

Massively Parallel Computing Begins to Yield Benefits in Applied Technical Work

Massively parallel processing is widely recognized as a computing technology of tomorrow, but at Sandia it is fast becoming the technology of today.

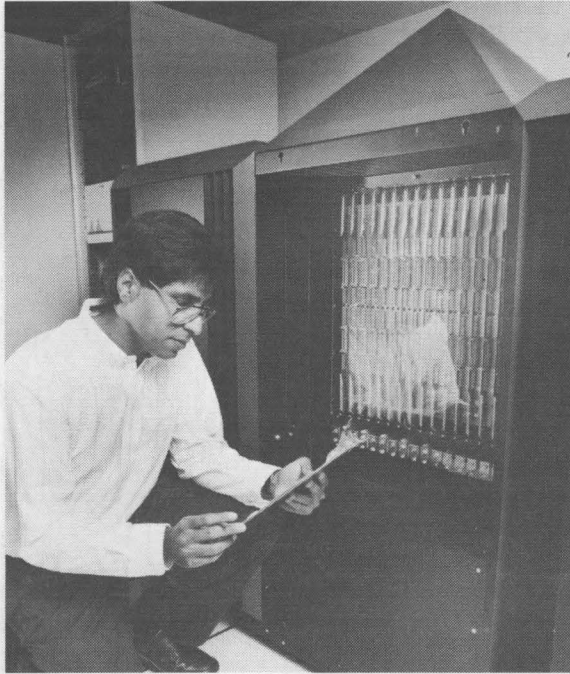
A massively parallel computer teams more than 1,000 processors to do many calculations simultaneously toward the solution of a single problem. Conventional supercomputers may have multiple processors, but in much smaller numbers — typically from two to 64. Massive parallel processing requires new forms of mathematics, algorithms, software, software tools, and parallel computer architectures.

A big part of the challenge is breaking complex problems into pieces that can be solved simultaneously. A number of Sandia organizations are cooperating to convert computer codes used for complex scientific and engineering problems so that they will run on massively parallel computers. In the recent past, these codes have accounted for 95 percent of the computing time used on Sandia's conventional supercomputers.

More Than 20 Projects

A full roster of recent and current applications of massively parallel computing at Sandia would form a list of more than 20 projects in particle-beam physics, structural mechanics, fluid mechanics, shock-hydrodynamics, robotics, mathematical cryptology, combustion, detonation, nuclear fuel programs, heat transfer, network modeling, and national security and intelligence.

One of the many Sandia organizations being affected by — and affecting — massively parallel processing is Fluid, Thermal, and Structural Sciences 1510, managed by John Cummings. "Mas-



ONE OF SANDIA'S massively parallel computers is the NCube 6400, shown here with Sudip Dosanjh, Supervisor of Parallel Computational Sciences Div. 1421. Several people in Sudip's division and elsewhere in Computer Sciences and Mathematics 1400 are working with Sandia scientists and engineers on applications for the rapidly developing capabilities of massively parallel processing.

sively parallel processing is clearly the way to go," says John. "We're trying to get more and more activities targeted that way. Right now, Randy Schunk [1511] is working with John Shadid [1421] to take existing production-type software that we

run on the Cray and see what we can do with it in the environment of massively parallel machines."

John points out that to optimize for production-oriented operation it's necessary to learn through experience — to find "the problems you inevitably run into with input, output, graphics, communication links. The way we're working them out," he continues, "is to take real computer codes that are used routinely on the Cray and get them up and running on massively parallel machines. I think that's a terrific approach."

Going for 3-D

John also mentions the work of Jim Schutt, who is doing three-dimensional simulations of the wakes created by hydrodynamic vehicles. "Jim was recently reassigned from Thermal and Fluid Engineering Div. 1513 to the newly formed Computational Mechanics and Visualization Div. 1425, but he'll still have an office here — we're interested in collaboration between our organizations. He's being assisted in this work by a collaboration with Doug Cline, in the Parallel Computational Sciences Division [1421].

"Jim's simulation problem is large enough to fill up the Cray," John continues, "and it can also fill up the present-generation parallel machines."

But the fact that such a simulation is being done right now is significant. At the same time, running a large 3-D simulation is an important indicator of what is to come. "The future for us, as massively parallel machines develop over the next few years," says John, "is clearly a move toward complete three-dimensional simulations. We've

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LAB NEWS

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Focus on Microelectronics

Sandia-AT&T Project Develops X-Ray Lithography to Make Tiny Circuits

Just as computers, calculators, and transistor radios have gotten smaller over the years, microelectronics technology today continues to be dominated by the drive to pack more elements into a small area.

In keeping with this goal, a joint project between Sandia and AT&T is aimed at developing the technology for producing tiny circuit elements that are only 0.1 micron wide, or about 1/1,000th the width of a human hair, through a process known as X-ray lithography. Typically, circuit elements today are about 1 micron wide, with only a few manufacturers in the world producing elements that are 0.8 micron wide.

The Sandia collaboration, which includes contributions from both the Livermore and Albuquerque facilities, grew out of a joint technical meeting with AT&T hosted by Research VP Venky Narayanamurti (1000), who along with Peter Mattern (8300) has been a strong advocate for this project.

X-ray lithography is a means of transferring a desired circuit pattern onto a silicon wafer, explains Rick Stulen, project manager and Supervisor of Advanced Materials Research Div. 8342 at Sandia, Livermore.

Circuit elements include such items as resistors, transistors, capacitors, and electrical connec-

tions. They are the tiny, individual components that make up microelectronic silicon chips, which in turn make up the components of any modern computer or other electronic device.

Similar to Film Developing

Lithography is conceptually similar to the process of making photographic prints from camera film. In conventional lithography, using visible light, a negative image is projected through a lens system onto a resist. The resist takes the place of film and consists of a polymer coating on a silicon wafer.

Once the resist is exposed to light, it is developed. During the development process, areas previously exposed to light are removed.

"The key is that wherever light hits the wafer, it activates the resist; you then remove whatever portion is not needed for the final image," explains Rick. The final image then becomes the blueprint for the electrical circuits on the wafer.

Because of its relatively long wavelength, however, visible light is not ideal for manufacturing tiny electronic devices. "It turns out that when you use optical wavelengths to produce these devices," says Rick, "there is a fundamental limit in the size of the ultimate object you want to produce. It's dependent on the wavelength of the

(Continued on Page Three)

Chemical Waste Class Offered

This is the second in a series of "helpful hint" columns as we prepare for the visit of the DOE Tiger Team (Environment, Safety, and Health inspection team) next year.

TIGER
TEAM
TIPS



A hazardous-waste training program is being offered for Albuquerque-based Sandians and contractors

who generate, handle, store, transport, sample, treat, package, or dispose of chemical wastes.

The three-hour program provides guidelines for safely conducting activities involving chemical wastes at Sandia; the training focuses on requirements outlined in federal and New Mexico hazardous waste regulations. "Guidelines for Hazardous Waste Generators," a booklet that applies to Sandia, Albuquerque operations, will be provided to every attendee. (The class does not address radioactive or mixed waste, or right-to-know laws.)

Offered through Hazardous Waste and Wastewater Div. 3221, the training involves a tour through an individual's work area before the class to help tailor course materials to specific operations.

The class allows time for questioning and for visiting work sites, explains Steve Ward, hazardous waste operations project leader.

For more information or to schedule a class, call Darlene Moore or Chip Roma, both on 5-9051.

**Employee Ideas
for Improving
Communication:
See Page Six**

This & That

Next Issue - The next LAB NEWS will be published Friday, Jan. 11. Deadline for news and ads is noon, Friday, Jan. 4. Have a happy and safe holiday break.

* * *

Thanks for Whelming Response - Reader response to our new feature, "What Do You Think?," was at least whelming, if not overwhelming. In the last issue, we announced this new feature that gives Sandians the opportunity to respond to a specific question and thereby suggest ways to make the Labs more efficient, more responsive, and perhaps a better place to work. Many of you responded to our first question: "What is the one, most important thing you would suggest to improve communication at the Labs?" We didn't have enough space to print all responses, but we included at least one response for every basic idea proposed. Responses to the communication question and the new question are on page six. Keep those ideas coming. Sandia management reads the LAB NEWS.

* * *

Superchanges - Technology can progress with unparalleled speed today. In the case of computing, make that with parallel speed. Following a 1987 Sandia breakthrough in massively parallel computing, Labs researchers are now making big strides in practical applications. See story on page one.

* * *

Personnel Directors: "Thank Goodness It's Tuesday" - According to the *Journal of American Insurance*, personnel directors at 100 of America's top corporations believe employees are most productive on Tuesdays. When asked what day of the week employees were most productive, 6 percent of the personnel directors said Monday, 53 percent Tuesday, 19 percent Wednesday, 9 percent Thursday, and 2 percent Friday.

* * *

Long Red & Longest Blue - Division 3411 now has one of the longest "red badgers" and the longest "blue badger" at Sandia. Len Malczynski has been waiting more than 22 months for his Q clearance, but G. C. Hollowa has had his clearance since 1947. Len may be waiting a while longer. He worked as an independent computer consultant in 11 different countries during one 10-year period.

* * *

Informal Followup - As announced in this column several months ago, the first Friday of every month is "Informal Friday" at Sandia. Employees who care to "dress down" and wear casual clothing to work may do so on those days.

I recently got a note from an employee who said some folks are reluctant to dress casually on those Fridays, even though they would like to: "They assume management frowns on such attire," said the writer. "They aren't convinced it's OK to not dress up one day a month." I can't speak for all Sandia management, but I can tell you that Al Narath supports the idea and even promises to observe informal Friday when he can. So break out those new casual spiffies for Friday, Jan. 4.

* * *

New-Fashioned Holiday Spirit - A note in a holiday-season greeting card from one of my cousins: "My artificial tree is up, my silk poinsettia is out, and the battery is in the candle. I'm all ready for Santa!" She probably even bought her gifts with "plastic money." •LP

Share a Ride

Ride Sharing Saves Gas, Hassle

Lower gasoline bills are only one good reason Sandians should share their rides to and from work, says Linda Stefoin (3533), administrator of Sandia's commuter assistance program.

"Ride sharing could reduce gate traffic," she says. "Also, Albuquerque's air would be a little cleaner, and ride sharing would make parking easier."

Sandians who are interested in carpools or vanpools can submit forms to Linda describing their needs and preferences. She submits these forms to the city's Ridepool data base, a listing of other Albuquerque-area people interested in ride sharing. (For blank forms, call Linda on 4-7433.)

Participants' names are matched based on their geographical area, their work destination, and preferences such as smoking or non-smoking. Linda says Ridepool can accommodate almost any request if participants fill out the form completely. Some Sandians have even said they prefer to be riders, not drivers, and help the drivers pay for gas.

Currently, seven vanpools commute between the Labs and outlying areas such as Cedar Crest, Rio Rancho, Santa Fe, and Belen. Seven city bus routes and two private bus lines carry Sandians on base and into the Tech Area.

Sandia fared well during last year's "Clean Air Challenge," an annual contest in which Labs employees compete with DOE and KAFB employees

Questionnaire Seeks Ride-Sharing Information

To describe the Labs' participation in ride-sharing programs, Linda Stefoin (3533) has sent a brief questionnaire to all Albuquerque Sandians. Please return your questionnaire as soon as possible.

to see which group has the highest participation in ride sharing programs. Approximately 350 Sandians rode the bus, 100 rode in vanpools, 160 rode bicycles or walked, and 2000 rode in carpools. Sandia has won the contest two years in a row.

In Livermore, contact Cindy English (8522) for carpool and vanpool information on 294-2723.



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TEACHER OPPORTUNITIES TO PROMOTE SCIENCE (TOPS) is a new teacher-enhancement program for mid-school teachers in rural New Mexico. A joint program of Sandia and Los Alamos national laboratories, TOPS is designed to upgrade science and math teaching capabilities and to encourage students to pursue careers in these areas. The first TOPS Advisory Committee meeting was held at Sandia Dec. 10. Seen here visiting before the meeting are (from left) committee members Julia Gabaldon (3511), Stephen Ortiz (9216), Maureen Baca (3510), and Kirby Gchachu from Zuni Public Schools. Sharon Holmes and Linda McNiell (both 3511) are also members of the TOPS Advisory Committee.

(Continued from Page One)

Sandia-AT&T Project

light. In order to produce smaller elements, you have to use shorter wavelengths."

X Rays Permit Printing of Tiny Elements

That's where X rays come in. Much shorter than optical wavelengths, X rays permit the printing of features greatly reduced in size. There are essentially two ways to do this — projection lithography and proximity lithography.

Proximity lithography is essentially shadow printing — images are transferred at a one-to-one ratio. A silicon mask, similar to a sheet of extremely thin plastic wrap overlaid with a metal grid of tungsten or gold, is flooded with a broad X-ray beam. Wherever the X rays hit metal, they are blocked from passing through. Those X rays that do pass leave an image of equal size on the resist-coated silicon wafer below.

A large effort to develop this technology is under way around the world, particularly in Japan. In the US, IBM, one of AT&T's competitors in microcircuit manufacturing, has taken the lead in developing proximity lithography, using X rays of extremely small wavelengths, notes Rick.

In projection lithography, an image produced with soft X rays (longer-wavelength X rays) is demagnified and projected onto a silicon wafer, similar to the way negatives are reduced or enlarged to produce different-size photos.

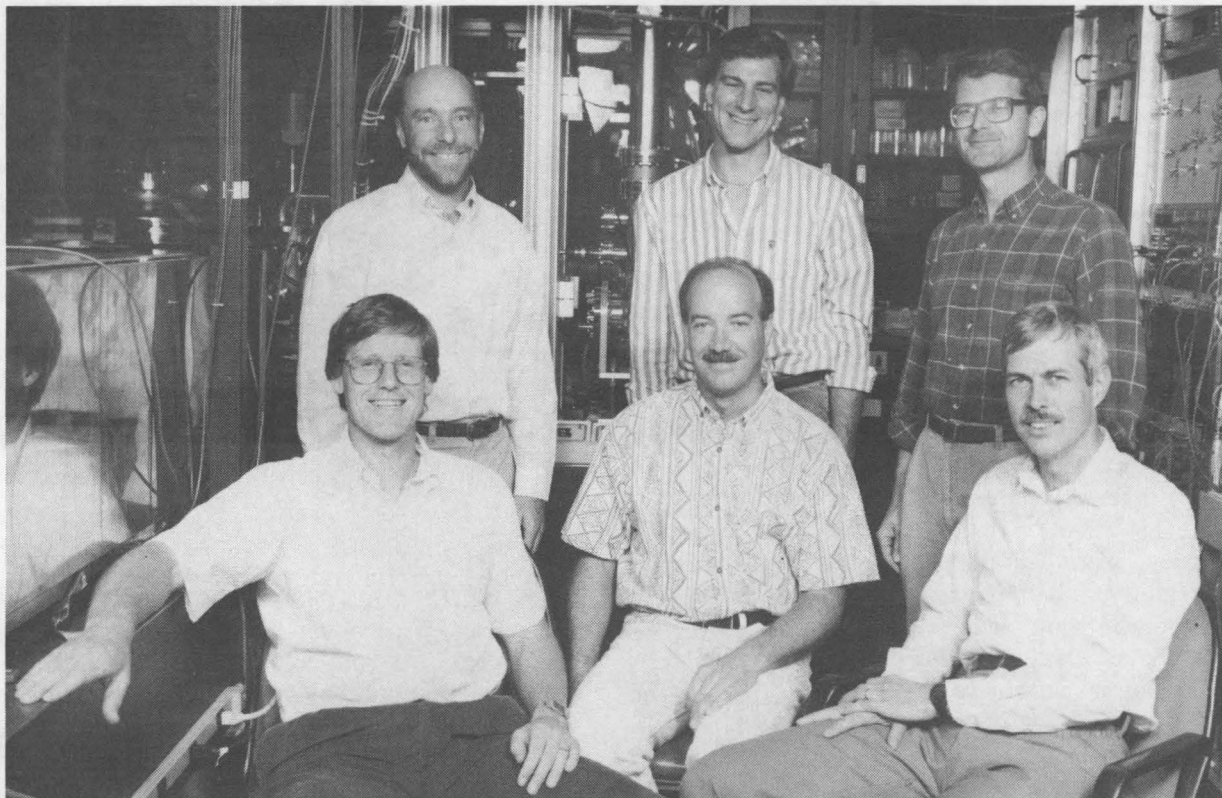
20-to-1 Reduction Printing

At AT&T's Bell Labs in New Jersey, a group headed by Richard Freeman recently used a Schwarzschild lens system to achieve 20-to-1 reduction printing, in which soft X rays with wavelengths of about 140 angstroms are projected through a mask and reflected off a mirror onto a wafer. A Schwarzschild lens system has only two optical elements — a concave and a convex mirror — that permit more light to get through without being lost during reflection.

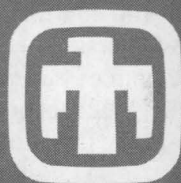
With this approach, the Bell Labs group was able to produce features .05 micron in size. One of the important factors leading to the success of this effort was AT&T's ability to deposit highly reflective coatings onto the Schwarzschild optics.

To date, all of the AT&T work has used X rays generated by a synchrotron radiation source at the National Light Source at Brookhaven National Laboratory. While this source is very bright, it is also complex and costly.

Sandia is collaborating with AT&T to determine the feasibility of using a laser plasma source (LPS) to produce X rays, a smaller and less expensive device than a synchrotron. An LPS costs about



SUPER-TINY circuit elements are the focus of a joint development effort between Sandia and AT&T. Sandians working on the project include (clockwise from top left) Project Manager Rick Stulen (8342), Kurt Berger (8342), Mike Malinowski (8343), Dan Tichenor (8446), Steve Haney (8342), and Glenn Kubiak (8342).



SANDIA LIVERMORE NEWS

\$750,000, compared to \$30 million to \$50 million for a compact synchrotron source, says Rick. If effective, the LPS can be integrated into a microelectronics fabrication line relatively painlessly.

'Compact Light Bulb'

"Think of the LPS as a compact light bulb," says Rick. "I put specially coated mirrors next to it that collect the soft X rays and refocus them onto a mask and into a camera." Meanwhile, AT&T will be providing the special, multi-layered coatings needed to increase the reflectivity of the mirrors, and specialized masks that contain the patterns to be reduced 10 to 20 times in size.

In Livermore, Glenn Kubiak and Kurt Berger (both 8342) are responsible for the development of the LPS, which this year won one of the R&D 100 awards. The LPS uses pulsed laser light at wavelengths of 248 nanometers, with a pulse duration of 20 to 30 nanoseconds. Each pulse of light is guided into a vacuum chamber and focused onto a cylindrical target coated with gold. Upon striking the target, the beam produces an extremely high-

temperature plasma that emits X rays at an optimum wavelength for projection X-ray lithography.

Glenn is currently using the output of the LPS to determine the sensitivity of commercially available resists to soft X rays. Paul Rockett (1273), who recently joined the project team, is leading an effort to further optimize the LPS output.

Other Sandians involved in the project are Mike Malinowski and Ken Stewart (8343), who are working on pattern transfer and resist processing; Steve Haney (8342) and Dan Tichenor (8446), who are working on the optical system design; and Cliff Renschler (1812) and Roger Clough (1811), who are responsible for advanced resist development. Chuck Gwyn (2160) and Brian Stallard (2131) are examining the future implementation of this technology.

The target date for development of the new technology is 1998, when it is expected to be implemented as a commercially viable technology. AT&T and Sandia researchers hope to produce the project's first reduced images by next spring, says Rick. ●LD

LEAP Campaign Sets Record

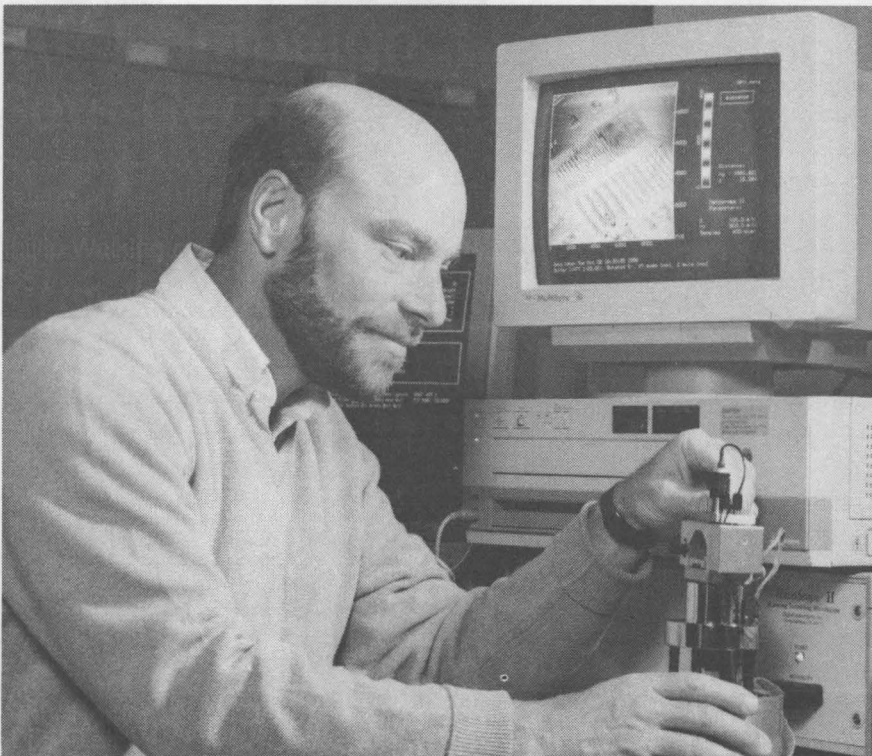
Sandia employees established a new record dollar amount in pledges during the annual Livermore Employees Assistance Plan (LEAP) campaign. Surpassing the goal by more than \$5,000, Livermore Sandians pledged a whopping \$160,837 during the annual charitable drive that benefits some 30 area human service agencies and the United Way.

Approximately 85 percent of employees are participating this year, and the number of Fair Share givers (those pledging one hour's pay or more per month) is 308, up from 290 last year. ●

Congratulations

To Rose Ketchum (2910) and Richard Schubert, a son, Jacob Thomas Schubert, Nov. 20.

To Danny Bernacil (8535) and Terri Tobiassen, married in Grass Valley, Nov. 24.



RICK STULEN (8342) uses an atomic force microscope to characterize patterns produced by X-ray projection lithography.

(Continued from Page One)

Massively Parallel Computing

moved from one-dimensional to two-dimensional to occasional three-dimensional simulations today. But the big ones can eat us alive, in terms of computer costs, because of the amount of time they take to run on a supercomputer."

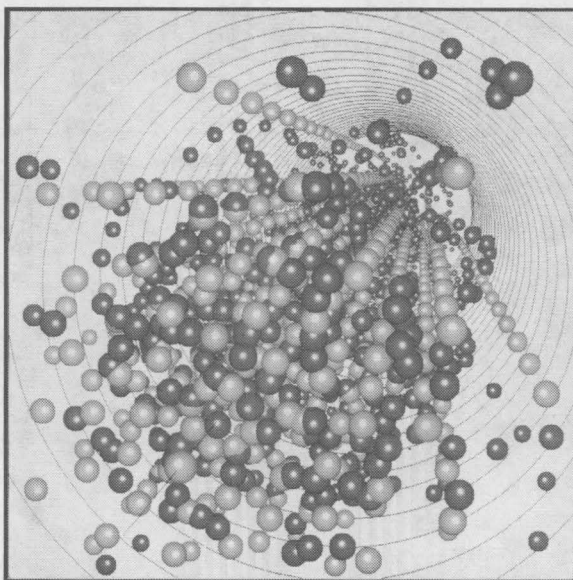
John expects to see more "transient computations," which reveal the details of what's happening in a computer-simulated system instant by instant. Today, phenomena such as turbulence take more computer power than is available for direct simulation. So do complex simulations of heat transfer that allow for radiation along with convection and conduction. But progress is being made.

"I like what I see going on today," says John, "and I see an extremely bright future."

More Realistic Models

In Structural and Solid Mechanics Dept. 1540, managed by Jim Asay, there is a similar awareness of changes going on now and the greater changes they portend. Jim agrees that growing use of 3-D codes is significant and notes, "We'll also be doing more realistic models of material response for weapon simulations and other things in the future. That takes a lot of computational time. Right now it's difficult to get the most advanced models into the computers that exist — it's a question of memory size as well as run time.

"Our initial goal in demonstrating the capa-



RELATIVISTIC ELECTRON BEAM is simulated by a massively parallel version of Sandia's BUCKSHOT code. The light-colored spheres represent electrons, and the dark ones represent positive ions. This is a single frame from a simulation run, for which the graphics display was created by Jeff Jortner (1424). Steve Plimpton (1421) converted the BUCKSHOT code for use on a massively parallel computer. The original code was developed by Isaac Shokair and John Wagner (both 1241).

bilities of massively parallel computing in hydrocode applications," Jim continues, "is to complete migration of a 2-D version of one of our big workhorse codes onto both of Sandia's massively parallel machines [the 1,024-processor NCube 6400 and the 16,384-processor Connection Machine] and then develop a 3-D production version

that can be used by our department and other people at Sandia, as well."

Allen Robinson (1541) explains more about large hydrocodes that simulate shock-wave physics — "the kinds of things that occur in very high velocity impacts," he says, "such as armor struck by a projectile traveling several kilometers per second." Other applications of these codes are various types of explosive devices and the impact of space debris on satellites or spacecraft.

Allen describes how a simulation problem can quickly become big enough to overwhelm even a supercomputer: "You might describe a problem as a mesh, where each cell of the mesh is a small area in which the simulation has to keep track of variables such as pressure, density, and temperature. If it's a 3-D mesh of 100 by 100 by 100, you have a million cells, with maybe 35 variables for each. That's a large data base.

"As you try to do bigger and bigger problems, with more and more cells, the computing time gets

A massively parallel computer teams more than 1,000 processors.

too long. So we're mapping big problems to large parallel machines. That's the focus — being able to run very large problems that take too much time even on a vector supercomputer."

Mike McGlaun, Supervisor of Computational Physics Research and Development Div. 1541, points out that Allen's example of a million cells, though big, is within the bounds of current simula-

(Continued on Next Page)

Ten to 100 Times Faster than Supercomputers

Massively Parallel Computing Exploits Breakthrough Made by Sandia Researchers

About three years ago, Sandia researchers were the first to show that massive parallelism could accelerate the solution of real problems almost in direct proportion to the number of processors working in parallel (LAB NEWS, March 11, 1988).

Until recently, many members of the US computer science community remained skeptical of the practical benefits of massively parallel computing. Over the last few months, however, a consensus has formed that the new parallel computing methods are probably the best course for the next generation of supercomputing.

This attitude represents a turnaround. Now, many US labs, including Sandia, are exploring massive parallelism as the likely supercomputing wave of the future.

Until Sandia's late-1987 breakthrough, most computer scientists believed that using even thousands of processors could speed up problem-solving by no more than 50 to 100 times the rate of a single processor. Sandia showed that when the problem size is increased in proportion to the number of processors — as almost always happens in real-world problems — the speed of solution can increase in proportion to the number of processors. Using a 1,024-processor computer, the Sandia team attracted national attention in 1987-88 by achieving speed-ups (compared with a single-processor computer) of 1,020, 1,019, and 1,011.

Since then, Sandia has taken massively parallel computing far beyond basic feasibility. Scientists and engineers are already using massively parallel computing to solve important application-oriented problems (see "Massively Parallel Computing Begins to Yield Benefits").

Applications range from simulating the arrangements of atoms on a surface to modeling

earth's oceans and atmospheres, from designing meteoroid-resistant space structures to designing new semiconductor materials and catalysts.

The goal is more than just to solve the same problems more quickly. The speed-ups mean that problems too large and complex to run on conventional supercomputers can be solved on massively parallel computers. That will allow simulating complex events and processes in nature much more accurately and realistically.

Still a Concentration on Research

While working on a wide range of applications, Sandia continues as a leader in the research of theory and techniques of massive parallelism. The Labs' massively parallel computing operation is now the largest in the US.

One of Sandia's advantages is having large, state-of-the-art parallel computers of both the MIMD (multiple-instruction, multiple-data) and SIMD (single-instruction, multiple-data) type. In an MIMD machine, different processors can be carrying out different operations at any step in a computation. In an SIMD machine, each processor must carry out the same operation at a given instant.

The two kinds of machines require different styles of program development. Each has its advantages and disadvantages when applied to various problems. Having both types of machine in one location allows Sandia researchers to develop expertise with both. They can try different approaches to a problem and choose the best-matched machine. Although other sites have smaller versions of parallel machines, Sandia has large ones that can compete with the largest vector supercomputers.

The Sandia massive-parallelism team — a group of about 50, including leading researchers

in parallel computing, previous vector computer users, and scientists and engineers who work on solving practical problems — is particularly enthusiastic about the potential of massively parallel processing in computer graphics. Visualization techniques can use computation to create displays that literally draw pictures of a problem's solution. The pictures convey results that would be difficult or impossible to comprehend in any other way, such as through conventional graphs or tables of numbers.

"Much of the output from these codes is so complex that visualization is virtually the only way to go," says Ed Barsis (1400).

Sandia-generated graphics for massively parallel computing include, for example, animated three-dimensional close-ups of micrometeoroids striking debris shields and superstructures. The massively parallel simulations are so realistic that it's hard to distinguish between a frame from one of these sequences and a photo of physical simulations of the same event using impacts created by hypervelocity launchers.

Educational Cooperation

To promote progress in massively parallel computing, Sandia is working with private-sector companies (see box, page five) and with educational institutions. The Labs is DOE's representative in the National Fellowship Program in Computing Science administered by the University of Maryland. In addition, Labs researchers are partnering with Oak Ridge National Lab and Vanderbilt University in developing computing sciences at the elementary-school level, and with Syracuse and Cornell universities in preparing a joint university curriculum in computing sciences.

●NHey(3161)/KFrazier(3161)/CS

tion capability: "We're running problems right now with up to six million cells," he says. "But some of the runs we do now on conventional machines take hundreds of hours. That means an analyst has to wait a long time between runs and can't get many runs in during a given period. It will be a huge improvement to be able to turn problems like that around overnight."

In the solid-state sciences, modeling of the tiniest structures can also lead to large simulations. Recently, for instance, Jeff Nelson (1143), Steve Plimpton (1421), and Mark Sears (1424) have been using Sandia's NCube computer for electronic-structure calculations of solid-state systems containing about 50 to 100 atoms. Calculations for systems this size would have required more memory and processor resources than supercomputers can provide.

"Because of this collaboration between 1100 and 1400," says Jeff, "Sandia can do electronic-structure calculations of complex solid-state systems that were previously not feasible. Our capability in that area is now unique among research institutions."

Simulating Synthetic Aperture Radar

Another type of simulation now going on at Sandia is what Tom Sullivan (9133) describes as "simulating a synthetic aperture radar system on the computer." Tom emphasizes that the simulations provide useful output for a project that Sandia is doing for a customer — it's not just exploration of how to use parallel processing. Working with Tom are Cullen Lee (9131), Bob Benner, and Mark Sears (both 1424).

Bob Clem, Director of Exploratory Systems Development 9100, points out that the alternative to simulation is going into the field and getting actual radar returns from various targets. "It's of great value to us that we can now predict signatures in the computer," he says. "It speeds our work and allows much more cost-effective solutions."

About a year ago, Tom worked on converting the code to run on an earlier-generation NCube machine. "It ran," he says, "but it turned out that we didn't really use it — the machine didn't have enough memory to let us solve the problems we wanted to solve. With the newer computer, we're really in production. Sitting at my terminal right now, I'm looking at the output for a run I just made."

That quick turnaround compares to the days when, in an overnight run on a conventional computer, the result would be only a single iteration. "Now," says Tom, "we get dozens of iterations per evening."

Focus Shift

Achievements like these have come in just the three years since a Sandia team demonstrated the feasibility of large speed-ups in problem-solving with massively parallel computers (see "Massively Parallel Computing Exploits Breakthrough").

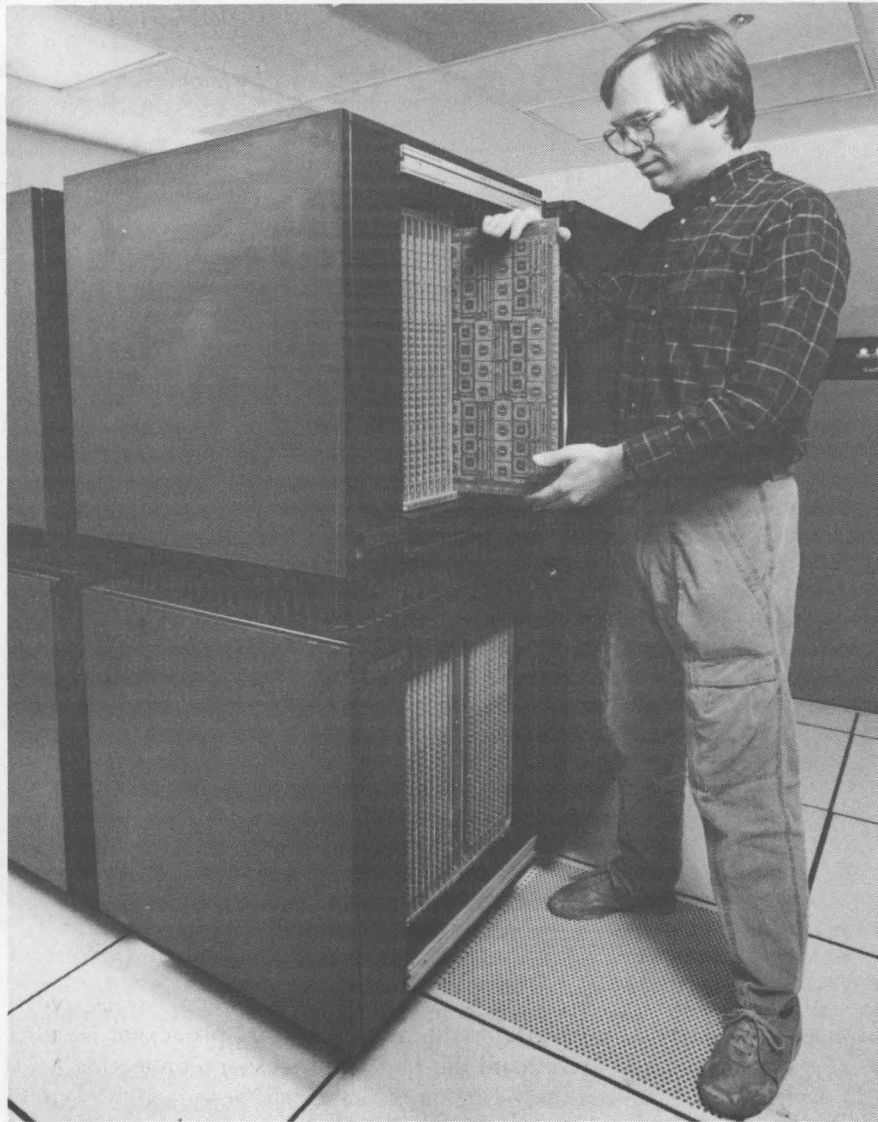
Retiree Deaths

Raymond Cohrs (72)	Nov. 1
Albert Sensel (69)	Nov. 2
Pedro Ortega (70)	Nov. 4
Jerry Dusek (71)	Nov. 11
William Sundt (65)	Nov. 12
Lee Hollingsworth (66)	Nov. 12
Charles Dunn (74)	Nov. 22

Sympathy

To Fran Cheek-Martin (6318) on the death of her daughter in Albuquerque, Dec. 4.

To Tom Sanchez (7852-1) on the death of his brother in Albuquerque, Dec. 9.



CONNECTION MACHINE CM-2x, being opened by Carl Diegert (1412), has 16,384 processors that work in parallel to solve large problems.

"Over the last three years, the focus of the research program has shifted so that demonstrating the potential is no longer an issue," says Bill Camp, Manager of Mathematics and Computational Science Dept. 1420. "We're routinely converting complex computer codes that are written for vector processors, so that we can run them with massively parallel processing. These are real-life engineering and scientific problems, and we're solving them anywhere between 10 and 100 times faster than we were with conventional supercomputers."

"In my opinion," says Ed Barsis, Director of Computer Sciences and Mathematics 1400, "the work being done at both sites, here and at the Center for Computational Engineering in Livermore, makes Sandia the national leader in massively parallel computing."

In short, Sandia has taken massively parallel computing from the class of exotic challenges and is applying it daily to a broad array of typical engineering and science problems, problems that are the daily "bread and butter" of technical work throughout the Labs. ●CS

Private-Sector Interest

Sandia's growing expertise in massively parallel processing is attracting the interest of private-sector computer companies, says Ed Barsis, Director of Computer Sciences and Mathematics 1400. NCube Corp. and Cray Research have assigned representatives to work at Sandia, and Thinking Machines Co. has had two computer scientists on-site for some time.

"We're not talking about service engineers," Ed stresses. "These people are working with us on applications. It's a two-way street: They hope to learn from us, and we hope to learn from them as well."

"In addition," says Ed, "Sandia — at both Albuquerque and Livermore — has started working with the commercial sector on applications that are not for computer technology per se, but in support of engineering and design activities."



OLD BONES — Paul Sealey (2832) examines the fossilized skull of a phytosaur, a crocodile-like animal that lived at the beginning of the age of dinosaurs more than 200 million years ago. Paul was recently named an adjunct naturalist at the New Mexico Museum of Natural History, which allows him to collect and study hundreds of fossils from all over the state.

What Do You Think?**Sandians Offer Ideas to Improve Communication**

This is the first in a series that will feature employee responses to questions posed by the LAB NEWS. The idea is to give Sandians an opportunity to suggest ways to make the Labs more efficient, more responsive, and perhaps a better place to work. The response to our first question was so good that we don't have space to print them all, so we are printing selected ones that represent every basic idea that was presented. Most responses have been condensed, excerpted, and paraphrased to conserve space.

The question: "What is the one, most important thing you would suggest to improve communication at the Labs?"

A communication system similar to the Credit Union's "Curos" or AT&T's "Bell System Savings Plan" voice-messaging systems would be useful and reduce our paper consumption. These systems give specific spoken information based on telephone keypad commands. *Weekly Bulletin* information could be placed on this system along with ES&H, Quality, and Security/Safety news. It could also record messages for vertical feedback.

Richard Graham (2855)

In our R&D efforts, we frequently require the expertise of other divisions. The phone book should include information about the services each department/division is capable of providing, thereby reducing frustration and the number of calls necessary to get information.

Phil Garcia (2531)

Actions speak louder than words. If you say something, act accordingly. Improved communication is not just a means of making orders clearer to subordinates. Improved communication is *reciprocal listening*. We are on your team only to the extent that you're on ours. So solicit and use our input.

Name Withheld by Request

To improve communication at the Labs, I'd put everyone on voice mail and teach them how to use it. If I had money left over, I'd put everyone on COMET or another electronic mail (e-mail) system. Finally, I'd add citations to the Sandia directory showing which employees are on the e-mail system and their "addresses."

Chris Madigan (3151)

Let's improve the top-down feedback. Management is quick to ask for help in preparing for a presentation or in getting a report out on time. But it is very slow in following up on how well things went. I'm not looking for thanks as much as an assessment of the value of what we do.

Glenn Elliott (9212)

I recommend anonymous yearly performance evaluations of those serving above each employee through the VP level. In other words, an MTS would evaluate his or her supervisor, department manager, director, and VP. A department manager would evaluate the director and VP, etc.

Gary Mastin (1421)

(Note: The "Upward Feedback" program, managed by Human Resources Directorate 3500, has similar goals — to give employees the opportunity to evaluate their management. A pilot phase has been completed that included feedback to directors and above. A second phase to include all employees and managers is planned for this spring.

A great deal of communication at Sandia is on paper (memos, purchase orders, etc.). Overall communications, both horizontal and vertical, would be improved substantially by increasing the number of mail deliveries to three times daily: early morning, noon, and late afternoon.

Howard Cilke (7483)

All supervisors, from the president on down, should spend about 10 percent of their time making informal, unannounced visits to the troops in the trenches. When they make these visits, they should come alone.

Chad Looney (5141)

A computer data base, available by networking PCs, that summarizes the capabilities of all experimental testing, modeling, and technical support facilities and lists staff areas of expertise would be valuable. This would provide staff with better access to the breadth of technical expertise available at Sandia, expedite incorporation of our technical capabilities into new ventures, reduce duplication, and help introduce new employees to the wide range of facilities available at Sandia.

Richard Behrens (8351)

The two fundamentals of any reliable communication system are feedback and redundancy. Vertical communication at Sandia has been on a hit-or-miss basis because all communication to the staff passes through a single point (i.e., the supervisor). I suggest mandatory periodic meetings between department managers and their staffs.

Robert Woods (9231)

What Do You Think?**The Current Question**

DOE Secretary James Watkins says ES&H (Environment, Safety, and Health) compliance activities should have top priority at all DOE facilities. Some Sandians, however, seem unenthused and unmotivated in this area. **In your opinion, what one or two things could be done to get more employees solidly behind ES&H compliance activities?**

Please limit responses to 50 words maximum. Include your name, organization, and phone number. We will print names and organization numbers with responses unless you specifically request that we don't; if that's your wish, we will honor it and won't reveal your name to anyone. Before we print any name with a response, we'll call you personally to verify that you submitted it.

Send responses to "Question", Division 3162, to arrive by noon on Wednesday, Jan. 2. If you prefer, responses can be faxed to 844-0645. We would also appreciate receiving suggestions for future questions.

One of the best forums for improving vertical communication is a monthly division meeting including a presentation by the division supervisor and brief status reports by each staff member. Quarterly department meetings are also excellent communication forums.

L. Mason Blaich (155)

1. Make the minutes of Sandia Management Council (SMC) meetings available to all employees.

2. The Change Management organization needs to produce a newsletter that includes: goals of change (where we are going); plans for change (how we are going to get there); what has been accomplished; and who is doing it.

Paul Rosenkoetter (110)

More face-to-face communication — Have periodic talks featuring top management, such as the Dec. 4 Q&A meetings with Al Narath, and give employees adequate notification. Continue the "Brown Bagging With Brass" series . . . Maybe expand this series to include directors and department managers for more interaction.

Penny Greer (7324)

Department managers should personally tell all of their employees that they approve of them freely contacting any level of management the empowered employee feels necessary to communicate new ideas or other important information. Without opening this front door, communication from the working level to upper management will remain nonexistent for fear of undesirable retribution in one form or another.

Name Withheld by Request

"Walk a Mile in My Shoes" day. Get top management and technical workers together regularly to observe what's critical to each. Semi-monthly, hold a lottery in which each VP selects a Sandian to accompany him or her for a half day during the VP's highest-priority activity. The VP also spends a half day

observing the highest-priority activity of the staff/technical aide. Each person summarizes his or her observations, new insights, and altered perspectives for the LAB NEWS or distribution through the line.

Steve Goldstein (9020)

Communicate what you are *already doing* to improve communication. For example, I've heard about "Brown Bagging With Brass" and "Lunch With a Vice President." But those of us who haven't been invited don't know how these programs are working, whether or not common issues come up, or how participants are chosen. I'd like to read more about the results of existing programs.

Gladys Sheldon (3144)

Restructure the LAB NEWS as two publications: a daily company newspaper and a monthly news magazine. The daily would be small . . . and would be distributed at the gates and other locations. It would contain corporate news, announcements, reports of significant company events/activities, and perhaps national news briefs. The monthly news magazine would be similar to the current LAB NEWS and would contain articles with greater depth and perspective.

Keith Ortiz (7544)

We believe that vertical communications can be improved by:

1. Reducing the number of management layers.
2. Establishing Process (Communications) Management Teams that will act as ombudsmen and will have ready access to all levels of management. There should be one or more teams per directorate; each division should be represented on a team.

Frank Burns, Mark Benner, Frank Garcia, Sharon Husa, Richard Chavez (all 7343)

Move ALL management to the general working area of their staff instead of having common management office areas. By integrating management and staff in a common work area, interaction would increase through association. Encourage MBWA (management by walking around) — informal and regular visits to every office to ask for opinions, problems, concerns, and comments.

Susan Kato (2817)

As mentioned, the LAB NEWS did not have enough space to print all responses or complete responses. Some common ideas were presented by several different people, however.

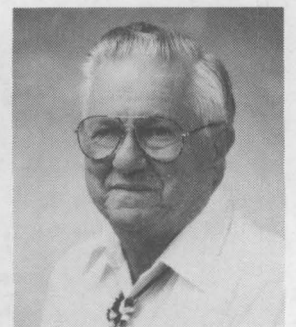
Many thought electronic mail (e-mail) would be a viable communication medium at the Labs because it is accessible, cheap, and reduces paper waste. Recent Q&A sessions with Al Narath and the "Brown Bagging with Brass" series were also praised by several folks, but many think these programs need to be better publicized, more frequent, and held at the department and directorate levels. Management by walking around, in which top managers spend a portion of their time visiting workers, was also a popular theme.

The following persons submitted suggestions similar to the ones printed: Brandon Ahrens (7265), Jim Hanlon (2552), Sandy Hudson (7000), Ronald Kensek (9341), Misch Lehrer (contractor), Gary Peterson (2335), Michael Ross (9212), Ken Steele (1415), Dick Thompson (2815), Donald Wright (7222), and Gregory Wyss (6412).

Thanks to everyone who responded. ●LP

Recent Retirees

Ada Kozlowski
2932



Clarence Carter
5113

28

36

From Separate to Shared Data

Electronic Design and Manufacturing Automation Will Speed Development, Decrease Errors

In just about every workplace, a perennial subject of conversation is the need for communication between employees. In the world of computer-aided engineering, the need goes further: If people are going to communicate, so must their computer hardware and software.

That form of communication is the aim of the Nirvana project, initiated in 1989 by Sandia and its manufacturing partner Allied Signal, Kansas City Division. The purpose is to improve design and manufacturing processes for electronic subsystems, including complex printed circuit boards (PCBs), hybrid microcircuits, and integrated circuits (ICs) by adopting hardware and software compatible among all the groups developing the design.

According to Art Verardo, Supervisor of Digital Subsystems and Test Equipment Div. 2313 and one of the project leaders for Nirvana, the project should increase productivity by providing individual users with better automation tools and making it easier for separate groups to share data.

Art says that the project's name originated with one of the dictionary definitions of Nirvana — a lofty, unattainable goal. In this case, though, the goal may be within reach.

Eliminating Data Reentry

Before Nirvana, each design group maintained its own separate design and component data base. As a design moved from one group to the next, all data had to be translated and reentered.

"This process increased design time and made it more likely that there would be errors in data transfer and entry," says Art. "Also, we had point solutions instead of an overall solution — each

Nirvana Puts Sandia in Electronic-Design Forefront

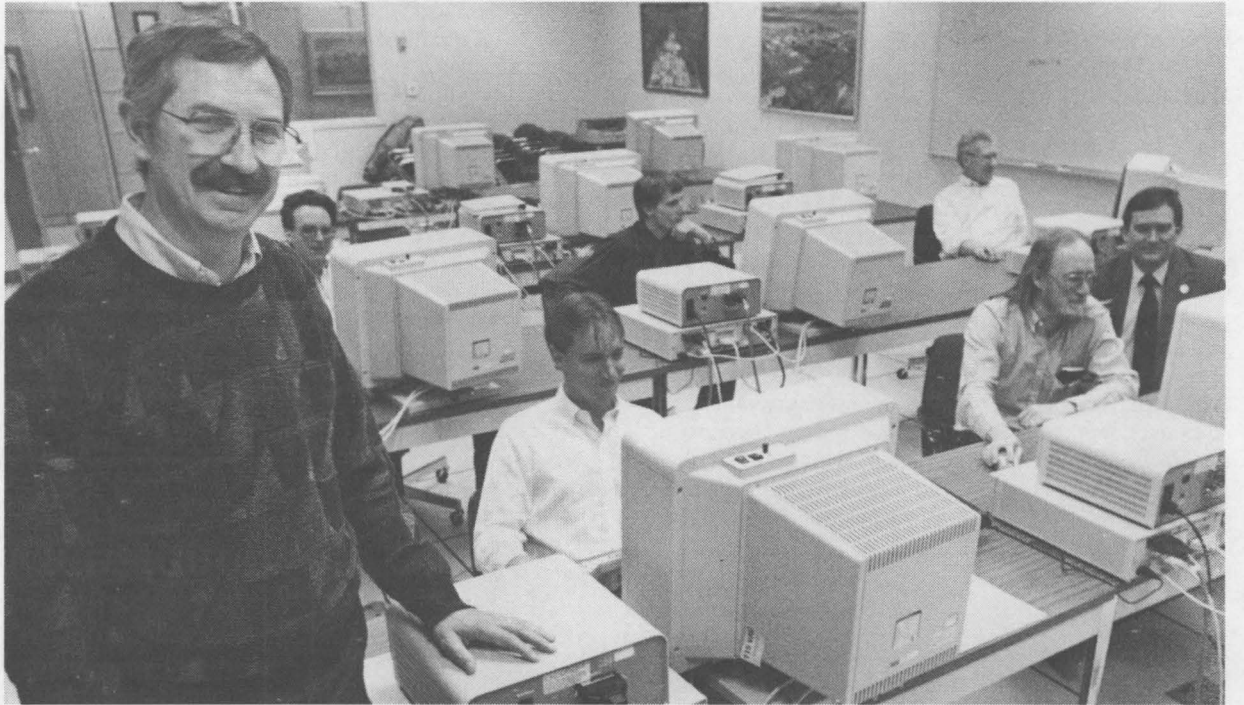
The electronic design and manufacturing automation system developed through the Nirvana project made Sandia an electronic-design pioneer, says project leader Art Verardo (2313). Increasing maturity of the equipment marketplace made the project possible, and Sandia is a leader in taking advantage of recent advances. "Vendors involved in the project have told us that we are one of the first — if not the first — to try to integrate our design and manufacturing process in this way," says Art.

organization would pick the best solution for its part of the design. That group then had an optimum solution, but the total effect was reduced efficiency and an overall solution that was less than optimal."

Art explains how Nirvana changes things: "Nirvana is implementing an electronic design and manufacturing automation — EDMA — system with concurrent engineering capabilities. Product design information will flow from initial design through subsystem design, PCB, or hybrid design, through physical ICs, and on to manufacturing. Because all designers will be using the same system, additional data will be added to the design definition at each step without the need to reenter design data from preceding steps."

Comes As 'Tool Set'

The system will use a "tool set" of computer software and hardware that is being provided to Sandia specifications by Intergraph Corp. of Huntsville, Ala. The function of the tool set — which includes products from a number of companies — is to provide integrated capabilities for electronic design, component data base man-



CHECKING OUT the Nirvana systems in a training room are some of the people from the Nirvana group: (standing) Art Verardo (2313), (front row, from left) Kevin Carmichael (2815), Vic Yarberry (2815), Larry Grube (2851), (second row, from left) Richard Kuehn (2113), Jeff Everts (2312), and Cliff Evans (9351).

agement, mechanical design, document management, and manufacturing. Tasks include hierarchical design capture (schematic capture), digital simulation and analysis, analog simulation and analysis, physical layout and design, packaging design, manufacturing design, thermal analysis, and three-dimensional interference fit.

The new hardware and software will be integrated with existing network and plotting resources, as well as with personal computers that are now used in engineering departments. Components of the new EDMA system will be phased into use as older systems are scheduled for upgrade or replacement. Art expects it will take two and a half to three years to have the complete common system operational.

In the first year of a three-year contract awarded in August, Intergraph will supply software tools and about 140 workstations to Sandia and Allied Signal. Most of the equipment has arrived at Sandia, and training is under way.

Others May Use System

The contract was written to include other members of the DOE weapon complex as possible users. DOE has approved a master implementation plan for any EDMA systems ordered as part of the Nirvana contract.

Art expects interest in the Nirvana project from other DOE and Department of Defense agencies, but he prefers not to speculate on how wide that interest may become. "I just know the project will have to stand on its merits," he says, "and that's the only way we are going to try to sell it."

Sandia and Allied Signal will be responsible for the complete design environment, from concept through manufacturing. Art says that design of the system had two tenets: that the users define the re-

Nirvana's purpose is to improve design and manufacturing processes for electronic subsystems.

quirements and that all the equipment be available commercially. The requirements were determined by a working group of 35 Sandia and Allied Signal members. Sandia directorates 2100, 2300, 2800, 3700, 7400, and 9300 had members on the panel. In addition to the working group, the Nirvana project team consists of Mark Dickinson (400), Frank Hewlett (2115), Jerry Allen (2312), B. D. Shafer (2335), Tom Perea (2811), Larry Grube (2851), Steve Heath (Allied Signal), and Art.

●AEtheridge(3161)/CS

Nirvana's Goal Achievable Through Teamwork

When an interorganizational team develops a system, it has to be "our" system, not "his," "hers," or "theirs."

So says Art Verardo (2313) as he reflects on how the Nirvana project was managed. "We relied on people in the organizations that use computer-aided engineering to define the requirements," says Art. "We found out who wanted what, and why. That helped develop mutual trust and understanding."

The manager of Sandia's Project Management Project, Gerry Barr (9020), says that such attention to the people side of a project is one of the hardest — and most important — aspects of project management. (The Project Management Project, begun a few months ago, is responsible for assessing Sandia's project management needs and making suitable methods and techniques more readily available.)

"A project's success often depends more on how well the project team works together than on their individual technical ability," says Gerry. "Sandia is traditionally proud of its teamwork, and project management is basically a set of ways to combine the efforts of people on a team so that they meet their customer's cost, schedule, and performance requirements."

The Nirvana project included activities designed specifically for team- and consensus-building, says Art. An example: "We used a facilitated session to hammer out the final details on requirements. We locked ourselves up in a meeting room every day for two weeks, until we reached consensus on the requirements.

"At that point," Art concludes, "we all knew that nobody was going to be jamming the system down anybody else's throat. Nirvana had become *our* system."

feed back

Q: Sandia Albuquerque phone numbers with 845- prefixes are scheduled to go on a telephone voice mail system soon. Other exchanges (846-, 844-) are not included. Why not use the answering service offered by US West, which has systems for large businesses?

A: The voice mail system is an integral part of Sandia's strategy to provide ubiquitous information services to our customers. The service will initially be provided to people who use answering machines, since DOE is concerned that answering machines pose an unacceptable security risk. Over the next couple years, all of Sandia will be given access to this information service, and the voice mail and electronic mail systems will be integrated to form a unified messaging system.

The voice mail system purchased by Sandia is the same machine used by US West. However, the number of voice mail features offered by US West is limited compared to the features we will offer our customers. In addition, commercial services cannot be integrated with our electronic mail systems. Finally, the cost of providing the US West service is quite expensive when compared with the total cost of the same system owned and operated by Sandia.

Don Daigle (2933)

Q: A long time ago I was given the option of having my phone number prefix changed to 845-. I did this based on the promise of gaining access to a "voice messaging system" or answering service. It must be approaching a year since my number was changed, but I have not had access to the "voice messaging system." Yet I know that other Sandians have this service, because when I dial their numbers, I am connected to recordings of their messages. After changing my number, I discovered that I could no longer forward my phone to other numbers. Changing my number has therefore been a great inconvenience with no benefits whatsoever. When can I expect access to this system? Why has it taken so long? What organization is responsible for its implementation?

A: Desktop Systems Div. 2933 is responsible for procurement of the voice messaging system (VMS), and coordinated the phone book changes and the switch over to the 845- prefix in November, 1989. However, staffing problems delayed completion of the project. A contract was awarded to Contel for a VMS system in September, 1990. The equipment was shipped Oct. 1 and is now being installed. Customers will be able to use the system after a brief training session scheduled to begin in January.

Approximately 75 Sandians are using DOE/AL's voice mail system. They were participants in a Sandia voice mail pilot program. When the pilot program ended, they were permitted to continue using the system. Unfortunately, the DOE system can only accommodate a limited number of subscribers.

A hardware/software incompatibility in the phone switches prevents forwarding calls between 845- numbers and 844- and 846- numbers. During the next three years, however, all Sandians will be switched to the 845- prefix and the problem will disappear. Fixing the problem now would involve considerable extra expense.

Don Daigle (2933)

Q: I wish to question travel restrictions and Sandia's current policy pertaining to airline carriers. I understand that American Airlines is being "boycotted" by Sandia for no longer extending government discounts. Delta Airlines has also been avoided for the same reason.

In instances where fares are identical (or sometimes even cheaper), I see no reason to not permit travelers to use these carriers. In all fairness, government procurement rules would seem to require the inclusion of such carriers if their fares are competitive. When one considers our relatively isolated location and the difficulty travelers can experience securing flights to or from Albuquerque, such limitations can even result in increased costs to Sandia. There are hidden costs for excess time spent in airports because of inefficient routing and connections — costs that might be avoided with the selection of another carrier.

As an employee entrusted with spending the taxpayers' money, I agree that a message must be sent to the airlines letting them know that we will not choose those carriers whose fares are too high compared to other discounted rates; but if this is not the case, then the most direct flight and the traveler's preference should be taken into consideration. Can I get some clarification of this policy?

A: Sandia's current policy with regard to airlines is based on SLI 4600, which states: "Sandia's designated

travel agent makes reservations on scheduled commercial airlines at the most economical fares available."

For the greatest number of travelers at Sandia, the most economical air fare is either the government rate or special Sandia negotiated fares. This restricts travel to those airlines with which we have the special rates. Please note, however, that we do not "boycott" airlines that do not permit government rates; rather, we focus on those that offer more competitive fares.

In situations when the traveler can take advantage of an advanced-purchase ticket, where penalties for cancellation and/or changes apply, the airline that best meets the traveler's schedule at the lowest cost will be offered. Such advance purchase fares should be considered whenever possible, because they can result in a cost savings.

Bob Zaeh (3700)

Q: I'm surprised that I can provide my wife with better economic benefits at retirement by purchasing a separate insurance policy. When I put the 10 percent I would lose by choosing Sandia's survivor option into a life insurance policy, she is better off than with the 45 percent from Sandia's retirement policy. Why?

A. The decision to elect or reject the survivor option is a difficult one with several variables that need to be considered in the decision-making process. Without knowing the details of the insurance alternative you are considering, we cannot provide individualized comments. However, some general considerations are:

- *The health of the employee and the spouse, as well as the health and longevity of their parents, which may be an indication of inherited life expectancy.* Actual deviations from the projected life expectancies used by insurance companies can alter the analysis.

- *The security offered by our pension plan.*

- *Inflation and interest rates.* A future fall in interest rates could produce a lower benefit if an annuity or cash value life insurance were purchased with the "savings" gleaned from choosing a single life pension. Or high inflation could erode the value of the supplemental benefit that could be purchased with the "savings."

- *Term life insurance policies.* These typically increase in cost at each renewal and may not be renewed beyond a certain age if the employee becomes uninsurable. Additionally, one must continue making premium payments in order to keep the insurance in force, and unanticipated future expenses could leave one without enough cash for the premium, in which case the policy would lapse. The financial strength of the insurance company issuing the policy should also be carefully reviewed.

Depending on your individual situation and the assumptions you and your spouse use in your analysis, the decision to reject the survivor annuity may produce a higher benefit to your spouse. However, we encourage the two of you to consider all of the variables in your decision. If you would like further information to assist in your decision, please contact Mark Biggs in Benefits Planning and Pension Fund Management Div. 3544. He can supply you with additional material.

Ralph Bonner (3500)

Q: Has Sandia considered changing the benefits coverage for couples who both work here? I married a Sandian after working here for several years, but although we are both covered under each other's policy, our benefits and/or coverage did not change.

I know a couple who work for IBM whose policy changed after they got married. Prior to their marriage, both were covered at 80 percent. After their marriage, their coverage was increased to 100 percent under a single policy. They were told that IBM saved money by cancelling one of their policies. Apparently, the savings was enough that IBM could afford to increase their coverage. Could Sandia adopt such a policy?

A: As you noted, consistent with AT&T's policy, Sandia's health plans do not allow an employee to be covered both as an employee and as a dependent of another employee. Since April 1, 1986, all of Sandia's health care plans have been self-funded. A self-funded plan does not pay premiums to an insurance company. Instead, Sandia has a contract with a company to perform the administrative services of the plan. This contractor processes claims and generates checks from a Sandia bank account. The fee for these services is less than \$2 per employee per month plus a fee for each claim processed. Because Sandia's plan is self-funded, no insurance premium savings would result from giving 100 percent coverage to an employee whose spouse also works at Sandia.

In this area, Sandia's health care benefits may appear less generous than the plan you mentioned at IBM, but it is important to remember that this aspect of the Medical Care Plan is just one piece of Sandia's very generous benefits package.

Ralph Bonner (3500)

Q: What is Sandia's position on the use of metric units? The newer programs W88 and B90 are back to English with the B83 the only metric. What happens in September, 1992?

A: Your question recognizes that Congress passed the Omnibus Trade and Competitiveness Act of 1988, which became Public Law 100-418 and requires each federal agency to move toward incorporation of the metric system (also known as Le Système International or SI) to the extent economically feasible by the end of FY92. You are also probably aware of the abortive attempts to switch to metric as a result of the Metric Conversion Act of 1975. For many reasons, this attempt met with failure. A few of the difficulties were:

- Most manufacturing capabilities in this country did not possess machine tools calibrated in the metric system.

- Suppliers of necessary metric parts from American industry did not exist.

- Available metric fasteners did not possess strength characteristics comparable to those of available English fasteners.

DOE has been wrestling with how it will implement this new law. I am sure you appreciate that Sandia must act in concert with DOE and the production complex if these new attempts to employ SI and to become competitive in the world market are successful. DOE is currently reviewing Draft Order 5900.2, titled "Use of the Metric System of Measurement," as well as a draft Metric Transition Plan to implement the order. The order and plan are expected to be finalized later this year. Sandia will cooperate with DOE in these activities.

I am making copies of the Metric Transition Plan available to vice presidents and directors at Sandia and apprising them of the need for their awareness of and attention to this activity.

Thank you for bringing the new law to my attention. I am sure it will take the effort of each of us at Sandia to make this transition successful where previous efforts failed.

Herman Mauney (7200)

Q: I'm not sure how we handle, or should handle, recyclable paper. Specifically, I throw away many pages of 8 1/2-x-11 paper because of multiple redrafts done on my LaserJet printer. I'm afraid once my waste basket is emptied with a mixture of different types of waste, no recovery is possible. Should I be doing something different with this and other recyclable wastes?

A: We are pleased by the interest shown in recycling by you and many other Sandians. At present, our paper recycling consists of a pilot program for Building 891 and a few other high-volume organizations. We assume you are not involved in this program. However, some people not directly involved have been hand-carrying small quantities of waste white paper to the deposit barrel at the west end of the first floor of Building 891. If you are nearby, you may wish to do this also. For clarification on the kinds of paper being collected, please call Recycling Coordinator Don Schubeck at 844-4936.

Meanwhile, we expect to expand waste paper recycling to other buildings in 1991. Thank you for your memorandum.

Jim Martin (3400)

Q: At a recent meeting on preferred parts in the Technology Transfer Center, there were four speakers, including a Sandia executive vice president and several directors, who fielded questions from the audience. They all had to share one wireless microphone. This did not look very professional. Can we not afford to get two or three wireless microphones for this type of event?

A: You're right — for many visitors, the TTC gives them their first, sometimes their only, impression of Sandia's facilities. I've asked Richard Sanderville, the TTC's audiovisual specialist, to order some more wireless microphones. Please bear in mind, however, that high-quality, reliable wireless mikes are expensive (\$1,500 to \$2,000 each). They also can't be used for classified presentations, and they are subject to RF (radio frequency) interference that can make them unusable on occasion.

Herb Pitts (3100)

Students Teaching Sandians**UNM Business Students Market Labs Research**

Shifting the focus of some Labs work toward developing commercial products, the goal of technology transfer, is a difficult job. But some graduate students in UNM's Anderson School of Management are now helping to find commercial applications for some of the Labs' more promising technologies.

The class, called Managing Technological Innovation, will begin its second semester at UNM next month. Mark Allen (5261) teaches the course, which brings together Sandia's technical expertise and Anderson School's business expertise to explore ways to market specific technologies being developed at the Labs.

"The course benefits UNM students because they get real business-world experience," Mark says. "It also benefits Sandia because we get information — in the form of a business plan — about the commercial viability of some of our technical products."

During the course, groups of students (usually three or four in each group) team up with Sandia scientists or engineers (called "technologists"). Each group meets with its assigned technologist regularly to understand the product.

Groups develop business plans and present them to the class and to the Labs technologists at semester's end. Each plan includes a detailed analysis of the available commercial market, plans to develop the technology and tailor it for real-world applications, and a marketing strategy for the finished product.

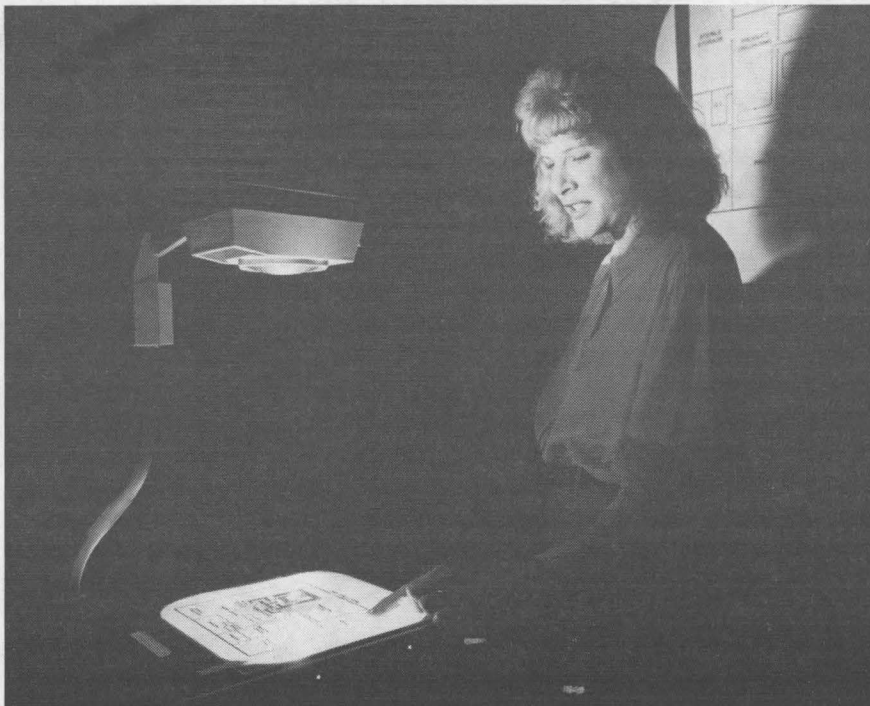
"Some of the students are shocked at the technical complexity of the projects, and a few of them get demoralized," says Mark. "But there's usually one or two people in each group with science or engineering backgrounds to help out. It just shows that real teamwork is required to get the technology out the door."

Products With Potential

Mark says that at the beginning of last semester, he chose the four class projects from a list of 20 Labs technologies with commercial potential — only the ones with immediate and practical application in the real world.

One group studied a nickel-chromium-phosphorus plating solution that resists corrosion. The students found that the solution was cheaper and more effective than stainless steel in some applications, such as surgical instruments and corrosive fluids piping. Terry Guilinger (1841), the Sandia technologist in charge of the plating solution project, says he spent approximately 25 hours working with students during the semester.

"The students did an excellent job," says Terry. "They compiled charts that showed how



UNM BUSINESS STUDENT Nancy Fisher presents her group's findings to Malcolm Buttram (1248), the Sandia technologist responsible for the High-Power Radiation Source, or HIPORS. The group found that HIPORS is a cost-competitive alternative to microwave devices currently used to sterilize medical waste. UNM will offer the graduate business course, called Managing Technical Innovation, again this spring.

much money it would take to get the technology off the ground. They also showed how they would market the technology and calculated profitability figures for the next ten years. I was surprised and pleased with what they discovered. It's definitely worth the time I put into it."

Another of the technologies, the High Power Radiation Source, or HIPORS (1248), showed particular marketing promise. Class members dis-

covered that HIPORS, which can be used to sterilize medical waste, is a cost-competitive alternative to current microwave devices used for waste sterilization.

covered that HIPORS, which can be used to sterilize medical waste, is a cost-competitive alternative to current microwave devices used for waste sterilization. Roy Hamil of Technology Transfer and Industrial Relations Dept. 410 says the course was a success for everybody.

"Before this fall, there was no easy mechanism for getting market studies done," says Roy. "Now we have some excellent market studies for Labs technologies, and a few UNM students are trained in technology transfer. It's a win-win situation."

Narrowing the Gap

Next, Mark and the Tech Transfer Department will use the plans to encourage outside investors and businesses to take an economic interest in Labs technologies.

"Sandia is on a fixed budget," says Mark. "If businesses or venture capitalists help fund the time needed to develop technologies, then Sandia can make an important contribution economically."

The students submitted lists of companies that said they were interested in helping Sandia develop specific technologies. Mark says that by initiating Cooperative Research and Development Agreements (CRADAs) between Sandia and private industry, the Labs will create opportunities for technology transfer.

Mark also hopes to establish a long-term cooperative relationship with UNM. "MBA students who take the course learn about technology," he says, "and more technically oriented businesspeople out there means more businesses that invest in technology. More businesses investing in technology means more opportunities for technology transfer. It's a snowball effect." ●JG

Got a Good Technical Project? Let Mark Know

UNM has agreed to offer Managing Technical Innovation as an MBA course again this spring. Mark Allen (5261), who will teach the course, is seeking Labs technologies that have potential commercial applications. If you are working on a technical project that you think could be developed and marketed, call Mark on 5-8191.

covered that HIPORS, which can be used to sterilize medical waste, is a cost-competitive alternative to current microwave devices used for waste sterilization.

The other two technologies were HIRCIS (1411), or High-Resolution Capacitive Imaging Sensor, which inspects edges of machined precision parts automatically; and Archimedes (1412), a software system that automates the programming of robots that perform mechanical assembly.

Groups presented their final projects on Dec. 3. Sandia technologists, representatives from private

Card of Thanks

The students, parents, and staff of Edmund G. Ross Elementary School want to take this opportunity to thank Sandia National Laboratories for its continued interest in the education of our children. Your unstinting support in the form of the SCIAD [science advisors] Program and Education Outreach has offered unprecedented opportunities for our students and teachers.

It is said that when you teach a child, you touch the future. Your help has enriched the future for many young lives.

Sincerely,

The students and staff of Edmund G. Ross Elementary School
Raquel Reedy, Principal



GILBERT SANCHEZ (right), President of New Mexico Highlands University, visits with NMHU grads Phil Gallegos (left, 7412) and Ben Ortega (3425) before a Dec. 7 luncheon at Sandia. The NMHU president is chairman of the Science & Technology Alliance, a consortium of three DOE national labs and three universities with predominantly minority student enrollment. Many of the nearly 160 NMHU graduates working at Sandia turned out to hear President Sanchez discuss the Alliance.

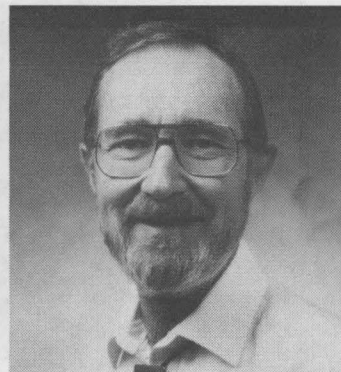
MILEPOSTS

LAB NEWS

December 1990



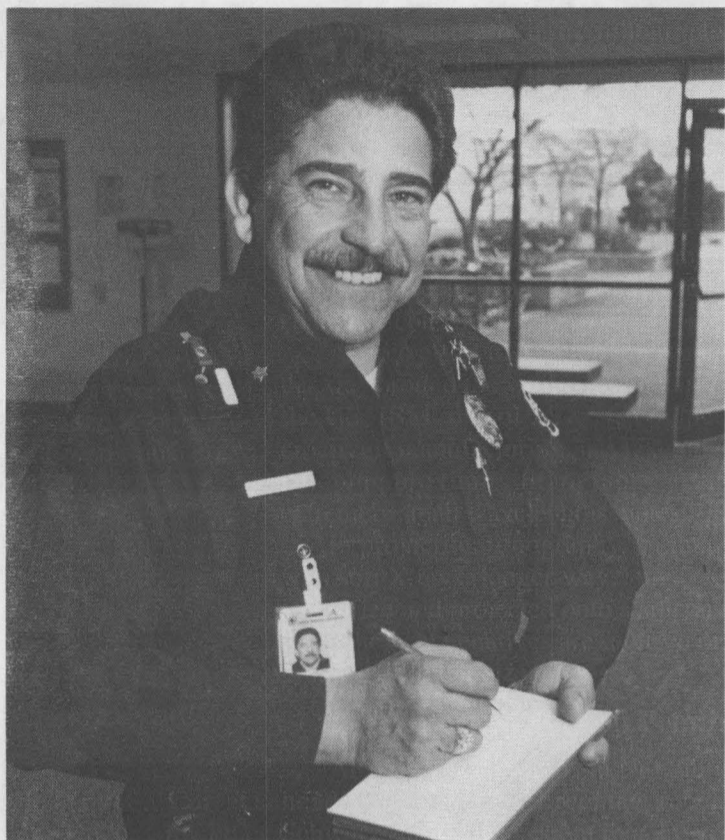
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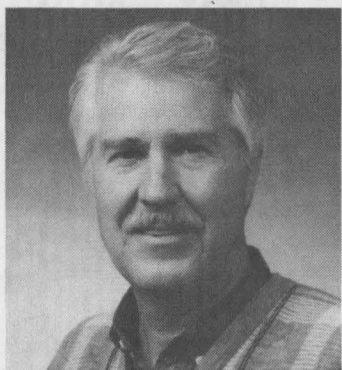
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Rita Baca
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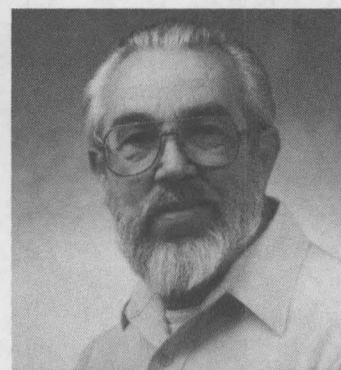
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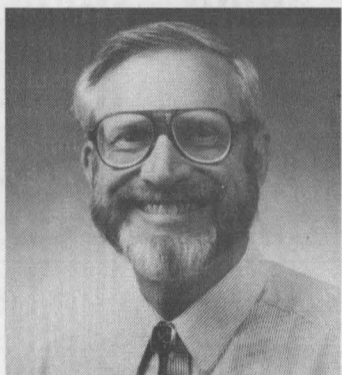
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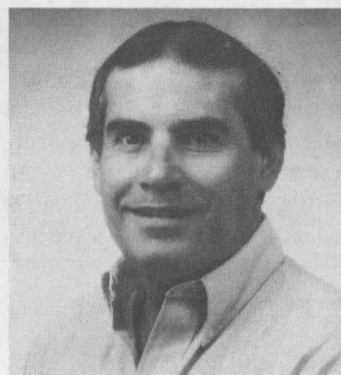
Jack Melograne
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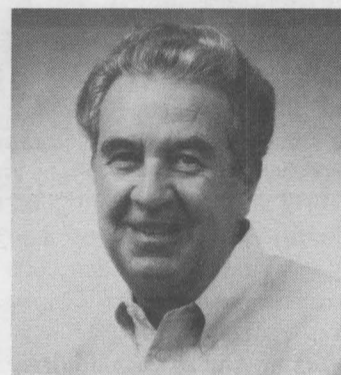
Alan Beattie
7552 25



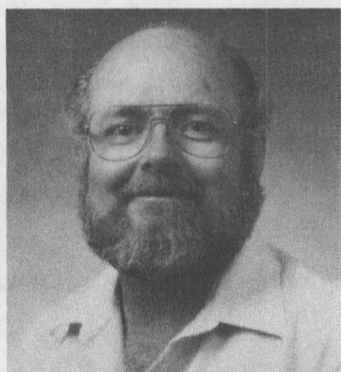
Sam Beard
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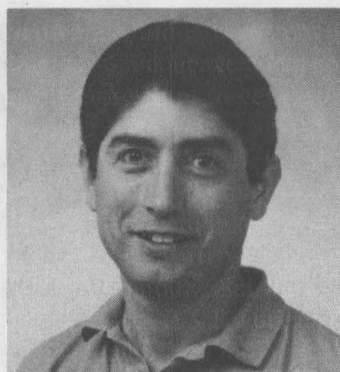
Paul Harrison
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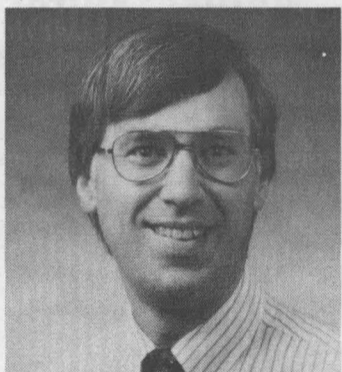
Don Gatto
3412 15



Larry Choate
400 15



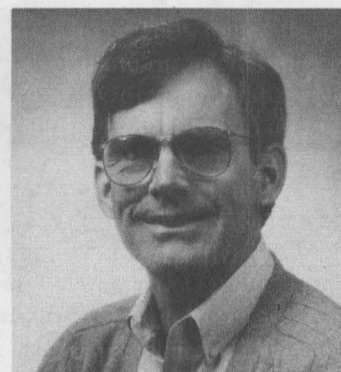
Gerald Gallegos
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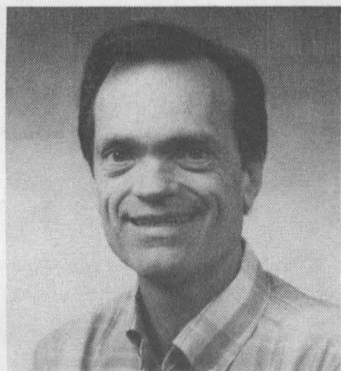
William Drotning
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Don Schubeck
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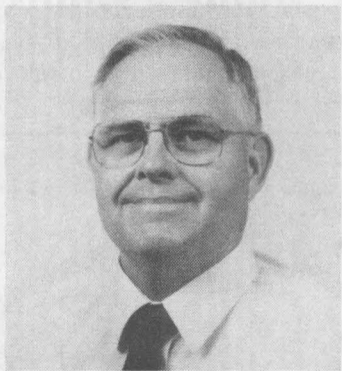
Drayton Boozer
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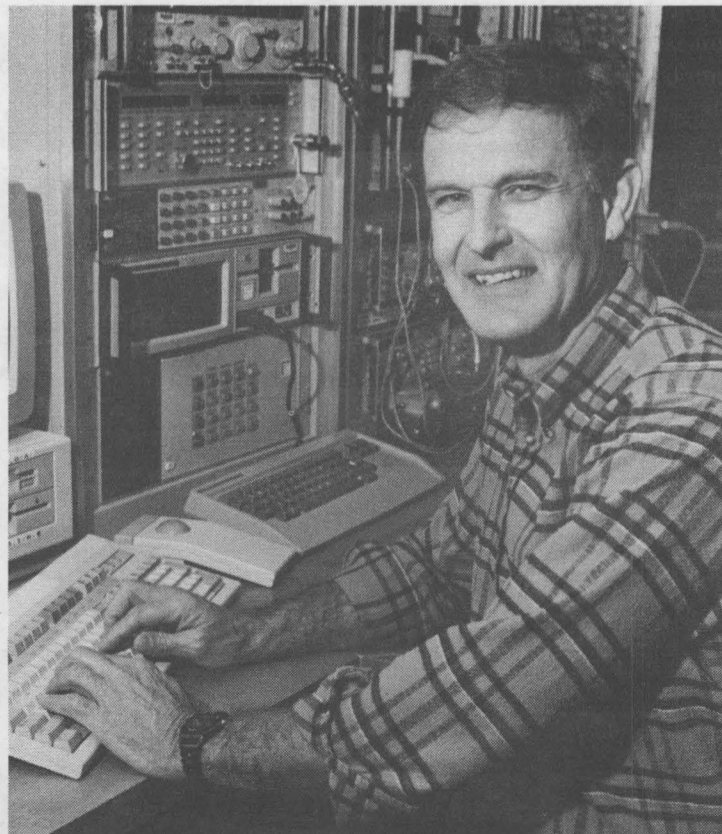
Leslie Orear
6315 15



Phillip Walkington
7552 25



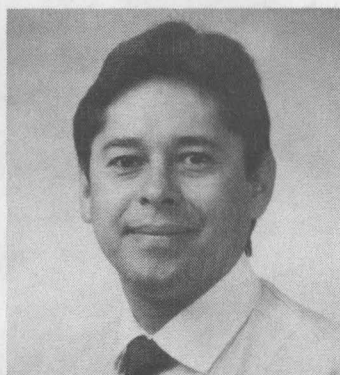
Frank Dean
5153 25



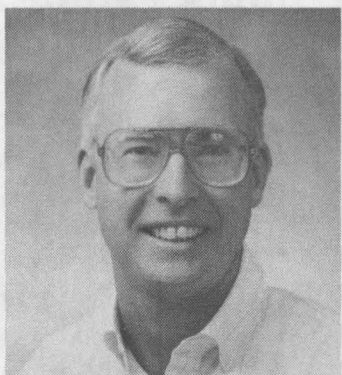
Russ Haushalter
7342 20



Socorro Silva
3301 15



Arthur Romero
5147 15



John Cummings
1510 15

Barrier Buster Breakthroughs

Barrier Busters Tackle Approval Levels

Recent Barrier Buster breakthroughs: A class completion certificate is no longer needed when vouchering expenses for attending courses. Phil Dreike (1264) worked with Wayne Potter (152).

Employees no longer need Div. 113 approval to purchase "off-the-shelf" rubber stamps. Shirley Wallace (113) tackled this one.

Design Dept. 2850 now publishes a biweekly *Current Cost and Estimate to Complete Report*. Before this report, drafting services users had no definitive way to know what charges were made against their orders and the projected cost to complete their work. Tom Cannon (2850) worked with Ron Williams (2853).

Badge Office procedures were modified to eliminate the one-week waiting period for replacing lost badges. Dick Shaw worked with Div. 3437.

The Badge Office formed a process management team to improve procedures. Rochelle Lari (2000) and Dick Shaw (9213) worked with Ray Chavez (3437-1) and Phil Rivera (3154-4, formerly 3437-1).

A supervisor's signature is no longer required to purchase business cards. Shirley Wallace handled this one.

Employee Benefits Committee approval is no longer needed for an Educational Leave of Absence. Shirley Wallace and Linda McEwen (3522) worked with Al Chavez (3543).

A regulation prohibiting employees with associate computer science degrees from bidding on TA/STA openings was eliminated. Linda McEwen worked with Dick Fairbanks (3521) and Al Villareal (3533).

Director approval for participating in the Educational Assistance Program was eliminated. Linda McEwen worked with Dick Fairbanks.

Director approval has been eliminated for release of SAND reports. Shirley Wallace worked with Anna Nusbaum (113).

Div. 2931 approval has been eliminated for computer hardware or software purchases that total less than \$2,500 or that do not involve a central processing unit. Paul Rosenkoetter (110)

worked with Max Marrs (2931).

The Barrier Busters Quality Action Team has received numerous requests to help reduce the number of signatures required on documents, to lower the level of approval required, and to allow more internal delegation. Because many formerly required approvals have either been reduced or eliminated, Barrier Busters is purging its data base of suggestions concerning approval levels. Nevertheless, if you feel that a problem exists that is not addressed by the recent SLI revisions, please submit (or resubmit) your suggestion.

Written suggestions can be sent to any Barrier Buster member: Paul Rosenkoetter (110), Phil Dreike (1264), Rochelle Lari (2000), chairman Tom Cannon (2850), Janet Walerow (3162), Lewis Sinneros (3718), Larry Greher (4010), Estelle MacKenzie (5210), Elaine Gorham (6344), Shanna Cernosek (7000), Bill Alzheimer (7400), Betty Mowery (7541), Don Wagner (8532), and Dick Shaw (9213). Pamela Romero (2850) and Rosie Jennings-Williams (2851) are the data base managers.

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

- CARPET SCRUBBER, floor polisher, Pencrest model, \$25; hanging garment bag, Valpac style, \$5. Roberts, 255-9527.
- ULTRASONIC ROOM HUMIDIFIER, Hanksraft "Whisper Mist," 1.5-gal. reservoir, 16-24 hours operation, humidistat/volume controls, cost \$70, sell for \$40. Schkade, 292-5126.
- KEROSENE HEATER, 15,000-Btu, used 1 heating season, \$100 OBO; tow bar for VW Rabbit, \$100 OBO. McCord, 281-2146.
- PLANER/JOINER, Craftsman, 4-in., model 149.236220, w/motor, wheeled stand, \$125. Carr, 281-1632.
- CONSOLE COLOR TV, 25-in., solid-wood cabinet, \$180. Sanchez, 292-1982.
- MAYTAG WASHER, 1 year old, large-capacity, \$425; electric dryer, \$325; Frigidaire chest freezer, 8 cu. ft., \$175 OBO. Mathews, 881-7369.
- CELLO, 3/4-size, \$350. Bordlemay, 883-4926.
- APPLE II+, boxed, never used, \$150. Riggs, 255-5725.
- WOMAN'S ATHLETIC SHOES, size 6, wide. Gonzales, 243-1434.
- SOLOFLEX, w/all attachments, \$850. Meeks, 292-5915.
- RAY-BAN AVIATOR SUNGLASSES, cost \$45, sell for \$15; Class I trailer hitch, new, \$15. Montoya, 296-4268.
- MISTRAL VENTURA SAILBOARD, 10'6", 150-liter board, \$495; Hi-Tech 9-ft. custom, \$300; full-sail 9'5" custom, \$300. Healer, 298-6967.
- UPRIGHT PIANO, Schaff, w/bench & cabinet, will deliver, \$500 OBO. Schaub, 865-9581.

- FISHER 170 SKIS, w/Tyrolia bindings, woman's size 7-1/2 Nordica boots, poles, \$150/all. Bassett, 873-0313.
- ALUMINUM EXTENSION LADDER, \$25; Olympic manual portable typewriter, \$15; metal folding picnic table, \$7; vacuum cleaner, \$45. Southwick, 281-3782.
- QUEEN-SIZE WATERBED, w/mirrored pier headboard, glass cabinets, 6 drawers, \$200 OBO. Tidmore, 884-1870.
- SILVER CORNET, w/case, \$250 OBO. Nation, 298-5605.
- JEWELRY: turquoise/silver squash blossom, \$275 OBO; two 1970-vintage "Charlie the Tuna" wrist watches, \$50/ea. OBO. Sikora, 881-4741.
- COMPUTER DESK, 41" x 24", w/monitor shelf, etc., oak-looking, \$50. Phipps, 299-8490.
- WOODSTOCK CHIMES, new, \$30; woman's racquetball set, w/glasses, \$25; electric blanket, double-size, \$10; Canon Sureshot, new battery, \$100. Miller, 281-3189.
- NINTENDO SYSTEM: NES joysticks, Mario Brothers, Duck Hunt, Bubble Bobble, golf, sell for \$130; original Tengen Tetris game, \$100. Edwards, 275-7611.
- CROSS-COUNTRY SKIS, poles, and boots, 180cm waxless TRAKs, size 40 boots, Salomon bindings, \$50. Knapp, 294-6359.
- ELECTRONIC TYPEWRITER, Sharp PA-1000H, high-resolution thermal transfer printer, PC-compatible, corrects mistakes electronically, \$70. Yaniv, 294-4490.
- SOFA, gold, traditional style, quilted, 94 in. long, \$150. Luettters, 296-3759.
- WEIMARANER, AKC-registered, female, 1 year old, basic training, all shots, potential bird dog, bloodline, \$150 OBO. Hernandez, 266-5395.
- SONY CD, \$125; radial arm saw, Sears, 10-in., \$250. Bowland, 256-1861.
- AT&T PC6300 COMPUTER, 640K RAM, 2 floppy drives, 20Mb hard disk, math co-processor, w/green screen, \$900; w/EGA color, \$1250. Carter, 296-8210.
- AUTOCAD RELEASE 9, ADE3, complete, never used, \$499. Luther, 293-4462.
- AUSTRALIAN SHEPHERD PUPPIES, 7 weeks old, 1 black w/white blaze/col-lar, 2 blue-eyed blue merles, 1 almost all white. Szklarz, 281-1096.
- CHEST FREEZER, Hotpoint, 10-cu.-ft. capacity, \$100. Morrison, 299-4757.
- COMMODORE 64, disk drive, 3-color monitor, printer, software, \$250 OBO; Commodore 16 word processor, tape drive, \$50 OBO. Zirzow, 281-9896.
- CUSTOM FLY RODS, new, 7'9", for two weight, \$200; 8'1" for five weight, \$215; graphite is Sage Lightline. Ortiz, 869-3278.
- YASHICA 35mm wide angle, telephoto, teleconverter 2x, close-up set lenses, flash attachment, carrying case, \$150 OBO. Liguori, 256-3613.

- RIVAL ELECTRIC FOOD SLICER, \$25; Sunbeam Oskar food processor, \$25; pair of 34-in. chrome table lamps, \$30. Webb, 828-2271.
- CAR-TOP SKI TOTE, attaches to luggage rack, \$35; reconditioned Ram air heads for '68 or '69 Firebird, \$275. McMullen, 298-2801.
- UPRIGHT PLAYER PIANO, Schafer & Sons, electric motor or pump; piano rolls; Thomas Paramount Deluxe theater organ. Jennings, 281-4507.
- SMITH & WESSON .357, new, boxed, extras, \$250; antique Remington Model 12, \$250 OBO. Nelson, 891-1789.
- WASHER, Whirlpool, apartment-size, multiple controls, white, \$100; dark pine coffee table, thick slabs w/brass plates, \$50. Dubicka, 296-6557.
- BOOKS: *Ski Touring Northern New Mexico*, \$10; *Project W-47*, \$5; *Sandia Peak Ski Patrol History*, \$5. Bldg. 814, benefits South 14 Project.
- TIMESHARE, near Wolf Creek skiing, sleeps 8, fully furnished, available for periods between Jan. 6 and Jan. 19. Elder, 298-5350.
- COLOR TV, 19-in., \$80; entertainment center, \$40; 40-gal. aquarium, w/stand, complete, \$125; computer desk, \$45; chain saw, \$45. Mowry, 299-2526.

Next Deadline

The next LAB NEWS will be published Jan. 11. Deadline for ads and other submissions is noon, Friday, Jan. 4.

- VACUUM CLEANER, Kirby Classic III, large head, \$125 OBO. Hole, 255-1444.
- TREADMILL, Sears, AC, motorized, electronic speedometer, odometer, timer, pulse indicator, adjustable grade. Wilcox, 899-8356.
- CHILD'S TWIN-SIZE WATERBED, oak, 5-drawer, 2 cabinets, 3-shelf storage capacity, storage closet, 4 ft. tall, 7 ft. long, \$800. Rael, 345-2084.
- ALFALFA HAY, barn-stored, \$4/bale. Garley, 865-8105.
- STORM DOOR, 3 ft. wide, w/inter-changeable full-length glass and screen, \$25 OBO. Garcia, 293-3937.
- SHOP MANUAL, for '77 Ford truck, \$5; 1971 Chilton's Motor Manual, \$5. Muchow, 299-1813.

TRANSPORTATION

DATSUN 200SK, full power, all accessories, sunroof, new paint, no dings, 87K miles, \$2,500 firm or \$2,650 negotiable. Underhill, 294-5774.

- '84 PORSCHE 944, new paint, loaded, \$12,500 OBO. Cincotta, 296-6022.
- '71 SPORTSCRAFT BOAT, 15-ft., 80-hp outboard Mercury. Jakubczak, 293-4536.
- '88 SUBARU GL10 WAGON, 4-WD, turbo, AT, AC; '88 Ford Ranger XLT, 4x4, king cab, camper shell, 5-spd. Lange, 292-5648.
- '84 HONDA ATC, 250cc, 10-spd./automatic/reverse gear, \$900. Apodaca, 247-8101 leave message.
- '88 HONDA ACCORD LXI, 4-dr., 5-spd., loaded, w/roof rack, one owner, 29K miles, below book. Henderson, 884-8309.
- '78 VOLVO 244, sunroof, \$3,000 OBO. Portman, 266-7648.
- '77 FORD CHATEAU VAN, 6-cyl., custom camper, insulated, paneled, \$1,000. Rosenberg, 296-1346.
- '75 MERCEDES BENZ, 2-dr. coupe, 450 SLC, \$12,300 OBO. Davidson, 293-9486.
- '85 TOYOTA CAMRY LE, 4-dr., loaded, \$6,000 OBO. Case, 293-5466.
- BRIDGESTONE 10-SPD. BICYCLE, steel frame, 28-in. wheels, \$175. Schneider, 299-6243.
- '73 MUSTANG FASTBACK, PS, AM/FM, 3-spd., chrome rims, custom paint, new engine, \$2,200. Gabaldon, 345-6885.
- '75 DODGE SPORTSMAN VAN, AT, V-8, \$500 OBO. Vahle, 891-0451.
- '89 FORD TEMPO GL, 4-dr., AM/FM cassette, cruise, tinted windows, tilt, \$8,150 negotiable. Cartwright, 836-6957.
- MAN'S 10-SPD. BIKE, 26-in., needs tires, \$25. Roberts, 255-9527.
- '82 DATSUN 200SX, 2-dr., AT, AM/FM cassette, brown, \$1,750 OBO. LaBarro, 242-6707 before 9 a.m. and after 6:30 p.m.
- '87 HONDA MAGNA, 700cc liquid-cooled V-4 engine, 9K miles, shaft drive, helmet, rain cover, \$2,700. Appel, 268-1008.
- '73 F-250 PICKUP, 390 engine, radio, tape deck, \$2,495. Christensen, 884-8249.
- '87 DODGE COLT DX, \$3,500 OBO. Nelson, 891-1789.
- MAN'S 10-SPD. BICYCLE, KHS 26-in., \$75. Nation, 298-5605.
- '88 FORD RANGER, long-bed, V-6, AC, PS, PB, 5-spd., 69K miles, \$6,300. Shaum, 821-4372.
- '88 ISUZU TROOPER, 4-WD, AC, PS, 5-spd., fuel injection, 4-cyl., AM/FM cassette, 5-dr. Wilcox, 899-8356.

REAL ESTATE

5-BDR. HOME, 3-1/2 baths, Belle-haven, brick, 3,800 sq. ft., country kitchen, game room, secret room, backyard, \$159,900. Luettters, 296-3759.

- 3-BDR. MOBILE HOME, 1-1/2 baths, 1,440 sq. ft., fireplace, storage area, in Vineyard Retirement Mobile Home Park. Rael, 345-2084.
- 1/2 ACRE north of Belen, set up for mobile home, utilities, fenced, \$17,000. Marquez, 831-3088 after 5 p.m.
- 3-BDR. HOME, 2 baths, on .88 acre, old Highway 66, new kitchen cabinets & gas range, single-car garage, \$65,000 negotiable. Chavez, 294-2650.
- 3-BDR. HOME, Cherry Hills NE, 2 baths, 2-car garage, 1,950 sq. ft., atrium, fireplace, \$125,000 value, owner finance \$120,000, buyer finance negotiable. Ater, 822-9697.

WANTED

- REMINGTON 721 RIFLE, chambered for 270 Winchester. Vaughn, 298-5919 before 4 p.m.
- SMALL LIGHTWEIGHT MOTORCYCLE, or scooter, street-legal only. Skogmo, 292-9773.
- DONATIONS: minerals, rocks, hand lenses, knowledge of Wingate area geology, saltwater aquarium, magnets, simple electrical components, for science classes. Dunn, 296-4904.
- KU-BAND SATELLITE TV EQUIPMENT, need KU-band receiver, dual C-KU band feedhorn, and LNB (lower degree desired), reasonably priced. Smathers, 298-0613.
- PC EQUIPMENT: EGA monitor and board, plus parallel printer for IBM-compatible computer. Lagasse, 293-0385.
- SOFTWARE on 8-1/2-in. floppy disks for CP/M and DOS, also modem and printer for NEC 86 computer. Stixrud, 298-0478.
- COLOR MONITOR for AT&T 6300 computer, will consider buying complete AT&T 6300 system if it has color monitor. Claussen, 293-9704.
- MODEM FOR IBM PC, inexpensive but operational, internal or external. van Berkel, 897-2541.
- NORDICTRACK. Tapia, 299-1941, leave message.
- MANUAL OR INSTRUCTIONS for a Texas Instruments printing calculator, model TI-5142. Yingst, 884-3812.
- PLAYERS for Rotisserie fantasy baseball league. Turner, 294-9674.
- SPONSORS, Jimmie Heuga Center/Multiple Sclerosis, to fund ski team racing in JH Mazda Ski Express, Jan. 25. Moore, 281-2480.

SHARE-A-RIDE

CARPPOOL WANTED, Rio Grande & Griegos area to Area I (Bldg. 802), 8 a.m. to 4:30 p.m. Krantz, 845-4075.

Coronado Club Activities**Lock Up, Come to the Club, and Celebrate the Holidays, At Long Last**

YOU DESERVE IT — Celebrate the beginning of the holidays tonight, Dec. 21, at the Club's annual Close-Down and Christmas Party. Starting at 4:30 p.m., right after work, the Club lounge offers a free buffet and special drink prices on all your favorites. The party begins at 6, when the Bourget Brothers begin playing your tune. Magnificent menu items include prime rib, poached halibut, broiled salmon steak, deep-fried shrimp (all \$7.95), and filet mignon (\$8.95). Jumbo margaritas are \$2.50 all night.

"PARTY II: Trio Grande Returns" — Not another bad horror movie sequel, but a second chance to celebrate. Saturday, Dec. 22, from 8 p.m. to midnight, Trio Grande will play country and western dance music, and Santa's kitchen helpers will serve prime rib or poached halibut (two-for-one priced \$14.95), steak Neptune (\$8.95), pan-fried catfish (\$7.50), chicken teriyaki (\$6.95), and garden soup/salad bar (\$1.50/one-trip and \$3.95/all-you-can-eat). Strawberry daiquiris are \$2.50 all night. Reservations recommended (265-6791).

MAKE NEW YEAR'S RESOLUTIONS NOW, because 1991 begins Monday night, Dec. 31, at the annual New Year's Eve party. The cost per person is \$20 for members and \$25 for non-members, which includes prime rib or chicken breast, champagne at midnight, and continental breakfast.

Dinner begins at 7 p.m., and the Isleta Poor Boys help you dance your way into 1991 starting at 9. Buy your tickets now; they're going fast.

BINGO IS BACK — Thursday, Jan. 3, marks the beginning of regular Thursday-night bingo in 1991. Card sales and buffet begin at 5:30 p.m., and early-bird games begin at 6:45.

GET TGIF FEVER on Friday, Jan. 4, as disc jockey Chuck Avery spins some groovy discs from 5 to 11 p.m. Chuck's light show and the Club's Mexican food buffet (tacos, enchiladas, green chile stew, rice, beans, and tortillas) help get you hop-pin' on the first TGIF of the new year. Cost is free for members and \$2 for guests. Domestic beers are \$1 all night.

WATCH YOUR FOOTBALL FAVORITES battle their way to the Superbowl on Saturdays and Sundays in January from noon to 6 p.m. Enjoy munchies, drink specials, and the AFC/NFC play-offs up close on the Lounge's big-screen TV.

HE'S PLEASED AS PUNCH because T-Birds Card Sharks membership is growing, says Jim McCutcheon, Sharks organizer. Come see what all the excitement's about at January's meetings: Thursday, Jan. 10, and Thursday, Jan. 24, from 10 a.m. to 3 p.m.

Take Note

The Secretary of Energy Advisory Board has selected former Sandia research VP Bill Brinkman to serve on an eight-member task force to study the future role of DOE's laboratories. DOE Secretary James Watkins has requested an interim report by May 1991 and a final report by October 1991. Bill is now Executive Director of Research-Physics Division, AT&T Bell Labs in Murray Hill, N.J.

* * *

The New Mexico Alcohol Issues Consortium has established a speakers bureau. Members of the organization are available to speak about 23 different alcohol issues. Topics include Alcohol in New Mexico's Environment, New Ways to Deal with Alcohol Issues, DWI Deterrent Measures, Alcohol Legislative Issues, the Public Health View of Alcohol Problems, Community Prevention Issues, Fetal Alcohol Syndrome, Alcohol Treatment Issues, and others. To receive a current directory with speakers' names and topics, contact Jo Ann Fredrikson on 296-5433. The goal of the New Mexico Alcohol Issues Consortium is to reduce New Mexico's severe alcohol-related problems by changing the current alcohol environment.

Welcome

Albuquerque — Kathleen Cash (21-1), Earl Conway (3220), Kathleen Geene (22-2), Rebecca Hebron (22-2), Suzanne Hughes-Wright (22-2), Maureen Locher (21-1), Kristy Savage (22-2); **Other New Mexico** — Lucrecia Garcia (21-1).

Elsewhere: **Washington** — Rekha Rao (6416).

Events Calendar

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

Dec. 21 — Winterfest on Civic Plaza, sponsored by Albuquerque Parks & Recreation Dept., 5-8 p.m., Civic Plaza, free, 768-3490.

Dec. 24-25 — Winterfest: arts, miniature train display, food, sponsored by the Albuquerque Convention and Visitors Bureau; 2-6 p.m. on Mon., 10 a.m.-3 p.m. on Tues.; Fine Arts and Resource Bldgs., NM State Fairgrounds, admission is one can of food per adult, 243-3696.

Dec. 24-29 — Christmas Indian Dances: Spanish dance-drama "Los Matachines" at Picuris and San Juan pueblos, pine-torch processions at San Juan and Taos pueblos (Kachina Dance at Taos); Basket, Buffalo, Deer, Harvest, Rainbow, and Turtle dances at Acoma, Cochiti, San Ildefonso, San Juan, Santa Clara, and Taos Indian pueblos; call for information, 843-7270.

Dec. 24-30 — "A Christmas Wassail (The Story of Gabriel Grub and the Goblins)," adapted by director Derek Davidson from a little-known Dickens work called "The Story of the Goblins Who Stole a Sexton"; 8 p.m. Fri. & Sat., 2 p.m. Sat., 7 p.m. Sun.; Vortex Theatre, 247-8600.

Dec. 21-31 — "The Wizard of Oz," Albuquerque Civic Light Opera presentation, music and lyrics from the MGM motion picture; 8:15 p.m., 2 p.m. matinee Dec. 23, 29, & 31; Popejoy Hall, 345-6577.

Dec. 21-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., South Broadway Cultural Center, free, 848-1320.

Dec. 21-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.

Jan. 1 — New Year's Day Celebration: Corn, Deer, Eagle, and Turtle dances at most Indian pueblos; call for information, 843-7270.

Jan. 5 — Pops Concert 3: presented by the New Mexico Symphony Orchestra, featuring Pete Fountain and his New Orleans Band (Dixieland music); 8:15 p.m., Popejoy Hall, 842-8565 or 842-8566.

Jan. 6 — Three Kings Day Celebration: Buffalo, Deer, Eagle, and Elk dances at most Indian pueblos, call for information, 843-7270.

Jan. 7 — Monday Lecture Series: Teresa Van Etten, storyteller and author of Winds of Indian Wisdom and Ways of Indian Magic; 10 a.m., Indian Pueblo Cultural Center, 843-7270.

Jan. 9-20 — "The Heidi Chronicles," by Wendy Wasserstein, bittersweet comedy about the effects of the women's movement on men and women, New Mexico Repertory Theatre production; 8 p.m. Tues.-Sun., 2 p.m. matinee Sat. & Sun.; KiMo Theatre, 243-4500.



DIRECTORATE 3700 WINS two Org. 3000 ECP Spirit Awards. For the second year, Spirit Awards have been given to the Org. 3000 directorate with the highest percentage of participation in the Employee Contribution Plan. Directorate 3700 had a 9.8 percent increase in total ECP participation and a 12.7 percent increase in Fair Share givers. Showing the awards are (from left) Purchasing Director Bob Zaeh (3700), Martrice Bordlemay (3718), alternate 3700 directorate representative Theresa Carson (3726), Executive VP Lee Bray (30), and 3700 directorate representative Esther Hernandez (3716).

Congratulations

To Sandy and Donald (1152) Overmyer, a daughter, Geena Dawn, July 10.

To Suzette Ashment (3543) and John Brooks, married in Albuquerque, Nov. 10.

To Linda (111) and Gilbert (2543) Benavides, twin daughters, Alysse Yvonne and Elena Marie, Nov. 11.

To Connie (3733) and Jerry Wenk, a daughter, Amanda Brooke, Dec. 1.

To Juli and R. D. (7265) Mackoy, a son, Richard Joshua, Dec. 1.

To Bernadette (2331) Abeyta-Sinclair and Ronnie Sinclair, a daughter, Rhonda Jolene, Dec. 3.