cables will also service the generator for ignition and instrumentation. Ignition can be achieved either electrically or by use of a pyrophoric—a substance called TEB which instantly flames when exposed to air.

The extensive instrumentation and control systems for the Deep Steam Project are the work of Jim Gover's Energy Subsystems Division 2165. The downhole instrumentation package, which measures and controls pressures, flow rates and temperatures, is five inches in diameter and 15 feet long. It is designed to operate continuously in an environment around 500°F.

On the surface, the entire system is under automated control. Air compressors, regulating valves, pumps, flow meters, connections and instrumentation are all under a central computer program. All operational data are displayed on a screen at the computer console.

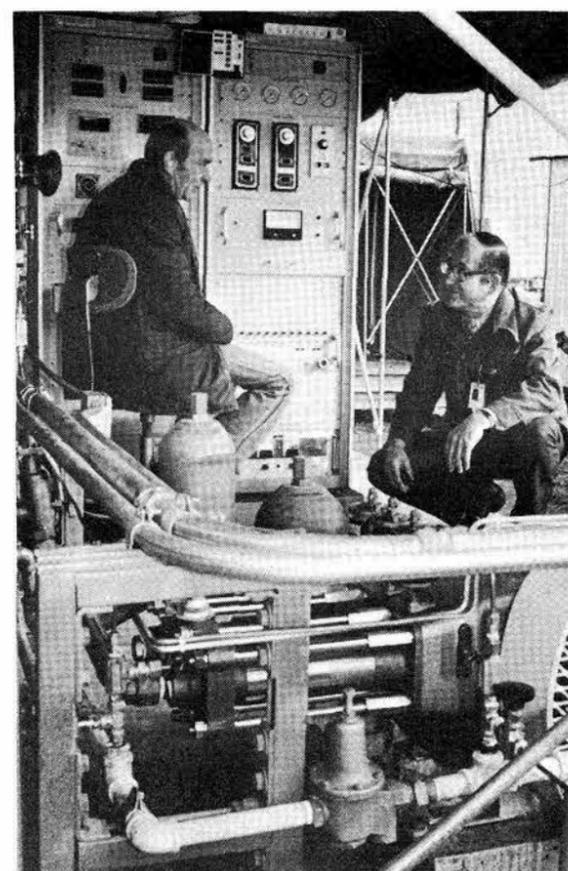
"The idea," Jim Gover says, "is that once installed, the system will operate continuously, perhaps for years when perfected, and require nothing more than monitoring and maintenance."

The Long Beach experiment is scheduled to run four months. At the end of that period, the system will be evaluated with the possibility of extending the experiment for a year.

Ron Fox (4755) is project director, Russ Maxwell (2165) heads instrumentation and control development, and Burl Donaldson (4755), the steam generator development. Bob Clay (4755) is site manager for the Long Beach operation.

Long Beach Oil Development Co., a company owned by Amminoil, Chevron and Exxon, is the operating agency in the Deep Steam experiment.

Other Sandia organizations contributing to the project include divisions 2513, 1125, 2166, 1481, 1473, 4533, 5512, 1135, 2458, 3613 and 3618.



AT CONTROL SKID for Deep Steam project, Les Sandlin and Baron Brumley (both 2165) discuss upcoming underground Long Beach experiment in which "heavy" oils, too thick to pump, will be lightened by injection of steam to permit recovery.

# A Dirty Story

For the last year, LAB NEWS has carried a series of articles about Sandians who, confronted with fuel bills to make a strong man weep, have cleverly contrived to turn their fireplaces into a heating plus. Some have even devised wood/coal burning furnaces whose economy, compared to butane or natural gas, is dramatic—there was the Cedar Crest resident with monthly butane bills of \$200 who now, burning coal, pays only \$25.

Each time we published these articles, people in some number would call us to get more detail about the fireplace insert or stove, or about the furnace installation. And, each time, we'd usually get a note from a reader who had misgivings about burning wood or coal.

Well, the volume of the latter is going up and, most recently, we've received several copies of an article from Great Britain's *New Scientist* entitled "Wood stoves: the trendy pollutant." Its message: the wood-burning stove is one of the most highly and most dangerously polluting domestic de-

vices known to modern man.

Noting that most believe the wood stove to be socially and environmentally benign, the article points out the stove's insatiable appetite for wood but really lowers the boom on its products of combustion:

"Wood smoke is rich in polycyclic organic matter (including) such compounds as benzo(a)pyrene, dibenz(a,h)-anthracene, benzo(b)fluoranthene . . . and many others less noxious. The ones we have named are all known or suspected carcinogens and if the list sounds familiar, so it should: it is the list of substances found in tobacco smoke . . . This similarity should not surprise us, for one vegetable product is very much like another chemically . . ."

And the problem is exacerbated in well-designed stoves, i.e., those in which the wood is burned slowly and at relatively low temperatures. "In extreme cases, the stove that is damped down to make it stay barely alight while its proud owners go out for the day may behave like a wood gasifier, or pyroliser, heating the wood in

the absence of air to produce greatly increased amounts of organic matter for discharge into the outside air."

Coal, of course, is rather similar to wood, but there are substantial differences in the environmental impact of the two fuels, due not to their composition but to the way they are used. "Where polycyclic organic matter emissions from wood were given a value of 1, those from residential coal fires scored between 0.33 and 10 but those from coal-fired utilities, industrial coal, and oil-fired boilers and furnaces scored between 0.01 and 0.33. In other words, wood burning causes more serious pollution than anything except a dirty, smoky coal fire . . ." The article notes that flue scrubbers and electrostatic precipitators are not likely to gain much popularity among domestic users. After presenting this dismal array of evidence about a device that most of us regard with some warmth, the authors wryly conclude: "Thus is innocence lost!"

## Events Calendar

*March 20*—Benefit Art Auction at Albuquerque Hilton Inn for Amigos de las Americas, 7 p.m.

*March 21*—Miguel Caro Dancers (Mexican folk dancing) benefit performance, 7:30-8:30 p.m., Student Union Bldg., south ballroom, UNM.

*March 22*—Purim Carnival at Temple Albert; games, food, & dancing from 12 noon to 2:30 p.m.; 1006 Lead SE.

*March 26*—NM Brass Quintet concert, 8:15 p.m., Keller Hall, UNM.

*March 26-28\*\**, *April 2-5\**—Albuquerque Civic Light Opera, "Guys & Dolls," (\*matinee only, \*\*matinee & evening performance), 2:15 p.m. and 8:15 p.m., Popejoy, 345-6577.

*March 27-29*—Gem & Mineral Show, Albuquerque Gem & Mineral Club, Ag. exhibit hall, NM State Fairgrounds.

*March 29*—Cultural Entertainment Series, "The Elephant Man," 8:15 p.m., Popejoy.

*March 29*—Mozart's "Requiem," 4 p.m., First United Methodist Church, 4th & Lead SW.

Metropolitan Opera Radio broadcasts: KHFM 96.3 FM, KZIA 1580 AM, 12 noon.

*March 21*—Puccini's "Turandot"

*March 28*—Tchaikovsky's "Queen of Spades"

## Speakers

John Holmes (4713), "The Solar Power Tower," staff seminar, Argonne National Laboratory, Argonne, Ill., Feb. 26; "The Solar Power Tower," Engineers Week Seminar, Western Electric Montgomery Works, Aurora, Ill., Feb. 27.

G. R. Reif (2522), invited paper, "In-Process Quality Control of Friction Welding By Using Acoustic Emission (AE) Techniques," semi-annual meeting of the Interagency Manufacturing Operations Group (IMOG), Joining Subgroup, March 19, Rockwell International, ESG, Rocky Flats Plant.

## Letters

### *Growing Up with Soot in St. Louis*

Editor, Sandia Lab News—Back in the early thirties when I was a boy in St. Louis, most homes and buildings were heated by burning coal . . . The pall over the city was atrocious—dark and dreary skies. Buildings were coated with soot. St. Louis, then dubbed "St. Lousy" by an observant punster, vied with Pittsburgh as the country's dirtiest city.

At our home, a truck would dump coal down a chute into the basement. Billowing clouds of coal dust would permeate the house for a day or so. I helped keep the hot air furnace going by setting a wood fire in the morning and shoveling coal on top of it. How I disliked that job!

In the mid-thirties a technological improvement appeared: hard coal (anthracite) packed in paper bags! These bags were dumped down the chute, and I stacked them in the coal bin. From there they could be tossed one at a time into the furnace. Not only was the dirt level in the house reduced, but the hard coal produced much less smoke. That cut down air pollution over the city. Unfortunately, clinkers (conglomerates of ash residue) were formed in the furnace. These had to be broken up and hauled outside. The smaller pieces were thrown on snow and ice in the driveway to increase tire traction. Hauling ashes was also my job. That, too, was hard work.

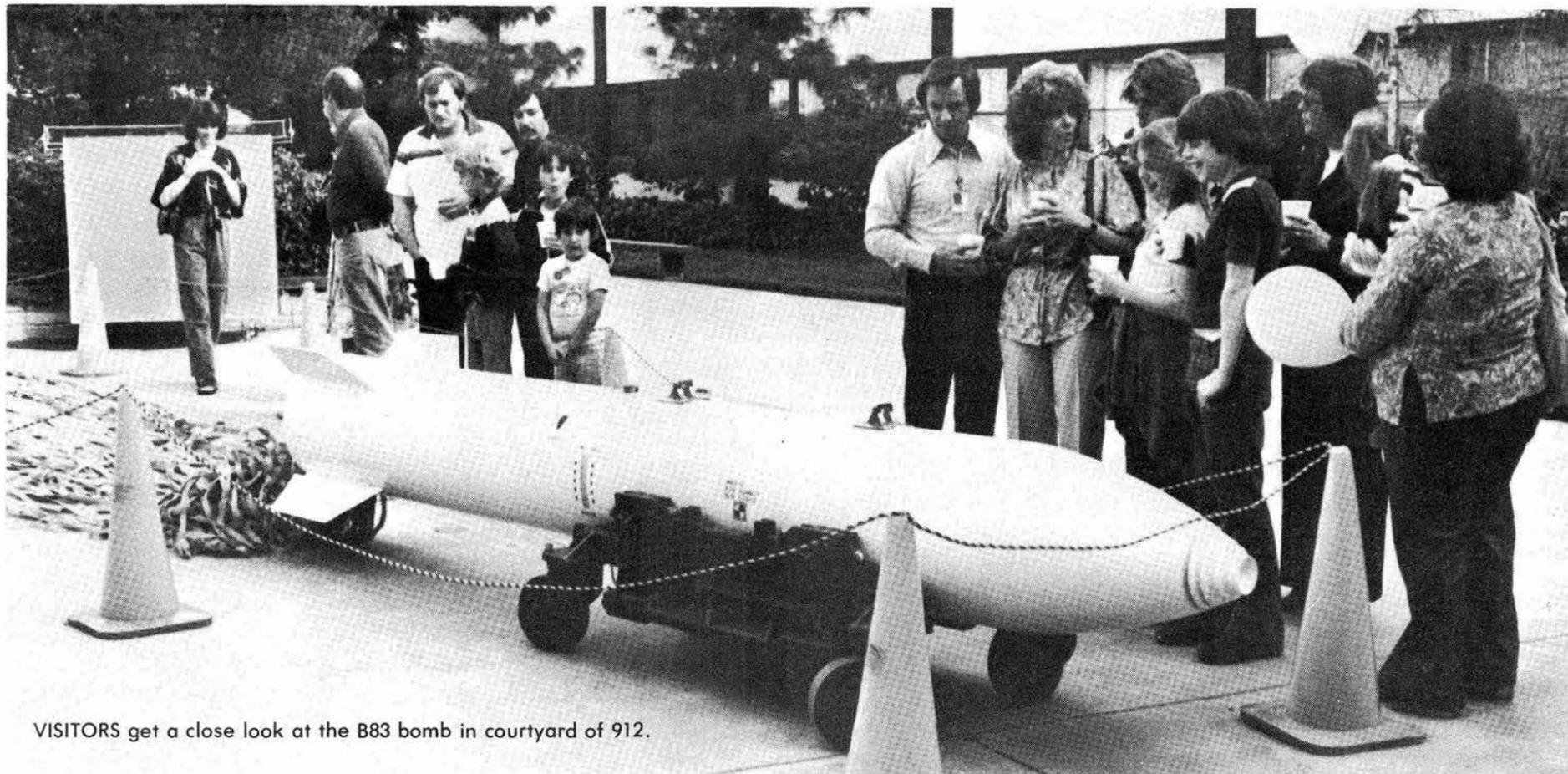
We thought that bagged hard coal was a great improvement, but that was trivial compared to the miracle of natural gas that came to us in 1938. Our family moved into a house that was heated by hot water in a natural gas furnace in the basement. What joy, what rapture! Clean-burning gas from the great Southwest! No coal trucks, no coal bins, no coal dust, no shoveling coal, no clinkers.

Now in New Mexico for almost 40 years, in Albuquerque I have used clean-burning natural gas and, more recently in the mountains, propane. However, like many old-time New Mexicans who remember bright blue skies in winters, I am appalled (no pun intended) by our terrible air pollution. Improved auto engine technology will eventually, I hope and believe, significantly reduce this source of air pollution.

But now, our Sandia LAB NEWS is reporting on conversion of a propane furnace in a home to a coal furnace! One coal furnace doesn't make a pall, but many could. I would be loath to haul and shovel coal again. Others perhaps don't mind. But I oppose the LAB NEWS promoting coal over a clean-burning gas such as propane, even by implication in lauding the initiative of an employee. Instead, our newspaper should promote more appropriate energy-saving efforts: technology that is relatively pollution-free such as solar heating, technology that includes more efficient gas furnaces and heat distribution systems, and technology that reduces heat loss by use of better insulation and better design.

In addition, more emphasis should be put on the other, and to me even more important, side of the coin: increasing the supply of relatively clean energy by encouraging the production and distribution of natural gas, propane and, particularly, fusion nuclear-generated electricity for home heating. If we use these better technologies, the shoveling of dirty coal into a home furnace can remain just a hazy memory.

Jay Grear—1232



VISITORS get a close look at the B83 bomb in courtyard of 912.

## Family Day '81

Some 4400 Sandians, their families and friends enjoyed Sandia Livermore's 25th anniversary observance Family Day March 7. The weather was in the sunny seventies, food and soft drinks were served throughout the day on the patio of building 912 and, for the first time, visitors got a look at the new Combustion Research Facility plus numerous other displays and working demonstrations and the new Cray computer system.



VAL ORI (at right, 8342) demonstrates a computer problem on a terminal for his guest Larry Hicks.



STEVE GUTHRIE (8347) demonstrates effect of liquid nitrogen on a balloon to Nomi Schalit and father Michael Schalit (8214).



JOHN WHEELER (8272) demonstrates solar cooking (roasting a marshmallow) to Ron Kirchgatter.



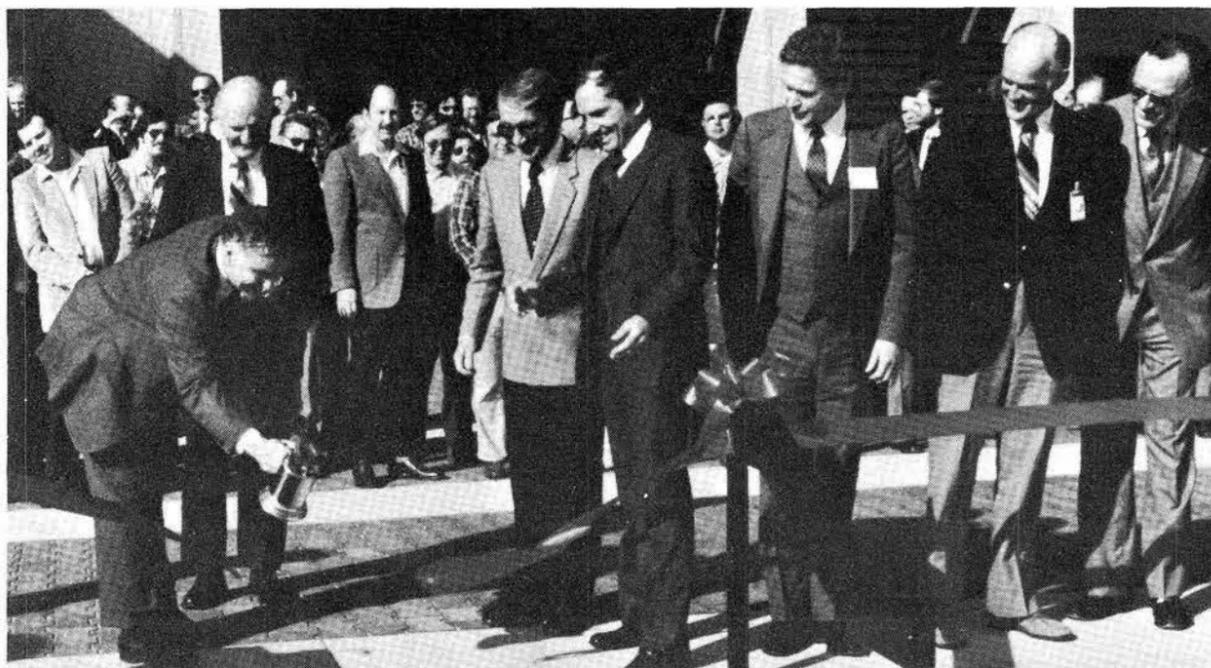
ORIGINAL STAFF who were at Sandia Livermore on the date of its official founding—March 8, 1956—were honored at a dinner during the 25th anniversary observance by the Labs. In attendance, left to right in front row, Bob Siglock, Bill Marsh, Vernon Field, Harvey Pouliot (8441), and Wayne Grimshaw. Second row: George Martin, Orval Wallen, Bill Little (8270), Frank Murar (8322), and Frank Thomas. Back row: Bob Dewhurst, James McMinn, Charles Barncord (3200), Ray Brin, Jim Henderson (8216), and Gayle Cain (8412).

# LIVERMORE NEWS

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BLOWTORCHING THE RIBBON to open the Combustion Research Facility is James Kane from DOE's Office of Basic Energy Sciences. President Morgan Sparks, VP Tom Cook, Combustion Sciences Department manager Dan Hartley, Karl Bastress of DOE, Elliot Pierce of BES/DOE, and Arlyn Blackwell (8200) note the operation.

## CRF Now In Go Mode

Sandia's Combustion Research Facility was formally dedicated March 6, and some 250 people listened as speakers praised the joint effort of government, industry and the university communities to do basic and applied research in combustion.

Livermore Labs head Tom Cook (8000) led the program with introductions of special guests, including Washington sponsors of CRF, members of the Combustion Research Advisory Board, combustion scientists from several states, State Assemblyman Gib Marguth, Livermore Mayor Dale Turner and Alameda County Supervisor Don Excell. Cook recalled how the new facility was proposed in a Washington meeting with the AEC's James Kane in 1975. The idea was to create a facility like the one now open where combustion scientists from universities, industries and national laboratories could pool their efforts to better understand the combustion process and thereby better utilize scarce fuel resources.

President Morgan Sparks followed, saying, "This research facility is a center of excellence in a field of great importance. I hope it will become a model for the productive interaction between government-supported institutions of research, the universities and industry."

Principal speaker was James Kane, head of DOE's Office of Basic Energy Sciences, who said, "Now that we have this facility, it has to contribute to the solutions of problems in energy. The idea of this center is not just to produce scientific papers . . . and they're not just going to do beautiful experimentation . . . but ultimately there has to be a product out there someday incorporating the knowledge that was generated here."

Another speaker, William Agnew, technical director of General Motors Research Labs and a member of the Advisory Board, said he sees the nation facing "two huge problems at the moment, problems which are in direct conflict with each other. One is the energy problem and the other is the economic recession." The problem comes about because government support is needed to help solve the energy problem through technology. He explained that over the years the auto industry has had offers of help from Washington, and industry has replied, "Don't tell us how to design or manufacture cars, don't tell us how to sell cars to the customer, just support basic research in technical areas that bear directly on our most critical problems. And this means basic research like that being done at Sandia Livermore."

Agnew continued, "We in the automotive industry have found research done here at Sandia Livermore of direct use to us in developing more fuel-efficient automobiles, and the automotive industry is only one example . . . And now I say that work must continue. We have the facility here to do it; there are a great many challenging and important problems left to be researched. No matter how hard the times, let's get at it," he concluded.

Also on the program were Sol Penner, professor of engineering physics and director of the UC-San Diego Energy Center; Dan Hartley, manager of the Sandia Combustion Sciences Department; and John Marion, supervisor of SNLL's Combustion Engineering Division.

Following the talks, the group moved outside to cut a ribbon with a blowtorch, utilizing the simple flame as a scissors.

## feed back

*Q. "There's gotta be a better way" to handle carpool parking. Look what happened to me and multiply it by? I had an appointment off base today, so I drove [not my regular day] in the carpool. When I returned from my appointment, my carpool parking spot was taken—as were all others—presumably by late-arriving Lone Rangers. I spent 15 minutes looking for a spot and then another half-hour calling my carpool buddies to tell them where the car was hidden. It seems to me that management should take something more than a "hands-off" attitude toward the problem, considering the amount of time wasted.*

*[I liked it better when carpools were issued parking places—I saw no problems with that system and lots of advantages.]*

A. We appreciate your problem with respect to availability of carpool parking. Unfortunately, no single carpool parking system is completely satisfactory under all circumstances. We received an inordinate number of complaints on the assigned parking space system concerning unused spaces infringing on available open parking.

To date, the present system is the most satisfactory one, giving consideration to factors such as parking facility use, employee convenience, rule enforcement, and company administrative burden.

We would, however, give consideration to any suggestions for a workable alternative to the present system which does not place additional administrative and enforcement burdens on the Security organization.

D. S. Tarbox—3400

*Q. When the big candlepower cutback took place a couple of years ago, and half of the overhead lighting was disconnected in many buildings, all the fluorescent tubes were left in place. Assuming the reduced lighting is permanent, what is to become of those unused tubes?*

A. The unused tubes will be reused when relamping is done. We didn't remove the unused tubes at the time of the lighting reduction because of the storage problem.

R. W. Hunnicutt—3600

*Q. Couldn't our Finance office utilize the system used at our Credit Union and banks whereby customers stand in one line, and branch off to the next available teller? I usually end up in the "wrong" line, and people who have been in there a shorter time than I have get waited on first at a different teller.*

A. We have investigated the possibility of using a queue line to regulate traffic approaching the teller windows. Plant Engineering has informed us that we don't have enough room to make it practical. Usually the three teller windows can accommodate the accumulating traffic with easy switchover to an available teller if one line is longer than others.

R. B. Yoder—6020

## Greenhouse Gives Warmth, Extra Room

To add a greenhouse to your house, you don't have to be born in a lumberyard and descended from an old line of carpenters—but such a background sure doesn't hurt. Fred Norwood (5533), the latest chip off this ancestral block, was telling us how he personally built his attached solar greenhouse at a cost of \$6000.

"I'd been thinking of doing this for a couple of years because my house is in an ideal location," says Fred. "It has a north-south orientation, it's on a wide street, and there's no tree blockage across the street. I drew up the plans myself, although I benefited from the ideas of other Sandians who also have built greenhouses.

"I sited the greenhouse over the existing front door and two windows, and put in a new entrance. My greenhouse's main features are thick adobe walls at each end, a flagstone floor over a gravel base which serves as thermal mass, clerestory windows, and vent windows along the lower front. The roof is 3/4-inch plywood on 2x8 rafters, and the front is double-pane glass. I decided against a slanted glass wall because they're prone to leakage and reduce the available space.

"In effect," reports Fred, "since the greenhouse has added about 300 square feet of living space to the house, I have an extra room which is more pleasant than the rest of the house. If it's sunny, even with snow and cold winds outside, the temperature in the greenhouse goes up to about 70 degrees. The whole family enjoys reading and having meals in the greenhouse. I estimate that in the summer the inside temperature could get up to 140 degrees, and then I'll open the front vents and the clerestory windows. I haven't made any detailed comparisons yet, but the heater is definitely running less. The greenhouse was finished on Dec. 1, but our mild winter hasn't really put it to the test. For now I can also enjoy the energy credits I can claim on my income tax."



FRED NORWOOD puts the finishing touches on his attached solar greenhouse.

## Fun & Games

**Corporate Cup**—This event, scheduled for the weekend of May 16, has already attracted some 90 or so sign-ups. But the more the merrier and, if you're interested, send your name, organization and phone number to Tom Lenz at the Coronado Club. You'll be contacted later about practice sessions and other details. Sandia teams won the Corporate Cup last year, competing with Los Alamos, PNM, Digital and others. Some 12 events, ranging in length from 100 metres to 10 km, are offered to men and women contestants.

\* \* \*

**Biking**—Walt Joseph (1713) dropped off a supply of entry forms for the 9th annual Tour of the Rio Grande Valley which is set this year for May 3. The century ride starts at the UNM campus, heads south to the Belen area and returns to the campus. Pick up entry forms at the LAB NEWS trailer next to Bldg. 814.

\* \* \*

**Basketball**—An open tournament is being sponsored by the military and the Labs Recreation Program. It will take place March 27 to 29, with different divisions according to skill level. Call Rec Manager Tom Lenz, 4-8486, for more information.

\* \* \*

**Softball**—The answer to the question "Is there softball after 55?" is yes! Tom Lenz at the C-Club is putting a team together to respond to a challenge from the Base military. Call him on 4-8486 for information on this and on women's slowpitch softball. The Labs softball league is trying to organize a women's division this season and needs 12 to 15 players.

\* \* \*

**Arts & Crafts**—Beginning Ceramics is the first in a series of arts and crafts classes to be offered by the Labs Recreation Program in cooperation with the Base Arts

& Crafts Center. Cost is \$4 for the four hours of instruction, and classes start as soon as six people sign up. Contact: Tom Lenz, 4-8486.

\* \* \*

**Dancing to fitness**—The Trumbull Community Center is offering a course in something called DanceFIT, which is described as "... a fun, safe, total dance-exercise program backed by extensive cardiovascular and aerobic research." Classes run on Mondays and Wednesdays from 6:30 to 7:30 p.m., and course registration is open through April 1. The 20 lessons cost \$35. The Center is at 419 Pennsylvania SE. Contact: 293-8598 or 298-5181.

\* \* \*

**Golf**—SEGA (Sandia Employees Golf Association) starts its 1981 season with a two-man, best-ball tournament at Los Altos April 4. Don Hosterman (4542), SEGA VP, states that all previous SEGA members should have received their new application forms by now (and the \$4 membership fee is due). Anyone interested in joining SEGA should give Don a call, 4-2036. The fee covers league play, handicapping, tournaments, a banquet and trophies.

\* \* \*

**Youth activities**—In our last issue we carried a map of the Base and its many facilities, and we've since learned that we managed to leave out the Youth Center, located in Bldg. 219 just west of the Texaco service station. Its programs are open to children of Sandians, ages 6 to 18, and there is an extensive group of activities: T-ball (ages 5-8), Little League (8 to 13), girls' softball (9 to 18), soccer (8 to 16), tennis instructions, Explorer Post 1606 (14 to 21), piano and guitar instruction, and dance classes in ballet, disco, tap and others. Most activities involve a nominal fee. More details: 4-9975.

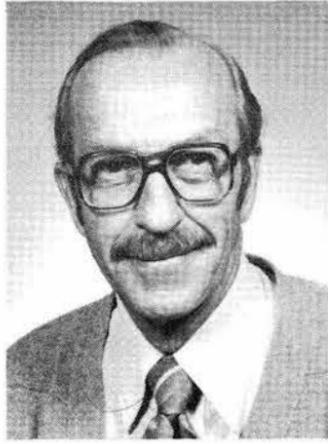
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**Bowling**—The recent No Tap Tournament went so well that the last tournament of the year on April 11-12 will have the same format. Winners in the March 7-8 tournament were Ernie (1471) and Janice Montoya with 1586. High game honors were shared by Donna Sanchez and Glenn Folkins (4337) with scores of 288. Men's high series of 766 was rolled by Ed Dacey.

\* \* \*

**Running**—A series of "All-Comers" track and field meets is being held by UNM for any competitor, male and female, age 15 and up. All runners compete together against time. Entry fee is \$2, and the meets run from 12:30 to 2 p.m. on the following Sundays: March 22, 29, April 12, 19, and May 3, 24. The release doesn't state, but we assume the meets are being held at the University stadium. LAB NEWS has a copy of the various events planned for each meet.

**MILEPOSTS**  
**LAB NEWS**  
**MARCH 1981**



Ed Domme - 2629 30



Ray Schultz - 1420 35



Vicente Garcia - 3423 30



Matt Bustos - 3423 30



Dorcas Entley - 2341 30



Charles Eisenhower - 2551 25



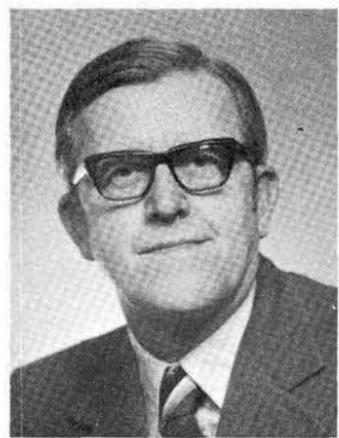
John Birdsong - 1116 30



Bob Middlesworth - 1725 30



Bob Hewes - 3741 30



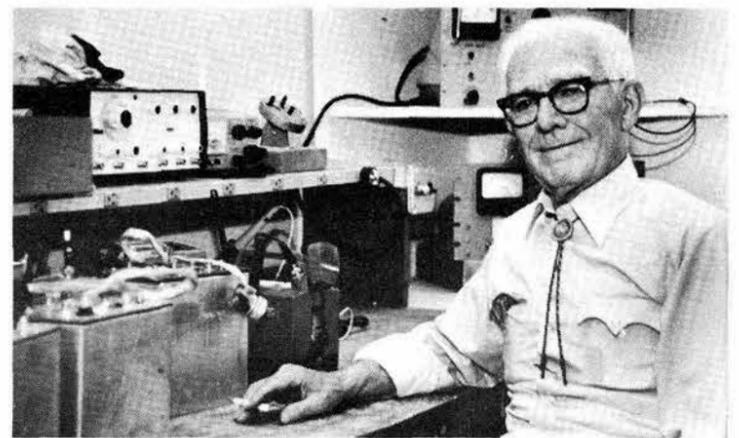
Al Skinrod - 8452 25



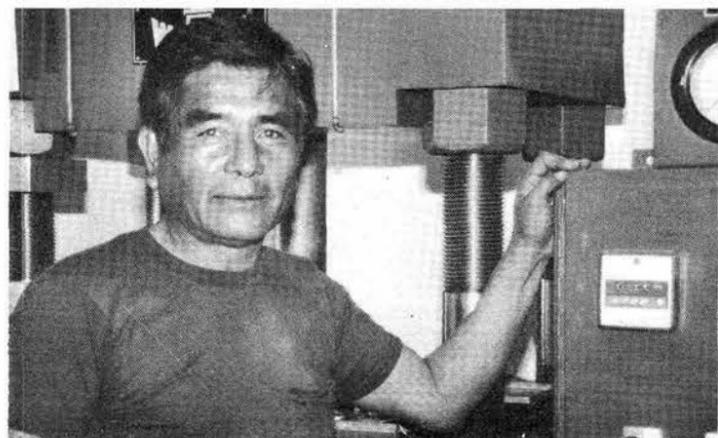
Debra Vosburg - 3533 10



Dave Watt - 1471 30



John Colwell - 1531 30



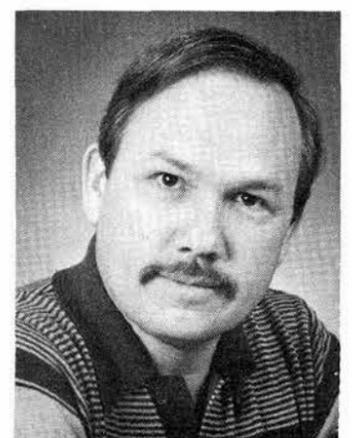
Geronimo Fragua - 1471 15



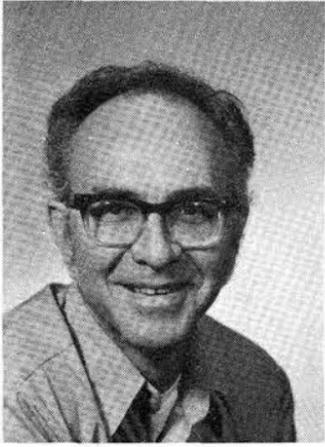
Douglas Buck - 2625 15



Jack Sublett - 1480 30



Bill Childers - 8115 20



Bill Geck - 3153

20



Ernest Niper - 1525

25



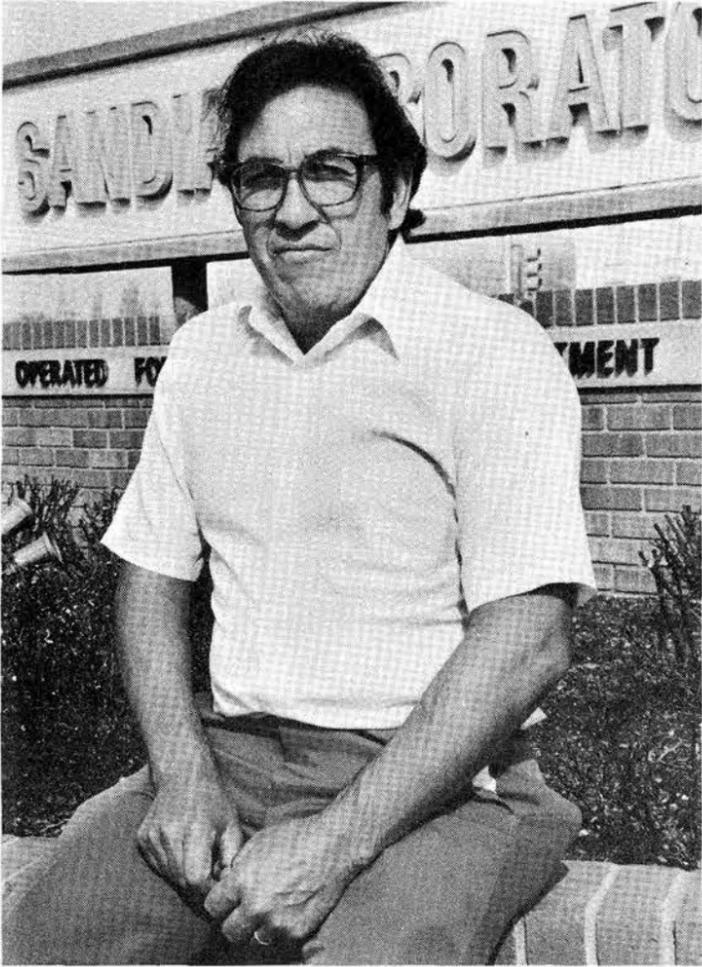
Don Hosterman - 4542

25



Jerry Jercinovic - 3440

35



Gilbert Apodaca - 3155

15



Sam McAlees - 5633

25



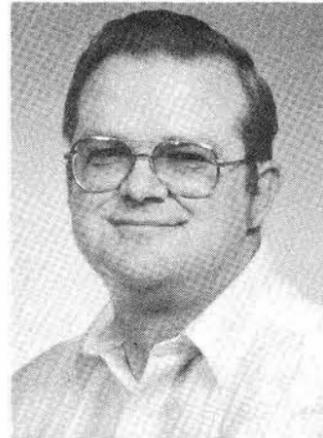
Muriel Iverson - 1522

25



Charles Drummond - 8271

25



Bob Bedford - 8461

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Fred Mitchell - 3212

30



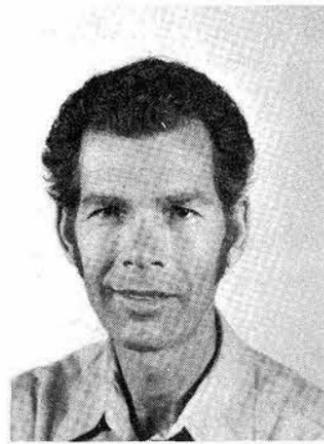
Ed Barber - 1472

25



Ben Bright - 3425

35



Roque Feliciano - 1551

25



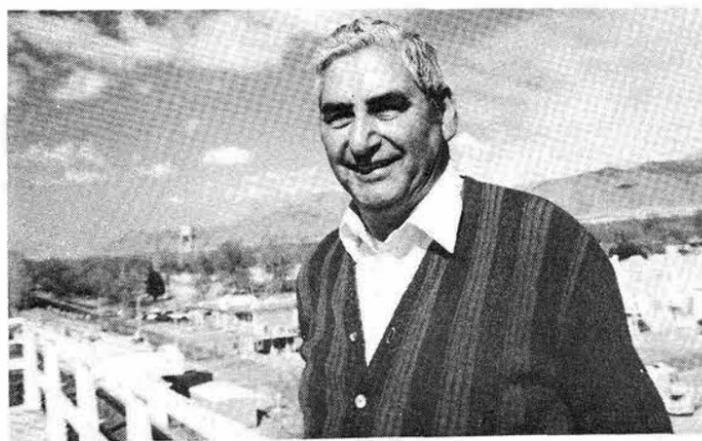
Bob Luikens - 4343

25



Bill Kraft - 1410

35



Joe Maldonado - 3613

30



Cid Dalin - 3154

25



Tom Edrington - 5627

20



Serafico Carrillo - 5500

25



## Favorite Old Photo

GRANDDAD came to New Mexico in the early 1900s from New York, chiefly to recover from tuberculosis at his brother's ranch in Roswell. He was a young physician, and this photo shows him (second from left) as a premed student at Bethany College in 1895. He later graduated from Cornell Med School. After recuperating, he moved to Elk, New Mexico, and practiced, riding as far as Carlsbad to do his doctoring. Ultimately, Granddad came to Albuquerque and, with some colleagues, opened the Women's and Children's Hospital on Central Ave. The site is now occupied by the Travelodge, just west of the freeway. He died in 1945—his name was Lucien Rice. (Lucien Rice 3rd—2352)

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Deadline: Friday noon prior to week of publication unless changed by holiday. Mail to: Div. 3162 (M0125).

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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

- SANDIA LABS caps, \$5; T-shirts, \$6; windbreakers, \$15; Tech Area color aerial views, \$5 & \$15. S. Hwy. 14 Village Project. LAB NEWS (next to Bldg. 814).
- 3-STRAND, 67-fetish, white clam shell heishi necklace, \$309; desk & chair, \$180. Conklin, 298-8217.
- GOLF CLUBS, MacGregor starter set for youths, irons, woods, putter, bag, \$40. Perkins, 299-8941.
- CAMPER SHELL, fits LWB, 28" high, L'I Colt, paneled w/sliding front window, \$190 or best offer. Bair, 296-3505.
- PIONEER PL-12D manual turntable w/Shure M91ED cartridge/stylus, w/dust cover, \$35. Roesch, 296-8248.
- PIANO, antique Holland upright grand, ivory keys, \$1000. Johnston, 821-3325.
- BOX SPRING & MATTRESS for dbl. bed, \$10. Padilla, 877-2116.
- FREE to good home: male dog, 2 yrs. old, Spaniel mix, medium sized, white w/black ears. Perea, 898-8328.
- SOFA & matching chair upholstered in choc. brown frieze fabric, \$50 for both. Geatz, 266-4806.
- NEW TARPS: 8x12, \$18, 8 1/2 x 13, \$30; rope hoists, 1/4" rope, \$10; 1/2" rope, \$15; 1/8" rope, \$10. Stuart, 299-9190.
- COMPTON PICTURED ENCYCLOPEDIA, 15-vol. set, never been used, '61 edition, \$50. Shaffer, 836-1610.
- MINK STOLE, \$200 or best offer. Pierce, 821-7536.
- WOOD BURNING STOVE, princess style Shrader brand, free-standing, 1 yr. old, \$425. Wilson, 299-3046.
- CARPET, 21'x19' plush nylon, beige, foam padding, \$50; Craftsman hand lawn mower, \$20. Sprinkle, 822-0326.
- GLASS fireplace doors, 25" tall, 40" wide w/screen. Edenburn, 869-2911.

- CALCULATOR, HP-97 programmable, warranty, \$525. Burgeson, 898-5859.
- CROSS-COUNTRY SKIS w/bindings, Huski made in Colo., laminated wood/fiberglass, waxable P-Tex bottom 195, high camber, \$55. Andersen, 294-8624 after 5.
- 5 HP air-cooled outboard motor, remote gas tank, \$120. Cleveland, 299-7420.
- SCREEN DOOR, 1/2 wood, 1/2 screen, sturdy, needs a new handle, \$15. Campbell, 256-1015.
- OXY-ACETYLENE torch outfit, oxweld welding torch w/five tips, cutting torch, regulators, hose, \$80. Mason, 299-2836.

- SEARS 20" girl's spyder bike, thorn-proof tires, \$50. Lewin, 898-2303.
- KENMORE sewing machine in mahogany cabinet, attachments & bobbins, \$50. Eckart, 299-3888.
- TWO SCHOOL DESKS, \$10 ea., Cummings, 292-0524.

- TEXAS INSTRUMENTS TI99/4 home computer w/RF modulator & 3 plug in modules & dual cassette cable, \$600. Mercer, 821-6449.

- YASHICA 35mm camera, \$60; Sound Design stereo, \$50; 10-spd. boy's bicycle, \$50; single spd. man's bicycle, \$30. Brigham, 296-8174.

- TELEPHOTO, new Rokinon 135mm F2.8 for Pentax K or Ricoh XR mounts w/case & UV haze filter, \$90. Chu, 293-1222.

- POOL FILTER, used, good for parts, Sears Diatomaceous earth type, make offer. Liguori, 255-7551.

- PIANO, Story & Clark, small upright, \$650. Hartman, 292-6560.

- 3 1/2 x 6' GLASS table top; 1.6 liter Pinto/Capri/Fiesta engine; TR7 & Fiesta 4-spd. trans; 2 tan bucket seats. Seager, 299-4137.

- 2 BAR STOOLS, black leather, \$20 ea. or 2/\$35; Sears 12 HP garden tractor, 48" mower w/full size trailer, \$1050 or \$975 without trailer. Sumlin, 869-9124.

- YOUTH BED, adjustable metal frame w/rollers, box springs, very firm mattress, set \$30. Kinsey, 294-2690.

- DINING ROOM SUITE: buffet, 6 chairs, table w/pad, extends, seats 12, cherry wood, \$550. Fox, 266-6606.

- SHELL for light pickup, made by Leer, fits Courier, Luv, Datsun, Toyota, etc., \$250. Fisher, 298-0526.

- FREE to good home, Springer Spaniel cross female, spayed, w/all shots. Shortencarrier, 292-3575.

- TRAILER HITCH receiver for Chev. or GMC truck from '76-'80, all bolts & accessories intact, \$100. Wheat, 821-2201.

- ACOUSTIC TILE: work bench; hedges, Arizona junipers; handmade afghans; misc. cinder blocks, tree well blocks, bricks; freestanding fp. Mozley, 884-3453.

- BABY BED w/mattress & dresser, \$40. Belding, 294-7443.

- TWO 14x8 & two 15x10 Jackman white spoke rims w/tires, 4 1/2"-5-bolt pattern, \$25 ea., Reif, 299-2665.
- PAINTED FURNITURE for children, chest, \$30; nightstand, \$15, small work table, \$10; Sears Jungle Jim, \$40. Worrell, 299-0381.
- SCOTT FM receiver, \$55. Stanley, 255-3083.
- COLT ARMY .38 Special, 4" barrel, \$125. Kraft, 821-6417.

#### TRANSPORTATION

- 71 1/2-ton pickup, LWB, AT, PS, PB, AC, \$1500. Hesch, 881-9874.

- 73 NORTON 850 Commando, windshield, saddle bags, just overhauled. Edgar, 884-8567.

- 80 KAWASAKI KZ 440, 1600 miles, \$1400. Foster, 265-0069 after 5.

- 70 CADILLAC convertible, new top, tires & paint, \$3000 or best offer; '76 Corvette, T-top, L-82, 4-spd., red w/black interior, \$7000. Hymes, 243-4198.

- 72 CHEVY NOVA, 2-dr., AT, PS, PB, lifetime JC Penney battery, 87,000 miles, \$800 or best offer. Armstrong, 265-1045.

- 79 THUNDERBIRD, PS, PB, AC, AM-FM stereo cassette, 26,000 miles, 50,000 miles or 5-yr. major warranty. Duvall, 292-5652.

- SUNFISH RACING RIG, barely been wet, \$699; matching Dilly tilt trailer, \$299. Baxter, 344-7601.

- 16' TAHITI speedboat, 455 ci Olds engine w/dual Holley carburetors, Berkley pump, metallic blue, \$3500. Sanchez, 877-7857 after 5.

- 74 DATSUN pickup, 64,500 miles, always garaged, \$2080. Mason, 299-2836.

- BICYCLE: Lenox Columbia 10-spd., 21" frame, 1" wheels, low miles, \$60 or ? Branstetter, 292-6369.

- 73 HONDA CB500-four, plexifairing, other extras, 40-45 mpg, \$975. Roybal, 864-2510 after 6.

- 74 DATSUN 260-Z, fresh rebuilt engine, 4-spd., mag wheels, needs paint, cosmetics & flare for front fender, \$3450. Battles, 294-4373.

- 71 4-WD SCOUT, AT, V8, over-size tires, w/dry gold panner w/engine, both \$2750. Norris, 299-4717.

- 76 PONTIAC LeMans, 350 V8, AC, AT, PB, PS, 36,000 miles. Duvall, 881-4406 after 5.

- MOPED, 1700 miles, \$250; 10-spd. Raleigh bike, \$50. Hopper, 281-1890 after 5.

- 79 FORD Fairmont 4-dr., 6-cyl., AT, PS, AC, radial tires, radio, 3700 miles. \$4500. Romero, 298-8586.

- 71 MONTE CARLO V8, AT, PS, PB, AC, vinyl roof, bucket seats, FM radio, \$995. Zurawski, 268-9511 after 6.

- 72 GMC 1/2-ton, \$1400. Clement, 281-2442.

- WARDS Sea King boat, oars and 2 flotation cushions, in water twice, \$150. Kingsley, 299-1226.

- 78 280Z, AM-FM cassette, AC, 4-spd., louvered sun screen, black w/multi-toned silver stripes, 18,000 miles. Hartman, 292-6560.

- 78 CORVETTE, silver anniversary limited edition, fully loaded, new tires, silver color, \$10,000. Little, 881-3270.

- 77 T-BIRD, 64,000 miles, 15-20 mpg, \$3900. Sumlin, 869-9124.

- 78 CHEVY pickup, SWB, 1/2 ton, 305 V8, AT, PS, new tires. Farmer, 865-9275.

- '60 VW BUG, \$350. Fisher, 298-0526.

- 76 FORD pickup, Supercab, 6-cyl., 3-spd., \$3500. Castillo, 836-2467.

- 70 FORD Maverick, 2-dr., new AT, 6 new tires, AM-FM & more, \$700. Kraynik, 294-1043.

- '66 YAMAHA YL1 100cc, \$150. Barham, 298-7304.

- 79 CHRYSLER LeBaron Medallion, PS, PB, AC, PW, CC, PS, vinyl top, tan on tan, 14,000 miles, \$5995. Hernandez, 268-5000.

- 79 CHEV LUV 4x4, 4-spd., rear slide window, AM-FM cassette, 28,000 miles, \$6500; '78 Yamaha SR 500, \$1300; new white tool box for small PU, \$90. Montoya, 265-2559.

- 79 HONDA Accord LX, all accessories, 5-spd., reg. gas, \$200 below book, 35,000 miles. Sharp, 867-2815.

- 79 VW Rabbit, 4-spd., AC, AM-FM stereo cassette, low miles, 28 mpg city, \$4995. Harris, 821-8524.

- '69 K-5 Chevy blazer. Condit, 281-3788.

- BICYCLE, ladies Schwinn Suburban 10-spd., w/headlight, \$75. Stanley, 255-3083.

#### REAL ESTATE

- 20 ACRES meadowland beside mountains, \$500 down, 9 1/2% interest, \$18,000, South Hwy. 14, 33 miles from Albuquerque. Dytzel, 881-4973.

- 3-BDR., FM, all brick, NE heights, covered patio, security wrought iron, elec. garage door opener, corner brick fp, \$62,500 firm. Jackson, 296-2548.

- 3-BDR. HOUSE, 1 1/2 baths, almost 2 yrs. old, 8% assumable loan, Rio Rancho. McFadden, 892-6167 or 298-4800.

- SW VALLEY, 3-bdr., 1 1/2 bath, den w/fp, 900 sq. ft. workshop, lg. lot, extras, terms, 9 1/2% assumable \$50,000. Paylor, 877-8953.

- APPROX. 30 acres w/3-bdr. house, Mora, NM area, \$50,000, terms. Lucero, 836-2467 or 877-6264.

- IDLE STARTER HOME, 3-bdr., 1100 sq. ft., assumable mortgage at low interest, Morris-Lomas vicinity, 4 miles from Sandia. Menicucci, 292-2688.

- 3-BDR. tile block home, 1950 sq. ft., assumable 10-5/8% mortgage, low equity, Ridgecrest area, 3 1/2 miles from Sandia. Corradini, 266-4307.

- 74 LeBARON mobile home, set in NE adult park, 14x70, 2-bdr., 2 full baths, new built-in appliances, \$13,900. Battles, 294-4373.

- 1/2 INTEREST in Hawaii condominium at Kihei, Maui, completely furnished, beach, swimming pools, tennis courts. Parker, 821-5999.

- 71 TOWN & COUNTRY, 14x70, 3-bdr., 2 bath, partially furnished, Terrace Park, Zuni & Wyoming, adults only. Walko, 292-3193.

- MOUNTAIN VIEW, 2.5 acre Placitas lot w/paved access, community water system, underground power available, \$20,000 or best offer. Stanley, 255-3083.

- ASSUME 8% loan w/moderate down, \$45,000, 3-bdr., 1 1/2 bath, single car garage, workshop, storage shed, consider trade on equity. McClure, 294-3095.

#### WANTED

- HUMIDIFIER, cabinet style; small anvil; trailer hitch & ball, 1 1/4-1 1/2 dia. Brown, 281-3608.

- TRAVERSE curtain rods, 1 or 2-way, to be donated to Neighborhood Drama Project for children's theater. Shepherd, 296-1238 or 247-2552.

- MINI-HOME: responsible family would like to rent a mini-home July 1 to July 23. Ripi, 884-4683 after 5.

- BASKETBALL backboard and hoop for home roof or wall installation. Fisher, 881-8072.

- RUGER MINI-14 model 181 or 182. Miller, 296-4531.

- COMPACT pickup, '74-'78, prefer front-wheel drive, good condition. Norris, 299-4717.

- GOING TO world Sci-Fi convention in Sept. in Denver, anyone interested in going & cutting expenses? Barbera, 299-6045.

- INFANT CARE, your house or ours, mature person caring for no children (except possibly own), 8 a.m.-6 p.m. M-F, position open about June, references required. Sweeney, 247-4866 after 6.

- OLD but serviceable or repairable scientific & engineering instruments: e.g., sextants, microscopes, transits, barometers, balances, clocks, theodolites, etc. Hughes, 299-6674.

- 12' ALUM. V-HULL BOAT, reasonable or will trade for 14' flat bottom John boat in good condition. Worrell, 299-0381.

#### WORK WANTED

- STUDENT wants light cleanup & hauling. Bryan Fisher, 298-0526.

- MARRIED security guard/law student will house sit all summer in exchange for no/low rent. Shepherd, 299-9066.

## How Reasonable Can You Get?

**HAPPY HOUR** tonight features steamship round of beef and baked ham on the buffet menu, Dennis Robertson entertaining in the main lounge and Natural Persuasion playing for dancing. Happy Hours start right after work on Fridays and prices (very reasonable) are in effect all evening.

**TOMORROW** is the big '50s-'60s special at the Club with a super dinner and super band. It's too late for reservations, BUT you can mark your calendar now for the biggie in April. It's Casino Night scheduled Saturday, April 25. The Club is transformed into Las Vegas on the Rio Grande with associated games of chance, prizes and the country music of Elton Travis.

**NEXT FRIDAY**, March 27, is another sit-down special featuring your choice of beef kabobs or mini lobsters for \$7.25. Scooter Ron entertains in the lounge and the Stardusters hold the ballroom. For guaranteed dinners, make reservations and pick up tickets by noon, Thursday, March 26.

**THE REDONDO ROUND DANCE CLUB** begins a new round of lessons on waltz steps starting Thursday, April 2, at 7 p.m. This series will run for three months with lessons each Thursday night taught by Fred and Kay Haury. Cost per C-Club member couple is \$20. For more info, call Fred and Kay at 298-5050, or Betty and Charlie Clendenin at 299-2071.

**TRAVEL DIRECTOR** Frank Biggs (4231) reports that the pre-trip meeting for the Disneyland/Catalina group is scheduled at the Club March 26 at 7:30 p.m.



CHANGING the oil in your car is a cinch (and saves bucks), but then what do you do with the stuff? Motor Pool Division 3421 under Stan Brooks has installed this dump tank just inside the Eubank Gate for use by Sandians and other Base people. The dumped oil is being recycled by a city firm. The recycle facility is the result of a suggestion contained in a Feedback inquiry.

There may be a couple of seats left on this one.

Today is the last day to sign up for the Puerto Vallarta trip (May 5-12, \$399). Still open is the Mazatlan trip, June 1-8, \$354. The one-day bus trip to Chaco Canyon (April 25, \$20) includes drinks and snacks

on the bus, and only a few spaces are left.

Also open is the charter bus tour to Las Vegas/Hoover Dam, three nights in Las Vegas, May 24-27 for \$132.

See Frank in the lobby tonight between 6 and 7 for more info.

## Take Note

Jack Canute (1587), Sandia's resident manager at the Kauai Test Facility in Hawaii, recently was presented with the Boy Scouts' Silver Beaver award by Hawaii's Governor George Ariyoshi. The award, the highest given for distinguished service to scouting, was made at the Aloha Council's annual Boy Scouts of America dinner in Honolulu. Jack is district chairman for the Kauai District. The citation reads, in part: "Camp Alan Faye on Kauai has been expanded and improved due to the planning, promotion, and many projects under his leadership . . ."

The annual Friends of the Albuquerque Public Library used book sale is taking place this weekend, March 20 and 21. Hours are 9:30 to 4:30 and, on the 21st from 2 to 4:30 p.m., you may fill one or more grocery bags with books at \$1/bag. The sale is held at the Main Library, 501 Copper NW.

"Sandia's Photon Simulation Capabilities" is next in the seminar series on transient electrical, optical and chemical phenomena. Gerald Zawadzka (4233) and Larry Posey (4232) are the speakers, and the seminar takes place March 27 at 10:15 a.m. in Bldg. 815 (inside).

Attention retirees: the Annual Retiree Picnic in Albuquerque is scheduled for Thursday, May 28. Invitations will be

mailed to all retirees the latter part of April.

The Albuquerque Gem and Mineral Club will hold its 12th annual Gem and Mineral Show on March 27-29 in the agricultural exhibits building at the NM State Fairgrounds. Sandians working on the show include club president Paul Hlava (5822), special programs; Bob Ault (1531), gold panning; Tom Massis (2516), show facilities; and Lloyd Keller (4748), show chairman. Wayne Fisher (DOE retiree) arranged for the 10 dealers who will be present.

A Purdue alumni meeting will be held March 26, 7 p.m., at the Mama Mia Spaghetti House, 1430 Carlisle Blvd. NE. For more information, contact Sidney McAhren, 296-5174.

Albuquerque Academy is sponsoring a jazz improvisation clinic and a concert featuring Tony Campise, noted jazz saxophone and flute soloist, today. The clinic, where Campise will discuss and demonstrate techniques of jazz improvisation, takes place this afternoon at 3. The session, of interest to junior high and senior high musicians, is free. The concert, featuring Campise as guest soloist performing with various Academy music groups, starts tonight at 8 at the Academy. More info from Ken Adkins, Academy music director, 296-0169.