

Flier Plates Reach Record Speeds for Impact Testing on Hypervelocity Launcher

What happens when a meteor or a chunk of space debris crashes into a space station or satellite? Or a well-aimed projectile strikes an armored vehicle?

Because the shock of such collisions creates extremely high pressures and temperatures, a material might flex, fracture, fragment, or vaporize. Hardware designers need to know the conditions under which different materials will survive — think of the crew inside a tank or astronauts in a space station. At present, high-velocity impact is the only experimental means of studying such extreme conditions.

For decades, Sandia investigators have worked with gas guns to accelerate projectiles and study the results when they hurtle into targets. Now a new high-velocity technique offers materials scientists data about conditions at even higher pressures, says Lalit Chhabildas of Experimental Impact Physics Div. 1543.

The new method, developed in response to research needs of the Strategic Defense Initiative, has given Sandia the ability to accelerate aluminum flier plates to 10.4 kilometers per second (more

“The plate receives the pressure pulse during about a half-microsecond.”

than 23,000 miles per hour). The disk-shaped plates — the size of a dime and nearly a gram (about 1/30 ounce) in weight — are big enough to represent events in the “real world” outside the lab.

Stretching the Limit

Lalit and Lynn Barker (ret.) achieved this record speed with a two-stage light-gas gun, formerly believed to have a maximum perfor-

mance of eight kilometers per second. The gun operates by firing a first-stage projectile in a gas-filled tube, compressing the gas. When the pressure builds up enough, a rupture disk at the end of this tube releases the gas into a smaller second-stage tube. In the old mode of operation, the high pressure of the gas in the second stage propelled a flier plate from the gun into a target.

The speed possible with this method is limited by the pressure a plate can withstand. Aluminum plates will survive the 10,000 atmospheres of pressure normally used in the old method. But the

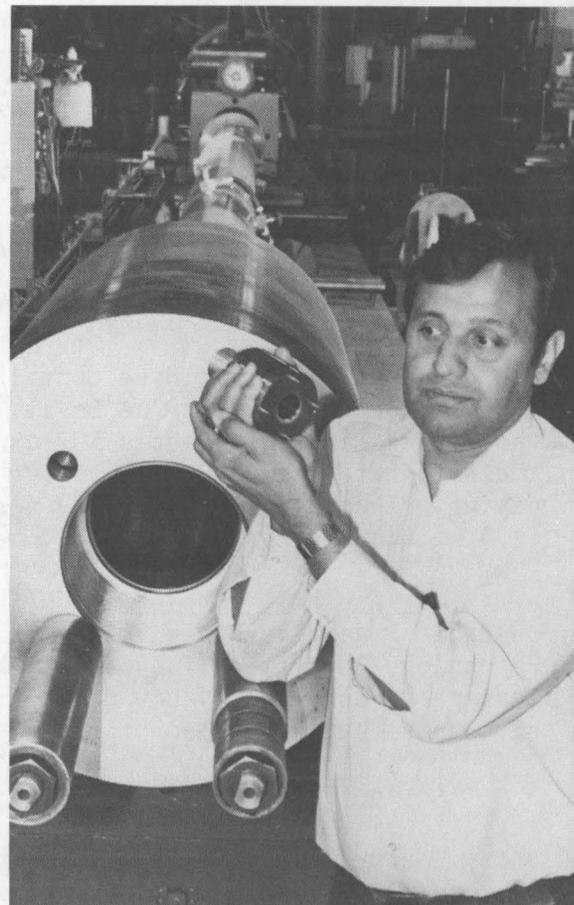
The dime-size plates are big enough to represent events in the “real world” outside the lab.

million-atmosphere pressure necessary for greater speeds cracks the plate into pieces while it's still in the gun.

Lalit explains why: “Pressure isn't distributed uniformly across the barrel of the gun,” he says. “At a million times atmospheric pressure, even a nonuniformity as small as 10 percent creates large pressure differences across the plate. That causes breakup of an aluminum plate.”

Titanium alloy, a stronger material, can survive, but it's so heavy that the maximum speed is only about six kilometers per second. “When we

(Continued on Page Six)



AT THE BREECH end of the Hypervelocity Launcher (HVL), Lalit Chhabildas (1543) holds a barrel extender. The barrel extender is an easily replaceable part of the HVL that holds the aluminum flier plate and receives much of the wear caused by operations.

Interview with Al Narath — See Page Four

LAB NEWS

VOL. 42, NO. 24 SANDIA NATIONAL LABORATORIES DECEMBER 7, 1990

1990 Campaign Wrap-Up

ECP Contributions Up Nine Percent

Each year during Sandia's Employee Contribution Plan (ECP) campaign, Sandians are asked to contribute just a little more than in the previous year, and each year many Labs employees do just that.

This year, ECP pledges total nearly 9 percent more than last year's total of \$1,374,089. Coordinators are waiting to release this year's final dollar figures because if \$3,000 more can be raised, the total contribution would exceed \$1.5 million.

Total participation is at 90.2 percent. Total Fair Share participation is 47.4 percent, and Gold Share participation is 5.3 percent, a 26 percent increase over last year's Gold Share participation. (Fair Share equals six-tenths of one percent of a contributor's salary, or one hour's pay per month, and Gold Share equals one percent of a contributor's salary.) This year, 657 Sandians checked the box on the contribution card that requested a one-tenth of one percent increase (10 minutes pay per month) in their contribution.

At the Nov. 20 ECP wrap-up luncheon, United Way of Greater Albuquerque's president, Mike Thompson, noted that one out of three people seeking help from United Way's 47 local agencies is helped by Sandia's ECP program.

“In times of reduced federal and state funding for programs to help the needy in our community, Sandians have really come through,” says ECP Chairman Don Cook (1260). “I and the rest of the ECP executive committee are exceptionally pleased with the 8.9 percent increase in pledges this year. That will really help fill those community needs.”

The ECP campaign is coordinated by Joe Laval of Community Relations Div. 3163. ●

What Do You Think?

New Feature to Explore Your Ideas

In line with the evolving Sandia climate of empowered employees and open communication, the LAB NEWS is beginning a new feature that we're calling “What Do You Think?” to get your opinions and ideas about various issues.

The intent is to give Sandians an opportunity to suggest ways to make the Labs more efficient, more responsive, and perhaps a better place to work.

Here's how it will work: The LAB NEWS will pose a question in each issue and ask for your answers. Depending on the number of responses we get, we'll either print them all or print representative ones if several folks express the same basic idea.

The few ground rules:

(1) Type or write your response clearly, and limit it to a maximum of 50 words; we're looking for ideas, not treatises.

(2) Concentrate on presenting constructive ideas; this feature is not for personal “ax-grinding,” and we reserve the right not to print any such responses or ones that are simply negative.

(3) Sign your response and include your organization number and telephone number. We will print names and organization numbers with each response unless you specifically request that you don't want your name associated with it; if that's your wish, we will honor it and will not reveal your name to anyone. But before we print any response — with or without a name — we'll call you personally to verify that you submitted it.

Question Number 1

Sandia is interested in improving communication throughout the Labs — vertical communication in particular. What is the one, most important thing you would suggest to improve communication at the Labs?

Send responses to Linda Doran, Division 3162, to arrive by Tuesday, Dec. 11. Responses can also be sent to our fax machine if you prefer: 844-0645.

We would also appreciate receiving your suggestions for future questions for this feature. ●LP

This & That

A Chat with the Boss - We're pleased to include an interview with Al Narath in this issue (page four), although it's a couple of months later than we intended. Our original idea was to interview Al back in September so he could provide a bit of review and preview on FY90/91. However, uncertainties over the new budget dragged on, delaying us a few months. We still plan our annual "State of the Labs" interview with Al and Executive VPs Orval Jones and Lee Bray early next year.

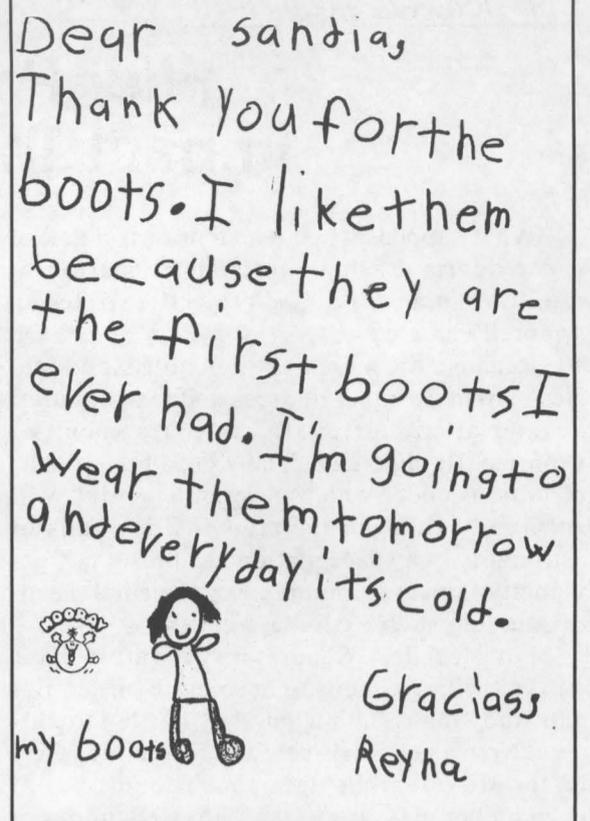
Speaking of Al - Like most of us, he too gets mail that's addressed strangely. Al recently received a letter addressed to Sancila National Labs in Albuquerque. I'm not sure, but I think a sancila is a teenage mutant New Mexico chinchilla.

Merry Mugs - Employee Contribution Plan (ECP) Chairman Don Cook (1260), ECP Coordinator Joe Laval (3163), and the many other Sandians who helped with this year's ECP campaign have had some big smiles on their mugs recently. Sandians have continued the tradition of generous giving. Pledges are up nearly 9 percent over last year and total almost \$1.5 million (see story on page one).

Yet Another Trouble Sign - Sometimes I think I should give up reading. I came across this recently: "Dr. Albert Mehrabian of UCLA's Psychology Department found that when we speak, 55 percent of our message is conveyed by how we look." On second thought, maybe I should give up speaking instead of reading.

Action-Packed Lead! - Newspaper writers strive to catch readers' attention in the first sentence to entice them to read the rest of the story. Gerry Yonas (400) spotted this lead recently in a New York paper: "A Romulus man, who Tuesday shot his estranged wife's lover and then killed himself, pleaded guilty last week in federal court to passing counterfeit money." How could you not read on?

Mr. "Modesty" Isn't His Name - From a brochure touting the lecturer for a commercial workshop: "Mr. _____ is a consummate [sic] professional and is perhaps the leading expert in the world on . . ." Right. And I'm *perhaps* the best columnist in the world. •LP



SHOES FOR KIDS APPRECIATED - For 33 years, Sandians have supported the Shoes for Kids campaign sponsored by Systems Evaluation Directorate 7200. Last year, 150 kids received new shoes. According to Liz Scott-Patterson (7212), at least twice that many need shoes this year. Children most in need are identified by educators at Eugene Field, Mission, La Mesa, Hawthorne, and Emerson elementary schools. With contributions, Kinney's Shoes in Coronado Center will fit a pair of shoes to each child. The campaign is off to a late start this year, so hurry and send your checks made out to Shoes for Kids for \$21 (discounted cost of one pair of shoes) to Liz in Div. 7212 (Bldg. 892, Rm. 100). Donations are needed by Dec. 12.

New Attorney Joins Legal Dept.

Attorney Cynthia Hall recently joined Sandia's Legal Dept. 4010 and will work on ES&H issues for the Labs.

Before coming to the Labs, Cynthia was assistant counsel for the Navy's Office of the General Counsel at the Naval Facilities Engineering Command in San Bruno, Calif., working primarily in environmental and real estate law. She has also worked in private practice and as an attorney for the State of New Mexico in various departments, including the Public Service Commission, Regulation and Licensing Department Securities Division, and the Energy and Minerals Department, where she wrote construction contracts for reclamation work, wrote safety regulations, and represented the department in administrative investigations and civil actions.



CYNTHIA HALL

Cynthia has a JD from Southwestern University School of Law (Los Angeles), an MS in physiology from St. Louis University, and a BA in biology from Washington University (St. Louis). She's a member of the New Mexico Bar Association. She enjoys classical piano, ballet, and cross-country skiing. She and her husband Alan, a local attorney, live in the North Valley.

Sandia Recycling Update

The first trailer-load of recyclable office paper was hauled away from Sandia at the end of October, signaling completion of the first three months of the Labs' pilot recycling program.

The waste paper was hauled to Recycle America's processing plant near downtown where it was shredded in preparation for turning it into pulp. The 26,640 pounds (about 13 tons) of waste paper collected equates to saving 226 trees, 56,000 kilowatt-hours of electricity, and 93,000 gallons of water.

In other recycling developments:

- The new Sandia personnel directory, is-

sued in late November, was the first product identified by a symbol as being printed on recycled paper.

- Reproduction, Still Photography, and Mail Services Div. 3154 is now asking its contractors to print certain publications on paper containing 50 percent recycled material.

- Recycling at Sandia is now recognized as being part of a new pollution prevention program mandated by DOE. The program calls for establishing solid waste recycling coordinators at Albuquerque and Livermore to develop and implement solid waste (paper, plastic, aluminum, etc.) recycling efforts. Proposed goals are to reduce solid waste volume by 25 percent by 1993 and 50 percent by 1995.

- Sandia will recycle phone books this year. Details will be announced soon. •

Earnings Factors September 1990

Long-Term Savings Plan for Management Employees (LTSPME) Earnings Factors

AT&T Shares	.9637
Government Obligations	1.0090
Equity Portfolio	.9465
Guaranteed Interest Fund	1.0071
South Africa Restricted Fund	.9427

Long-Term Savings and Security Plan (LTSSP)

AT&T Shares	.9639
Guaranteed Interest Fund	1.0068
South Africa Restricted Fund	.9430
Equity Portfolio	.9467
Employer Stock Fund	.9636

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Focus on Math and Science**Oakland Schools to Get Help from Sandia**

Sandia has made a major commitment to help thousands of students in Oakland schools face their most dreaded subjects — science and math.

Sandia joined three other Bay Area DOE laboratories in signing a Nov. 13 agreement dedicated to improving math and science education in the Oakland Unified School District. Oakland Unified serves more than 50,000 students representing 82 languages and ethnic groups.

Oakland's schools were selected for the collaborative effort as part of DOE's commitment to work with urban and rural schools. DOE's financial support will be between \$300,000 and \$500,000 for FY91.

Funds will be channeled through a newly established consortium called BASTEC (Bay Area Science and Technology Education Collaboration). Over the past year, Denise Koker (8526) has been laying the groundwork for the DOE labs and the school district to work together to provide programs for teachers and students. Other BASTEC members include Lawrence Berkeley Laboratory, Lawrence Livermore National Laboratory, the Stanford Linear Accelerator Center, and a dozen other educational institutions and organizations.

Vice President John Crawford (8000), who represented Sandia at the Nov. 13 ceremony, told the LAB NEWS, "The concept of the Bay Area national labs collaborating with the Oakland schools offers tremendous potential for the future. I am optimistic that all the institutions will benefit from this endeavor."

BASTEC grew out of a national meeting convened in Berkeley last year by DOE Secretary James Watkins and Nobel laureate Glenn Seaborg. Along with John Crawford, nearly 250 scientists, educators, business executives, and government leaders met to develop plans for revitalizing math and science education. Oakland was selected along with other urban districts for the initial program.

The funds will support summer workshops for elementary, middle, and high school teachers, grants for teachers to attend professional meetings, and mini-grants to provide students with hands-on laboratory work. The funds will also



SANDIA VP John Crawford (8000, third from left) signs the Bay Area Science & Technology Education Collaboration (BASTEC) agreement. Looking on are (from left) Phil Coyle of Lawrence Livermore National Lab, Burton Richter of the Stanford Linear Accelerator, and Pier Oddone of Lawrence Berkeley Lab.

support a resource center and a newsletter to keep teachers current on the latest developments in science as well as on opportunities and grants available to them through the national laboratories and scientific foundations.

Even though DOE is placing greater emphasis on educational outreach, Sandia has historically been involved with schools. As part of its Affirmative Action Program and through individual initiatives, Sandia has been involved with Oakland schools for many years.

As a participant in Oakland Partners in Education (PIE), Denise Robinson (8526) has worked to encourage systemic changes in Oakland's middle schools. This partnership between school, community, and industry encompasses special projects such as STRETCH (Students and Teachers Raising Expectations to Challenging Horizons) that foster school-based decision-making teams, parent involvement, community and industry involvement, and district support.

Denise has arranged for Sandia speakers to teach some 200 students about topics such as consumer math, word processing, computer programming, and improved academic performance. Denise also serves on the McClymonds High School Advisory Committee.

Oakland Schools Volunteer

Marv Kelley, a volunteer for 18 years, says, "I'm a product of the Oakland school system. I realize that the system can be improved and that it is very easy for students to be knocked off track if they don't take the right college prep courses in high school."

Marv helped set up some innovative career fairs with a group representing both Sandia and Lawrence Livermore labs. "We provided role models for students in science, technology, business, law, and medicine. We wanted to foster an interest in continuing education and bring together as many hands-on demonstrations as possible to the career fairs," he says.

Another outreach group of some 50 Sandia and LLNL employees called ABLE (Affiliated Black Laboratory Employees) grew out of these early activities. The group's current projects involve serving as role models and career advisors to area high schools.

"Students really find it an eye opener when we tell them they should get college catalogues and read about the required coursework for careers they want to pursue," notes Marv. "I am rewarded when students tell me they are doing something to prepare for their college education, and I get even more interested if they want to pursue careers in science and technology because that is an area where minorities have been underrepresented."

Sandian Helps Chinese Schools

Ray Ng (8445) is another Sandian who has been personally involved in helping schools. For three years, Ray has spent one morning a week at the Chinese Christian Schools in San Leandro. The

private school is unusual in that many of its students are immigrants, and many are from low-income families who receive financial aid.

"I'm trying to help motivate students in science," says Ray. "I'm trying to show them that science isn't a far-fetched topic, but one that affects their daily lives."

Ray's involvement ranges from tutoring individual students to working with classes or groups of high school and junior high school students. Sometimes he brings students to Sandia to show them how real labs work.

New Programs Offered

This year is the first time DOE has made educational outreach a top priority, formally incorporating it as part of DOE's mission, explains Karen Scott (8526), educational outreach coordinator at



**SANDIA
LIVERMORE NEWS**

Sandia, Livermore since October. Although BASTEC is committed to education in Oakland, Sandia's commitment represents a broad corporate pledge to help improve the teaching of math and science on a national level. Karen will help plan and coordinate many of these programs.

Upward Bound Program

One such effort involves working with TRIO, a well-established program that prepares low-income, disadvantaged students nationwide for successful entry into and completion of college. Sandia will help Upward Bound, one of the TRIO programs, strengthen the math and science component and may also develop a national data base for record-keeping. "We're plugging into an already successful program that will allow us to reach 500,000 children a year," says Karen.

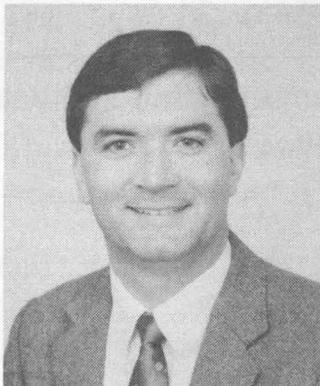
Plans are also under way at Sandia, Livermore to strengthen these and other well-established outreach programs, and to explore new program opportunities. Examples of new programs include working with the Lawrence Hall of Science, establishing an educational component for the Center for Computational Engineering (CCE), and forming a Design and Drafting Advisory Group. ●

Fun and Games

Winners in the annual Sandia Employees Golf Club championship tournament are Jan Inzerilla (8525), who took first in the women's flight, and Rex Steele (8286), who led in the men's flight. Jan boasted a 143 score for the two-day tournament, and Rex posted a 137. Low gross was won by Todd Howe (contractor) with 159. The annual tourney was played at two courses in two days — Van Buskirk Golf Course in Stockton and Willow Park in Castro Valley.

Maxwell Named Assistant to VP

BRIAN MAXWELL has been promoted to Administrative Assistant for VP-8000, effective Nov. 16.



BRIAN MAXWELL

Brian joined Sandia in June 1987 as a budget analyst in the Budget and Financial Div. 8523. In his newly created position, he will be involved in business planning and strategic planning, and will serve as the administrative ac-

tion officer for the vice president's office.

Before joining Sandia, Brian owned a printing business in Gainesville, Fla. for four years, then went back to college. He earned bachelor's and master's degrees in finance at the University of Utah.

Originally from Canada, Brian grew up in south Florida. He and his wife Viviane have one daughter and reside in Manteca. His interests include gardening and playing basketball and volleyball in his church league. He received a Sandia Award for Excellence earlier this year.

A Chat with the Boss**Al Narath Discusses Events and Expectations**

Sandia President Al Narath visited with the LAB NEWS last week to answer some questions and give his views on several issues. Here is some of what Al had to say:

LN: Is our FY91 budget adequate to sustain our people and programs?

Al: We're generally in good shape in FY91, but we will reduce the size of the staff somewhat through attrition.

LN: Are we still projecting approximately 200 fewer employees by the end of the fiscal year?

Al: I don't know what the exact number is, but we'll have very limited hiring this year. The real concern is what may happen in fiscal '92 and beyond, and how best to position the Labs in anticipation of continuing federal budget problems.

LN: So you're concerned about '92?

Al: Yes. I'm definitely concerned about fiscal '92.

LN: About particular programs?

Al: We may see some decline in nuclear-weapon program support. Nonetheless, we must not forget that our responsibility in that program is awesome. The challenges that lie ahead of us in terms of further improvements in weapon safety, security, control, reliability, and cost are very significant. I anticipate similar conflicts in all of Sandia's programs between growing opportunities to serve national needs, on one hand, and financial pressures, on the other.

LN: How about our basic R&D funding?

Al: If I have a serious concern about our future, it's that we must not neglect the investments required to maintain and further develop our core competencies. That means that we need to focus attention on relevant research programs and other

“... we need to focus attention on relevant research programs and other forward-looking work.”

forward-looking work. That's going to be the subject of much discussion in the next round of strategic planning that begins in January.

LN: Have we been “drawing down our bank account” in that area?

Al: It's like climate change. You have an uncomfortable feeling that it's taking place, but it takes a while before the effects become fully visible. And once they are visible, it takes a long time to reverse the trend. So we need to be careful that we do the right thing in the short run so long-term damage isn't done.

LN: Some folks at Sandia, Livermore are voicing particular concern about the future.

Al: There's no need for our Livermore staff to be any more concerned than anyone else at Sandia. As far as I'm concerned, we face a common challenge. As I've said on many occasions, we are one laboratory—both locations are important to our future, and I don't intend to deviate from that position.

I have consistently expressed my belief that our Livermore laboratory is a very special asset for Sandia. Being smaller gives it a special character—an *esprit de corps* that's more difficult to achieve in a larger facility like our Albuquerque laboratory. And Livermore's West Coast location and proximity to some of America's outstanding industrial firms and universities provides an opportunity for our Livermore people to interface more easily with those institutions. I've challenged John Crawford [VP of Livermore Programs 8000] to develop a long-range strategy for Sandia, Livermore that takes advantage of these special conditions.

LN: Some Livermore employees were concerned that the consolidation of central computing facilities and planned move of supercomputers

from Livermore to Albuquerque [LAB NEWS, Nov. 16] was perhaps the first step in phasing out Sandia, Livermore.

Al: I've responded in writing to their concerns and have tried to reassure them that this is not a first step toward dissolution of Livermore. I anticipate future consolidations that will move in a westerly direction instead of easterly.

LN: Anything that you can announce yet?

Al: Not yet, but soon, I believe.

LN: The Albuquerque Journal took Sandia to task last week for using “pricey” training consultants in our change management initiative and questioned some of their methods. Are we planning any changes in the initiative as a result?

Al: Dan Hartley [VP, Corporate Change Management, Org. 5] and his people have been evaluating the program constantly since we started it, and they are making refinements as we go along. The desired changes in Sandia's operating style will take time to fully define and implement. It's important that all employees understand what the change management objectives are, and what's at stake for this laboratory.

LN: Such as?

Al: We went through a very difficult time once before — back in the early 1970s — and we were not sufficiently sensitive to the warning signals that appeared on the horizon then. We're facing potential cutbacks in our funding for FY92 and beyond, and we must all be committed to making this laboratory as efficient and productive as possible. Our objective is to maximize customer satisfaction. This will enhance our competitive position and ensure that we will continue our record of valuable contributions in the national interest.

LN: Do you see the change management process as an integral part of this?

Al: Yes. About two years ago, as we approached Sandia's 40th birthday, we could see that our operating environment was changing, becoming more demanding — although we didn't recognize how rapidly at the time — and the Management Council began developing a strategic vision for the Labs. We crafted a Vision Statement and developed our *Strategic Plan*. We challenged Sandia to aim for a larger leadership role, and we began to institute modern quality practices to enhance performance.

We knew we could accomplish the plan's goals only through greatly increased employee involvement, improved communication, and a greater sense of ownership at all levels within the Labs — we call that empowerment. We looked around and sampled the experiences of organizations that had followed a similar path, particularly in the private sector — companies like Motorola, Xerox, GE, AT&T. We became convinced that the changes in Sandia's operating style that the *Strategic Plan* called for could be achieved most rapidly by engaging a consulting firm with experience in change management, to assist in pointing us in the right direction and getting the program off to a fast start.

LN: Some Sandians are questioning the firm's methods.

Al: I suggest that Sandians base their judgment on the experience of those who have had direct interactions with the “Being First” consultants. I have been impressed with the results achieved to date and have had no reason to fault their professionalism. Of course, I can't expect all 8,600 Sandia employees to be in agreement with everything that management does. There will always be differing views, both inside and outside Sandia, and that's healthy—it keeps management on its toes.

LN: How about the editorial in the Albuquerque Tribune that came out supporting our change management program after the Journal articles appeared?

Al: It came as a most welcome vote of confi-

dence. I very much appreciate the *Tribune's* thoughtful support. I was pleased that the *Tribune* understood the enormous leverage that would result from productivity improvements of even a few percentage points at an organization as large as Sandia.

LN: Some employees point out that Sandia has an outstanding record and reputation, and therefore question the need for a change management program, or for that matter, much change at all.

Al: It has always been very difficult for successful organizations to recognize the need for improvement. We certainly have a history of significant accomplishments, and we've become accustomed to believing that we're the best. Pride in the Labs is a must. However, all we have to do is look around to realize that there have been many other organizations who thought of themselves similarly, but when confronted by rapidly changing competitive realities suddenly discovered that large performance gains were needed to survive. We have been good at what we do, but it's unrealistic to think that we're currently performing at top efficiency and don't need to make adjustments in today's increasingly demanding R&D environment. We must improve because our customers are expecting it and because everyone else is striving to improve. Ultimately, what matters most on the road to improvement is the rate of progress. We may occasionally take a wrong turn and have to backtrack some, but it is a road that we must travel as fast as possible.

LN: So, what's the key to a successful journey?

Al: We must close ranks, recognize the urgent need for change, and commit to carrying out the necessary actions. We must move toward a more fluid, project-oriented organization and minimize the impediments of our rigid hierarchical structure. We need to develop a more participatory style of decision making and program execution — one in which all employees feel a strong sense of ownership and assume accountability for the consequences of their actions. All of us need to communicate more freely and effectively — in all directions. We need to strengthen mutual trust and respect and focus on teamwork while giving each individual opportunities to excel. We're much more than a collection of individuals. We will succeed or fail depending on how well we pull together and dedicate our efforts to a common purpose.

LN: As a practical matter, what can the individual employee do to make Sandia a better place?

Al: The role of management is to provide leadership and support, but lasting changes will happen only to the extent that each individual influences

“We need to strengthen mutual trust and respect and focus on teamwork while giving each individual opportunities to excel.”

his or her work environment. It's important for all employees to find ways to do their jobs better, at lower cost, and in a timely manner. Even small improvements in the way we work together can have a large impact when multiplied a thousandfold.

LN: Are we making progress?

Al: Yes. The reaction to Vision Day this spring was extremely heartening. I'm cheered by the many changes, for example, that the Barrier Busters have engineered. Other initiatives started since then have had similar impact. I see much evidence that employees support the need for change and that we're making real progress. On the other hand, I don't want to become overly optimistic. I sense there is still quite a bit of confusion. I was told at the outset to expect some initial chaos. Significant change is never easy to achieve, either for individuals or

organizations. Change is often painful, especially when you've had years to get comfortable with existing ways of doing business.

LN: *One of the things that you emphasized in a recent presentation to the Secretary of Energy's Advisory Board (SEAB) on the National Labs was the need for stability in the weapon complex, saying that it's cheaper to maintain our capabilities than to rebuild them later. Is there a good appreciation of that today in the right places?*

AI: I believe the Department of Energy recognizes the importance of maintaining the capabilities of the nuclear-weapon complex. At the same time, shrinking budgets at a time of increasing costs for environmental cleanup and restoration mandate that we do things differently in the future — more efficiently. I am confident that DOE for its

“... shrinking budgets at a time of increasing costs . . . mandate that we do things differently in the future — more efficiently.”

part will provide as much continuing support as possible; for our part we must make the most of it. [For more about AI's SEAB talk, see “Narath Addresses DOE Advisory Panel.”]

LN: *DOE's weapon complex reconfiguration study, requested by Secretary Watkins, is due out soon — perhaps as early as next month. Anything you can discuss about that now?*

AI: I don't have any inside information, but the Secretary is definitely exploring ways to streamline the complex, particularly on the production side, but also on the RD&T [research, development, and testing] side. It's our responsibility to help DOE define how these improvements can be realized and then implement them. It's important for us to understand what the critical core competencies are that support the nuclear-weapon program and to be sure that we maintain those competencies. We must also recognize that beginning in the 1970s, a number of our core competencies have been sustained by more than one customer. Our challenge is to seek programs that on one hand serve an important national need and on the other hand help protect the core competencies.

LN: *Such as, in Sandia's case?*

AI: Examples of Sandia core competencies are microelectronics and photonics; computational science and intelligent machines; pulsed power; our ability to test in very stressful environments; systems integration and rapid prototyping; our capability to develop and engineer advanced materials. We're continuing strategic planning efforts to come to a better understanding of what Sandia's most essential core competencies are. And we're constantly assessing our strengths and weaknesses to determine how we can best contribute to national needs.

LN: *As Sandia diversifies and seeks expanded roles in certain areas — for example, in space technology, drug interdiction technology, and advanced superconductors — other private and government labs are trying to do the same thing. How can Sandia best position itself in this increasingly competitive R&D climate?*

AI: The answer ties back to the issue of core competencies — those special capabilities that provide an organization with differentiating strengths. Ours are considerable, and we must capitalize on these fundamental capabilities. However, it's also important to realize that no organization owns unique capabilities. It's a question of how effectively we can assemble all the pieces to provide our customers with superior value. It comes down to leadership, quality, and empowerment.

LN: *How are we doing with our environment, safety, and health [ES&H] compliance efforts?*

AI: We're making progress, but not as rapidly as I had hoped initially. Secretary Watkins has assigned *top priority* to ES&H compliance activities

at all DOE facilities, and I'm determined that Sandia will achieve ES&H excellence in the shortest possible time. In the near term, ES&H must be the principal focus of our change efforts. It's painful to admit that our ES&H performance was not as good as we had thought. Our rate of progress was not what we needed to remain in step with customer expectations. Now we have the opportunity to test the power of our change principles—leadership, quality, employee empowerment—in addressing a tough set of requirements. I made a commitment to Admiral Watkins—and we must not fail.

LN: *Is the appointment of Glen Cheney as ES&H VP [see story this issue] intended to get our ES&H program into high gear?*

AI: We've made some significant progress. Nestor Ortiz, Dick Lynch, and their many supporters have worked extremely hard to define and implement the needed changes. But we haven't provided the ES&H initiative with the necessary full-time high-level support. Glen's appointment does that. Given the magnitude of the effort needed, it is important to provide a single dedicated focal point for all ES&H activities in the Laboratories over the next year. I think we all understand that the line organizations are responsible for satisfying the ES&H requirements. Nestor Ortiz's organization [ES&H Directorate 3200] has the responsibility for determining requirements, managing specific activities such as waste disposal, and providing an independent internal audit function over our ES&H performance. But until we've ramped up to a higher plateau, it's important that an executive coordinate the Labs-wide effort.

LN: *Granted, we have the expertise, but can we shoulder the additional costs associated with ES&H compliance and still be competitive?*

AI: Our task — our real challenge — is to meet the requirements with minimum adverse cost impact. If we let the costs of ES&H compliance overwhelm us, we will not remain a competitive laboratory.

We all see a future for Sandia which will be as important to the nation as our past. But if we're not competitive, we will not be in a position to make those contributions. In ES&H, as in all other areas, it's cheaper to prevent problems than it is to fix them, and that's why we need to get our act together as soon as possible.

LN: *So far, we've talked mainly about concerns and problems. What about the positive side?*

AI: I've received a lot of positive response from within the local community and from our

customers to our *Strategic Plan* and to our efforts to improve the quality of our performance. Our customers say they value our efforts and are looking forward to reaping the benefits.

LN: *How about technology transfer? We've had some success stories there, haven't we?*

AI: Definitely. The signing of the cooperative agreement with the Specialty Metals Processing Consortium [LAB NEWS, July 27] is a significant milestone in our technology transfer program. It took a long time to get this agreement, but once the 1989 technology transfer legislation has been fully implemented, the process will be greatly streamlined. A significant number of industrial partners are waiting to complete final agreements with us on other cooperative R&D arrangements.

LN: *How about our basic capabilities today — our facilities, equipment, and people?*

AI: In my view, there has never been a time in our history when we've had a better staff, better facilities, or enjoyed better customer recognition. We've come a very long way in recent years, but a great deal more is expected of us, too.

LN: *In what directions are we evolving now? Any new trends?*

AI: We'll continue to expand into new areas where opportunities exist, where national needs

“We will give greater emphasis to teaming and partnering with other organizations both inside and outside the government.”

exist, and where we have the competence to make telling contributions. We intend to strengthen our energy programs and manufacturing technology programs. We plan to become much more involved in environmental R&D, with emphasis on helping DOE achieve its environmental restoration goals more rapidly and at a reduced cost. I also believe we can make significant contributions in health care. In the long term I also see opportunities for a greatly expanded role for Sandia in supporting NASA's Space Exploration Initiative.

We will give greater emphasis to teaming and partnering with other organizations both inside and outside the government. We also realize that our customers — our ultimate customers — are increasingly in the private sector, not within government. And for that reason, we are putting heavy
(Continued on Page Nine)

Subject: The Future of the Labs

Narath Addresses DOE Advisory Panel

Sandia President Al Narath had an opportunity recently to advise DOE on the role of the national laboratories in the 21st century.

In a consolidated overview presented to the Secretary of Energy Advisory Board (SEAB) on the DOE National Labs, which includes advisers from the scientific, defense, and public policy communities, Al spoke on behalf of Sandia, Los Alamos, and Lawrence Livermore labs, stressing issues of importance to all three.

His primary message was that DOE defense program laboratories differ from DoD labs, industry, and universities by satisfying critical national needs in ways that cannot be easily duplicated by other institutions. Al also expressed the concern of the three labs over the stress being placed on their relationships with DOE as a consequence of demanding ES&H requirements, proposed controls and incentives, and other factors. He emphasized the importance of increased laboratory responsiveness to DOE requirements as a way to strengthen that relationship.

Later, when the three weapon-labs directors discussed the core competencies and strategic

visions of their institutions, Al raised several issues, including:

- The continuing importance of the nuclear-weapon program.
- The importance of working for other Government sponsors as a way to maintain Sandia's technology base and special capabilities.
- The need for flexible and efficient mechanisms to transfer new technology to industry.
- The necessity of a balanced approach to ES&H, with prioritization based on risk-benefit analysis, and the need to achieve ES&H excellence at minimum cost.
- The desirability of maintaining a relationship of partnership and trust with DOE, Sandia's primary customer.
- The importance of the Sandia/AT&T relationship.

The SEAB task force will give its recommendations on the future of the national labs to Secretary Watkins. All points of view will receive thorough consideration.

“In the meantime, I am convinced that our continuing efforts to strengthen our support for DOE will be crucial,” notes Al.

Glen Cheney Named ES&H Vice President

Focusing greater senior management support on environmental, safety, and health problems at the Labs is the key purpose for the new ES&H organization that became operational on Dec. 1.

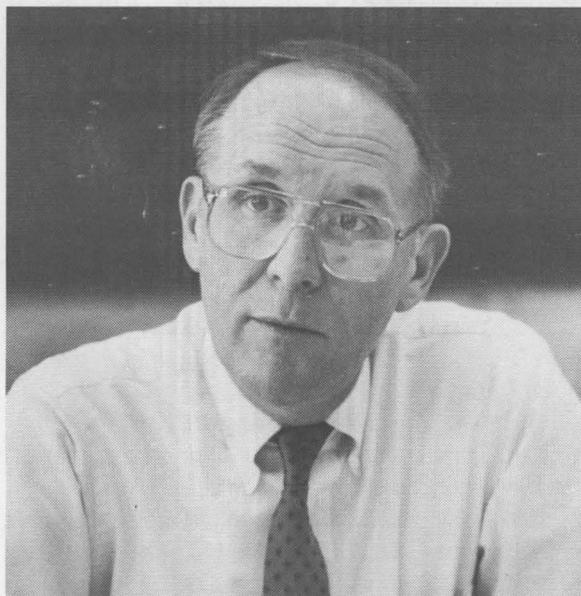
Glen Cheney, formerly Vice President of Component Development 2000, is now VP of ES&H Improvement and Compliance Program Management (Org. 3). He reports directly to President Al Narath.

In a Nov. 28 memo announcing the new organization and appointment to Sandia supervisors, Al noted that his goal in creating Glen's new position is to "accelerate our progress toward ES&H excellence and to bring our operations into alignment with DOE orders."

Glen acknowledges that both he and Sandia have a major task ahead.

"I'm concerned that we communicate our objectives clearly to Sandians and explain how we're going to achieve them," he says.

"I've already started some activities aimed at fostering that improved clarity. Paul Longmire [7310] is leading an audit team on requirements. His job is to review the sources of requirements and to make sure our objectives are clear and consistent with our plans.



GLEN CHENEY

"Dick Lynch [3600] is working on an overarching conceptual framework for our ES&H compliance structure and how we will achieve it. Dick Traeger and Mike Eaton [both 3600] are acting as auditors for this effort.

"We must have an ES&H project plan that's realistic, achievable, and trackable and that has the confidence of Sandians," continues Glen. "To help with this, Mike is leading an audit team to review our ES&H project planning. He's being assisted by Brick Dumas [9210] and Joe Abbin [5130]. Their job is to look for weaknesses in the plan and then help shore them up.

"I've asked Nestor Ortiz [3200] to put together a one-page flow chart that both shows how requirements come to Sandia and summarizes key content of laws and DOE orders."

The ES&H management structure is being reviewed by Bob Peurifoy (7000), Larry Bertholf (7300), Dick Lynch, and Marilyn Warrant (6601). "This team will ensure that the roles, responsibilities, and accountability are clear to all Sandians," says Glen.

Dick Lynch is also leading a series of design reviews of ES&H programs. He and other team members will examine the concept, content, and use for these vital ES&H documents.

Glen's assignment as ES&H VP is temporary, and he will return to his duties as Org. 2000 VP in about one year. Jack Wirth (2300) is now acting VP of Org. 2000. ●LP

(Continued from Page One)

Record Speeds for Flier Plates

tried to use thinner, lighter titanium alloy plates," says Lalit, "they also broke."

What if they didn't use gas to accelerate the flier plate, but hit it with another projectile instead? That is, the high-pressure gas in the second stage accelerates a second projectile, which then strikes the flier plate without a gas's turbulence. The obvious flaw is the very high, sudden shock of the projectile hitting the flier — that would be even more certain to break or melt the plate. But if a projectile's momentum could be transferred gradually to the plate, without a sudden shock . . .

Enter the Pillow

"We put a 'pillow' on the front end of the projectile to cushion the impact," says Lalit. "This technology was developed at Sandia by Lynn Barker. The pillow is a mixture of plastic and metal powder, with the density graded from that of plastic at one end to about that of copper at the other."

The low-density end of the pillow hits the plate first, preventing a destructive shock, but

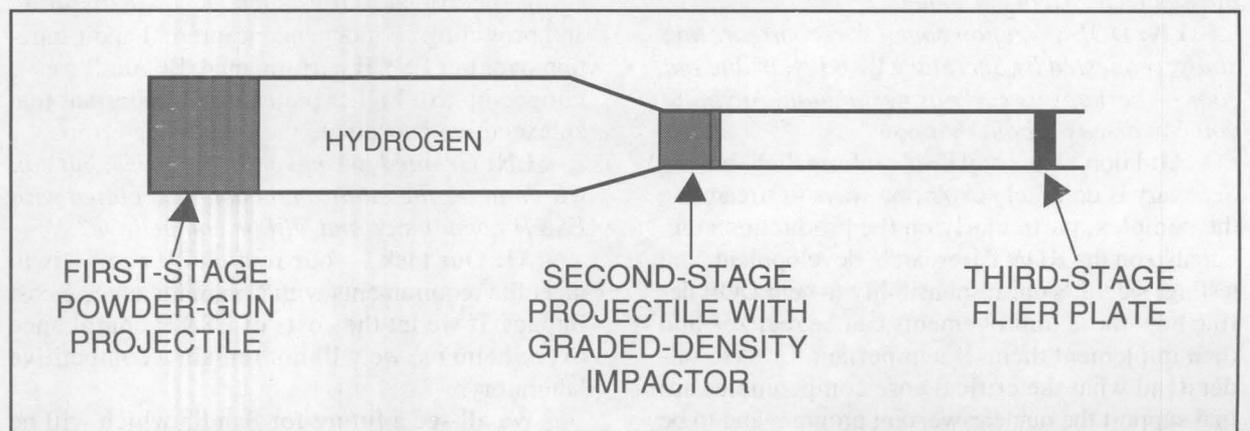
"The pillow is a mixture of plastic and metal powder."

the higher-density material continues to push into the plate, building up the pressure gradually — though rapidly by everyday standards.

"The plate receives the pressure pulse during about a half-microsecond," says Lalit. (A microsecond is a millionth of a second.) "The pressure created by the cushioned projectile is still in the million-atmosphere range, and it builds up quickly — gas takes about 200 microseconds for the pressure to build. With the pillowed projectile, there's no turbulence, and the ramping up of the pressure lets the plate survive."

New Capability, New Name

The new capability of the gas gun merited a new name for it: the Hypervelocity Launcher. Work is continuing to extend its performance. "We may eventually be able to launch a five-



FLIER PLATES are accelerated in Sandia's Hypervelocity Launcher (HVL) by a process illustrated in this simplified diagram. First, a powder gun fires (left), which propels a 6.8-kilogram (15-pound) projectile into a rupture disk (not shown). This releases gas into a smaller-diameter second-stage barrel. The pressure sends hydrogen gas bursting into the launch tube to push a 30-gram (1-ounce) projectile containing the graded-density impactor down the barrel. The graded-density impactor, or pillow, then strikes the 1-gram flier plate and sends it out of the gun at speeds that can exceed 10.4 kilometers per second (more than 23,000 miles per hour). The HVL is about 50 feet long.

gram plate at 10 kilometers per second," says Lalit. "For studying the effects of orbital debris, which we are doing right now [see box at right], NASA would eventually like to see as much as 10 grams at that speed. But that would take a scaled-up gun."

Lalit credits two other Sandians with making a key contribution to the Hypervelocity Launcher by working in software. Tim Trucano (1541) and Gerry Kerley (1542) used hydrodynamic computer codes for mathematical modeling of the pillow and the impact of the pillow and plate.

"Although it's not possible to list everybody," says Lalit, "all the people who have been involved — including the gun crew at the facility — can take satisfaction from the value of their work. We hope to do more, but what we've already accomplished has real significance." ●WKeener(3163)/CS

Tests for a Space Station

Tests using Sandia's Hypervelocity Launcher (HVL) are contributing to NASA's development of debris shields and structural components for space station *Freedom*. Shields must protect the station from micrometeoroids and orbital space debris. Orbital debris (space junk created by human activities) is considered the more hazardous because of its greater size and mass — typically centimeter- to millimeter-size particles of about one gram. Structural and Solid Mechanics Dept. 1540 recently conducted a series of experiments with the HVL to evaluate the integrity of a shield design at impact speeds up to 10.4 kilometers per second. The HVL is the only gun facility in the US that can reach a high enough combination of mass and velocity for tests in this range.

Welcome

Albuquerque — Lynn Bitters (21-1), Catherine Estill (3426), Camille Gerwig (22-2), Virginia Grossman (21-1), Margaret Kopriva (21-1), Myra O'Canna (22-2), Jimmy Richardson (7230), Karen Silva (21-1), Barbara Walling (3741); *Other New Mexico* — Brian Damkroger (1833), Ann Sever (22-2).

Congratulations

To Barb Lammie (1163) and Bill Wampler (1112), married in Albuquerque, Oct. 6.

To Margaret (9117) and Jim (2173) Murray, a son, Luke Christopher, Nov. 15.

To Cynthia and Gilbert (2174) Herrera, a daughter, Aubrey Victoria, Nov. 16.

To Lan and Tan (5212) Thai, a son, Nathan, Nov. 18.

Outlook Bright for SolarTrak

Private Companies Marketing Solar Energy Technology Developed at Sandia

A palm-sized circuit board containing all the electronic intelligence necessary to control a solar energy array so it accurately tracks the sun in its path across the sky is Sandia's latest technology transfer success story.

The information is packed inside a tiny computer, one-quarter-inch square, called a microcontroller. The system was designed by Alex Maish, a mechanical engineer in Photovoltaic Technology Research Div. 6224. Called SolarTrak, the "smart" tracking system provides improved economy and reliability. It is autonomous and accurate enough for use with solar concentrators.

Three solar energy companies have signed non-exclusive licensing agreements with Sandia to manufacture and market the system: Power Kinetics Inc., a small company in Troy, N.Y., that manufactures solar concentrators; Alpha Solarco, a Cincinnati, Ohio, firm that builds concentrating photovoltaic systems; and Kirk Enterprises, a Florida firm that specializes in solar-powered water heating, pool heating, and air conditioning.

A unique feature of SolarTrak is that a software algorithm corrects for tracking errors caused by physical misalignment or gear train error. During installation, the system need only be aligned within a few degrees — the software algorithm adjusts for any remaining misalignment, saving considerable labor and expense.

The tracking system also points at the sun in any kind of weather, without using sun sensors. Previous trackers have used sensors to determine if sunlight is brighter in one direction than another, but such sensors can be fooled by glare from a bright cloud or a nearby building.

"Most systems use sun sensors — if one sensor is illuminated more than the others, the electronics directs the motors to point in such a way that all of the sensors are equally illuminated," says Alex. "Although this works well when conditions are optimal, if sunlight is reflected from a bright cloud or even a car window, it can distort the sensor reading and cause a tracking error."

Tracking System Uses Precision Clock

Instead of relying on sun sensors, the Sandia tracking system employs a clock that, together with location data such as latitude and longitude stored in the computer's memory, computes the sun's position. Using equations from the US Naval Observatory, Alex's system can calculate the sun's position to within 1/100th of a degree throughout the next century. Better yet, the advent of inexpensive computers makes the SolarTrak control board cheap to make; it contains less than \$125 worth of parts.

The microcontroller directs the moving parts of the solar array to point at the sun during the day and to stow at night or in bad weather. It has all the electronic capabilities needed to operate the system — three kinds of memory, a processor, analog-to-digital converters, and input and output lines. Sensors on the motors enable the microcontroller to keep track of the array's position.

Although the control board can operate the system independently, Alex also designed a handheld user-interface board that enables human operators to check or modify the tracking system. The user-interface board simply plugs into the control board, eliminating the need for a separate unit permanently attached to the array. Like the control board, the user-interface board is a tiny printed circuit board fitted with tiny switches and a miniature joystick for manual motion control.

Alex designed both printed circuit boards — for the control system and the user-interface system — on a computer at his desk. He also wrote the computer program — outlined in an inch-thick sheaf of printouts — that runs the tracking system.



ALEX MAISH (6221) keys data into user-interface board to check the performance of the SolarTrak controller, an autonomous solar tracking system (in cubicle in center). The array tracks the sun in its path across the sky based on time readings and location rather than less-reliable sun sensor data. The system is being manufactured and marketed by three solar energy companies that have negotiated non-exclusive licensing agreements with Sandia. (Photo by Mark Poulsen, 3162)

The software can be tailored to meet the needs of a wide range of systems by changing more than 100 values stored in its memory. Jim Dudley, a part-time Sandian and a computer science student at UNM who has been assisting Alex, wrote the user-interface program that enables an operator to change those values.

Licensing Gives Firms Access to Software

The non-exclusive licensing agreements give companies access to the two software programs and the software files for the printed circuit boards, along with permission to modify the software and manufacture and sell the units.

Although SolarTrak can be used with a variety of solar trackers, including solar thermal systems, it was initially developed for use with photovoltaic concentrators that focus sunlight onto a solar cell. In such systems, sunlight is concentrated by a factor of 20 to 500 times onto a solar cell. As sunlight is focused on the cell, excess heat is generally dissipated into the air, but SolarTrak can be used to control a cooling system if the heat is recycled for other uses.

The only time the tracking system operates in a manner similar to sun-sensor systems is during a special self-alignment mode — generally the first day the system is put in operation. While in self-alignment mode, the controller monitors the photovoltaic array while the array scans the sky for a day to locate the sun and compare its location to where the controller calculates it to be.

The controller defines whether the array is tilted slightly to the east, west, north, or south; whether it is rotationally misaligned about the two axes; and whether there are any gear ratio

errors in the two axes.

SolarTrak has operated reliably on three different systems since 1989, including a solar array in Nevada. This system, containing more than 125 square meters of collector area, was pointed within 1/10th of a degree of the sun over a full day by SolarTrak, well within the required range of accuracy.

Sandia will soon publish a report by Alex on the software and hardware design, and plans to encourage additional non-exclusive licensing agreements. ●LD

Take Note

The Duke City Chapter of Business and Professional Women (BPW) recently announced the availability of college or university scholarships. Applicants must be female and residents of the Albuquerque metropolitan area, attend a state-supported New Mexico college as an undergraduate, be accepted for enrollment and show a 3.0 GPA on the previous semester's transcript, be of exceptional financial need, and show evidence of academic and creative promise and a capability of maintaining good standing in her course of study. The recipient doesn't have to be a member of BPW. To apply, write to Scholarship Committee, Attn. Mary Ann Lindsay (4000-1), 4300 Hilton NE, Albuquerque, NM 87110. Application deadline is Dec. 15.



News Briefs

Improved Dish Reduces Cost of Solar Energy

A new kind of parabolic dish that reflects sunlight to produce electricity has demonstrated high efficiency in recent tests at Sandia. Researchers say the dish holds promise as a lighter, more economical component of solar thermal systems than other designs.

Called a stretched-membrane parabolic dish, the concentrator was developed by researchers at Sandia and Dallas-based Solar Kinetics Inc. using a unique fabrication process. In place of traditional glass mirrors, the single-facet dish has a thin metal membrane covered with a shiny polymer film that forms the reflective surface. The steel membrane is less expensive than glass, weighs far less, and does not need as sturdy a base — all factors that help minimize costs.

The solar energy concentrated at the focal point of the dish, designed by Solar Thermal Collector Technology Div. 6216, was more than 5,000 times stronger than that of regular sunlight.

Tech Transfer Climate Warms

Increasingly, US companies are combining their technological forces in an effort to strengthen US industrial competitiveness. At the same time, the national labs are actively pursuing technology-sharing relationships with private industry. US Sen. Pete Domenici says the climate for technology transfer between US industry and the national labs has improved during the last three years, and the future shows promise for even better relationships.

Domenici made the statement via videotape to participants in a recent conference of the American Institute of Physics (AIP) Corporate Associates held at Sandia Oct. 23 and 24. The conference featured talks by representatives from industry and the national labs. Participants toured several Sandia facilities showing promise for technology transfer opportunities. Labs President Al Narath and Vice President for Research Venky Narayanamurti (1000) spoke at the AIP conference.

WIPPers Celebrate Another Million

Like a halftime marching band, employees at the Waste Isolation Pilot Plant (WIPP) arranged themselves in a huge "1,000,000" recently to celebrate 1 million safe working hours without a serious accident. Oct. 26 marked the third consecutive 1-million-person-hour stretch for the WIPP plant without serious injuries or accident-related lost work.

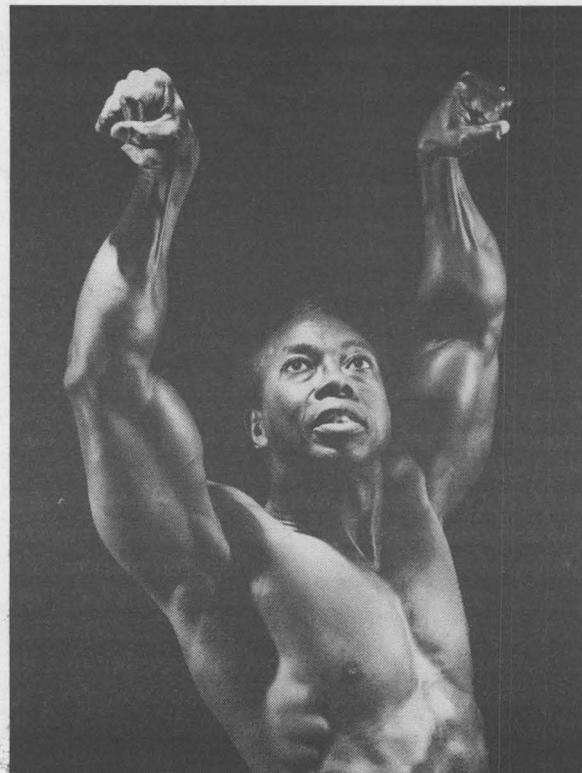
Officials at the site say the outstanding safety record is because employees take responsibility for both personal safety and workplace practices. WIPP has received several safety awards, including seven awards from the New Mexico Bureau of Mines, the National Safety Council's Cameron Award for safety management, and three consecutive DOE Awards of Excellence. Several WIPP-site employees are Sandians.

Wendell Weart, WIPP project manager for Sandia, says safety is so important for WIPP because "an incident at WIPP becomes front-page news when it wouldn't be significant at a potash mine. WIPP has to be a little bit better."

Sandia Earns Award for Info-Sharing

For the third consecutive year, Sandia has been recognized as one of the Government-Industry Data Exchange Program's (GIDEP) top twenty data submitters. GIDEP is a government and industry network that saves research dollars and eliminates research duplication by making maximum use of existing knowledge and technology.

Sandia contributes to the information-sharing network by submitting its SAND reports to be used by industry and government agencies. Approximately 150 Sandians in 100 organizations also use information from the network. Michael Dugger of Surface and Interface Technology Div. 1834 estimated his division saved \$26,000 recently by using GIDEP information. SLI 1004 outlines Sandians' responsibilities and participation in the network, and Steve Baca and Pat DeTevis (both 2833) coordinate Labs' participation in GIDEP.



DALLAS ALLEN (9114), a body builder for 17 years, won the master's division (35 and older) and took second place in the open division of the Mr. Natural North America body builders competition in September. "Natural" in body building refers to competitors who do not use drugs to enhance their training or muscle definition. Dallas competed against title holders from all over Canada and the US. He hopes to discourage young athletes from using steroids and other drugs.

(Photo by Randy Montoya, 3162)

Sympathy

To Carol Ashby (1126) on the death of her father in Albuquerque, Nov. 8.

To Deborah Frank (5268) on the death of her mother in Cherry Hill, N.J., Nov. 10.

To Theresa Olecksiew (2171) on the death of her father in Albuquerque, Nov. 11.

To Bob Mata (7525) on the death of his father in Dallas, Nov. 14.



For Your Benefit

Health-Care Costs: Finding a Solution

By Jann Levin (3545)

Several changes will become effective in the Sandia medical, dental, and vision plans Jan. 1. You will soon receive an announcement explaining them. The purpose of these and future changes is to better manage rapidly increasing health-care costs while protecting plan participants against catastrophic medical bills and providing high-quality, affordable health-care benefits.

If other prices had increased as much as health care during the 1980s, you would be paying 75¢ for a postage stamp, \$6 or so for a gallon of gasoline, and \$1,750 for a 19-inch color TV.

Over the past 10 years, the cost to employers of providing health-care benefits rose 400 percent. It's no surprise that controlling medical costs is a major concern for American employers.

What's Fueling the Fire

The last decade's increases — expected to continue with a 20-percent rise in 1991 — have a number of causes. Among them:

- The inflation experienced by every business.
- Costs of malpractice insurance and "defensive" medicine sometimes practiced to avert suits.
- Medical advancements such as organ transplants and intricate surgeries and neonatal care.
- Long-term care for catastrophic illness.
- Record spending for mental-health problems and alcohol and drug abuse.

- Chronic ailments that come with increasing life spans.

- Competition for patients based on the level of service providers can give, not the cost of the service.

Through the '80s, companies made changes to control costs. In 1980, 96 percent of US workers were covered by plans that paid most or all charges for any doctor or hospital. Now, fewer than 20 percent of US workers have that kind of plan. Almost 70 percent of plans now include cost-management provisions, such as Sandia's HealthSmart, that review the need for hospitalization and manage catastrophic cases.

The 1980s also saw increased employee contributions to plan costs. In 1980, about 33 percent of US employers required employee contributions; by 1989, 75 percent did. Higher deductibles are now common.

Easing the Pain in the Pocket

Despite these measures, health-care inflation is still at double-digit rates. That's especially worrisome to companies that, like Sandia, "self-insure" their medical plan. After you pay your deductible and co-payments, the dollars come from Sandia's operating budget. Sandia's health-care bill now exceeds \$32 million annually, and continuing large increases could erode funds

needed for the Labs' mission.

You can do your part to control costs by obtaining only necessary care and by becoming educated consumers. It's important to have a doctor who is familiar with your total health and lifestyle and can refer you to competent specialists when necessary. This primary care physician will manage your medical needs by keeping your records together and monitoring tests, treatments, inoculations, and medications.

Don't be afraid to ask your doctor why he or she is recommending certain tests and procedures. And when the plan administrator feels that the provider's charge is above "usual and customary" rates, don't be afraid to ask the provider to justify the charge.

Like many companies, Sandia will be restructuring some benefit plans. Changes in the design of health-care plans, besides helping manage employees' costs, can secure advantages for employees.

Among the changes planned at Sandia is (by 1992) a Health Maintenance Organization plan that employees and retirees in the Albuquerque area may choose as an alternative to the current Medical Care Plan. Also, over the next three years, Sandia will develop a Preferred Provider Organization to deliver psychiatric and chemical-dependency care (probably in the Albuquerque and Livermore areas). •

Supervisory Appointments

MELISSA SMARTT to Manager of Design and Product Support Dept. 2810.

Melissa joined the Labs in 1983 as a member of the Adversary Analysis Division, where she analyzed command and control software. She transferred to the Safety Assessment Technologies Division in May 1984 and joined the Advanced Electrical Systems Division in November 1984. In 1986, she transferred to the Digital Subsystems II Division, where she was project leader for the Crypto Algorithm Message Processor (CAMP).

She was promoted to Supervisor of the Digital Subsystems Software Division in August 1986. Her work there was related to analysis, definition, and development of PAL (permissive action link) ground support equipment.

Melissa has a BS in computer science and mathematics, and an MS and a PhD in computer science all from NMSU. She's a member of IEEE and the Association for Computing Machinery.

Melissa enjoys fishing and soccer. She and her two children live in the NE Heights.

JO ANN ROMERO to Supervisor of Accelerated Procurement Systems Div. 3741.

Jo Ann joined Sandia in 1976 and worked as a secretary in the Aerodynamics Division and the Arming, Firing, and Fuzing Division. In 1978, she was promoted to department secretary in the Planning, Policies, and Results Department. In 1980, she joined the Design Definition Department as an MA-IV, and in 1983 became an MLS trainee, providing administrative support to Org. 2800.

She transferred to the Purchasing Directorate in 1984, where she spent three years as a Sandia contracting representative, contracting for major computing design systems and support services. She joined Administrative Policies and Procedures Division in 1987, as a senior consultant/trainer. She is currently on special assignment to Change Management Org. 5.



JO ANN ROMERO

Jo Ann has a BS in business administration and an MBA from UNM, both obtained through Sandia's Education Assistance Program. She's currently the chairperson of the National Contract Managers Association Education Committee, chairperson of the Inreach Committee of the Hispanic Leadership and Outreach Committee, and a volunteer at New Futures School. In March 1990, she received the YWCA Woman on the Move Award in the Business Non-Managerial category.

Jo Ann enjoys race-walking, hiking, soccer, travel, reading, gardening, and Cajun cooking. She and her husband, David Goodnow (1842), have two daughters and a son; they live in the NE Heights.

TERESA OLASCOAGA to Supervisor of Corporate Self-Assessment Div. 7312.

Terri joined Sandia in 1975 as an energy systems analyst, working on site analysis of nuclear power plants, nuclear waste disposal, and photovoltaics projects. In 1977, she joined the Safeguards Systems Analysis Division, where she developed design guidance and evaluation methods for security at commercial nuclear facilities.

Terri transferred to the Nuclear Security Systems Directorate in 1981. She participated in a review of safeguards at Savannah River Plant facilities and led work on a safeguards and security site plan for the plant. She also headed the planning and presentation of security training courses for International Atomic Energy Agency member nations and workshops for NRC security inspectors.

Since 1987, Terri has worked primarily on aviation security. She coordinated a security systems study of US airports, which became the basis for a proposed airport security system demonstration program at a major US airport.

She has a BS in mathematics from New Mexico State University and an MS in industrial engineering from Columbia University. Before joining Sandia, she worked at Bell Telephone Laboratories in Whippany, N.J. She's a member of the Institute of Nuclear Materials Management and the New Mexico Network for Women in Science and Engineering.

Terri enjoys cross-country skiing, reading, traveling, and community activities. She's been a



TERESA OLASCOAGA

board member and officer of various United Way agencies. She lives in the NE Heights.

ROGER RIZKALLA to Supervisor of Facilities Construction Sec. 7851-1.

Roger joined Sandia in 1968 as a member of the Mail Services Section. He became a voucher clerk in 1969 in the Accounts Payable Division. He joined Sandia's electrical apprenticeship program in 1973 and worked in Facilities Operations and Maintenance Department. He graduated from the apprenticeship program in 1978, and became a standards analyst in the Maintenance Operations Planning Division in late 1978.

He is currently working on a business management degree from the College of Santa Fe. He is president of Servants of the Lord, a non-profit corporation serving the needy.

Roger enjoys basketball, racquetball, fishing, and motorcycling. He and his wife Kristeen live in the SE Heights.

BELINDA HOLLEY to Supervisor of ES&H Training Div. 3524.

Belinda joined the Labs in 1983 as a member of the Continuing Technical Education and Training Division, where she coordinated the initial development of the Design for Manufacturability curriculum, the Project Engineering curriculum, and the Software Engineering curriculum. In April 1990, she transferred to the Compensation Department, where she was a member of the Rewards and Recognition Project Team.

Belinda has a BA in business administration from Winston-Salem University and an MBA from Xavier University. Before joining the Labs, she worked for Blue Cross/Blue Shield in Albuquerque and AT&T Technologies in Dublin, Ohio.

She enjoys music, gardening, board games, and family activities. Belinda and her husband Ken (3510) have two children and live in the NE Heights.



BELINDA HOLLEY

(Continued from Page Five)

Al Narath Interview

emphasis on developing ways to interface more effectively with American industry.

LN: When you go to Washington and other places around the country these days, what kinds of things do people recognize us for and what are they saying?

Al: Sandia has a reputation for being objective, for doing what we promise, and for our commitment to national service. These values aren't new — they are our traditional values. But we have more opportunity to act on these values today than we did 20 years ago because our activities span a broader range. Not surprisingly, I also hear critical remarks occasionally when our performance does not meet customer expectations. More importantly, however, there is a growing awareness that we are hard at work to achieve a higher performance level.

LN: Is there any particular project that we've done recently that outsiders mention to you?

Al: The outstanding job that Dick Schwoebel [2500] and his many teammates from throughout the Labs did on the USS Iowa investigation earlier this year [LAB NEWS, June 15] is often mentioned. It's cited as an outstanding example of the Labs' objectivity and technical competence. The project demonstrated Sandia's ability to generate confidence and respect on both sides of a very sensitive issue. Our team's performance on this project makes me very proud. It's a great example of Sandia's ability to quickly assemble a multidisciplinary engineering and scientific team from many areas of the Labs and get an important job done efficiently and quickly.

LN: Are you having fun?

Al: [After a laugh] I'm not sure that fun is the way to describe it. It's the most challenging work I've ever done and certainly the most stressful, but also the most important work I've ever done. Come to think of it, I guess I am having fun. •LP

Fun & Games

Bowling — Winners of the Best Ball Tournament held at Fiesta Lanes Nov. 17-18 were Tanya (5171) and Jim McMullen with a 788 three-game handicap series. Second place went to Lyle (2818) and Alice Davis with a 780 series.

August/September Bowlers-of-the-Month: Scratch — Reggie Tibbets (7813-3), 682; and Cheryl Barton, 691; Handicap — Paul Sands (2932), 578 and 665; and Tanya McMullen, 562 and 682. October Bowlers-of-the-Month: Scratch — Bob Barton (3745-2), 715; and Felicita Montoya (3426), 607; Handicap — Jerry Long (ret.), 578 and 668; and Julia Norwood (3400), 496 and 649.



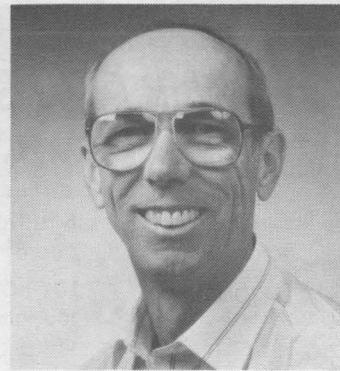
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LAB NEWS

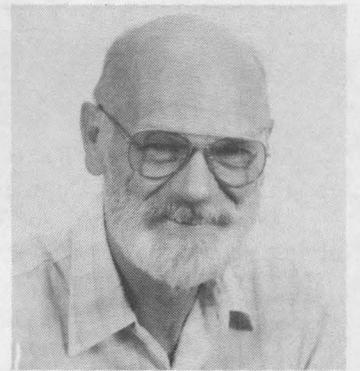
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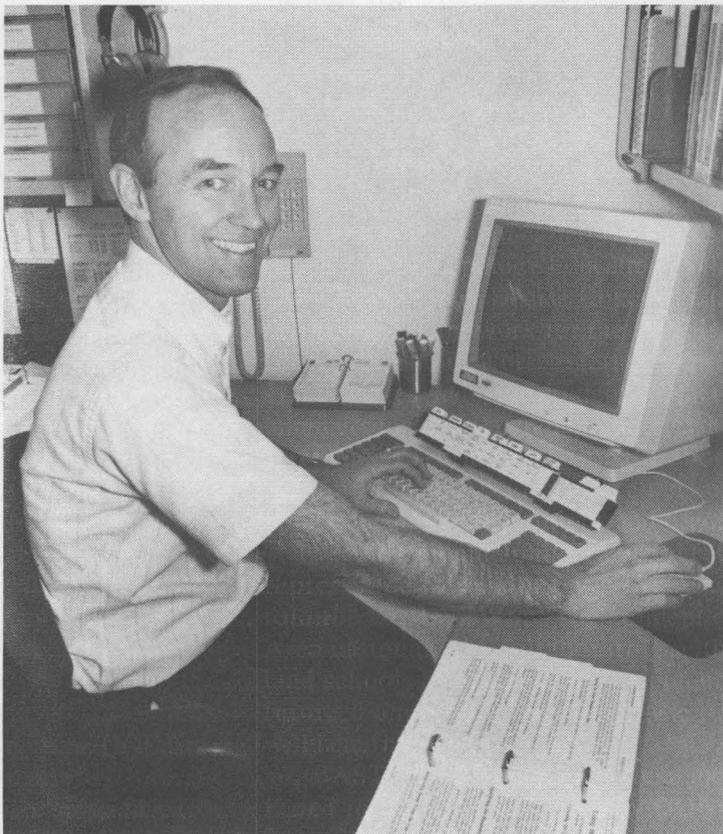
Karen Davis
8531 30



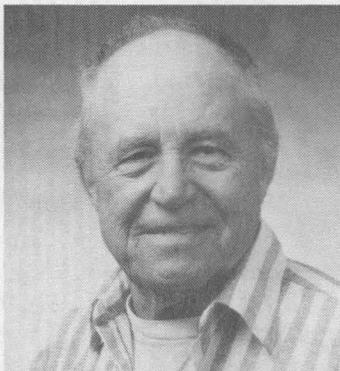
Dale Shenk
9333 25



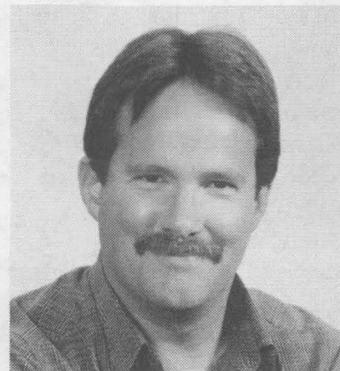
Gene Angvick
8283 25



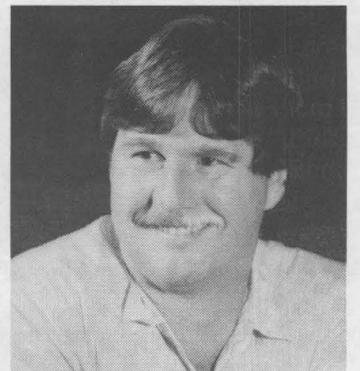
Tom Linnerooth
2118 25



Leroy Henderson
7812 40



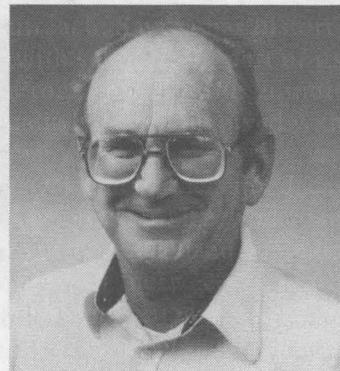
Jim Hachman
8272 15



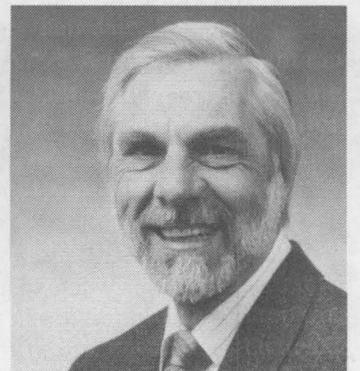
Brian Chamberlain
8524 15



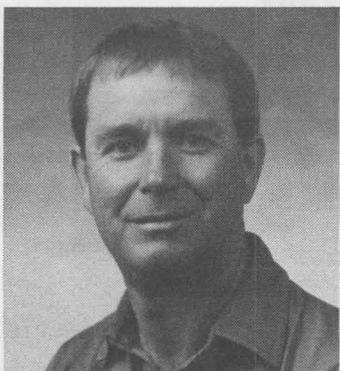
Jim Dremalas
8446 30



George Stone
9142 30



Bruce Hawkinson
5 25



Thomas Welch
9243 20



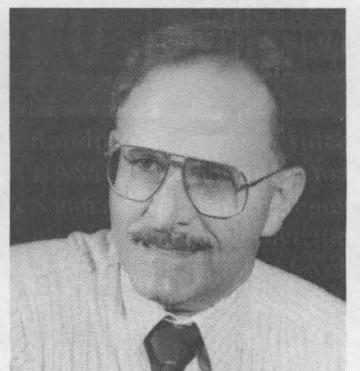
Alice Rogers
8242 25



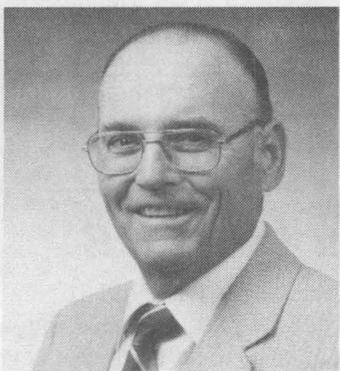
Gary Simpson
8453 15



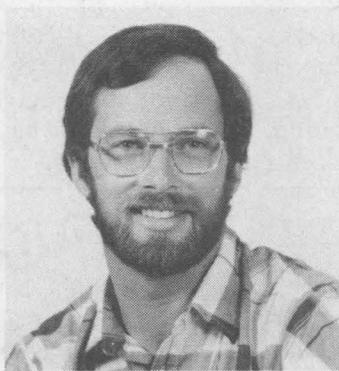
James Freese
2525 30



Norm Wagner
8174 25



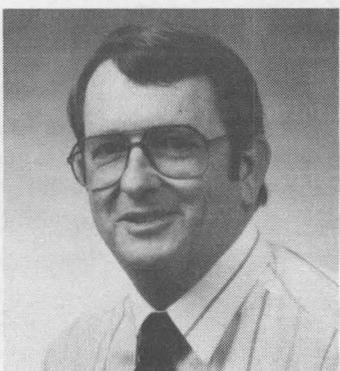
Ralph Johnson
7340 25



Jim Van De Vreugde
8164 15



Barbara Freeman
8237 20



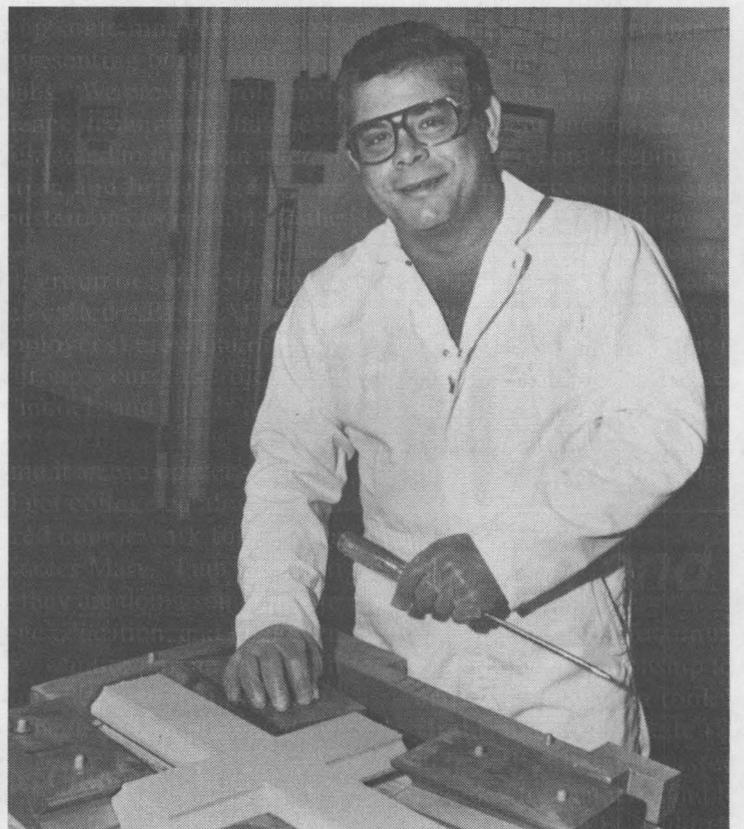
Jim Beasley
3732 15



Toyoko Lee
2817 15



John Becker
8454 15



Gary Gallegos
7473 15

UNCLASSIFIED ADVERTISEMENTS • UNCLASSIFIED ADVERTISEMENTS • UNCLASSIFIED ADVERTISEMENTS • UNCLASSIFIED ADVERTISEMENTS

Deadline: Friday noon before week of publication unless changed by holiday. Mail to Div. 3162.

Ad Rules

1. Limit 20 words, including last name and home phone.
2. Include organization and full name with each ad submission.
3. Submit each ad in writing. No phone-ins.
4. Use 8 1/2 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.

MISCELLANEOUS

- SONY COLOR TV, 19-in., Trinitron Model KV1923, 14 channel presets, \$175 OBO; VCR, VHS, Sylvania, 2 recording heads, \$125 OBO. Godshall, 294-2214.
- WASHER/DRYER SET, \$225; stereo cabinet, \$50; entertainment center, \$30; ADC color TV, \$100. Croessmann, 262-0444.
- FLUTE, French-key, sterling silver, Gemeinhardt, w/low B-key, \$1,000 OBO. Lemen, 293-3487.
- HARD DISK, 105-Mbytes, ESDI interface, \$500; speakers, Magnephanar MG-11B, \$650. Hsing, 293-5670.
- SLIDE-IN CAMPER, Mitchell Fishing Hut, furnace, icebox, 2-burner stove, water tank, jacks, \$850. Eisenberger, 877-7041.
- DOG, small, long-haired male, brown/black/white, free to good home. Lucas, 266-0907.
- SIERRA WOOD STOVE, w/fireplace opening cover, \$200; white sofa, \$70; CAD blueprint of Starship Enterprise, free. Maloney, 275-9207.
- FUR JACKET, dark-brown opossum, size 12/14, \$475; Ethan Allen maple dinette, 42-in. formica-top table, w/leaf, captain's chairs, \$250 OBO. Tremi, 292-9219.
- HOOVER UPRIGHT VACUUM CLEANER, 6.5-amp motor, plastic cup (no paper bags), 6 months old, cost \$179, sell for \$120. Davis, 294-1048.
- WHITE SAMOYED PUPPIES, AKC-registered, have shots, \$175. Silva, 897-6954, leave message.
- THOMAS ORGAN, w/self-training manuals, \$600; bedroom set, \$100; Epson FX-286 printer, \$50; Litton microwave, \$50. Cernosek, 299-2252.
- PARACHUTES, 2, Vector containers, Raven mains, altimeters, helmets; refrigerator/freezer, 13.6 cu. ft., General Electric, \$250. Potter, 869-4716.
- QUEEN-SIZE BOX SPRING, new, \$150; 20-gal. aquarium, light, stand, \$100; map/plan metal file cabinet, 16" W x 39" D x 52" H, \$50. Pasterczyk, 255-2066.
- STUDENT DESK, 4-drawer, 42-1/2" L, 16" W, brown, solid wood, \$75. Kind-schi, 256-0531.
- IBM SELECTRIC TYPEWRITER, model 75, electric, w/manuals, type elements, \$100 OBO. Wood, 823-1965.
- RCA VCR (VGP 170), tuner/timer (TGP 1500), video camera (CC010), w/cases, manuals, '82 models, \$500 OBO. Price, 294-4743.
- PONDEROSA PINES, two 2-ft. trees, you dig, free. Meikle, 299-4640.
- QUEEN-SIZE WATERBED, medium stained pine frame, 12-drawer base, headboard w/shelves, mirror panel, heater w/thermostat, \$425. Schkade, 292-5126.
- CAIRN TERRIER PUPPIES, 10 weeks old. Tipton, 293-9285.
- DOWNHILL SKIS, 200cm, Elan 975, never used, intermediate, \$75. Contreras, 292-7831.
- WOMAN'S FOX JACKET, white, size 12, Norwegian blue trim, \$650 OBO. Marchi, 291-9681.
- SUBARU TRANSMISSION, '80-'81, 4x4, \$75; four 15x10 aluminum turbo wheels, universal 5-bolt pattern, \$85; heavy-duty grill guard, \$35. Summers, 881-7765.
- VIVITAR ZOOM LENS, 100-200 w/2x matched multiplier, Minolta mount, w/case, \$150. Barnette, 292-5186.
- ROWING MACHINE, \$60. Summers, 881-7765.
- PROPANE-GASOLINE CONVERSION SYSTEM, dual-fuel, IMPCO Model E, 22-gal. tank, recently rebuilt vaporizer, instructions, \$600. VanDevender, 821-9435.
- HABITRAIL, for hamsters, make offer. Huston, 265-1831.
- TURNTABLE, Thorens TD124 w/Ortofon tonearm, \$50. Fienning, 298-0743.
- DRUM SET, bass, 3 toms, snare w/stand, top hat, cymbal w/stand, Zildjian w/stand, music stand, \$400. Barnaby, 865-1348.
- BUNK BEDS, wood construction, w/mattresses, \$150 OBO. Lesperance, 298-5203.
- ROOM RESERVATION at Bally Hotel in Las Vegas, Dec. 23-28, transferable but not refundable, \$149. Schowers, 822-8494 (number in previous ad was incorrect).
- AIRLINE TICKET, New York (Kennedy) to Albuquerque, round-trip, leave Feb. 15, return Feb. 23, \$250. Musinski, 1-717-655-9010.
- ELECTRIC DRYER, Kenmore, new heater coil, older model, works, \$50. Tucker, 888-9786.
- SKI BOOTS, Sangiorgio, size 11, red, \$20. Oberkamp, 292-4366.
- AIRLINE TICKET, round-trip, to New York, San Francisco, or Chicago, in your name, good most times, depart Albuquerque before Oct. 1991, \$275. Hagerman, 275-3326.
- LHASA-APSO PUPPIES, deposit will hold, AKC-registered, 9 weeks old, have shots, parents on premises, health guarantee, \$250. Kuehn, 281-2727.
- HONEYCUTT VIOLA, 15-1/2-in., new strings, complete checkup, case, original owner, \$2,000. Judd, 294-5347.
- AM/FM CASSETTE, 2-speaker portable radio, \$15; custom gold tie chain, w/Elk logo on elk tooth, \$75. Hines, 821-8592.
- PARTICLE BOARD, 4' x 6' x 5/8", was used as bedboard, \$5. Woods, 884-4224.
- WHEELCHAIR BATTERY CHARGER, \$40; Ruger Bearcat, 22-cal., \$200 OBO; SLR 35mm cameras, flash, telephoto; drawing/drafting instruments. Chavez, 275-0490.
- CHANDELIERS, crystal, antique brass, small/large, \$25/\$35; golden brown imitation fur coat, leather trim, size 12, \$45. Biffle, 293-7043.
- TIMESHARE: Pagosa Springs, sleeps 8, 2 baths, 2-bdr., fireplace, fully furnished, fishing, golf, Wolf Creek open for skiing. Tedesco, 888-1068.
- SUPER-SINGLE WATERBED, 3-drawer pedestal, w/heater, \$50. Jones, 883-4349.
- EXERCYCLE, \$30; 18-in. chain saw, \$35; Lowrance fish depth finder, \$30; fly-tying bench, \$15; cut glass chandelier, \$75. Westman, 881-0471.
- SOFA SLEEPER, \$300. Robinson, 268-8281.
- KEYBOARD, professional analog, Polyphonic synthesizer, w/case, stand, pedals, \$195. Sleefe, 281-4103.
- SONY CAMCORDER, model CCD-V5, 8mm, power zoom, extra batteries, carrying case, \$595. Eagan, 281-9589.
- EMERSON COLOR TV, 19-in., remote, 4 yrs. old, \$150. Graham, 293-2449.
- AT&T 6300 PLUS COMPUTER, monochrome, 20M HD, 1.2M floppy, Star printer, \$795 OBO. Senglaub, 281-8002.
- CHARISMA SPA, portable, 80" x 80" x 35", 6-person capacity, insulated cover, timer, chemicals, lighting, \$1,200. Perryman, 281-3020.
- KENMORE REFRIGERATOR, 19.2 cu. ft., ice maker, copper, \$250; range hood, \$10; drop-in range, \$25; kitchen sink, \$10. Trelue, 292-7369.
- MICROFICHE VIEWER, \$55; 2 electric auto radiator fans, \$40 OBO; child's bicycle seat, \$7. Baney, 294-8970.
- SHOP-VAC, wet/dry vacuum w/detachable blower, 6-gal. capacity, never used, \$49. Bando, 292-2452.
- VARI-KENNEL DOG CRATE, med. size, new, \$25. Odinek, 892-5822.
- SKI RACK, for van/pickup, rolls down, holds 5 sets skis, \$75; tire chains, for pickup-size tires, used twice, \$49. Tapp, 821-3843.
- SONY REEL-TO-REEL RECORDER, 3-motor, head, TC-645, \$150; spa/swimming pool gas heater, 125,000-Btu, \$250; 8-ft. patio door, \$150. Matthewson, 883-6649.
- ROPER RANGE HOOD, almond, \$35; polybutylene tubing, 3/4-in., hot or cold water, 44c/ft. Everts, 822-1767.
- SHOP MANUALS, for '76 Dodge, Plymouth, Chrysler, \$7. Drake, 299-1209.
- BUNNY CLARINET, w/case, \$250. Chavez, 865-5240 evenings.
- BLEACHED COW SKULLS, \$25/ea. Hall, 242-5119.
- SCHWINN AIR-DYNE EXERCYCLE, accessories, \$580 retail, sell for \$425. Underhill, 294-5774.
- ROTTWEILER PUPPIES, 6 wks. old, AKC-registered, w/papers, starter shots, \$375. Hole, 877-1902.
- MACINTOSH PLUS COMPUTER, external drive, 20-Meg. hard drive, HP DeskJet printer, software, original boxes, \$1,500. Newman, 884-7565.
- KITCHEN/DINING ROOM TABLE, chrome & glass octagon, 48" x 48", w/4 chrome & brown leather chairs, \$250. Webb, 828-2271.
- QUEEN-SIZE WATERBED, waveless mattress, heater, frame, pedestal, \$100. Heald, 281-8826.
- YAMAHA CORNET, silver, B-flat, student model, w/shepherd's crook, \$200. Guthrie, 299-7182.
- TWO TWIN-SIZE CANOPY BEDS, w/mattresses & dresser w/mirror, \$200. Gabaldon, 864-1864.
- MICROWAVE OVEN, Montgomery Ward model 8263, 1.5 cu. ft., 650-watts power, \$75. Devine, 822-1072.
- COLLECTOR'S PINE "64" WINCHESTER RIFLE, model "70" - 270-cal., \$450. Zownir, 256-3753.
- SOFA, traditional style, gold, quilted, 94 in. long, \$150. Lueters, 296-3759.
- GOLD VELOUR SOFA, 2 matching green/gold chairs, 3 matching tables, \$500. Lisotto, 884-7331.
- DINING ROOM SET, table & 6 chairs, Mexican, hand-painted (signed) by Ser-Mel, appraised at \$2000. Laval, 898-9112.
- NAILS, 50-lb. box, 20d, \$20; brass rods and lined floor-length drapes, 4 sets at \$75/set; Century child's car seat, \$20. Turpin, 281-5933.
- DINING ROOM SET, Drexel mahogany, 2 leaves, 6 chairs, recently reupholstered, buffet, 3 end tables. Jakowatz, 299-9271.
- JVC CASSETTE DECK, TD-R411, quick-reverse, full logic controls, Dolby Band C, \$125. Herther, 298-4823.
- WINDOW COVERINGS, Hunter Douglas Duetto Eclipse, 8 months old, three 36-1/2" W x 50" L sections, \$135/ea. Smith, 888-2402.
- DOGHOUSE, medium size, \$30. Jensen, 821-4291.
- CLASSICAL GUITAR, Juan Orozco 1976, w/hardshell case, strings, \$400 OBO; preamplifier, David Hafner DH-101, \$75 OBO. Linebarger, 275-7931.
- PEKINGESE PUPPIES, AKC-registered, available for Christmas, \$275; Scott At4 mountain bike handlebars, \$30. Golightly, 293-5987 after 5:30 p.m.
- PRECOR 612 ROWING MACHINE; Thermador double built-in oven, 24-in.; Thermador 5-burner electric stovetop. Broyles, 344-3872.
- CHILDREN'S CLOTHES, toys, child's rocker, brass fireplace set, coal bucket, electric typewriter, rocking chair, chairs. Levan, 293-0079.
- VIDEO CAMERA, \$80; open-reel tape deck, \$60; refrigerator generator, \$30; lamps, 3 for \$25. Grieco, 822-8253.
- NORELCO EZ STEAM IRON, auto shut-off, new, \$25. Chirigos, 298-3837.
- UPRIGHT PIANO, antique oak, \$450. Dupree, 294-1835.
- SCHWINN LeTOUR BICYCLE, 10-spd., 25-in. frame, \$85. Summers, 881-7765.
- '87 FORD RANGER, 4x4, new TA tires & shocks, 48K miles, sound system, \$5,500 OBO. Orzel, 299-4164.
- '84 CHEV. VAN, Model C20, PS, PB, AT, AC, 50K miles, custom features, \$6,500 OBO. Patrick, 265-4569.
- '80 PONTIAC SUNBIRD, 100K miles, \$800, may trade for cash and all-terrain bicycle. Ulibarri, 293-2649.
- '89 GMC PICKUP, short-bed, 5-spd., 350 V-8, extras. Campbell, 296-8304.
- '85 GMC S15 PICKUP, AM/FM cassette, long-bed, step bumper, 80K miles, \$3,950. Karr, 823-2473.
- '28 MODEL-A FORD, 2-dr. coupe, w/rumble seat, fully restored. Lippis-Madden, 247-9144.
- '89 KAWASAKI BAYOU 4-WHEELER ATV, red, single/dual traction, 6 hours riding time, \$3,000 OBO. Chavez, 899-8695 or 884-7909.
- '78 PONTIAC FIREBIRD, 305 V-8, AT, one owner, 44K miles, new tires, \$2,600 OBO. Robertson, 869-3580.
- '88 DODGE DAKOTA, 4x4, Brahma shell, carpet kit, AC, V-6, 18K miles, transferable warranties. Crenshaw, 296-8948.
- '79 PLYMOUTH VOYAGER VAN, 8-passenger, AT, AC, \$2,200; '83 Plymouth Colt, 2-dr. hatchback, AC needs condenser, \$1,500. VanDevender, 821-9435.
- DIRT BIKES: '90 Honda CR125, \$2,200; '88 Yamaha YZ250, \$1,600; '88 Kawasaki KX125, \$1,300. Sceiford, 298-6396.
- '79 FORD ECONOLINE CONVERSION VAN, V-8, 43.5K miles, AT, cruise, kept in garage, \$8,750. Salazar, 296-5671.
- '89 FORD TEMPO GL, 4-dr., AM/FM cassette, cruise, tinted windows, tilt, \$8,150 OBO. Cartwright, 836-6957.
- OLD TRACTOR, runs, doesn't burn oil, \$600; '79 Toyota truck, needs transmission, lost title, \$600/all or parts. Flores, 873-4337.
- '78 COUPE DeVILLE, fully equipped, \$1,200. Keiss, 299-3312.
- '78 DODGE POWERWAGON, 4x4, PS, PB, club cab, \$2,650. Perryman, 281-3020.
- '69 PONTIAC GTO, 2-dr. hardtop, new paint (snow white), new motor, transmission, rims, tires, suspension, \$3,000 OBO. Ortiz, 831-0274 evenings.
- '89 YAMAHA FZR400, 5K miles, take over payments. Padilla, 298-0903 after 5 p.m.
- '73 FORD F350 w/11-ft. camper, PS, PB, AT, AC, stereo, furnace, stove, self-contained, \$2,800. Kulju, 299-8182.
- '65 BONNEVILLE BROUGHAM, 4-dr., 389, AT, options, new parts, w/custom-fit car cover, \$3,000 OBO. Cowen, 296-5980.
- '81 CHEV. BLAZER, 2-wheel drive, AM/FM tape, AC, PS, AT, \$3,500. Cooper, 881-1329.
- '82 HONDA ACCORD LX, hatchback, AC, new AM/FM cassette, PS, 5-spd., 125K miles, M/S tires, blue, \$2,400 OBO. Siegel, 281-2438.
- '89 DODGE COLT; '86 VW GLC; '89 Subaru Justy w/4WD; '89 Chev. Camaro; '90 Ford Tempo GL; '82 Chev. pickup. Bids accepted through Dec. 19, 1990. Sandia Lab FCU, 293-0500.
- '78 MUSTANG, AT, PS, 50K miles, \$1,500. Eicker, 293-8435.
- FUJI ESPREE TOURING BICYCLE, large frame, 12-spd., needs overhaul & tires, \$100. German, 247-2882.
- BOY'S BICYCLE, 20-in. wheels, \$35; boy's motorcross-style bicycle, \$45. McGovern, 275-3725.
- '80 FORD BRONCO, FWD, V-6, 4-spd., 67K miles, \$4,000; '79 VW Rabbit, diesel, 40-mpg, 65K miles, \$1,000. Rountree, 296-7268.
- RACING BIKE, Huffy, 20-in., \$50. Lucero, 296-2473.
- '82 MAZDA PICKUP, 5-spd., 4-cyl., passed emissions test, AM/FM, 8-ft. bed, 67K miles, \$1,550 OBO. Nelson, 265-7482.
- '67 MUSTANG 289, AC, AT, PS, restored, rear-ended, many new parts, \$1,850. Benischek, 256-7869.
- '79 SUBARU BRAT, 4-WD, \$2,000. Dupree, 294-1835.
- '79 LINCOLN MARK V, 60K miles, fully loaded, sunroof, Michelin tires, \$3,500. Key, 265-8838.
- '78 CHEV. MALIBU, 305 CID engine, AT, PB, PS, AC, stereo/cassette radio, \$1,000 OBO. Heid, 892-8608.
- WOMAN'S NICHKI BIKE, 10-spd. Broyles, 344-3872.
- '87 DODGE DAKOTA SE PICKUP, 2x4, 43K miles, 8-ft. bed, w/custom topper shell, accessories, \$7,500 OBO. Wood, 823-1965.
- '77 DATSUN B210, AT, cruise, 83K miles, \$650. Oravec, 281-3667.
- '88 HONDA ACCORD LXI, 4-dr., 5-spd., loaded, w/roof rack, one owner, 29K miles, below book. Henderson, 884-8309.

REAL ESTATE

- 2-BDR. HOME, 2-1/2 baths, fireplace, 1,180 sq. ft., assumable w/qualifying or refinance, \$5,700 cash to loan. Johnson, 883-0344 or 345-7990.
- 3-BDR. TOWNHOME, 2 baths, 1,410 sq. ft., 11009 Malaguena Ln. NE, mountain views. Lang, 292-3421.
- 4-BDR. HOME, 2 baths, living/dining/family rooms, covered patio, satellite dish, RV parking, Academy Hills, La Cueva High School, \$122,500. Wheeler, 821-3068.
- 3-BDR. HOME, 4 years old, study, 2 baths, 2-car garage, near Academy & Wyoming, heated pool, 2,136 sq. ft., \$169,500. Nordyke, 821-2661.
- 3-BDR. PRESLEY HOME, Nor Este Estates, 2-story, w/loft, \$1,638 sq. ft., plus sunroom, 1-1/2 years old, below market, \$119,000. Allen, 821-4193.
- 3-BDR. MOBILE HOME, '86 Fleetwood double-wide, 28' x 40', 2 baths, porch, appliances, \$3000 under book, you move, \$19,000. Jones, 881-1918.
- 3-BDR. MODULAR HOME, 2 baths, 1,344 sq. ft., 2 x 6 walls, on 1/3 acre, South Valley, low interest, assumable, \$12,000 down, \$476/mo. Flores, 873-4337.
- 4-BDR. HOME, 1-3/4 baths, 1,920 sq. ft., east of KAFB, below market. Garcia, 292-0979.

WANTED

- NATURALIST to volunteer advice and counsel in establishing an outdoor nature center at Ft. Wingate Navajo School. Dunn, 296-4904.
- TOYOTA LANDCRUISER PARTS, for '74 FJ40, lots of parts needed, especially doors and gas tank. Summers, 881-7765.
- SHOTGUN, 20-ga., Remington 1100 semi-auto. Cooper, 299-4454.
- ELECTRONIC KEYBOARD, full-size keys, 61 keys or more, also need stand, for aspiring kids. Barnette, 292-5186.
- BUNK BEDS, wood construction, w/drawers, with or without mattresses. Romero, 864-6254.
- K-1 KEROSENE HEATER, for immediate use. Jojola, 869-3922 after 5 p.m.
- BIRD CAGE & accessories, or gerbil cage & accessories, for 6-yr.-old's Christmas. Field, 268-0025.
- GRAND CANYON BUFFS, 9 days boating entire canyon to Lake Mead, May 26 to June 3, \$990 group rate, includes all meals. Shunny, 265-1620 mornings.
- WANT TO SHARE house or apartment w/female nonsmoker(s) anywhere in Albuquerque, split rent & utilities. Conroy, 345-9322.
- ROOMMATE, female, to share your house or apartment or find one together, start at Sandia on Jan. 7. Gately, 806-795-3590.
- CYMBAL, 18-in. crash, Zildjian, excellent condition. Lopez, 881-1363.
- OAK ENTERTAINMENT CENTER and large television. Davis, 294-1048.

LOST AND FOUND

- FOUND: cross, possibly from rosary or chain, near Bldg. 891 on Nov. 14. Adams, 4-8008.

SHARE-A-RIDE

- CEDAR CREST VANPOOL has openings, Frost Rd., N-14, Tijeras. Yelton (281-2893) or Burns (281-3922).

TRANSPORTATION

- '76 CADILLAC ELDRADO, \$500 OBO; '76 Southwest Ranger, 8-ft. overhead camper, \$1,000; Schwinn tandem bicycle. McCormick, 869-2879.

Coronado Club Activities

Shop 'Til You Drop, Then Shop Some More

STILL SHOPPING FOR GIFTS? You'll have money left over after you come to this Sunday's brunch and tea dance on Dec. 9 from 10 a.m. to 4 p.m. Brunch, served until 1 p.m., includes the usual mouth-watering fare: omelets, scrambled eggs, home fries, sausage or bacon, french toast, pancakes, and much more. Afterwards, Bob Weiler and Los Gatos will play some irresistible dance music. Prices are \$5.95 for adults, \$2.50 for children (ages 4 to 12), and free for toddlers.

WHAT DO YOU GIVE somebody who has everything? A good time, of course, at this month's T-Bird Card Sharks meetings. The first, a Christmas party and card game, takes place Tuesday, Dec. 11, from 2 to 5 p.m. The second meeting, a card game and party (what else?), begins at 10 a.m. Thursday, Dec. 13.

HO, HO, HO — HAPPY HOLIDAYS, say Santa Claus and Mrs. Claus on Saturday, Dec. 15, from 9 a.m. to noon. Pixie T. Clown and friends will also be there at 10 to entertain the kids. Parents, bring your youngsters and a camera because Santa will be available for photo opportunities just once this year, and you won't want to miss it. All this fun is free for member kids, moms, and dads.

FIT FOR A PRINCE — Sunday brunch on Dec. 16 will feature some extra-talented guests — the Eldorado High School Strolling Strings — who recently performed for Prince Charles. The Strolling Strings appear from noon to 12:45 p.m., and brunch will be served from 10 a.m. to 2 p.m. Reservations recommended (265-6791).

DANCE 'TIL YOU DROP, TOO, at the Ski Club's December meeting Tuesday, Dec. 18. The fun starts at 7 p.m., and after the meeting, you'll be itchin' to dance to the tunes of the Beth Keyo Console Duet. Don't miss the holiday munchies and door prizes.

SHUTDOWN SORROW — Because of the holiday shutdown and private parties at the Club, only one general Friday-night activity is planned this month: the Shutdown and Christmas Party on Friday, Dec. 21. Don't make plans, because you won't want to miss what the Club has in store for that night.

Take Note

Sam Levy (2523) was recently elected to a two-year term as treasurer of the Battery Division of the Electrochemical Society (ECS) at its fall meeting in Seattle. The Battery Division currently represents the interests of about 1000 ECS members. Sam has been a member of this division for 15 years, and was a member of its executive committee as member-at-large before he was elected treasurer.

UNM is again offering a course in "Entrepreneurial Engineering" (ME 456) in the spring semester. Sandia staff members with engineering and science backgrounds have taken the course; some have developed business plans, with class assistance, for companies they have contemplated starting. The class works in teams, usually starting four new businesses each semester. Staff members with technical or business backgrounds who have in mind possible business developments are especially invited to enroll. The Labs Technology Transfer and Patent organizations both support the class. The class meets on Tuesdays beginning Jan. 15 from 6:30 to 9:30 p.m. at UNM. Enrollment must be completed in the Student Services Building Registration Center (telephone 277-5548) by Jan. 18. For more information, call Prof. Bill Gross on 277-6297.

Collection boxes have been set up in both Sandia Laboratory Federal Credit Union locations in Albuquerque for donations of items to be sent to US troops in Saudi Arabia. American Legion Post #49 and the New Mexico Army National Guard will send the items overseas as they are collected. Nonperishable donations are requested — balm, beef jerky, canned green chile, presweetened Kool-Aid, tissue paper, razors, hard candy, small boxes of detergent, toothpaste, toothbrushes, pencils & sharpeners, and Odor Eaters for boots. Call Bob Mattison (7482-1) on 6-5618 or 892-4818 if you have questions.

REI (a local outdoor equipment company) is hosting a recycling event on Saturday, Dec. 15, from 10 a.m. to 1 p.m. Half of the proceeds from items collected this month will go to New Mexico Volunteers for the Outdoors. The other half will go to the Earth Day Coalition, a consortium of local environmental groups. Take items to the vacant lot across from REI (west of the New Mexico Museum of Natural History). Items accepted include aluminum cans (no aluminum scraps), newspaper (remove glossy inserts), plastic (milk, water, and soda bottles), and clear glass (no colored glass). Recycling collections are held the third Saturday of each month at REI. Items collected each month depend on the market.

Events Calendar

Events Calendar items are gathered from various sources. Readers should confirm times and dates of interest whenever possible.

Dec. 7-8 — "An Evening With Shakespeare" by Theatre-in-the-Making's Youth Performance Workshop; 8 p.m., CenterStage (3211 Central NE), 260-0331.

Dec. 7-8 — Classical Concert Four: New Mexico Symphony Orchestra with guest pianist Rudolf Firkusny, featuring "Piano Concerto No. 16 in D Major, K. 451" by Mozart and "Symphony No. 5 in C-sharp Minor" by Mahler; 8:15 p.m., Popejoy Hall, 842-8565.

Dec. 7-9 — "The Winter's Tale," Shakespeare's magical medieval fairy tale, combines tragedy with comedy, loss with restoration, dying with rebirth; 8 p.m. Fri.-Sat., 6 p.m. Sun.; Vortex Theatre, 247-8600.

Dec. 7-16 — "Other People's Money" by Jerry Sterner, dramatic comedy about Main Street vs. Wall Street, presented by the New Mexico Repertory Theatre; 8 p.m. Tues.-Sat., 2 p.m. Sun.; KiMo Theatre, 243-4500.

Dec. 7-Jan. 11 — Esposicion Navidenia Art Exhibit, furniture, retablos, and wood sculpture featuring Our Lady of Guadalupe; 8:30 a.m.-5 p.m. Mon.-Sat. (opening reception w/live entertainment, 7-10 p.m.), free, South Broadway Cultural Center, 848-1320.

Dec. 7-April 14 — Exhibit, "Wolves and Humans," from the Science Museum of Minnesota, provides comprehensive picture of the social, biological, and mythological relationships between wolves and humans; 9 a.m.-5 p.m., New Mexico Museum of Natural History, 841-8837.

Dec. 8 — Chi Omega Holiday Bazaar: arts & crafts, pictures with Santa, face painting, poinsettias, New Mexican food; 4-8 p.m., free, Chi Omega House (1810 Mesa Vista Rd. NE), 299-1941 or 243-6113.

Dec. 8 — Holiday Arts and Crafts Sale, 48 New Mexican artisans and craftspeople; 10 a.m.-3 p.m., Bear Canyon Center (4645 Pitt Ave NE, north of Montgomery between Eubank and Morris).

Dec. 10 — "Happy Hollydays," Chamber Orchestra of Albuquerque presentation, holiday concert for seniors, features traditional holiday favorites and sing-alongs, guest Nelson Martinez sings "Noche de paz" and other carols; 1 p.m., St. John's United Methodist Church (2626 Arizona NE), 881-0844.

Dec. 14-16 — "Christmas Joy," celebration in dance, presented by the Performers Ballet & Jazz Company; 7:30 p.m. Fri.-Sat., 2 & 7 p.m., Sun.; Rodey Theatre, 344-9840.

Dec. 15 — Family Christmas Concert, New Mexico Symphony Orchestra; 6:30 and 8:15 p.m., free (tickets must be picked up in advance at the NMSO Box Office, 220 Gold SW), Sunshine Music Hall, 842-8565.

Dec. 15 — Sister Source Coffee House: music, poetry, skits; 8-11 p.m., South Broadway Cultural Center, 848-1320.

New Administrator for Medical Care Plan

Because Sandia is changing Medical Care Plan administrators, the address for sending insurance claims will change this month.

Through Dec. 21, claims should continue to go to Provident Life and Accident Insurance Company. After Dec. 21, claims should go to

Mutual of Omaha
National Accounts Group Claims Processing Center

Mutual of Omaha Plaza
Omaha, NB 68175.

The plan number is GMSI-3L77, and the phone number (effective Jan. 2) is 1-800-753-6078.

During the last week of December, Mutual will mail kits containing claim forms and new Sandia Medical Care Plan identification cards. Mutual will accept Provident claim forms through January.

When Mutual begins processing claims, it will process all claims, no matter the date of service (subject to the normal two-year limitation). Provident will transfer all Sandia Medical Care Plan records to Mutual.

For more information or answers to questions, call Doris Mason on 844-3545.



FIRST RECIPIENTS of the Captain Augustus McCrae Award are Michael Butteri (3745, left) and Suzy Wagner (3743). The award is given quarterly to employees in Purchasing and Materials Management Org. 3700 for outstanding customer service. Augustus McCrae is a fictional character from Larry McMurtry's novel *Lonesome Dove*, in which an angry McCrae teaches a rude bartender about good customer service with a little help from his fist.