Diamonds may be the key to smaller microelectronics

Sandians put them to the test

By Dawn Hipsh
Summer Science Writer

What began as weapons-related research may someday allow supercomputers to be carried around like laptops. A small 5x5-cm cube being tested at Sandia may hold the key to a microelectronics revolution.

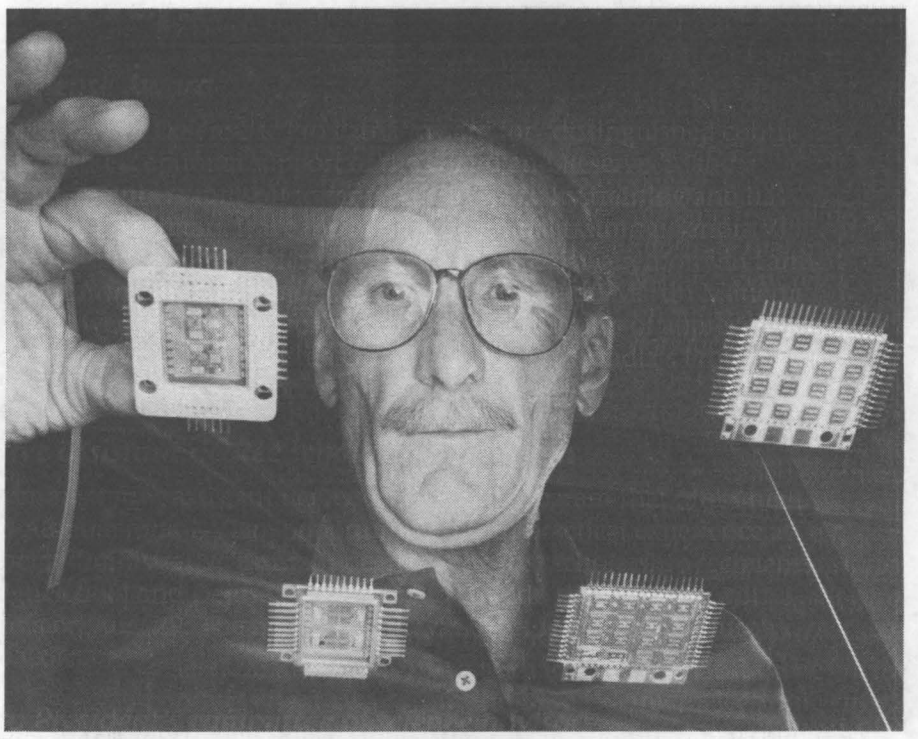
The cube consists of four plates stacked together, each plate containing 16 closely spaced Sandia-developed assembly test chips to thermally simulate high performance circuits. Integrated circuits spaced this closely can easily produce enough heat to destroy themselves. To alleviate this, chips are placed on a special substrate that conducts heat away from the chips to the edge of the substrate. If not removed from the substrate, the heat would again build and pose a threat to the chips. Liquid cooling along the edge of the substrate solves this problem, permanently removing heat from the system.

Heat is the enemy

More important than the device, known as a multichip module, and its cooling system is the substrate that makes it all possible. While recent research has focused on superconductivity and semiconductors as a means of miniaturizing electronics, Sandians are exploring another possibility — synthetic diamond. Made by a process called chemical vapor deposition (CVD), synthetic diamond's nearly flawless crystal lattice gives it an extremely high thermal conductivity, a must for high density microelectronics.

"Heat is the enemy of most microelectronic circuits," says Len Napolitano, Manager of Scientific Computing Dept. 8117. "Unfortunately, heat is the normal by-product of circuits. If the circuit is to operate properly, the

(Continued on page 6)



ELECTRONIC JEWELS — Don Johnson (contract employee) examines multichip module plates being developed and tested by Sandia. The module's assembly test chips are built on thin diamond substrates that quickly remove heat from the system. Each plate contains 16 chips the size of one square centimeter. (Photo by Randy Montoya)

Sandia National Laboratories

Sandia LabNews

Vol. 46, No. 17 August 19, 1994

New ethics director says Sandia's ethics program parallels Martin Marietta's

By Howard Kercheval
Lab News Staff

Sandia's new ethics director, Jack Dickey, checked in early Monday morning and began getting his feet wet immediately — really. "I hope this isn't an omen," he said, with a chuckle, "but when I moved to Luxembourg last October, it was raining the day I arrived and it didn't stop for six months."

Having spent a tour as field commander for the Defense Nuclear Agency at Kirtland AFB, however, he knows that isn't likely in New Mexico, despite a record-breaking steady rain the whole night before he reported for his first day of work at Sandia. (The 2.12 inches of rain measured at Albuquerque International Airport set a National Weather Service record for rainfall accumulation there during a 24-hour period.)

The rain certainly didn't dampen his enthusiasm for his new post, which he says covers an area vital to any organization.

"Without ethical standards, a set of values and codes an organization can live by and enforce, no organization would endure for long," he says. "I believe it's the very backbone of any organization, and I'm fortunate to be joining an organization that has had since its beginnings a foundation of extremely high values and ethics."

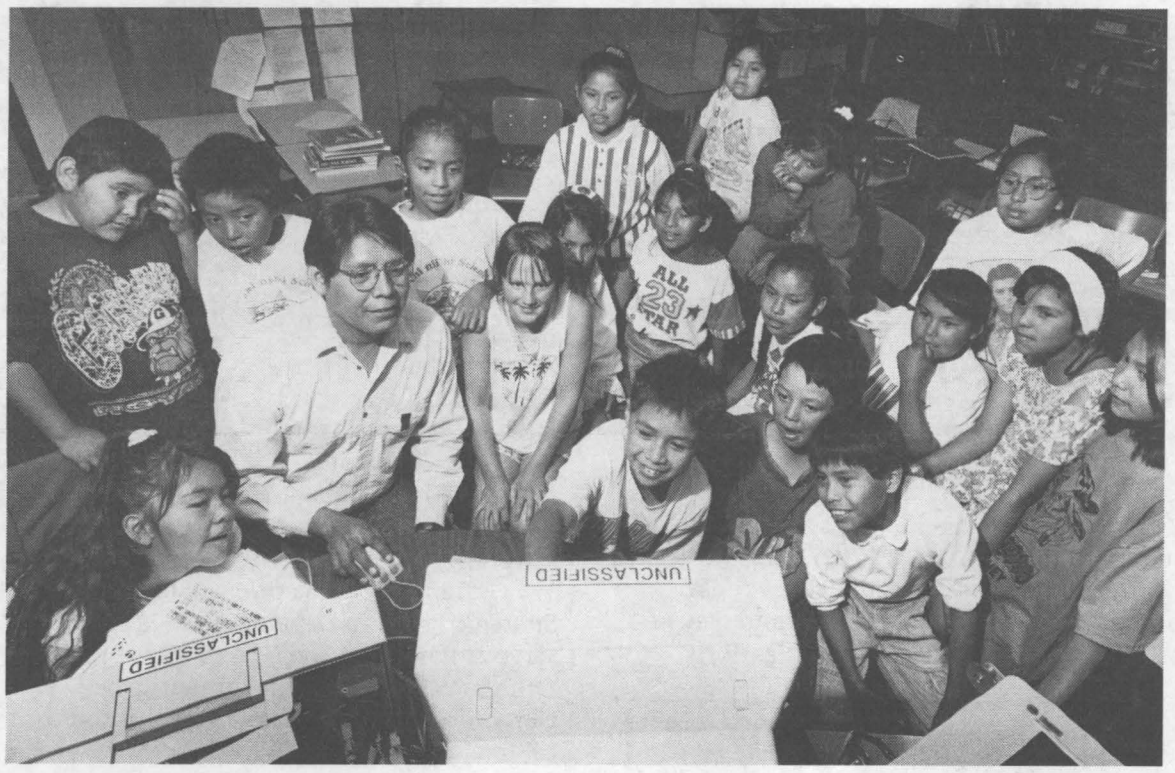
Jack takes over the post of ethics director (12700) from VP Dan Hartley (6000), who has filled it in addition to his other duties as Energy and Environment VP since early this year (*Lab News*, March 4).

Martin Marietta ethics background

Jack was involved in creating guidelines for the ethics post when he assisted in development of Martin Marietta's proposal seeking the management and operating contract for Sandia.

"One of the primary themes we used was Martin Marietta's very strong ethics program at

(Continued on page 6)



DRAWING INTEREST — Ryan Hosteen of Design Services Dept. 2783 demonstrates computer-aided drawing techniques to a roomful of students at Pueblo Pintado School in rural northern New Mexico. He says the students are very much interested in drawing and artwork, and he wants to show them that science and engineering can be fun. Ryan is one of nearly 200 Sandia Science Advisors igniting the sparks of scientific curiosity in schools from Albuquerque to Alaska. See story on pages 4 and 5.

This & That

Dogs to have their day? – "Mr. Voicemail" Gary Shepherd (13411) called several days ago to ask whether Sandia plans to follow up the "Take Our Daughters to Work Day" and the recent "Take Our Sons to Work Day" (see page seven) with a "Take Our Dogs to Work Day." He says his cocker spaniels are upset that they haven't yet been invited. (Gary didn't say whether his dogs read the *Lab News* or whether he reads it to them, but something tells me he's long overdue for a vacation, and I suggest that his co-workers keep a close eye on him.)

Anyhow, now that our children have had their visits, I suppose we should start planning for the next group. How 'bout "Bring Your Weird Uncles to Work Day?" I could bring a minibus full of them! Seriously now, congrats to everyone at Sandia who helped make the sons and daughters days so successful. What a great idea!

* * *

The Galvin visit – Robert Galvin and six more members of the Secretary of Energy's Task Force on Alternative Futures for the DOE National Labs visited Sandia this Tuesday, Aug. 16. That was after this issue's deadline, so we'll report details in our next issue. Laboratory Development VP Paul Robinson (4000) said Wednesday morning he was very pleased with the visit and that Galvin was liberal in praising Sandia's contributions and future plans. The task force is studying the role and responsibilities of all major DOE labs and will make recommendations to Secretary of Energy Hazel O'Leary by February.

* * *

Living the high life in Texas – Sandia retiree Robert Sylvester, who left the Labs in '82 after nearly 30 years of service, wrote recently to relate his experiences while serving as city engineer in the small town of Granite Shoals, Texas. Bob has worked for about the past five years to get a new water tower approved and built there. Now 69 years old, Bob had to climb the 135-ft tower *seven* times to inspect and approve the work before it was completed this spring. Bob says he realizes many Sandia retirees continue to do interesting things after retiring, but then asks in a completely shameless pun if any other retirees can "top" his experience.

Bob and Travis "T.A." Allen in the early 1970s invented and refined the hot air solder leveler, a revolutionary device used in the manufacture of printed circuit boards. T.A. retired in 1988 after nearly 40 years at the Labs, and he lives in Albuquerque.

* * *

Welcome Col. Guitars! – Media Relations Dept. Manager Rod Geer (12630) isn't the first person to get embarrassed by a computer spell checker, but that wasn't much consolation to him after he recently sent a written announcement back to Martin Marietta headquarters saying that Sandia had hired New Mexico native and former astronaut "Sid Guitars." It is, of course, Sid Gutierrez (see story at right).

As best he can recall, Rod typed Sid's last name correctly, then used his spell checker after completing the announcement. Not recognizing the name Gutierrez, the spell checker suggested "Guitars" as an alternate. Working against a tight deadline, Rod went momentarily brain dead and clicked the "change" icon. — *Larry Perrine*

Sandia LabNews

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MARTIN MARIETTA

Retiree deaths

William F. Peay (76) .....7653.....June 11
Delfin O. Salazar (70) .....7474.....June 12
Donn Stewart (63) .....7471.....June 24
Bruce Barth (70).....1727.....June 26

Organization numbers indicate retirees' positions at the time of retirement and may not correspond to present-day organizations.

Lab News offices are now outside the area

The Employee Communications Department offices are now "outside the area." The department publishes the *Lab News* and *Weekly Bulletin* and administers the Feedback Program.

Our offices remain in Mobile Offices (MO) 172-173 in the northwest corner of Tech Area 1. We're just northeast of the visitor parking lot that's north of Bldg. 800; look for the *Lab News* signs on MO 172. Access is via a single open gate at the northwest corner of MO 172. We will soon open another gate closer to Bldg. 800. Watch for an announcement.

Martin Marietta's President Tom Young announces retirement

Tom Young, Martin Marietta's President and Chief Operating Officer, announced early this week that he will be retiring July 1, 1995. Young will retire following a 33-year career, most recently with Martin Marietta and earlier with the National Aeronautics and Space Administration (NASA).

He joined NASA after graduating from the University of Virginia in 1961. He served in several increasingly responsible management positions, including deputy director of the Ames Research Center, director of the Planetary Program, mission director of the Project Viking Mars landing program, and director of the Goddard Space Flight Center.

Young joined Martin Marietta in 1982 as VP of research and engineering for aerospace. In 1983, he was appointed president of the Baltimore Aerospace division, and later he became president of its Electronics and Missiles group, headquartered in Orlando, Fla. He became president of Martin Marietta in 1990.

Martin Marietta Chairman and Chief Executive Officer Norm Augustine says Young's "insight, integrity, and superior technical and management skills have been enormously important to our success. We will miss Tom's leadership, and I personally will miss his day-to-day friendship. While we would have preferred Tom continuing in his key role, we fully respect his desire to pursue his personal interests. I am pleased we will have his services for another year."

Martin Marietta has managed Sandia National Labs for the Department of Energy since October 1993.

Former space shuttle astronaut will join Sandia Labs Aug. 29

Col. Sid Gutierrez, a former astronaut who has accumulated 488 hours in space on two space shuttle missions, is scheduled to join Sandia Aug. 29.

SID GUTIERREZ

Gutierrez, a native of Albuquerque, left the National Aeronautics and Space Administration (NASA) recently after 21 years in the Air Force. He spent the past 10 years of his career as a NASA astronaut.

Gutierrez's Sandia title will be Manager for Strategic Program Development 9911. He will serve as liaison between Sandia's Work-for-Others (WFO) customers (primarily DoD officials) and Labs program managers and technical line organizations involved in WFO work, says Joe Polito, Director of Program Development and Sector Support Center 9900.

A member of the astronaut class of 1984, Gutierrez flew most recently in April as Commander of Space Shuttle *Endeavour's* STS-59 mission. During that mission, crew members used radar to measure environmental changes and atmospheric pollution on Earth's surface. His first shuttle mission aboard *Columbia* in June 1991 (STS-40) was dedicated to study of the human body.

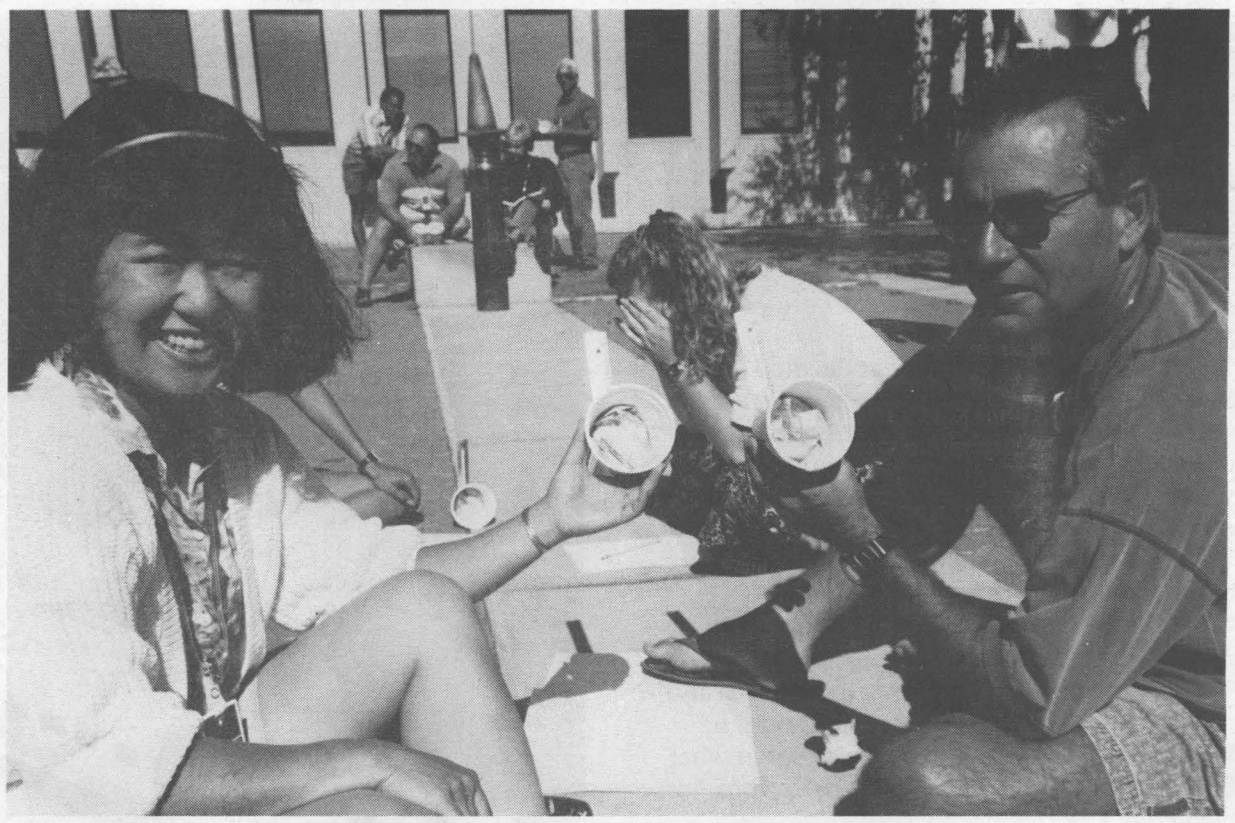
He has also had various technical and managerial assignments for NASA and the Air Force and has logged more than 4,500 hours flying time in approximately 30 different types of aircraft, including the F-15, F-16, F-4, and T-38. — *John German*

SUPER! program integrates science with everyday life

Forty-six teachers study the 'science behind the issues'

By Pat Radin

Summer Science Writer



DEMONSTRATING GLOBAL WARMING — SUPER! program participants Wendy Matsumoto, biology teacher at Independence High in San Jose, and Dennis Lang, science teacher at Channel Island High in Oxnard, hold cups from the heat-trapper experiment, which simulates greenhouse warming.

Science teachers from all over California are going back to school this year with new skills and materials, thanks to a month-long summer institute at Sandia/California.

The 46 secondary school teachers from across the state recently completed the SUPER! (Science Understanding Promotes Environmental Responsibility!) program, an annual project of Sandia's Education Outreach Dept. 8528. Throughout July, teams of teachers from nine school districts — Livermore, Pittsburg, Sacramento, Los Angeles, Vallejo, San Jose, Fresno, Modesto, and Ventura County — received information on how to teach environmental topics, from global warming to plutonium disposal. Many discussions and demonstrations were led by Sandia scientists and engineers working in these areas.

Karen Scott, Manager of Education Outreach, says the program uses SEPUP (Science Education for Public Understanding Program) science modules developed by the Lawrence Hall of Science in Berkeley. "The sequence of activities is designed to take participants from a broad overview perspective to a more in-depth discussion of the science behind the issues," Karen says.

Teachers took SEPUP kits, equipped with all the materials needed for individual experiments, back to their classrooms. They also went home laden with books, manuals, and other teaching materials. The teachers received nine college units for completing the program.

'Cups of global warming'

Teachers were shown how to conduct classroom projects that integrate science with everyday life — for example, taking an inventory of hazardous chemicals used at home. Some projects were very simple, such as covering the top of a paper cup with plastic wrap, leaving another uncovered, and placing both out in the sun. Measuring the temperature difference of the air inside the cup illustrates how global warming works when the sun's energy is trapped. Another project involved watering some seedlings with tap water and others with "gray water" that contained shampoo, to see whether they developed in the same way. (They don't.) The program included tours of such facilities as Sandia's hazardous waste disposal plant and the Evergreen Oil recycling plant in Newark.

Many teachers introduce a more integrated approach to science in their school districts.

"Science isn't just a subject you take for half an hour at school," says SUPER! project leader Beth Fuchs (8714), who works as an experimental engineer when she isn't running the summer program. "Science is a part of your life. That's what we try to put across," she adds.

Beth says the workshops influence not only individual lessons, but entire science curriculum structures, as many teachers introduce a more integrated approach to science in their school districts. This change is supported by SUPER!'s partnership with the California State Department of Education Reform Organization.

'Very useful for my students'

Fresno high school teacher Phyllis Emparan notes an unexpected side benefit — teachers become aware of numerous technical jobs their students can aim for after high school. "Here at Sandia, we find out about a lot of good jobs that take just one or two years of college — for example, ultrasound technician, laser specialist, mechanical design technician, metal plating, and hazardous waste disposal," Emparan says. "This is very useful information for my students."

In addition to learning about the scientific issues behind environmental questions, teachers receive training in leadership, grant writing, networking, teamwork, curriculum integration, and evaluation.

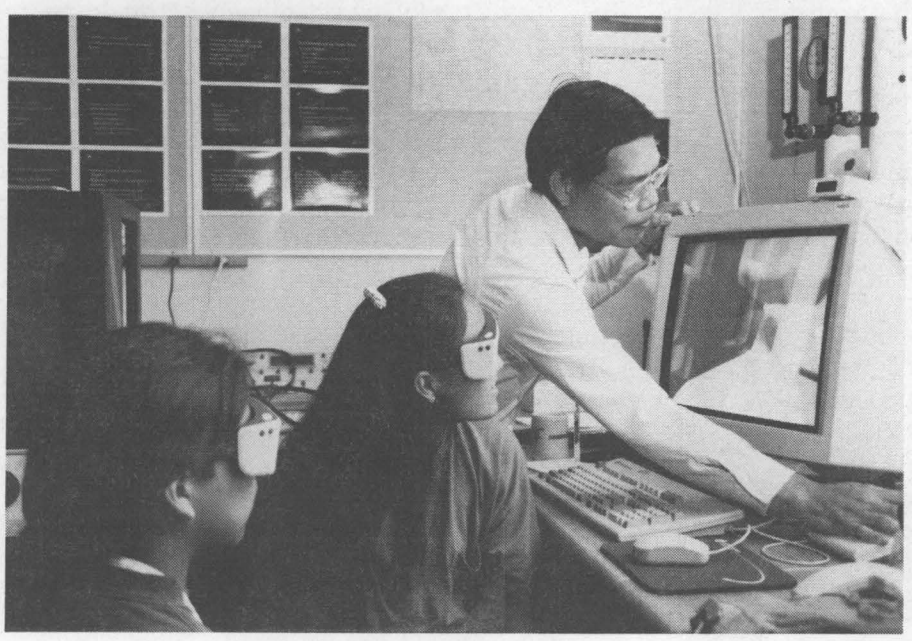
Each district's team returns in the fall ready to lead workshops for their fellow teachers. Support from the state includes release time for staff development.

"Science is a part of your life. That's what we try to put across."

Participants are enthusiastic. "It's very eye-opening," says Livermore High teacher Lucille Holloway. "When you go back into your classroom, you have real information. You aren't just talking about something you learned from a book."

Judi Hazen of Junction Avenue Middle School in Livermore adds, "When you think that nine school districts are involved, and that this training is disseminated to the entire school district, the number of students that SUPER! touches is incredible."

Twenty Sandians and contractors participated in the second annual SUPER! summer institute. They included Karen Lee, Linda Domeier, and Tim Shepodd (all 8713), Richard Wheeler (8112), Dave Ross (8642), LeRoy Whinnery and Bill Even (both 8716), Jay Spingarn (8714), Nina Bergan French (8113), John Didlake (5321), Jim Costa (8711), Will Bolton (8102), Craig Carson (8284), Davina Kim (8412), Dave Shimizu (8272), Roy Lee (8117), Dave Andaleon (8111), Celeste Rohlfing (8353), Robyn Davis (7576), and Hank Irwin (contractor).



"COLLEGE BOUND" students from Southwestern Indian Polytechnic Institute (SIPI) in Albuquerque visited the Livermore, Calif., area recently to participate in Lawrence Livermore National Lab's National Supercomputer Program. They also toured Sandia/California and other Bay area attractions. Two of the students are seen here visiting Sandia's Virtual Reality lab, hosted by Roy Lee (8117).

Sandia CaliforniaNews

Gravity and 'gluep' — 200 Sandia Science Advisors generate classroom curiosity

School administrator: 'All you need is to create a spark'

By John German

Lab News Staff

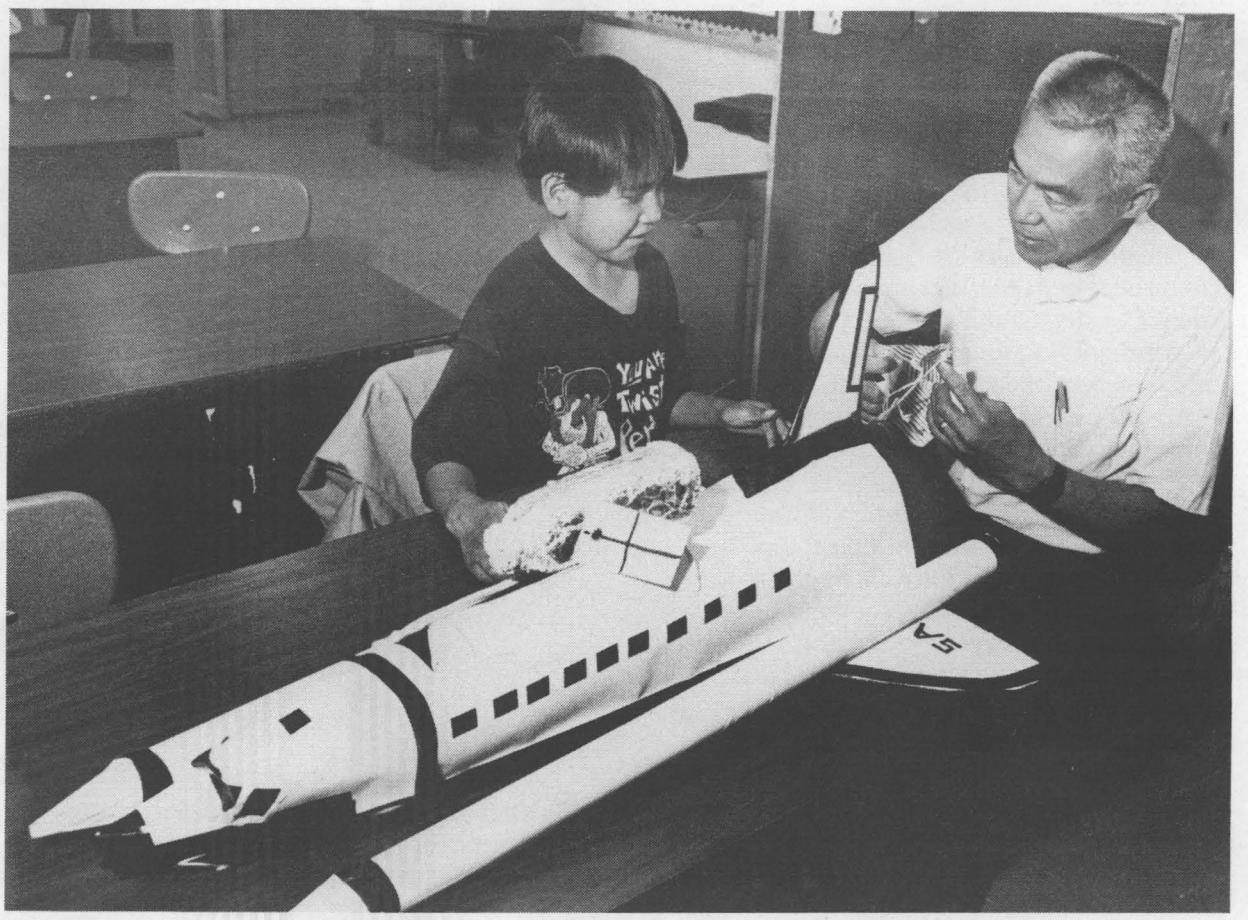
A glob of slimy "gluep" made from corn starch and water whizzes past Kathy Zimmerman's head. Little green specks spot her sunglass lenses. Her first grade class is learning about materials science today. Apparently they're learning something about projectile physics as well.

Zimmerman is a teacher at Pueblo Pintado School. To get to this little-traveled cluster of houses, trailers, a church, and the school, you drive west from Cuba nearly 60 miles over some of the most windy, desolate grassland in northern New Mexico.

It is here, in the shadow of thousand-year-old Anasazi ruins, that Kaz (pronounced "cause") Oishi (5161) travels twice a month. Armed with computers, magnets, batteries, wires, crayons, marshmallows, toothpicks, and myriad other modern-day learning tools, he hopes to become to some of the children what flint is to a campfire. (See "Science in a box" on next page.)

"All you need is to create a spark," says Pueblo Pintado Education Department Head Ed Doler, who believes the mind of a youngster is like dry tinder for math and science. "You can create it in first grade, fourth grade, or eighth grade — it doesn't matter."

He believes the sparks of scientific curiosity created by a visiting scientist such as Kaz can be fanned and fed by teachers and parents into careers in science or engineering.



FIRST-GRADER Philbert Tsosie explains his science fair project last school year to Kaz Oishi (5161). Philbert built the three-dimensional space shuttle model — complete with rocket boosters, cargo bay doors, satellite payload, and landing chute — from a photograph he found in a library book.

Students benefit from collaboration

Kaz is one of nearly 200 Sandia scientists who spend about one day per week visiting elementary and middle schools as part of Sandia's Science Advisors (SCIAD) Program. In all, 180 schools in Albuquerque, across rural New Mexico, and in 10 states ranging from Maine to Alaska participate in the program.

A SCIAD's job is to help teachers, says Jesus Martinez of Education Outreach Dept. 3020, coordinator of Sandia's SCIAD Program for rural and Bureau of Indian Affairs schools. Many SCIADs support teachers by peforming hands-on demonstrations in the classroom that both entertain students and teach them the principles of math and science.

But a SCIAD's primary work is not in the classroom. "SCIADs are there to support teachers, not teach their classes," says Sheri Martinez (3020), coordinator of Sandia's SCIAD program for Albuquerque Public Schools.

By providing materials, support, and background information in science, math, and computer technology, SCIADs help teachers feel more confident and competent teaching math and science. They often help teachers tie their curricula to real-life issues in science and technology.

"The engineers and scientists have the in-depth knowledge of math and science, and teachers have the teaching know-how," she says. "The students benefit from the collaboration between the teachers and scientists," she says.

The teachers at Pueblo Pintado prefer a mixed approach. Kaz spends most of his time helping individual teachers outside the classroom, giving them ideas for classroom activities that demonstrate scientific principles. Other times he's helping out in the classroom, conducting labs and demonstrations himself.

"I visit each teacher to let them know I'm available," says Kaz. "Some want help in the classroom and others want to be left alone. It's up to each teacher."

He's also making sure that Pueblo Pintado students have a good showing at regional science fairs and helping Doler establish a school science club.

"The goal is to generate interest," he says.

Computer art draws interest

Once every two weeks Ryan Hosteen, a computer-aided designer in Design Services Dept. 2783, leaves Albuquerque at 4 a.m. and drives more than four hours to his assigned school in Teec Nos Pos in the Four Corners region of Arizona. Today he accompanies Kaz as part of a career day Kaz organized for Pueblo Pintado students.

"Last time Ryan visited Pueblo Pintado, he asked how many kids were interested in designing things with computers," says Kaz. "More than 80 percent raised their hands. What we found out was that the kids are very much interested in drawing and artwork."

After Ryan shows a fifth grade class how a mouse works and teaches them the difference between menus and commands, he lets the kids try an AUTO CAD system similar to computer-aided design systems he uses at work. One student draws a car, the next draws his family. Soon the classroom erupts in a frenzy of requests — a house, a snake, a tree.

"I want the kids to get comfortable with the keyboard," he says. "And I want them to see what can be done with artwork and drawing systems in science. I want them to know

(Continued on next page)

Wanted: Retirees with some time on their hands

Sandia retirees are going back to school in droves these days as part of Sandia's Science Advisors (SCIAD) Program.

Retirees make good SCIADs because, says Sheri Martinez (3020). "They often have the luxury of extra time, they want to stay active, they want to give back to the community, and they have fun working with kids."

"A lot of them have grandchildren in school and want to stay involved," she says.

She says several retirees served as SCIADs during the last school year. More than 30 are signed up for the 1994-95 school year.

"Retirees by nature are patient people," says Tom Schultheis of Education Outreach Dept. 3020. "We are finding that retirees have a good relationship with teachers and students."

Like Sandia SCIADs, retiree SCIADs get two days of "basic training" before they visit schools. They also attend a monthly meeting. Each retiree SCIAD receives a small stipend that more than pays for travel expenses. "It's nice to know that you are valued enough that someone is willing to pay for your efforts," says retiree SCIAD Gene Jeys.

Depending on the number of schools a retiree wants to takes on, a retiree SCIAD can spend from one to three days per week at school. Sheri says she encourages most to take on two schools if possible, which equates to two days per week.

"Although it's taken some brushing up on some of the things I learned in science classes so many years ago," says Gene, "I've found that I know a lot more science than I thought I did."

For more information about becoming a retiree SCIAD, call Tom Schultheis on 889-2310.

(Continued from preceding page)

that they can be scientists, too."

Kaz says an important part of a SCIAD's job is being a role model. "If we can help show students that science is part of their everyday lives, they become daily scientists," he says.

Science fairs are another good way to spark student interest, Kaz says.

Take Philbert Tsosie, for instance. As part of a science fair project last year, Philbert, a shy first-grader, constructed a 3-ft-long, near-scale model of a space shuttle — complete with rocket boosters, cargo bay doors, satellite payload, and landing chute.

"He took a picture out of a library book and copied it in three dimensions in cardboard," says Doler.

School officials sent NASA a photo of Philbert's model along with a letter requesting more information. A few weeks later, the educational program director at NASA in Washington, D.C., called Philbert and then sent him an astronaut cap and various photos, posters, and brochures about the space shuttle program.

Philbert was delighted. "He couldn't stop talking about it for a week," says Zimmerman, Philbert's former teacher.

She says having to explain the project to science fair judges also helped Philbert work through his shyness and become more comfortable talking about science.

Materials a key ingredient

Jesus says the SCIAD Program recently has turned its attention to large summer workshop events for teachers. The reason: Teachers, not scientists, should be the students' primary role models.

During workshops, teachers get ideas about how to make science interesting and culturally appealing to students. They can then take their ideas back to the classrooms and share them with other teachers. "Teachers like the workshops because they're being treated as professionals," says Jesus.

SCIADs, however, will always be the program's mainstay, he says. The program is now recruiting new SCIADs for the upcoming school year. (See "Wanted: Retirees with some time on their hands" on page 4.)

Sheri says the program is recruiting retirees and non-Sandians as well as members of Sandia's technical staff. So far one Honeywell employee, a retired science teacher, an engineering graduate student, and more than 30 Labs retirees have become SCIADs.

"We're not just looking for Sandians," she says. "We're also looking for participation from DOE, other companies, and all interested parties."

Each SCIAD gets two days of training before the school year begins. "Engineers are not teachers," says Jesus. "We show SCIADs how to collaborate with the teachers in developing classroom sessions appropriate for the particular grade level and students."

Anyone interested in becoming a SCIAD can call Sheri on 889-2313 or Jesus on 889-2305.

* * *

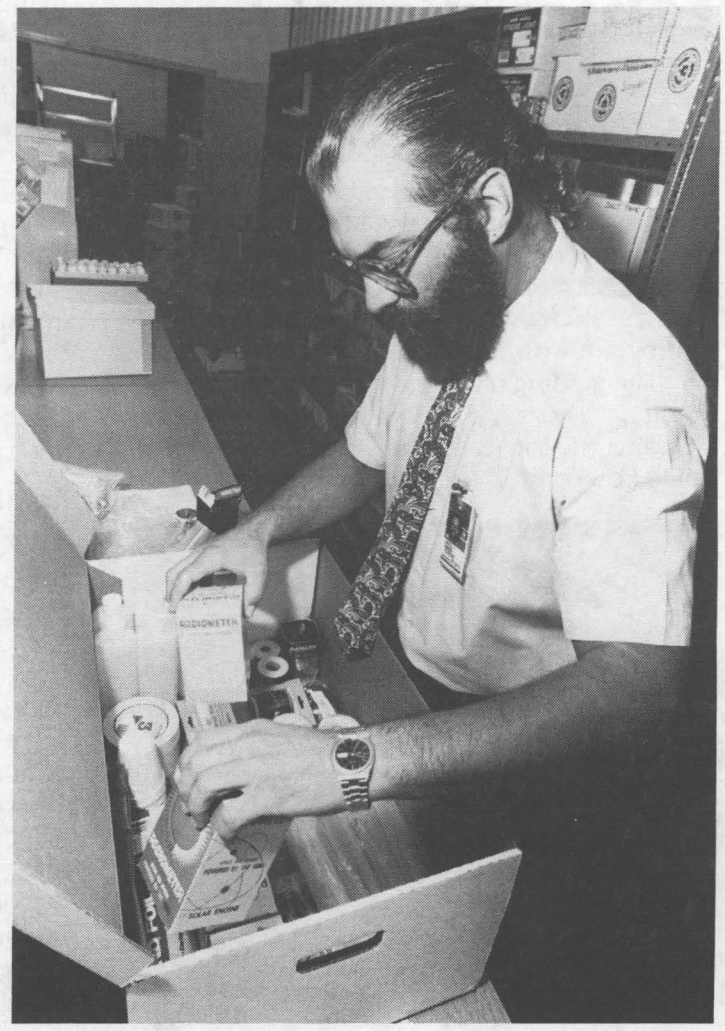
In LaVerne Wagner's classroom, fourth graders grill Kaz with questions about the human body. The topic is sense organs.

"Why do people have two eyes and only one nose?" one youngster asks.

For an instant Kaz, a weapons engineer, looks out of his element. He begins to explain depth perception to a fourth-grader. "Try closing one eye and looking at your finger," he begins. . .

Twenty fourth-graders close one eye and hold up a finger.

The sparks fly. Kaz smiles.



KIT REFURBISHING — Contract employee Gabriel Gawrada restocks a science kit returned from classroom duty by a Sandia Science Advisor. Sandia's Education Outreach Resource Center stocks more than 100 different science kits, each containing all the materials needed to demonstrate a particular scientific subject to 30 students. (See "Science in a box" at left.)

Science in a box

It's like a candy store for science teachers: shelves and shelves of boxes, each containing all the materials needed to demonstrate a particular scientific subject to 30 students without ever letting on that they're being taught the principles of science.

One box contains pie tins and wooden spoons, pinto beans, coat hangers, string, fishing line, rulers, straws, tape, tuning forks, cups, and disassembled music boxes. It's meant to teach third- through fifth-graders the principles of sound and vibration.

Another kit contains calculators, cubes, dice, press-on letters, colored tiles in a bag, and a Boggle game. It's meant to demonstrate the basic principles of probability.

In all, Sandia's Education Outreach Resource Center stocks more than 100 different kits. SCIADs can visit the Resource Center and pick out hands-on classroom activities that teach a variety of scientific principles ranging from gravity to "gluep." Kits are available in fields as widely divergent as zoology, chemistry, and math.

"I either use the kits myself or check them out for teachers to use in the classroom," says Zia Elementary School SCIAD Dorthe Carr (9236), who visits the Resource Center every couple of weeks during the school year. "The kits are a valuable resource both to me and the teachers," she says.

After use by SCIADs or teachers, the kits are returned to the Center and restocked with materials. A catalog, call numbers, and computerized bar code system help locate kits appropriate for particular grade levels and classroom science topics. New science kits are always under development, often based on the ideas of SCIADs.

The Resource Center's library also contains hundreds of books on proven lab experiments and demonstrations for elementary and middle school students. Dorthe says she uses the library occasionally to get fresh ideas for classroom activities.

Neill Gilbertson (5931), former Resource Center coordinator, calls the Resource Center "a materials and idea warehouse." "The kits are heavily used by the SCIADs in the schools," he says.

PUEBLO PINTADO SCHOOL lies in the shadow of the Pueblo Pintado ruins, the easternmost portion of the Chaco Canyon ruin complex occupied from about A.D. 1000 to 1130 by the ancestors of today's Pueblo Indians.

Welcome

Albuquerque — Glenda Sweatt (13415)
California — Ganesan Nagasubramanian (2206)
New Jersey — James Stevens (1326)
Texas — Theodore Kim (9131)
Virginia — Leonel Miranda (10200)
Wisconsin — Lucy Meigs (6115)

Congratulations

To Pamela and Scott (9131) Burgett, a son, Luke Robert, June 19.

To Sheri and Mark (9432) Richards, a daughter, Quinn Eddy, July 16.

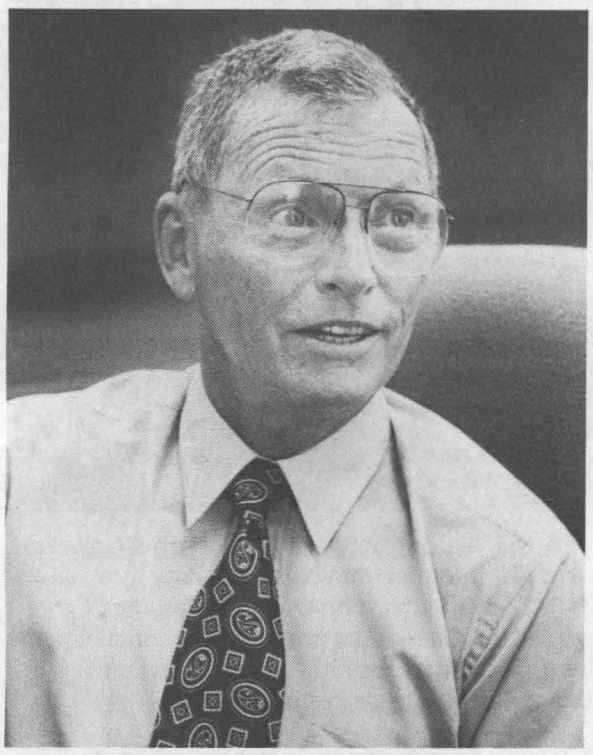
To Sue Swanback (3512) and Jim Hamilton (13412), married in St. Lucia, West Indies, Aug. 3.

Ethics director

(Continued from page 1)

the corporate level," he says. "They have a senior person, corporate Vice President George Sammet, Jr., a retired army general, who's developed a very effective program for Martin Marietta. Part of my work in helping develop Martin Marietta's proposal was to create a similar program within Sandia.

"The guiding principle was that this person would have access to the whole organization, including the top leadership — that he or she would be a conduit from the lowest to the highest level," he says.



JACK DICKEY, new Sandia ethics director.

Labs President Al Narath says the ethics director will report concurrently to both the Sandia president's office and to the Martin Marietta corporate ethics officer.

"Jack's duties will have great breadth of scope," says Al. "In addition to encouraging employees to report wrongdoing and concerns, he will refer matters needing investigation to the appropriate organization, ensure that investigations of employees and corporate concerns are fair and complete, adjudicate when necessary, and provide ethics awareness training to managers and employees on a continuing basis."

Retaliation, retribution forbidden

Both Al and Executive VP Jim Tegnelia emphasize that retaliation or retribution against employees voicing ethics concerns will not be tolerated. "Honesty and openness are vital to Sandia's success in the new environments of technology transfer and cooperative research and development with industry, as well as our enduring missions, and we cannot allow anything to interfere with those efforts," says Jim.

"Jack was selected because of his knowledge of Sandia, the Department of Energy, and the Martin Marietta corporate ethics program, and because he has had a great deal of senior-level experience in a variety of other kinds of operations," he adds.

Although he has seen Sandia mostly from the outside up to now, Jack says his impressions are good. "One can't have the kinds of successes that Sandia has had — 45 years of absolutely perfect performance from a nuclear deterrent perspective — without high ethical and moral standards and a set of values," he says.

He says he hasn't yet had an opportunity to visit with Sandia's two ombuds, who will report to him under the new arrangement, but has had many opportunities to review Sandia's Code of Conduct and Corporate Personal Integrity Program, which draw high praise from him. "I think I'm going to have a fairly easy job of it here, because I firmly believe people at the Labs live by that standard and that code," he says.

Other numbers to call to report concerns

Ethics Director Jack Dickey's office is in Bldg. 802, Room 1327. He can be reached by phoning 844-2277. His secretary, Jackie Blackburn, can be reached on 844-9212.

Martin Marietta's corporate ethics office can be called on 1-800-338-4427.

Other offices and/or programs handling Sandia ethics-related issues, and their phone numbers, are:

- Code of Conduct and Corporate Personal Integrity Program (CPIP) concerns — 844-1744.
- Sandia Ombuds — Mike Birnbaum (California), 294-2065; Wendell Jones (New Mexico), 845-8301.
- Equal Employment Opportunity or Affirmative Action concerns — California, 294-2598; New Mexico, any of several applicable numbers listed under EEO/AA Dept. 3611 on page D58 of the current *Sandia Directory*.
- Fraud, waste, or mismanagement concerns — CPIP hot line, 844-1744; or DOE Office of Inspector General, 1-800-541-1625 or 202-586-4073.

Diamonds

(Continued from page 1)

heat must be removed before it can build to damaging levels."

Traditionally, heat is managed by fabricating circuits on a heat-conducting substrate, or surface, that directs heat away from the circuits to areas where it can be removed. In most cases, heat is the limiting factor for overall size and power of electronic devices. For example, in the 1970s, computers roughly equal to an old personal computer, filled entire rooms and required extensive air conditioning to remain operable.

Semiconductors allowed computers to shrink to laptop size with an added increase in computing power and speed resulting from more densely packed circuits. Sandia's research over the past two years shows that diamond substrates could achieve even more. What was formerly a 30-square-cm circuit, about the size of a small notecard, can now be reduced on a diamond substrate to 1.6 square cm, an area roughly equal to the size of a thumbnail.

"For high-speed computing, circuits must be placed closer together," says David Peterson of Advanced Packaging Dept. 1333. "This reduces the propagation delay of an electric signal as it travels from circuit to circuit. Unfortunately, it also concentrates heat within the system. CVD diamond allows circuits to be placed closer together without the heat build-up of other substrates."

Creating the 'computer in a cube'

Sandia's diamond work began with a CRADA between Sandia and General Electric Corporation (GE). While awaiting final approvals on the CRADA, Sandia's defense programs became interested in the use of diamond substrates for weapons circuitry. Sandia's research quickly divided into two applications, work on the packaging of a weapons flight computer and joint development with GE of a three-dimensional multichip module, referred to by co-developer Jim Sweet (1333) as a "computer in a cube."

Typically, microelectronic chips are packaged individually and then attached to a printed circuit board. In multichip modules, the chips are removed from their conventional packages and placed on a common substrate plate. Substrates are then stacked on top of each other to achieve a three-dimensional cube.

"With the multichip module, we've created a powerful computer in a small amount of space — perfect for weapon systems, satellites, and other things that require high reliability in a compact case," says Jim.

In addition, as diamond manufacturers are able to produce substrates with fewer impurities, optical connections, rather than slower electrical ones, would be possible between multichip module plates. These connections will allow for yet another increase in computing power.

Diamonds pose special problems

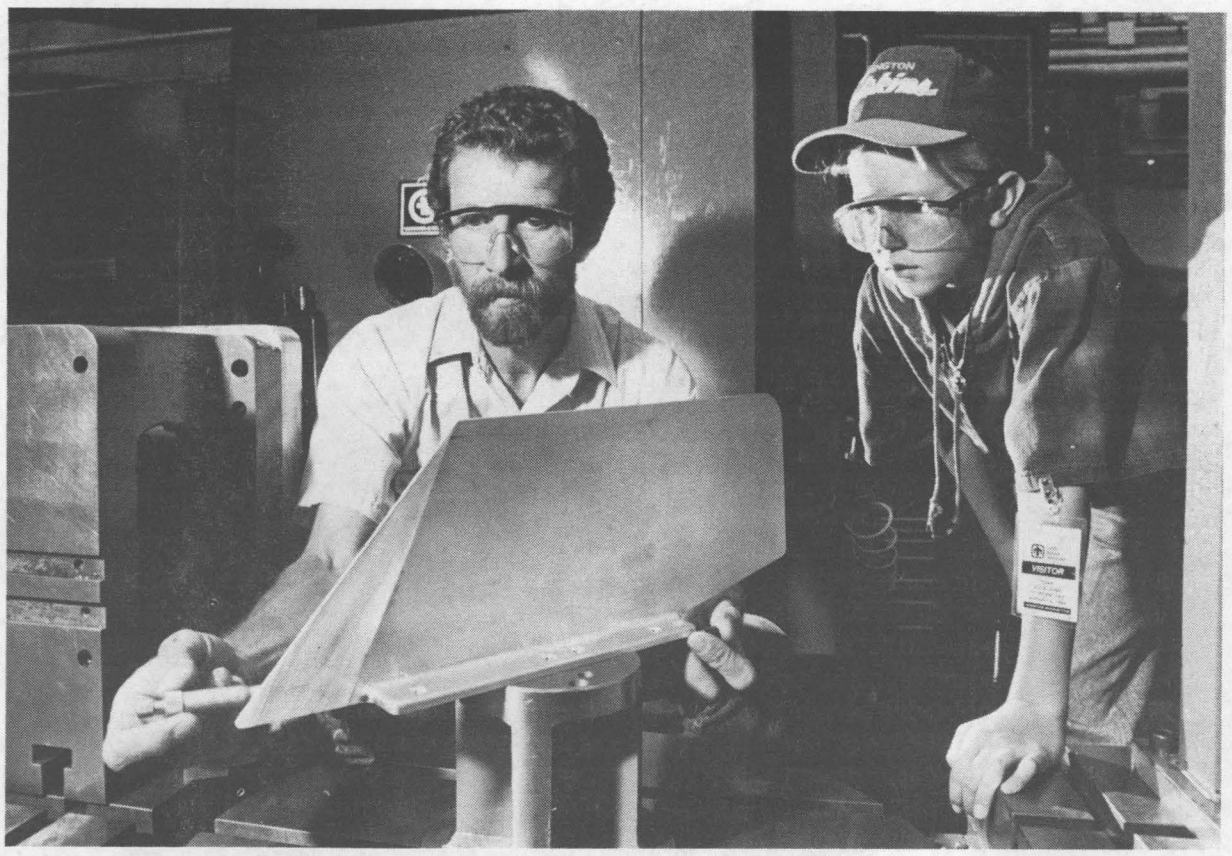
As part of diamond substrate tests for the weapons flight computer project, Sandia designed and developed accompanying circuits. Circuits were constructed using a Sandia-developed process that forms thin-film circuit components such as resistors, capacitors, and fine-line gold conduction patterns directly on the diamond surface.

Once deposited, circuit resistors, only millimeters in size, must be tested and laser trimmed to a desired value, or a certain number of ohms. While attempting to trim resistors on diamond substrates, Sandians Dave Norwood and Walter Worobey, both of Electronic Processing Dept. 2411, and contractor Doyle Miller found that conventional laser trimming techniques didn't work on diamond substrates. Once focused for trimming, the laser burned the diamond underneath the resistor, causing a decrease rather than the desired increase in resistor value. Working through this problem, Walter and Dave not only succeeded in trimming resistors down to one percent of design value, but they also patented the process that got them there. The process uses a defocused laser to build up an oxide on the resistor that prevents burning and will prove valuable if diamond substrates become commercially feasible.

"If the circuit is to operate properly, heat must be removed before it can build to damaging levels."

Right now, diamonds are too expensive for most industrial purposes, costing $1,000 per square inch of 0.5-mm thick, typically charcoal gray substrate. According to Dave, the high price is not due to the diamond itself, but to the fact that once the diamond has been laid down on a base platen, it must be lapped and polished to the degree of many semiconductors. The polishing has proven to be tedious and expensive, and the process must be improved before diamonds can make their mark on the microelectronics industry. But when they do . . .

"The benefits will be unmistakable," says Dave.



WHERE IDEAS BECOME REAL OBJECTS — Dave Rogers of Heavy Machining Team 2482-2 shows son Eric, age 10, how metal parts are formed by machinists from designs created by Sandia researchers.

ANTICIPATING A PBFA POP — Anthony Mattson, son of Craig Mattson of Fusion Accelerator Dept. 1236, plugs his ears waiting for a test firing of Particle Beam Fusion Accelerator (PBFA) II. Because a test was in progress, tour members had to wait in the hallway at the facility in Area 4.

Nearly 900 sons came to work Aug. 8

Photos by Randy Montoya

Sandia/New Mexico's "Take Your Sons to Work Day" on Monday, Aug. 8, drew 893 enthusiastic young men ages 9-15 to the Labs to see where mom or dad works.

The day began with a welcoming address and introductions by Charles Emery, VP of Human Resources Div. 3000; an overview of the day's activities by Paul Robinson, VP of Laboratory Development Div. 4000; and on-stage demonstrations at the Technology Transfer Center, including "Fun with Science," "Liquid Nitrogen," and "3D Modeling." Some of the young men were picked at random to tour Labs facilities.

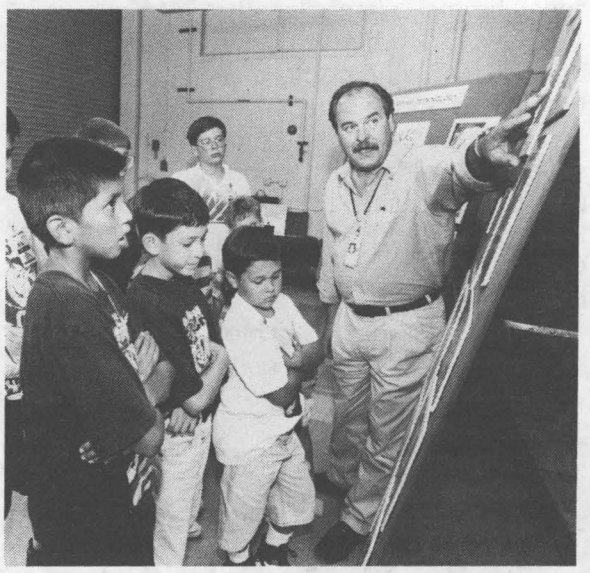
An offshoot of the national "Take Our Daughters to Work Day," "Take Your Sons to Work Day" was the result of Sandia volunteers planning the event and obtaining materials and cooperation Labs-wide. The purpose was to expose the boys (sons, grandsons, brothers, nephews) to Sandia's diverse contributions to the nation's security, technological advancements, and energy programs, and to provide them with a wide range of information about careers in science, mathematics, and engineering.

Sponsored by the Diversity Leadership Center and various Sandia diversity committees, the event got rolling when a request went out asking for employee volunteers, who then formed a committee that put it all together.

"Everyone we talked to was so helpful," says committee chairperson Melanie Florez, Supervisor of Personnel Security/Visitor Control Team 7437-1. "We had enthusiastic cooperation from various Sandia groups who volunteered time and materials."

Volunteers who contributed to the success of "Take Your Sons to Work Day" include Tim Wisely (2883), Sophia Garcia (10500), Janet Ahrens (5848), Emil Kadlec (2663), Randy Normann (2663), Bill Richard (9421), and Nichole Bottarini (7811).

— *Janet Carpenter*



ACCESS DELAY LAB in Bldg. 904 hosted a tour for "Take Your Sons to Work Day." Marty Kodlick (9611) tells the boys about safeguarding Sandia materials.

STICKY, GOOEY STUFF was an irresistible invitation to these guys when they visited the Access Delay Lab in Bldg. 904. The boys were learning about "sticky foam," gooey brown gunk that foams up to 50 times its original volume and could be used to subdue lawbreakers when it's "shot" at them.

ACCESS CONTROL is one of the many duties of Sandia Security Police Officer Nora Tyree of Protective Force Dept. 7435. Nora and son Eric Gallegos, age 16, were on duty at the gate to this "igloo area" on "Take Your Sons to Work Day."

Sun behind Sandia training a rising hope for Africa

Students harness solar energy

By Dawn Hipsh

Summer Science Writer

Solar ice makers, ovens, and water heaters are more than novelties to a group of African students who recently visited Sandia's solar testing facilities. To them, they represent a rising hope for rural Africa.

Twenty-three African students and three mentors from Texas Southern University in Houston spent a week at Sandia wiring simple solar lighting systems, assembling solar water heaters, studying solar ice makers, experimenting with photovoltaics, and testing solar steam devices. The visit came at the end of a five-week Renewable Energy for African Development (READ) wind and solar energy training program.

"I'm finally learning what I need to know," said vocational instructor Thabo Ramphana of Lesotho, Africa, referring to the hands-on training the group received at Sandia after four weeks of class instruction at Texas Southern University. "In fact, you can just leave me here," he joked, waving his hand toward tables cluttered with solar cells, wires, and pipes.

Giving Africa its own support

The group, composed of vocational teachers and policymakers from Lesotho, Botswana, Malawi, and South Africa, has now returned home to train others in solar energy design, installation, and maintenance, and to advocate government subsidies and support for solar technologies. Government support would enable villages to finance such things as local solar lighting, refrigeration, and water heating while vocational training will provide Africa with a base of people to support the new technologies.

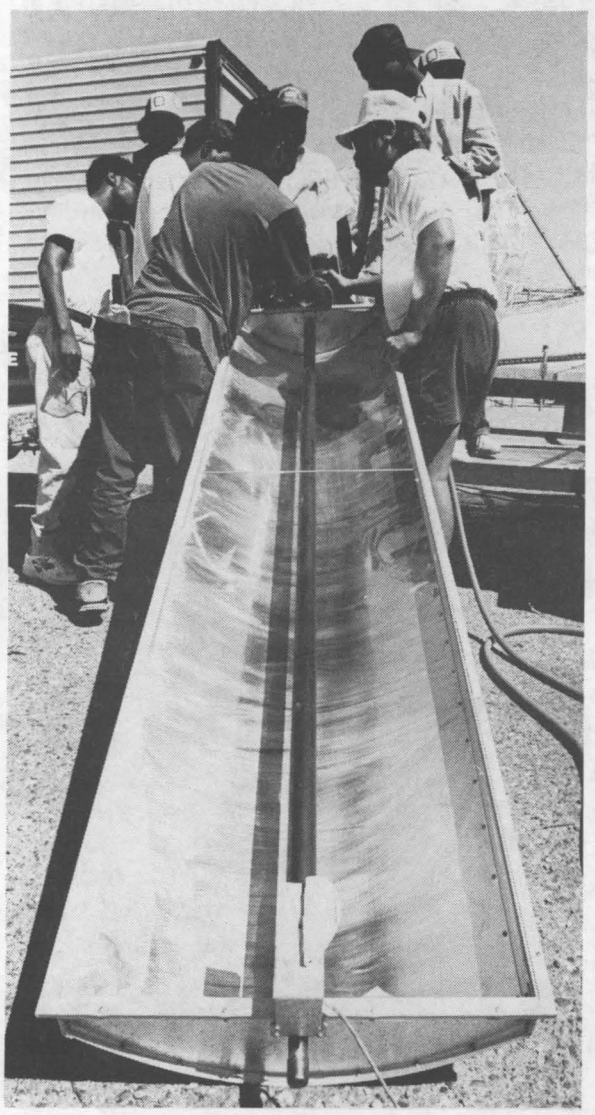
"After all, if something breaks or goes wrong in Africa, they can't just send back to Albuquerque for help," says Leonard Spearman, former US Ambassador to Rwanda and current READ director, who was present for the last day of solar training at Sandia. "The African people must be able to sustain solar development within their own countries."

HELPING HANDS — Leonard Spearman (right), former US Ambassador to Rwanda and now director for the Renewable Energy for African Development project, looks on as a team of four African students assembles a solar water heater.

READ is supported by the US Export Council for Renewable Energy (USECRE), whose Renewable Energy Training Institute provided the overall course coordination. USECRE represents US renewable energy trade associations and is aimed at increasing US product exports, says Max Harcourt (6201-1) of Sandia's International Renewable Energy Design Assistance Center, who helped coordinate the Sandia training sessions.

"The READ project is an excellent example of Sandia's support for government/university/industry partnerships," says Max.

Texas Southern University provided the classroom instruction; Siemens Solar Industry, Albuquerque's AAA Solar Supply, Daystar Ink, and Florida Solar Energy Center provided demonstration equipment and training; and Sandia provided its troubleshooting and testing expertise, instructors, equipment, and a place to conduct hands-on field work. "Together," says Max, "I think we've created a successful program and laid a strong foundation for future business relationships with Africa in the area of renewable energy."



GETTING STEAMED — African students get a lesson in making solar-powered steam from Jeff Schmitt of Albuquerque's AAA Solar Supply.

Take Note

Sandia robots will put on a laser show for visitors to the Albuquerque Intergalactic Reception (AIR) on Saturday, Aug. 27, 5-10 p.m., on top of the Albuquerque Convention Center's new parking structure. Sponsored by the Albuquerque Convention and Visitors Bureau, AIR is intended to be a fun and educational event that combines science fiction and science fact exhibits, a book and video fair, "space" food, and lots of entertainment.

The event will feature UNM telescopes to look through, retired shuttle astronaut Mike Mullane, a space capsule from the Space Center at Alamogordo, a Lovelace Medical Center astronaut-testing exhibit, a Starlab dome where you can learn about the planets and stars, a kids' science tent, a moon walk for kids, and more. For more information, call the Albuquerque Convention and Visitors Bureau on 842-9918.

* * *

UNM's Hispanic Student Services Center is trying to locate UNM Chicano/Hispanic alumni who graduated in 1968 or afterwards to help the center celebrate its 25th anniversary, which begins Sept. 16. All Hispanic alumni, faculty, and staff who have been associated with the center in the past are being sought. Individuals are needed to participate in the planning of the three-day celebration. Contact Veronica Mendez-Cruz, Director of UNM Hispanic Student Services, on 277-5020.

* * *

The Kodak Albuquerque International Balloon Fiesta Chase Crew Committee is seeking volunteers for the 1994 Fiesta, Oct. 1-9. Crewing offers a perspective of ballooning that most spectators will never experience. Volunteers are needed to help out-of-town and foreign pilots, and if possible, provide a truck or trailer suitable for transporting ballooning equipment and people. To volunteer, call the Fiesta office on 821-1000, ext. 700.

* * *

Retiring and not seen in *Lab News* photos: Mary Abeita (2781), 27 years; Ed Austin (12302), 37 years.

Fun & Games

Golf — The Albuquerque Chapter of the Armed Forces Communications and Electronics Association is holding its second annual Education Scholarship Benefit Golf Tournament on Monday, Aug. 29, at the KAFB Tijeras Arroyo Golf Course. Format is two-person best-ball. Fees and donations go toward a scholarship fund to help UNM ROTC students. For more information, contact Ron Lord on 842-8990.

* * *

Tennis — SERP (Sandia Employee Recreation Program) and Coronado Club members and military employees are invited to participate in the Labor Day tennis tournament scheduled for Sept. 3-5 at the Coronado Club tennis courts. Events include men's and women's singles and doubles and mixed doubles. Gift certificates will be presented to winners and runners-up. Participants' guests may play doubles. Entry deadline is Aug. 29. For more information and entry forms, contact the SERP office on 844-8486.

* * *

Bike tour — The Fourth Annual Albuquerque Century Tour "Bike for the Health of It" to benefit University Hospital will be Aug. 28, beginning at 7 a.m. (rain or shine) at Civic Plaza. For registration forms and more information, contact David Lippe on 843-2656.

Mileposts

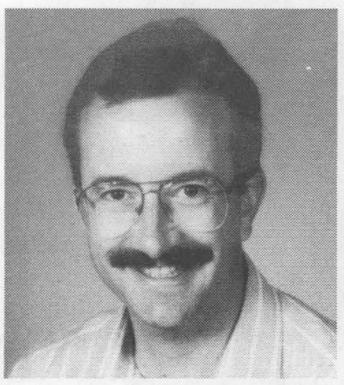
August 1994

Bill Talley 30
5833

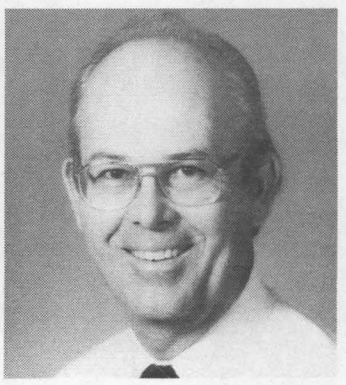
Carol Ashby 15
1322

Don Bohrer 35
5303

Ron Cheek 35
7614



Steve Ehle 15
5301



Dick Finn 35
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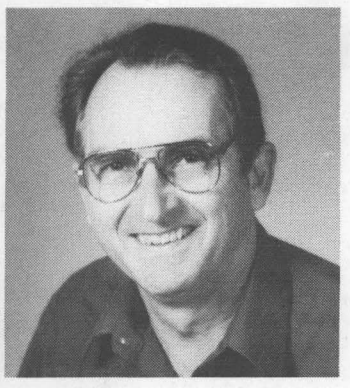
Betty Voss 20
5921

Wendell Weart 35
6303

Michael Ebben 15
10600



John Totten 30
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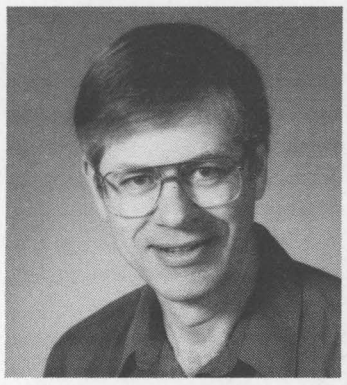

Dan Folk 30
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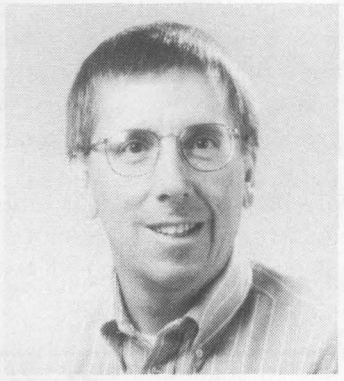

Vince Dandini 20
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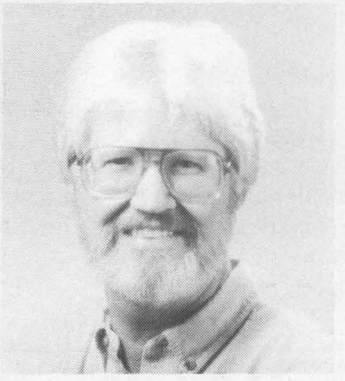
Robert Allen 15
8114



Walt Vandevender 25
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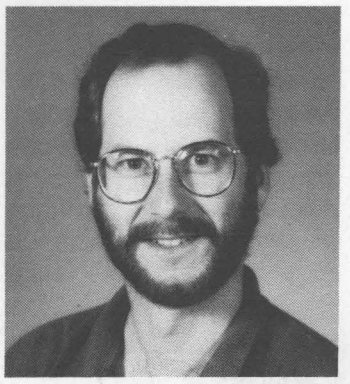

Scott Faas 15
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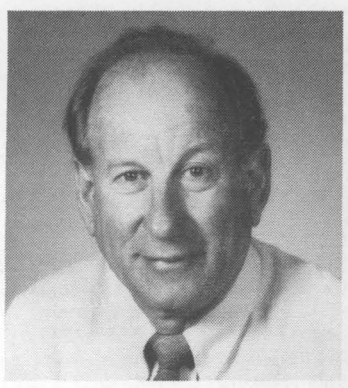

Walter Bauer 25
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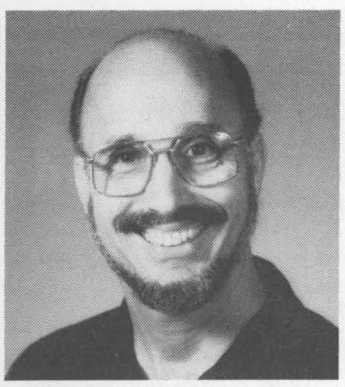

Jim Spoonemore 15
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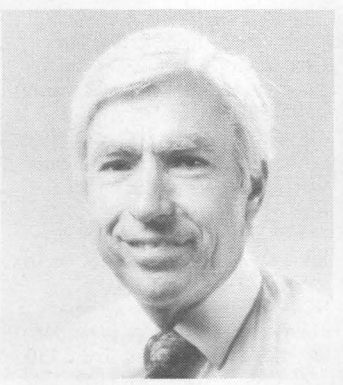

Tom Picraux 25
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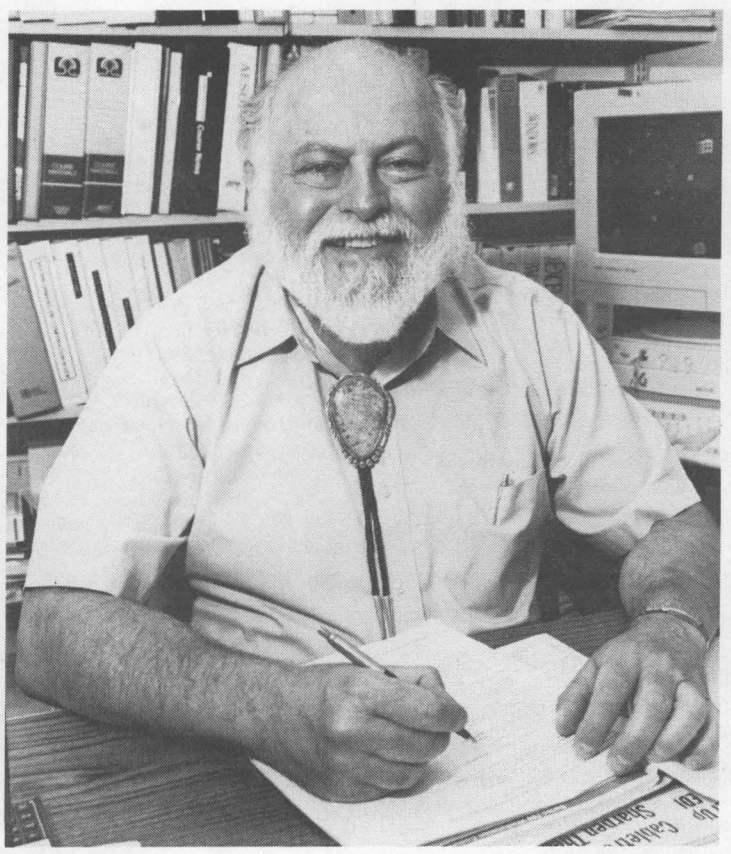
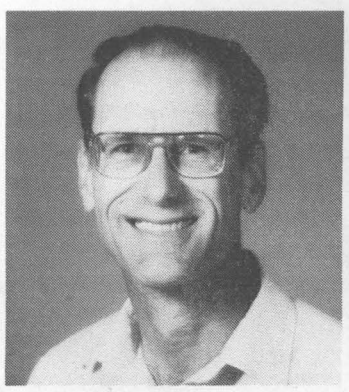
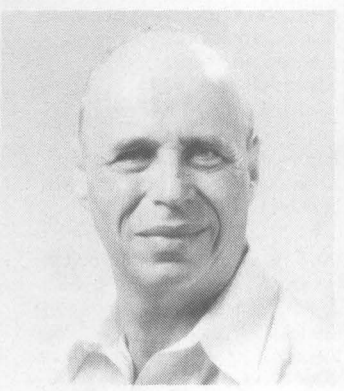


Al Iacoletti 40
1904



George Fisk 20
8355



David Emin 25
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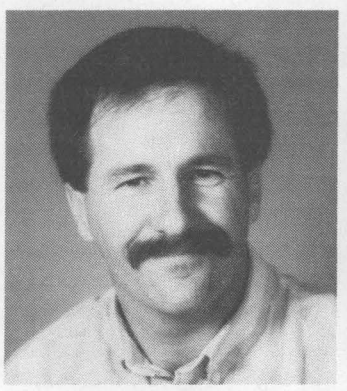


John Hachman 20
8716

Snakes and Sandia: Training part of some jobs

Class soothes snake-phobics, dispels long-held myths and misunderstandings

SNAKE HANDLING skills are not something Bob Helgeson (6621, left) ever expected to acquire, but thanks to a recent training class, Bob and his co-workers will be able to safely remove snakes that might appear around their Tech Area 3 workplace. In return for the class taught by Bob Myers (right), members of the training class sponsored a rattler at the Albuquerque International Rattlesnake Museum in Old Town. The snake, named "Sandi" for Sandia, is a prairie rattler, a species common to the area.

If you asked how he came to be in the rattlesnake training business, Bob Myers of Albuquerque's American International Rattlesnake Museum might give you a blank look.

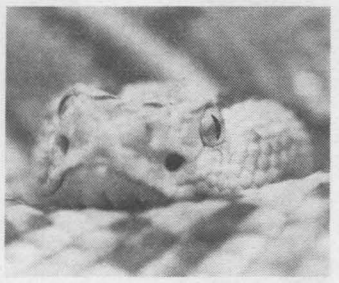
"I don't teach the rattlesnakes anything," he says. "It's the people I train."

Among the things Myers teaches museum visitors and Sandians in a special training class recently held for Area 3 employees is that snakes are not after people. They don't "chase" people, he says, and unless provoked, they won't bite.

"There are a lot of myths about snakes," says Bob Helgesen of Environmental Restoration Technologies Dept. 6621. "About half the people I work with and I were out perpetuating them."

Myers says his classes are designed to dispel snake-phobic myths and help people understand rattlesnakes rather than just kill them.

"Rattlesnakes are important to the environment," says Myers. "Safely removing them from work areas where they are a hazard is a relatively simple process."



Bob, who organized the class, would have had a hard time believing that before Myers' training session. Workers in Area 3 and other remote sites sometimes encounter snakes in or around their work areas. From Myers' class, Bob and his co-workers have learned how to handle rattlesnakes safely using a snake stick rather than panicking or having to wait for security to remove them.

"The class was very valuable to us," says Bob. "We get a lot of people out here in the summer, and it really helps for us to be able to take care of snakes ourselves."

In return for their newfound confidence, members of the Sandia class have sponsored a rattlesnake at the rattlesnake museum in Old Town. The snake, named "Sandi" for Sandia, is a prairie rattler, the kind most likely to be found in this area.

This summer is not the first for Sandia's snake-related training. Bob learned of Myers and his museum from Wendy Johnson of Nuclear Energy Technology Center 6400, who organized similar training for her organization a year ago. While the idea of scheduling a rattlesnake handling lesson seems odd at first, the benefits of such training are soon obvious. More important than the snake handling itself is the peace of mind that comes with basic awareness — watch where you step; be careful where you reach; and if you encounter a rattlesnake, slowly back away from it.

"Not only will this training save us time and make us safer in the future," says Bob, "but I, for one, feel a lot more comfortable about snakes."

— Dawn Hipsh, *Summer Science Writer*

Sandia Classified Ads

MISCELLANEOUS

SECURITY SYSTEM COMPONENTS, control panels, motion detectors, zone expansion boards, photocells, magnetic contacts, commercial grade, functionally perfect. Rathbun, 888-3344.

HOME STEREO, Pioneer, CD changer, dual-casette-deck, tuner receiver, 10 band EQ, four 3-way speakers, must sell, $1,500 OBO. Lucero or Aguilar, 857-0687.

TIRE AND RIM, full-sized, for '86 Mazda 626, $75. Spacesaver tire and rim, fits Jeep Cherokee, $25. Skinner, 299-5063.

REAR CAR SEAT, for Chevy Astro Van, seats 3, $299; solid oak, 48" bathroom cabinet, stained mountain ash, sell for $200 OBO. Luther, 822-1187.

STEEL HAM TOWER, $2/ft.; 2 Mtr, 10 element Yagi, $40; 6-ft., 250 lb. nonworking WWII, UHF, XMTR, $30. Dunn, 298-6278.

COUCH, four cushions, 96" long, brown and beige nylon plaid, very good condition, $275. Caskey, 294-3218.

SHOPSMITH, MARK VII, saw, dado, sander, drill press, lathe, chisels, motor needs repair, $200. Koehler, 344-7889.

FREE DOG, German Shepard, 2-yr.-old female, spayed, current shots, family dog. Gallegos, 292-8186.

NATIONAL GEOGRAPHIC MAGAZINES, '64, '70-'76, '83, '84, '87, '90-'91. $3/yr; oxygen concentrator, $275. Lane, 856-1341.

BI-FOLD DOORS, 12-in., X STD, HT, $2 ea. Curzi, 296-5386.

MAGIC CARDS, complete sets Arabian nights and antiquities, almost complete Alpha and Leginds, lots of unlimited, revised, bets. King, 821-4692.

POOL TABLE, oak rails, leather pockets, 1-in. thk. slate, $1,400 OBO; foosball table, 1-yr. old, $175. Cunico, 892-8365.

FRAM AIR FILTERS, model CA2740, Honda/Ford/Mazda cars and trucks, $4 ea., or 2/$7.50; boaters rescue kit, smoke cartridges, aerial flares, $20. Schkade, 292-5126.

METAL ROOF PANELS, Channeldrain, slate blue color, 8 sheets, 3 ft. x 20 ft., $200. Wilde, 281-7027.

OVERLOAD SPRINGS, fit 1/2- and-3/4 ton Ford and Chevy, maybe Dodge pickups, 2,500 lbs., increased capacity, $85. Jones, 883-1284.

GARAGE SALE, Aug 20-21, 9 a.m.-5 p.m., multifamily, weights, toys, auto cassette player, electric edger, collectibles, more. Romo, 275-1192.

TV, 19" w/remote; Beechwood breakfast bar w/stools; Busch, two-sided stereo rack w/glass, all excellent, $90 ea. Henry, 296-1781.

REFRIGERATOR, dorm room essential, 2.5 cu. ft., 18 x 18 x 26 in., $85. Edmunds, 856-6918.

RIDING LAWN MOWER, '91 Sears Craftsman, 12-hp., 38-in., lawn sweeper and basket, $700. Arndt, 271-1599.

GI JOE AIRCRAFT CARRIER, 6-ft. long; running boards for crew cab dually; will fit standard cab also. French, 856-6126.

DOG HOUSE, for medium-size dog, igloo-style, fiberglass, $35. Hickox, 299-0772.

PIANO, Wurlitzer console w/bench, cherry finish, excellent condition, 9 yrs. old, $1,100. Elder, 298-5350.

DELUXE CAR SEAT, Fischer Price, $30; trike, $15; head skis, boots, $40, for child 6 or under. Sleefe, 281-4103.

EXERCISE MACHINE, Gravity Edge, 2-mos. old, excellent condition, $200. Babcock, 892-7199.

FUTON, queen size, 8" thick, 2 mos. old, excellent condition, $120 OBO. Kearns, 246-8368.

PICKUP CAMPER SHELL, fits Chevy short narrow (or short wide); aluminum, sliding front window, like new. Cochran, 842-1528.

TWO SPACES, in the Masonic Gardens in the Sandia Memory Gardens cemetery, $1,050 for both. Hodgden, (409) 636-7896.

SLIDE DUPLICATOR, Bowens Illumitran with 60mm lens, needs calibration. Ganter, 265-5007.

TABLE w/4 CHAIRS, Scandinavian designs, teak, extends to seat six, good condition, $100. Fredrich, 296-0858, leave message.

OVERSTUFFED COUCH & LOVESEAT, neutral colors, sturdy, great shape, $200 for both. Denton, 822-5067.

CHROMECRAFT DINETTE SET, 48" square, rounded corners, 1/2" glass top, 4 swivel-rocker chairs, 2 barstools, southwestern print, $1,000. Altman, 254-0103.

PHANTOM OF THE OPERA, two tickets Sept. 18, 2 p.m., in Tempe, Ariz., $35. Wagner, 823-9323.

EXERCYCLE, Airgometer, DP-fit for Life, $150. Forsythe, 821-5274.

HOTEL ACCOMMODATIONS, Grand Bahama, 3-days; Orlando-3 days, Daytona-2 days, $400 total/deal separate. Garcia, 266-9419.

QUEEN-SIZE WATERBED, dark pine, deep drawer base and bookcase headboard, includes waveless mattress and heater, $350. Greenslete, 268-8394.

DISHWASHER, GE Powermiser, cabinet installed $50; clothing, girl's age 12-14 yrs.; child's outdoor backpack, $15; skis/boots downhill. Rockwell, 884-4206.

10-GALLON AQUARIUM, complete setup, $50; Casio CA-110 keyboard, like new, $50. Purvis, 867-5150.

LOTUS ELECTRIC GUITAR, imitation Les Paul, w/case, $130. Lieberman, 299-7739.

CANON CAMERA, T70, programmable w/28-200 lens and flash, other lens available, $300; electronic typewriter w/memory, $100. Duvall, 881-4406.

EPSON PRINTER, MX80 w/Graftrax, works fine, operation and maintenance manuals included, $100 OBO. Roseth, 856-6964.

TWO (2) LOTINS COCKATIELS, 2 months old, $50 ea.; one cage w/accessories, $25. Powell, 877-4939.

SEALY TWIN-MATTRESS SET, $150, frame, $30; white desk (28 x 47 x 27), $125; Duncan kiln, small automatic, $350. Adams, 823-1845.

BUNK BEDS, wood, excellent condition, $150. McClellan, 869-7247.

BABY CRIB, Jenny Lind, and mattress, $60. Franks, 275-9568.

CHANDELIER, modern look, bright brass, 3 tiers, 4 in. x 9 in., etched glass plates, $80 new, sell for $40. Olsen, 294-2333.

12-GAUGE SHOTGUN, Remington automatic, Model 58, 28-in. modified choke and 26-in. improved cylinder, $200. Krenz, 298-0619.

BLACK LAB DOG, spayed female, 7-yrs. old, well trained, mellow personality, loves kids, free to good home. Yourick, 822-8148.

MICROWAVE OVEN, Whirlpool, full size, 700-watts, digital controls, three-yrs. old, excellent condition, $75. Chael, 294-8757.

YAMAHA CLARINET, excellent condition, $100. Vieth, 899-9625.

SECTIONAL, like new, four pieces, federal blue, two-tiered oak corner table, recliner, sleeper couch, $795; large executive swivel chair, $95. Castillo, 294-5182.

Sandia Classified Ads

DELTA AIRLINE TICKETS, four, round trip, Hawaii, Bermuda, Canada, Caribbean, Mexico, no restrictions, $750 ea. OBO. Feng, 275-6639.

FIBERGLASS SHELL, for short-bed Toyota, $300; '92 Ford pickup unibody, needs work, $750; treadmill, $75. Marquez, 898-3169.

IBM PS/2 COMPUTERS, model 60, w/coprocessor, 80-meg HD, color VGA, $500; AT&T model 6300, 20-meg HD, color, $125. Hansen, 299-2337.

ENTERTAINMENT CENTER, solid oak, like new, $200; china cabinet, $200; hammer dulcimer w/matching stand, $350. Hughes, 296-8940.

CAMCORDER, RCA, "Pro Edit," VHS, 8X power zoom, AC adapter/charger, carrying case, mint condition, $450 OBO. Prins, 867-9440.

OLD YARD PUMP, $100; old violin and case, $100; concrete laundry tub, $35. Johnson, 255-5427.

CUSTOM DRAPES, queen-size bedspread to match, like new, cost $800, asking $300. Varoz, 344-0868.

ELECTRONIC ORGAN, Lowry, w/bench and music, $500. Watson, 298-2374.

PIANO, upright, 1912, rebuilt by Simpson & Sons, Albuquerque, cutdown front/mirror, cherry, good condition, you move, $350. Whitehill, 298-2011.

TICKETS, Rolling Stones, Sept. 15, Denver, Colo., on field, 40 rows from stage, $90. Ewen, 836-3563.

DOGLOO, like new, $50; girl's 20-in. bike, $40; Casio electric typewriter, hardly used, memory, $75. Moreno, 294-4268.

ORGAN, Baldwin Fanfare, recently serviced, excellent condition, includes bench and books, used little, cost $3,000, asking $650 OBO. Randolph, 299-2057.

YARD SALE, Aug. 20, 8 a.m.-4:30 p.m., 4119 Ravenwood Pl., NW, Dietz Farms, camping gear, light fixtures, furniture, kitchen gadgets, glassware. Wilson, 344-5373.

TABLES, solid oak w/glass inset tops; coffee table, $120; end table, $100; library table, by Bassett, excellent condition, $120. Seyfer, 292-0179.

MOVING SALE, extra-long Ethan Allan sofa, excellent condition, $300; microwave, stereo cabinet and more. Traeger, 294-2564.

RECLINER, Spanish oak dining room table, w/2 leaves, 6 chairs, lamps, toaster oven, desk, chair and couch. Fisher, 881-8072.

COLLECTABLE, super reverb fender amp, black face, excellent condition, chromed, stands on sides, $850. Lenz, 884-4835.

MOVING SALE, Saturday, Aug. 27, 1209 La Charles NE, 7 a.m.-2 p.m. Everett, 296-0920.

CAMERA, 35mm, Richo Reflex, two integrated ext. modes, 35-135mm, macro, auto/manual, DB, AF, 2 exp./sec, option, new condition, $245. Rainhart, 821-3690.

DP GYMPAC 1500, cable weight trainer, 110-lb. bench, leg extension, squat and press bar, good condition, $90. Hufnagel, 294-5949.

WHIRLPOOL REFRIGERATOR/FREEZER, 25.1 cu. ft., almond, ice/water dispensers on outside. Morales, 296-0928.

VANITY SET, 22-1/2 in. x 48 in., medicine chest w/mirrors, 24 in. x 48 in., wall mirror, eight bulbs, bar, sink and faucet, all $50. Rael, 884-4778.

ROLLAWAY BED, $25; child's bike, excellent condition, $25; swing set, assembled, $20. Fate, 293-2131.

COMPACT SANYO FREEZER, used only in motorhome occasionally, $229, new, asking $125. Woodward, 293-4369.

EXCEL 4.0 SOFTWARE, $125; Word Star 5.0, $75; both w/license. Baker, 884-8543.

LADY KENMORE, full-size washer and dryer, excellent condition, $350 for both. Rudolph, 298-0941.

DROP SPREADER, excellent condition, $10. Meeks, 828-9825.

STORAGE BUILDING, never assembled, new in original crates, 10 ft. x14 ft. x7 ft.3 in., Arrow brand w/gambrel roof, Rust-Oleum finish, $325. Snelling, 294-5751.

SMALL 2-WHEEL TRAILER, w/bins, $175; also, 2-man auger, $150. Gutierrez, 877-2580 after 5 p.m.

CHILDCRAFT, Reading Readiness Program, *"The Letter People,"* complete set in storage box, excellent condition, $100. Jensen, 821-2373.

GRAY METAL DESK, and table, each 30 x 60, w/matching swivel and straight chairs, $160; additional negotiable office items available. Hook, 821-5780.

BASEBALL CARDS, many stars and commons from the '60s and early '70s, 10-50% below Beckett. Holloway, 294-5816.

GARAGE SALE, six families, Saturday, Aug. 27, 6909 Hildegarde NE. Dandini, 296-4975.

EXERCISE BIKE, Weslo Aerobike 1500, electronic monitor, programmable resistance, works arms, legs, or both, like new, $100 firm. Jennison, 299-8391.

OUTBOARD MOTOR, 15 hp, Seaking, w/tank, low hours, $500; equalizer hitch, 750 lb. hitch weight, no receiver, $50. Luikens, 881-1382.

HAND-CARVED SOFA, chair, stool, Spanish Colonial, Chimayo-woven covers, $150; Sears water softener, good condition, $50. Church, 281-5215.

SEMIAUTO .22 RIFLE, 19 shot, scope, more, $110; plywood 1/4 in. unfinished cabinet grade ash, 20 sheets, $22 ea. Stephens, 822-8584.

FIREPLACE GRATE, $5; mantel rough wood, curtainrods, shades free, you pick up. Alexander, 291-8028.

TIRES, 245 x16, 10-ply, $30 ea.; electric automotive radiator fans, excellent condition, $15; tire chains, $10. Baney, 294-8970.

KENMORE REFRIGERATOR, side by side, frost free, 22.2 cu. ft., icemaker, golden wheat, $300. Muir, 296-6032.

HOMELESS, 2-year-old male terrier-shepard cross, needs a loving family, neutered, healthy, and sweet. Hake, 856-6176.

OAK DINING SET, table, chairs, buffet and china, $600; olive Drexel sofa, $200; two gold chairs, $50 ea. Gibson, 294-6831.

KING-SIZE WATERBED MATTRESS, semi-motionless, $100, accompanying frame and headboard, $50. Sikora, 881-4741.

COLOR TVs, 25 in., Curtis Mathes Console, w/remote, $75; 20 in. Emerson table model w/remote, $125; both in good working condition. Graham, 293-7302.

TWO HEAT PUMPS, water-to-air, carrier, refrigeration unit, never used. Moss, 298-2643.

TRANSPORTATION

SAILBOAT, plastic covered styrofoam w/sail, daggerboard and rudder, $30. Curzi, 296-5386.

'81 HONDA ACCORD, 5-spd., 2-dr., AC, runs good, clean, 100K miles, $1,200 OBO. Cheng, 275-7008.

'69 CORVETTE COUPE, 350/350, 4-spd., numbers match, LeMans blue, 80% restored w/upgrades, very good condition, $12,500. Wilde, 281-7027.

'61 AUSTIN-HEALY, sprite, restored, spare engine, Xmission, parts, bright red, great investment $5,000. Eikelberg, 296-0899, call in PM to see.

DUNEBUGGY, Sandhawk, sandrail project, rolling chassis, no engine, $1,000 OBO. Jones, 247-3455 or 836-5179.

'87 FORD ESCORT GL, beige, one owner, AC, AM/FM cassette, 87K miles, $2,000. Moya, 864-4582.

'92 JEEP CHEROKEE LAREDO, 31K, CD player, hitch, 5-spd., tinted windows, excellent condition, $15,500. DePoy, 281-4536.

Deadline: Friday noon before week of publication unless changed by holiday. Mail to Dept. 12660, MS 0413, or fax to 844-0645.

Ad Rules

1. Limit 20 words, including last name and home phone (the *Lab News* will edit longer ads).
2. Include organization and full name with each ad submission.
3. Submit each ad in writing. No phone-ins.
4. Use 8½- by 11-inch paper.
5. Use separate sheet for each ad category.
6. Type or print ads legibly; use only accepted abbreviations.
7. One ad per category per issue.
8. No more than two insertions of same "for sale" or "wanted" item.
9. No "for rent" ads except for employees on temporary assignment.
10. No commercial ads.
11. For active and retired Sandians and DOE employees.
12. Housing listed for sale is available for occupancy without regard to race, creed, color, or national origin.
13. "Work wanted" ads limited to student-aged children of employees.

'91 FORD TAURUS, 4-dr, absolutely perfect condition, new tires, $800 below NADA book, $6,200. Kaplan, 294-8243.

'92 CHEV. CAVALIER, 4-dr., AT, AC, 20K miles, $6,500. Campbell, 856-9195.

'81 CORVETTE, 350 cid engine, 53K original miles, power everything, $9,500. Babcock, 892-7199.

'70 CADILLAC COUPE DEVILLE, one owner, 98K miles, garaged, very nice, everything works, clean, reliable, all options, $2,400 OBO. Torres, 294-7273.

'86 DODGE CONVERSION VAN, fully loaded, 68K miles, one owner, very clean, $7,200 OBO. Roginski, 296-6494.

WOMAN'S BICYCLE, Panasonic, blue, 10-spd., good condition, $25. Bohne, 275-0736.

'85 BUICK CENTURY, 4 dr., sedan, AT, AC, PS, PB, maintenance records available, 61K miles, excellent condition, $3,000. Koletar, 255-4751.

'91 FORD TAURUS, white, V6, 4-dr., AC, PS, PB, cassette, cruise, tilt, excellent condition, $7,500. Gillen, 294-7551.

'65 MGB, white, convertible, new interior, new transmission, clutch, alarm, stereo, dual carbs, wire wheels, runs great, $6,000. Sisneros, 292-1854.

'87 FORD ESCORT GL, beige, one owner, AC, AM/FM cassette, 87K miles, $2,000. Moya, 864-4582.

'91 MERCEDES-BENZ 420 SEL, beautiful, black/black, loaded, nicest in NM, asking $41,000, must sell. Eikelberg, 296-0899.

'91 PLYMOUTH SUNDANCE, blue, 5-spd., AC, AM/FM cassette, airbag, only 20K miles, like new, $6,200. Hunkins, 299-4964.

'84 MERCEDES, 300SD Turbo Diesel, impeccable condition, fully loaded, fully serviced, SR, ALB, beige over silver, $13,900 OBO. Smith, 298-5868.

'70 1/2 CAMARO Z-28, 400 engine, 4-spd. transmission, perfect body and paint, good interior, $5,500. Prevender, 296-8586.

'92 FORD RANGER XLT, 4x4, ext. cab, green/silver, 5-spd., fully loaded, alarm, low miles, excellent condition, $12,000. McClellan, 869-7247.

'80 OLDS CUTLASS BROUGHAM, original owner, rebuilt AT, new paint, PS, PB, AC, cruise, perfect condition, everything works, $2,500. Lucero, 856-6293.

'66 DATSUN 1600 ROADSTER, runs great, new softtop, head, alternator, clutch, starter, includes spare engine, transmission, goodies, $2,000. Klarer, 344-0612.

'88 PLYMOUTH VOYAGER, V6, AT, PB, PS, tilt, AM/FM cassette, sunscreen glass, seven passenger seating, 73K miles. Warner, 281-7217.

BOAT, aluminum, 10-ft., good condition, w/trailer, needs tires, $150 OBO. Wilson, 293-2228.

'88 FORD TAURUS AT, AC, PD, PW, cruise, 54K miles, 4-dr., bronze, $4,500. Randolph, 299-2057.

'83 HONDA, Goldwing Interstate, AM/FM cassette, CB, Intercom plus more, black w/lots of chrome, $2,700. Eilers, 294-8582.

'85 DODGE COLT VISTA stationwagon, 7-pass., AC, power windows and locks, 5-spd., 105K miles, $1,900. Kiefer, 296-2331.

'73 FORD MUSTANG, white, Mach I, AC, PS, PB, automatic, 351 Cleveland engine, stereo/radio. Nelson, 881-0148.

'86 FORD BRONCO II, 4-wheel drive, one owner, tinted windows, sunroof, $4,950. Chavez, 877-7518.

'75 DODGE MOTORHOME, 24', all the right stuff including 3,500-watt generator, runs great, inside newly redone. Woodward, 293-4369.

'89 ISUZU PICKUP, w/character, AM/FM stereo cassette, oversized tires, chrome rims, 5-spd., 49K miles, runs well. Prindiville, 897-1850.

'93 MUSTANG GT HATCHBACK, 5.0L, red, 5-spd., sunroof, PW, PL, power seat, 14K miles, $15,500, Bluebook. Cameron, 275-7516.

'91 SUBARU LEGACY, 4WD sedan, AC, PL, PW, CC, tape, all records, 61K miles, $9,299 OBO, below book. Schkade, 299-4141.

'84 NISSAN MAXIMA, all power, 6-cyl., 5-spd., sunroof, $2,850 OBO. Bronkema, 291-1323.

'84 FORD RANGER, 4WD, shell, 120K miles, AM/FM cassette, $3,375. Clifford, 281-5083.

'93 CHEV. CORSICA, 24K miles, PS, PB, PW, CC, tilt, stereo cassette, rear defr., 4-dr sedan, white, $10,850. Liguori, 256-3613.

BOY'S 20" BICYCLE, one owner, used little, we live on a hill, $30. Phipps, 299-8490.

'72 FORD PICKUP CAMPER SPECIAL, 130K actual miles, doesn't look pretty, but real workhorse, make offer. Church, 281-5245.

BICYCLE 20" DYNO STUNT, 360 degree fork, pegs black, was $250 new, $110. Stephens, 822-8584.

'91 HONDA ACCORD, 4-dr., 35K miles, 5-spd., loaded, teal, one owner, excellent condition, below NADA, service records available. Henderson, 299-6083.

'87 MOTORHOME, Titan Champion, excellent condition, 31-ft. long, 26K miles, 454 cid, fully equipped. Carroll, 299-6061.

'76 MOTORHOME, Titan Champion 25 ft., class A, 440 Dodge, 64K miles, fully loaded, including 5KW generator, awning, top rack, $8,000. Smith, 384-5182.

'88 FORD RANGER PICKUP, w/camper shell; 4-cyl., 5-spd., 82,500 miles, new tires, $3,700. Padilla, 345-2351.

'92 JAYCO EAGLE 8, 8-ft., pop-up camping trailer, awning, battery, like new condition, many extras, $3,200. Vanderburg, 836-1169.

REAL ESTATE

NORTHEAST HEIGHTS, 3-bdr., 1-1/2 baths, LR, DR, FP, 2 CG., 1,400 sq. ft., new AC, remodeled baths and kitchen, $110,000. Montoya 296-4268, before 9 p.m.

2-BDR. '93 SPIRIT MOBILE HOME, 1 bath, 16 ft. x 60 ft., front livingroom w/bay window, parked at Four Hills M.H. Park, 5 minutes from base, $24,500. Sisneros, 292-1854.

CEDAR CREST, 4-bdr. custom, 2,400 sq. ft., paved access, views, exposed beams, decks. Sleefe, 281-4103.

4-BDR. HOME, 1-3/4 baths, 2,550 sq. ft., 2-car garage, living, formal dining room, game room, family room, NE heights, $165,500. Voccio, 292-6001.

3-BDR. HOME, 1-3/4 baths, large covered patio, oversize 2-car garage, double lot, $125,000. Crawford, 881-3812.

NAVAJO DAM, 3-bdr., full basement, solar and central heat, 1/2 acre, close to river and lake, owner financing available. Welch, 505-632-8935.

MOBILE HOME, adult park, '75 Lancer, 14x70, $16,000, 2 bdr., 2 baths, washer, dryer, disposal, dishwasher, carport, sheds. Ridlon, 298-4729.

20 ACRES, east of Sandia Mts., beautiful vistas all directions, 15 minutes from I-40/Tramway. Farmer, 764-5939, leave message.

3-BDR., 2-1/2 baths, 2-car garage, electricity/solar, wood stove, softener, 1/2-acre, east mountains, 2,070 sq. ft., white brick, AC, basement, $149,900. Clifford, 281-5083.

2 BDR. HOUSE, $50,000 OBO, close to schools, shopping centers, quiet neighborhood, very clean. Sanchez, 873-4281.

REMODELED, 3-bdr., 1-3/4 baths, fireplace, new carpet, new vinyl, custom cabinets, new commodes, near Menaul and Eubank, $107,000. McClure, 271-4908.

WANTED

HOTWHEELS, Matchbox, Corgi Toys, slotcars, modelcars, built/unbuilt and related items, if it has wheels I will probably buy it. Torrez, 294-7273.

4-WHEEL ATV, 250cc or greater, any brand, 2-or-4 wheel drive. French, 856-6126.

HOUSEMATE, female or male, 3-bdr. house, private baths, washer/dryer, large backyard, storage area, $225/mo. plus 1/2 utilities. Ewen, 836-3563.

TREE TRIMMING, stump removal, hauling, ask for George. Estill, 883-1531.

WORLDS OF WONDER, "Lazer Tag" sets, 3-4 sets, includes gun, belt, harness, holster, and sensor. Polito, 281-3953.

'83-'89 YAMAHA XT or Honda XL, enduro motorcycle, good condition, 250-350cc. Hoover, 281-8644.

HOUSE TO RENT, 4-bdr., for couple w/children and small pets, preferably Northeast Albuquerque, Sept. 1, Oct. 1, or Nov. 1. Parr, 831-1439.

HOUSEMATE, male or female, to share house near Constitution and Juan Tabo, $350/mo, utilities included. Mitchell, 298-1402.

ATARI 5200 game system and/or controllers, in working condition; Coors Light Silver Bullet jacket. Langwell, 293-2728.

WRITER of funny stories about animals. Heidrich, 897-5025.

Feeling rejected? Please follow the rules

Some classified ads are rejected because they do not meet requirements. LAB NEWS staff members do not have time to call people who submit ads, so nonqualifying ads may be rejected *without notice*. The most common reason for rejected ads is that Sandians do not list their full names and organization numbers; this information is not printed, but it is necessary to verify that the ad was submitted by a Sandian. The rules are printed at the top of this page in each issue, and Sandians are encouraged to clip and save a copy.

Sandia News Briefs

Sandia receives Secretary of Defense Award

Sandia recently received the Secretary of Defense's "Pro Patria" award for "distinguished contributions to the national defense through exceptional support of the Guard and Reserve." Sandia grants its National Guard and Reserve members time off for annual and specialty training and has implemented a new program to grant paid military leave for 15 days of annual training. Sandia VP Lynn Jones (7000) accepted the award for Sandia and Martin Marietta in a special ceremony in Farmington July 16. Wes Martin (7400), an Army Reserve major, nominated Sandia and Martin Marietta for the award. Also, Sandia supervisors were nominated for more than 30 certificates of appreciation by the New Mexico Committee for Employer Support of the Guard and Reserve. Sandia's Protective Force Division received another award for its special support.

Sandia sponsors administrative assistant degree scholarship program

Sandia is sponsoring a new administrative assistant degree scholarship program that offers high school seniors planning to attend Albuquerque T-VI an opportunity to gain practical experience at the Labs while working toward their administrative assistant degrees. The first scholarship recipients, Nicolle Navarrete of Del Norte High School and Denise Romero of Rio Grande High School, will begin their part-time work at Sandia on Aug. 29. The new program was developed by Ann Murphy (3533) and former Sandian Diana Cole.

Norm Augustine appointed to President's committee of science advisors

President Clinton recently appointed Norm Augustine, Martin Marietta's Chairman and Chief Executive Officer, to the President's Committee of Advisors on Science and Technology. The 18-member committee, composed of top-level representatives from industry, education and research institutions, and nongovernmental organizations, is charged with ensuring that US science and technology policies and spending reflect what the President says are the nation's needs: health, prosperity based on long-term economic growth and technological investment, national security, environmental responsibility, and improved quality of life.

Send potential Sandia News Briefs to Lab News, *Dept. 12660, MS 0413, fax 844-0645.*

Sandia in the News

This is a periodic column listing a selection of recent print and broadcast news reports about Sandia. It is provided by Media Relations Dept. 12630 to give Sandians a sense of what is being said about Labs work in national and international media.

Peter Boissiere (2161) was seen on Cable News Network (CNN) newscasts and on CNN's feature "Science and Technology Week" talking about Sandia's RETRVIR (Remote Telerobotic Vehicle for Intelligent Remediation), which CNN science correspondent Miles O'Brien describes as a new kind of robot that can think.

Popular Science has a story about the Labs' EnviroTrade database system, which it says "enables researchers to compile information about contaminated sites and the technologies used to detoxify or monitor them."

"The Greening of the Diesel," in *Popular Science,* discusses a joint Sandia/Cummins Engines project designed to cut soot levels.

Smart guns in the news

Doug Weiss (2337), who testified recently before Congress about nonlethal weapon technologies under development at Sandia, appeared on KWGN-TV (Denver) and KTVT-TV (Dallas) talking about the smart gun, which is being designed to enable police officers to disable their guns so criminals can't use them.

The *Los Angeles Times* story that grew out of that nonlethal weapon technologies testimony before Congress resulted in a page-one story that describes smart gun R&D efforts at the Labs.

Superman & Batman Magazine, a children's publication with a combination of comics and news, has a story and photo about Sandia's micro steam engine (world's smallest steam engine).

The *San Francisco Examiner*'s "Down to Science" column recently discussed two July 8 *Lab News* stories about work aimed at getting rid of excess explosives by reprocessing the chemicals and about the importance of preserving basic knowledge about the design of nuclear weapons.

Mechanical Engineering ran a photo of Cliff Loucks (2171) as part of its four-page story on agile manufacturing. That piece devoted considerable space to Sandia interactions with Pratt & Whitney, Babcock & Wilcox, and Hibbitt, Karlsson, & Sorensen.

The *USA Weekend* edition of *USA Today* recently had a short story and color photo about Sandia's RATLER (Robotic All-Terrain Lunar Exploration Rover).

Business Week reports that Sandia is doing computer searches for new pharmaceuticals using software originally developed to help arrays of telescopic video cameras detect incoming ballistic missiles.

Coronado Club

Aug. 19 (tonight) and Sept. 2 — Friday night kids' bingo. Buffet at 5 p.m., with cartoons and movies. Bingo starts at 7 p.m.

Aug. 21 — Sunday brunch buffet, 10 a.m.-2 p.m. Adult members $6.95, nonmember guests $7.95, children 4-12 $1. Reservations required. Tea dance, music by Bob Weiler & Los Gatos, 1-4 p.m.

Aug. 25, Sept. 1, Sept. 8 — Thursday night bingo. Card sales and buffet begin at 5:30 p.m., early birds' bingo at 6:45 p.m.

Aug. 26 — Friday night dinner/dance. Dinner 6-9 p.m., filet mignon or grilled halibut, each two for $14.95, or all-you-can-eat buffet, $6.95. Dance, 7-11 p.m., music by Nite Rider.

Sept. 5 — Labor Day pool and patio party, 11 a.m.-6 p.m. Entertainment, Bob Weiler & Los Gatos; Pixie, Mitzie, and Sparky the clowns.

New dedicated phone line for savings plans

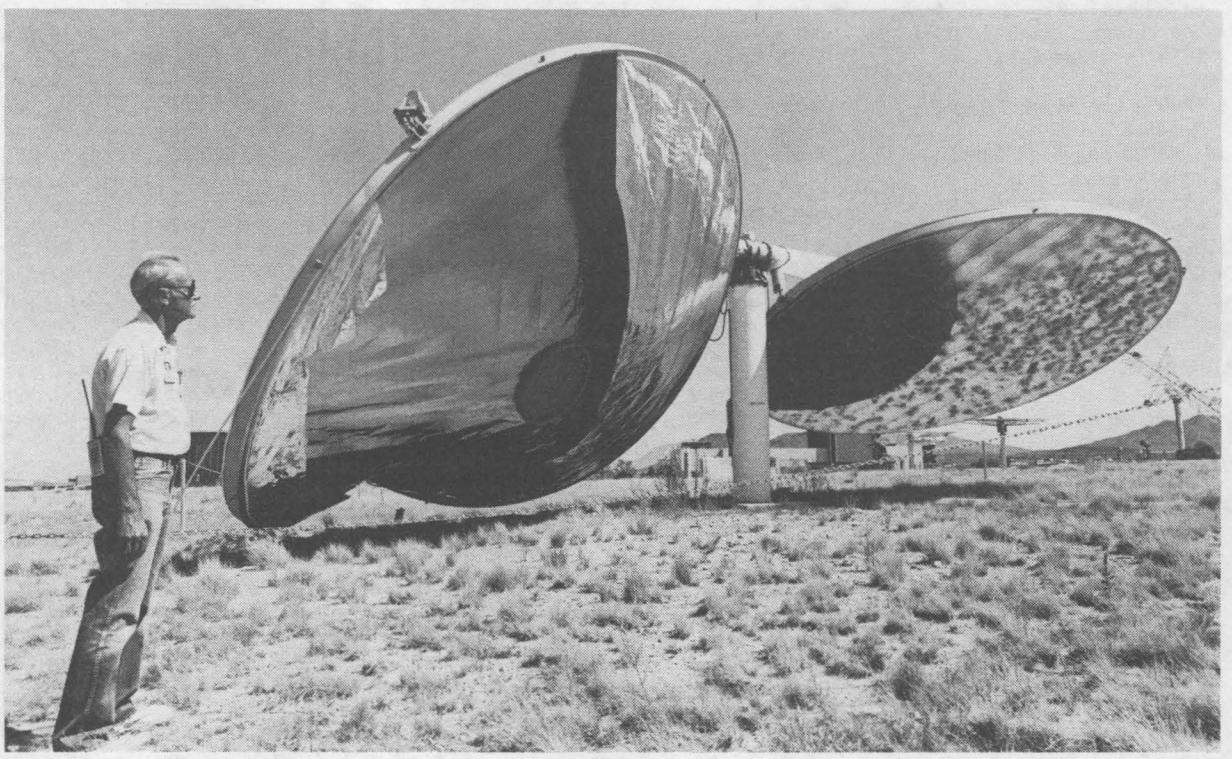
Fidelity Investments has added an Information and Transaction Line for Sandians and added a mailing address to speed correspondence having to do with Sandia's savings plans.

Fidelity services representatives trained specifically on the Sandia savings plans are available Monday-Friday, 6:30 a.m.-6 p.m. Mountain time, and 5:30 a.m.-5 p.m. Pacific time, by calling 1-800-240-4015.

Fidelity's automated telephone service remains available at all other times (24 hours a day) by calling the same number.

Meanwhile, written correspondence and inquiries may be sent to Fidelity Investments, Sandia Savings Plans, P.O. Box 9029, Boston, MA 02205-9029. That address also should be used for early lump sum loan payoffs (cashiers' checks only), written account verification, and address updates (terminated and retired Sandians only).

Wallet cards with the new phone number will be sent to Sandians soon.



SOLAR DESTRUCTION — Larry Gillette of Solar Thermal Test Dept. 6215 examines a heliostat damaged by 113-mile-per-hour winds that hit outlying southerly areas of Sandia during an Aug. 1 thunderstorm. Winds blowing at the highest speeds ever recorded at Sandia shattered glass, dented building structures, and destroyed heliostats (such as the one seen here). Damage to the area, which houses more than 225 large, mirror-like heliostats used to focus the sun's energy on a central point, has been estimated at nearly $100,000 in replacement costs. Actual damage was about $1 million, but much of the damaged equipment was from completed projects and will not be replaced.