

Unique transmission could revolutionize car industry

Sandian and inventor Don Wilkes team up on infinitely variable gear technology

By Mary Hatheway

Lab News Intern

Entering Don Wilkes's lab is like stepping into Merlin's workshop. Located in a tin-sided warehouse in Albuquerque's North Valley, the lab is filled with whatsits and whirlagigs, models and milling machines, and plans for a new technology that could revolutionize the car industry.

A worn and well-read copy of Benjamin Franklin's biography is perched on a book-crowded shelf in Don's office. Don says it's been a must-read for a man who wanted to be an inventor for as long as he can remember. Indeed, the creative spirit that guided the careers of great American inventors like Franklin has always been a primary driving force in Don's life.

"I decided very early that I was going to straighten out the universe."

"I decided very early that I was going to straighten out the universe," he explains. "I started inventing gadgets when I was six years old. Built my first transmission at 13. I created the rolamite while I was at Sandia, back in

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INFINITELY VARIABLE GEARING — Former Sandian Don Wilkes (right), the guy who brought Sandia the rolamite "gravity switch" back in 1966 (now widely used to help trigger automobile airbags), shows off one design utilizing his idea for infinitely variable gearing. With him is his Sandia partner Jim Purvis (9204), who is helping Don engineer various designs. The two hope commercializing the new approach to gearing will revolutionize the automobile and other industries.

Nuclear materials on the high seas — fires in ship's hold test cask transport

By John German

Lab News Staff

A group of Sandians sparked a couple of blazes recently that would have done their boyhood troop leaders proud.

But the burning wasn't followed by wieners and smores. The fires they set inside the cargo hold of a Coast Guard merchant ship had a distinct technical purpose — to measure how heat from the flame transferred to nearby simulated nuclear materials shipping containers.

The tests were a part of DOE's SeaRAM (for Sea RAdioactive Materials) program that is developing technical tools to help assess the safety of transporting radioactive materials by sea. Specifically, they were aimed at studying how an engine room fire (the most common type of ship fire) or an accidental blaze within a cargo hold might affect specialized casks used to contain nuclear materials during transport.

By land or by sea

DOE develops such casks as part of its nuclear weapons and materials transportation mission. Historically Sandia has played a major role in ensuring that the containers meet accident-survivability thresholds set forth by the federal government and by international

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Sandia LabNews

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Sandia National Laboratories

Robinson challenges Labs leaders to help rouse a 'renaissance'

1995 Fall Leadership Forum focuses on team building, change

By Nigel Hey

Media & Employee Communications Dept. 12620

Participants in the 1995 Fall Leadership Forum heard Labs Director C. Paul Robinson declare the start of a "new journey" that, as the new fiscal year unfolds, could bring about a "renaissance" for Sandia.

The annual meeting of Sandia's top leadership was held Sept. 26-29 at Taos Ski Valley. Its three-day agenda included presentations, breakout meetings, and informal gatherings at which about 100 vice presidents, center directors, and other officials focused their attention on long-term planning, leadership, customer orientation, organizational structure, and team building.

During an opening night presentation that set the tone for the conference, Paul challenged his leadership to assist in the creation of a

renewed Sandia that provides:

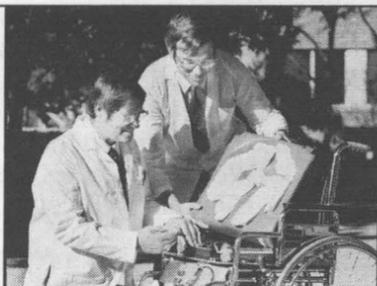
- A vigorous, stimulating intellectual environment
- Leadership in finding technology solutions to the nation's most important problems
- Mission responsibilities that Sandians and everyone else recognize
- An environment of high-risk, high-payoff science and technology, making a break with "incrementalism" and "demonstration projects"
- Success in attracting the "best of the best" in science and engineering talent
- Respect and support from customers, the Congress, and the nation

Paul extracted a metaphor from physics, likening the focusing of creative energy within Sandia to the laser. He challenged his audience

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Computer-controlled manufacturing goes to 'intelligent agent' concept 3

APS planning group builds team spirit at Sandia training facility 7



8 New landfill cover designs tailored for arid climates

9 Labs' assistive technologies address needs of disabled people

This & That

No purple prose, please - I'd like to know if wildly colored e-mail messages bug other people, too. Some folks are fond of sending garish-looking e-mail messages that are nearly impossible to read. One frequent correspondent of mine sends messages in yellow type on a blue background. If I can figure out how to do it, I'm going to start replying in avocado green type on a bright plaid background and see if he takes the hint. If you really want people to read something, I suggest black type on a plain background. That's what I prefer.

* * *

A quick talk with John - New Sandia Executive VP and Deputy Director John Crawford has been at the Labs since 1962, but many New Mexico Sandians probably don't know him well, because he was VP of Sandia's California Lab from mid-1987 until beginning his new duties in August. You'll have a chance to hear John on Monday, Oct. 16, when he gives a quick report to employees about the recent restructuring of the Labs and about the Fall Leadership Forum held late last month. John has a very tight schedule that day (three different speaking engagements), but all Sandians are invited to hear his 35-minute-or-so report in the Tech Transfer Center (Bldg. 825) at 1:10 p.m. The presentation will be televised live in the Sandia/California Bldg. 904 auditorium. John's presentation is sponsored by the Labs' Quality organization as a National Quality Month event.

* * *

Yellow tape means weapons? - Several Sandians responded to my appeal in the last issue for information about Sandia's "screaming-yellow" duct tape - why we buy that color, etc.

Lola Stude (7806) called to point out that this isn't just any old duct tape, and that it can be ordered from Sandia's office supply catalogue. It's described there as "yellow, weatherproof, pressure sensitive, cloth backed, plastic coated, fungicide treated." (Doesn't everyone need fungicide-treated tape?) Several other folks indicated that yellow duct tape has been used for many years throughout the nuclear weapons complex. Vann Bynum (6719) says most sites use it to seal containment bags for radioactive materials. And Jim Martin (5513) called to say he first began using yellow duct tape in field testing work years ago when he worked for Los Alamos National Lab and has been using it ever since.

All of this is quite interesting, but I still don't know who manufactures the yellow duct tape, why it was first used in weapons work, or whether it has any special meaning. More help, please!

* * *

What - no nap time? - I wrote last month about a Sandian's wife who asked why - after marriage - there's an unwritten rule that couples can go dancing only once a year, and even then only between 6 and 9 p.m.

Don Schubeck, who retired from Sandia in 1991, thinks he may have the answer: It's training for your 50th high school reunion. Don recently returned from his, in Detroit, and he sent me the schedule: cocktails at 3 p.m., photographs at 4 p.m., dinner at 5 p.m., and dancing from 6 to 9 p.m. Now that's a schedule even I could maintain if I could catch a quick snooze between the photo session and dinner.

- Larry Perrine (845-8511, MS 0129, lgperri@Sandia.gov)

Open enrollment for Benefits Choices '96

The Open Enrollment period for Benefits Choices '96 will run from Friday, Oct. 20, through Thursday, Nov. 9. All nonrepresented employees should receive their Open Enrollment packages via interoffice mail by Oct. 13. All retirees and remote site employees should have received their Open Enrollment packages via first class mail this week at their home addresses.

All nonrepresented employees and all retirees are urged to read the Open Enrollment information carefully to understand the new Benefits Choices offered for 1996. The new options for 1996 for nonrepresented employees include the Triple Option Plan, Dental Deluxe, Long-Term Disability Plus, and Long-Term Care Insurance. In addition, the Triple Option Plan is also available for all retirees.

If you are a nonrepresented employee or retiree and are currently enrolled in the Medical Care Plan, your coverage will automatically default to the Triple Option Plan unless you call into the Open Enrollment phone system and choose the Lovelace HMO (New Mexico) or the Kaiser HMO (California).

In addition to signing up for the Triple Option Plan or the "+ Choice" plans, you must call into the Open Enrollment phone system to enroll or reenroll in the Reimbursement Spending Accounts and to change your Voluntary Group Accident coverage.

Enrollments will be accepted only until midnight Nov. 9. The phone system will be open 24 hours a day (with the exception of Friday evening for 4 hours for maintenance) during the Open Enrollment period. Instructions for using the Open Enrollment phone system are included in your Open Enrollment materials.

A listing of Open Enrollment meetings for the Triple Option Plan, Lovelace HMO & Senior Plan, Kaiser HMO & Senior Advantage Plan, "+ Choices," and Reimbursement Spending Accounts will be printed on the back of the envelope in which you receive your Open Enrollment material and on the back of the Open Enrollment booklet (enclosed in your Open Enrollment package). These meetings will run from Oct. 18 through Nov. 8.

Please note the following changes to the Open Enrollment Schedule of Meetings printed on the envelope for your Open Enrollment materials:

Date	Location	Time
Oct. 23	Coronado Club	3:30 p.m.
Oct. 26	Area IV, 962 Auditorium	Canceled

If you have questions regarding any of the benefit options for Open Enrollment, call the Benefits Hotline on 844-9983.

Benefits '96 Vendor Fair

On Thursday, Oct. 26, the Health & Work/Family Benefits Department will host a Vendor Fair at the Coronado Club from 9 a.m.-3 p.m. Representatives from the following Benefit Plans will be available to answer questions:

- Lovelace - Lovelace HMO & Senior Plan
- The Prudential - Triple Option Plan
- Caremark - Prescription Drug Plan
- Value Behavioral Health - Mental Health/Substance Abuse Plan
- Mutual of Omaha - Reimbursement Spending Accounts & Long-Term Care Insurance
- CNA - Voluntary Group Accident Insurance
- MetLife - Dental Deluxe
- UNUM - Long-Term Disability Plus.

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LOCKHEED MARTIN

Workshop for supervisors of troubled employees

It's not always easy for a supervisor to recognize employees whose personal and emotional problems are impairing their performance on the job. But if, for example, an employee is preoccupied with personal problems or is having difficulties in getting along with co-workers, his or her work is likely to suffer.

What is the role of the supervisor in such situations? The Health Promotion and Employee Assistance Dept. 3335 is offering a short training workshop for supervisors. It's called "Managing the Troubled Employee," and its purpose is to help managers and supervisors recognize and cope with employees whose problems are causing their job performance to suffer.

The workshop consists of one two-hour session to be held on a Thursday morning from 8:30-10:30 a.m. in the TLC Conference Room, MO170. Two separate workshops are set for Oct. 19 and Oct. 26. To enroll, call the TLC office on 844-8238. Workshop leaders are Arlene Price (3335), Clinical Psychologist, and Linda Duffy (3335), Manager.

Agile Manufacturing Cell demonstrates software-based 'intelligent agent' approach

Control software designed to let machine tools exchange information

By Nancy Garcia

California Reporter

The old relationship in computer-controlled manufacture is being replaced by a new "intelligent agent" concept demonstrated at Sandia's Integrated Manufacturing Technology Laboratory.

The system enables "a lot better decisions," says Ron Stoltz, Manager of Sandia's Corporate Manufacturing Infrastructure Dept. 8008. Machines linked by software being developed at Sandia can request and receive information from each other, communicating laterally as "peers" rather than through a hierarchical arrangement.

"The control software is actually a quantum leap from the usual standard manufacturing automated control," says project engineer Robert Hillaire of Integrated Manufacturing Initiatives Dept. 8205.

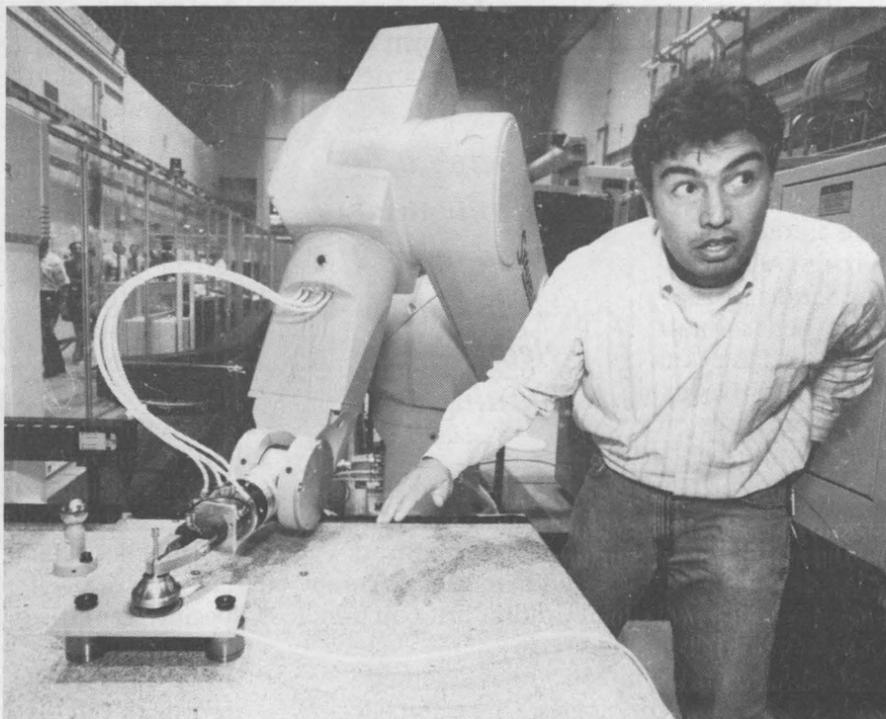
In the future, the software will give people running the system recommendations, advice, and options for various trade-offs that may be critical, such as fabrication deadlines, cost, and precision tolerances. This information will allow better-informed decisions during design and manufacture, which Sandia pro-

fabrication, and inspection," says Carmen, who is helping design the software.

At the IMTL's Agile Manufacturing Cell, several machine tools are coordinated to work in unison. The software under development has been linked to a lathe, robot, and coordinate-measuring machine. In a demonstration of the software, the robot picks up a stock piece of metal and transports it to the lathe, where it is turned into a small vessel and probed for on-machine acceptance, then carried to a cleaning station, next to the coordinate-measuring machine, and finally deposited in a finished-part area.

During this process, information from the inspection can be transmitted via the Internet to other organizations. The software also works with different computer operating systems. Eventually, Carmen says, manufacture with this type of "intelligent agent" control can take place in a virtual enterprise across organizational and geographic boundaries. She is working toward that goal with collaborators at the Center for Design Research at Stanford University.

"We're looking for a software architecture that is open and modifiable," Ron says. "You can't really obtain that from commercial suppliers today. It allows you to modify the system much more quickly and effectively."



DURING A PAUSE in a demonstration of the software under development, project engineer Robert Hillaire (8205) stands near a robot at the Agile Manufacturing Cell. He calls the control software a "quantum leap" forward in manufacturing automated control. (Photo by Iris Gan, *Tri-Valley Herald*)

Adds Bob Whiteside (8920), who is also working on the project, "Information-intensive manufacturing is what we're trying to achieve."

Fifteen Sandians based in California have been developing the demonstration with input from university and industry consultants, according to Hisup Park (8205), who coordinates the efforts. Another 15 Sandians from New Mexico have provided expertise in the areas of robot safety, programming and simulation, cell control structure, design-advising tools, and welding-advising tools.

"The notion of agile manufacturing has been around for a while now. It so far has just been a vision, and what we intend to do with the Agile Manufacturing Cell is apply the flesh to the vision," says Hisup. "The product development process is not a set of discrete steps; it is really a continuous cycle of events that feed one to another."

The discrete steps, he says, have been imposed by traditional approaches to manufacture in which specialists at each step have had to guess or assume capabilities of the other parts of the cycle.

Instead of requiring these specialized groups to simply take what the preceding group has "thrown over the wall" to them during product development, the new software can provide more thorough information about the manufacturing operation, which can be used to enhance product reliability, Hisup says.

Eventually, he envisions a network of responsive, well-characterized manufacturing centers that are connected through high-speed data links and can work as a single entity if necessary for either commercial or defense purposes. Within this network, "intelligent agent" software modules can function as well-defined building blocks that easily fit together to control the process.

Ultimately, Ron Stoltz says, the system should help Sandia reduce cost and time for precise production of defense components.

The Sandia agile manufacturing scheme will also include a virtual reality component in which operators can test their control software before machining a part.

Sandia CaliforniaNews

grammer Carmen Panzerella of Distributed Systems Research Dept. 8920 calls "a very elaborate process." She adds, "It's really an art, it's not black-and-white."

University of California at Berkeley Professor Paul Wright collaborates on this development and is interested in the ability of the system to permit planning "on the fly" to take advantage of opportunities or correct problems that arise. The system also allows choosing between options before the manufacturing process begins.

"One of the things that we're really interested in is to close the loop between design,



TRITIUM PHASEOUT HONORED — DOE presented Sandia/California's Tritium Research Lab (TRL) transition team with an unprecedented Award for Exceptional Service. Kirtland Area Office Manager Michael Zamorski (left) presented the award to Jim Bartel (8281), who accepted on behalf of the 17-member team. The team carried out the successful transition of the TRL to a non-nuclear lab, doing all the cleanup themselves. The building is now available for other Sandia program users.

Transmission

(Continued from page 1)

1966. And now I've come up with a way to build the ideal transmission."

Don is a second-generation mechanical engineer and former Sandian best known as the inventor of the rolamite switch, a device used primarily as an acceleration sensor or gravity (G) switch in nuclear weapons and automobile airbags. After leaving Sandia in 1967, Don spent several years working as an R&D executive for a company based on his rolamite technology, but he never stopped inventing.

"There's a definite need to build more efficient, safer, cleaner-burning cars."

His inventions draw from a lifetime of work, Don says. "It took me 50 years of working, thinking, tinkering, and inventing to come up with these ideas — they didn't just pop into my head overnight," he says.

Besides the rolamite, Don has invented dozens of other technologies. One is the Life Cycle, a wheelchair that has a self-adjusting center of gravity and normal rolling propulsion, which he invented after investigating the design of the conventional wheelchair and noting its deficiencies.

"The only reason to invent something is to solve a tangible problem or meet an unmet need," he says. "With the rolamite, there was a weapon-safing necessity. And with this new technology, there's a definite need to build more efficient, safer, cleaner-burning cars."

Differential band

Don says many standard car features, including electronic emission controls, a clutch, even brakes, could be eliminated if his infinitely variable transmission, based on an endless metal band torque transfer system, is developed.

He got the idea for the transmission while washing a continuous metal band in a beaker. "The band was longer than the beaker's circumference, and I noticed that it bulged inward in one place, settling in a minimum energy state," he says. "I realized you could achieve the same thing in gearing because a small amount of excess length is powerful in gears. That was the evolution of the differential band."

The differential band, an endless strip of

thin spring steel with no welds, is the key to Don's infinitely variable transmission, also known as the wave action rotary transmission (WART). Whereas a conventional standard transmission uses a clutch and gears to transfer force from the engine to the drive shaft, the infinitely variable transmission uses these differential bands to accomplish the same task.

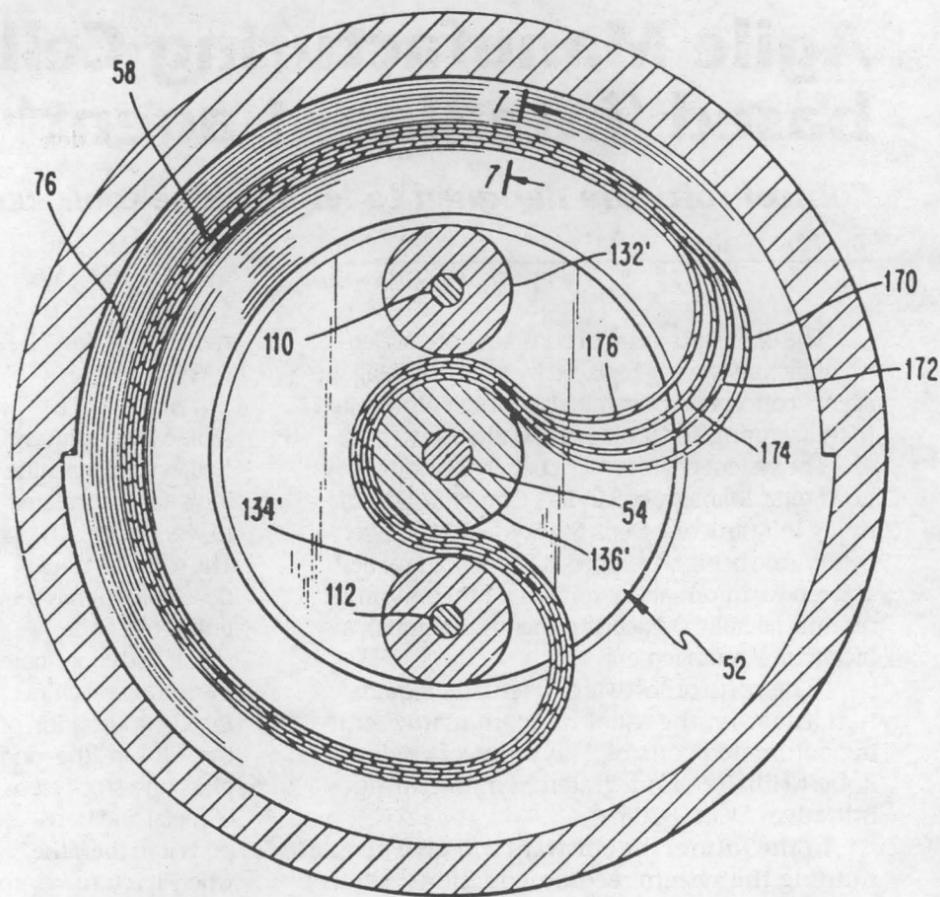
Most people are familiar with manual and automatic transmissions in automobiles, which have four or five specific gear ratios. Driving speed is varied by using the throttle to vary engine speed.

In contrast, continuously variable transmissions, or CVTs, allow the engine to operate at a single, nearly constant speed. The output speed of the transmission is varied continuously between an upper and a lower limit by mechanical means within the transmission. A commonly used CVT consists of two V-grooved pulleys connected by a V-belt. The effective diameters of the pulleys are varied by moving the sides of the pulleys in or out, thus giving continuous variations in output speed between a lower and upper limit.

Inside-out CVT

Enter the infinitely variable transmission. In Don's WART design, a CVT has essentially been turned inside out, with one V-pulley in the center and a reversed V-cylinder housing the system. The conventional V-belt has been replaced with a group of layered differential bands compressed into a kidney shape (see figure above). Add a clever planetary roller and gear assembly, and you have an infinitely variable transmission.

As with the CVT, the transmission output speed is not varied by throttling the engine, but by mechanical means within the trans-



SCHEMATIC DRAWING of the main components of Don Wilkes's wave action rotary transmission (WART), filed with its US patent application, showing the unique continuous differential metal bands (compressed into a kidney shape) and roller assembly, which are keys to the WART technology.

mission itself. Unlike the CVT, though, the operating limits on the WART are from a negative output speed to a positive output speed, with a zero output point somewhere in between.

If you still don't understand how the transmission works, take heart. Jim Purvis (9204), who helped design Sandia's Robotic All-Terrain Lunar Exploration Rover (RATLER), has been teamed up with Don on the transmission for a year, working out kinks in the system and exploring potential applications for the technology. Jim says only one of every ten engineers he tells about the new transmission "gets it" the first time.

"When I first started working with Don on this project, I spent some long nights trying to figure out his transmission," Jim says. "But once I finally understood it, I realized how inherently simple it is. Mechanically, it's much simpler than standard gear and clutch transmissions because it eliminates a lot of the extra machinery."

Don agrees. As an inventor, he says, his role is not to make things more complicated, but rather to improve the quality of life by making things simpler.

"We have this notion that for there to be progress, we need to make things more complex," he says. "I see it differently. By making things simpler, we use less raw materials and save energy. That's progress. And that's why the new transmission is unique."

Sports car behavior

But that's not all that makes this transmission unique. Don says it could improve fuel economy by as much as 20 percent because of its lightness and efficiency. The transmission doesn't require emission controls or a carburetor to control the air/fuel mixture, since the engine can be run constantly at its optimal speed, where emission outputs are minimal. And because it has no gears, there's no need for transmission fluid for lubrication.

"Getting the most out of a car engine is the basis of this revolutionary transmission system," Don says. "With the engine always running at its best speed, you can get sports

(Continued on next page)

Other applications for WART explored

According to Don Wilkes, the possible applications for his new wave action rotary transmission (WART) are limitless. Don, Jim Purvis (9204), and Keith Miller (9818) have been working with other Sandians, exploring various uses of the transmission besides its obvious potential use in automobiles.

One possible application of the technology is using the transmission in a numerically controlled lathe. After meeting with Jim and discussing the capabilities of Don's infinitely variable transmission, Charlie Robino of Physical and Joining Metallurgy Dept. 1831 suggested installing it in the lathe to improve tool-bit life and increase precision.

"The basis of this idea is improving the machining process by running the lathe at an ideal speed independent of the part

geometry," Charlie says. "With this transmission, we could improve our ability to predict the life of the cutting tools on the lathe, a capability which is pretty valuable in manufacturing."

Charlie says the transmission would provide an ideal means of regulating cutting efficiency in the lathe because it would keep the surface speed of the tool constant in relation to the part, improving surface finishes on facing operations, like diamond-cutting of optics.

"This potential use of Don's transmission in lathes and other motor-driven tools fits well with Sandia's advanced manufacturing initiative," Jim says. "I think it's a great way to get this technology to the market and to give US manufacturers a competitive edge in the rapid manufacturing arena."

(Continued from preceding page)

car behavior from a much simpler engine."

"Don's transmission offers the potential to combine a number of the car's transmission-oriented controllers, like the clutch, gear shift, brake, and throttle, into a single device, like a hand-controlled joystick," Jim adds. "Saab is already test-driving a joystick-like steering device. In the future, you may see cars with a joystick that controls everything from starting and stopping to steering."

Don says the transmission can theoretically stop a car in half the time it takes to stop a car using brakes, but the stopping mechanism is one area that requires additional research.

"Imagine going from 60 to zero using a hand-controlled braking device," Jim says. "The potential for operator interface problems is obvious. So we need to come up with a controlled way to slow the vehicle down, equivalent to braking, that will redirect energy back into the transmission and take the driver's reaction into account. I'm counting on Sandia's expertise to help us design an electrical control system to do just that."

A 'roundabout' improvement

Even though Don has created a process for manufacturing the differential bands essential to the infinitely variable transmission, the technology does not exist currently, and realization would require extensive research and

development. Not only would a manufacturer have to invest a significant amount of money to build the machinery to produce the bands, Jim says, but determining the longevity of the bands within the transmission would also require a "good bit of testing."

After working on the project for several months, Jim and project manager Keith Miller (9818) decided to pursue a use of Don's technology that doesn't require bands.

"What Jim saw as potential deficiencies in the technology when he got involved have turned out to be so, and those are things that need to be worked on," Keith says. "To keep the project moving, we've identified an alternate transmission design utilizing Don's ideas and currently available technology."

The three have developed and filed a patent for a "converter" device that utilizes conventional gears to adapt existing continuously variable transmissions to run as infinitely variable transmissions, incorporating many of the advantages of Don's system.

Both Dutch and Japanese manufacturers are likely to be selling vehicles with CVTs in the US in the near future, Jim says.

"They're energy-saving, but friction generating, and they still require a clutch to start and stop," he says.

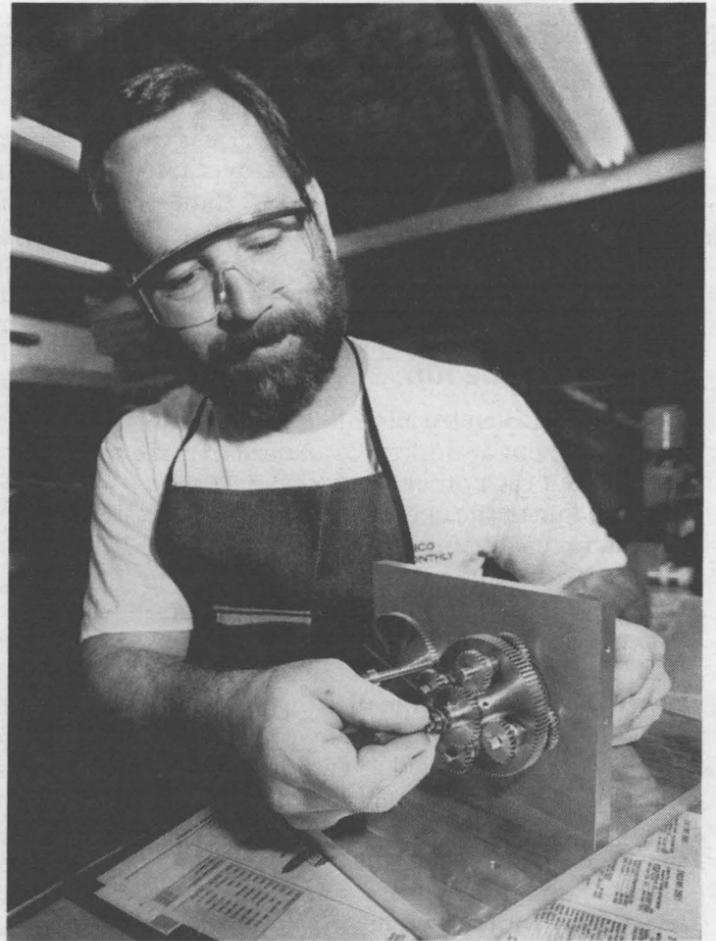
In addition, Chrysler is road-testing a Dutch version of the continuously variable transmission that uses two V-pulleys and two metal band assemblies holding metal V-shaped elements rather than a rubber belt to transfer power from the engine to the driving axle. "The transmission they're testing is one that has shown a 15 percent increase in fuel economy over vehicles with automatic hydraulic transmissions in European cars," he says.

US auto makers could license the continuously variable transmission from the foreign manufacturers, bolt on the Sandia converter, and sell a car with an infinitely variable gear transmission that outperforms all others across the board, Jim says. The team plans to market their adapting device to generate royalties to begin doing research and development on Don's infinitely variable band transmission.

"This adaptor is the next-best thing to the band transmission," Jim says. "It can do everything the WART system can do, but lacks the advantageous features of that system, such as its simplicity, lightness, and efficiency. The adaptor certainly improves on a continuously variable transmission, but in a roundabout way. The band transmission, not the adaptor, is the more exciting consumer technology here."

Thousands of applications

But whether the band transmission is ever available to consumers is largely up in the air right now. Pace VanDevender, Director



DENNIS DUNN of Project Machining & Rapid Turnaround Team 2481-2 puts finishing touches on a prototype version of an adaptation of Don Wilkes's wave action rotary transmission — a converter device that utilizes conventional gears to adapt existing continuously variable transmissions to run as infinitely variable transmissions.

of National Industrial Alliances Dept. 4700, who's been working to find industrial applications for the new technology, says electric cars are a potential first-use of the transmission.

"We're very aware that this technology must be coupled with our DOE mission," says Pace. "Right now we're focusing on the development of a hybrid electric car utilizing Don's infinitely variable gear system. Eventually, we'll explore uses of the technology in energy and environment applications, as well as in defense areas, such as robotic vehicles." (See "Other applications for WART explored" on page 4.)

Don believes the scope of the invention is even wider than that. "Cars are just one application for this technology," he says. "Everything in the world that has a motor can be made better and more energy-efficient using this transmission. There are literally thousands of applications for this technology."

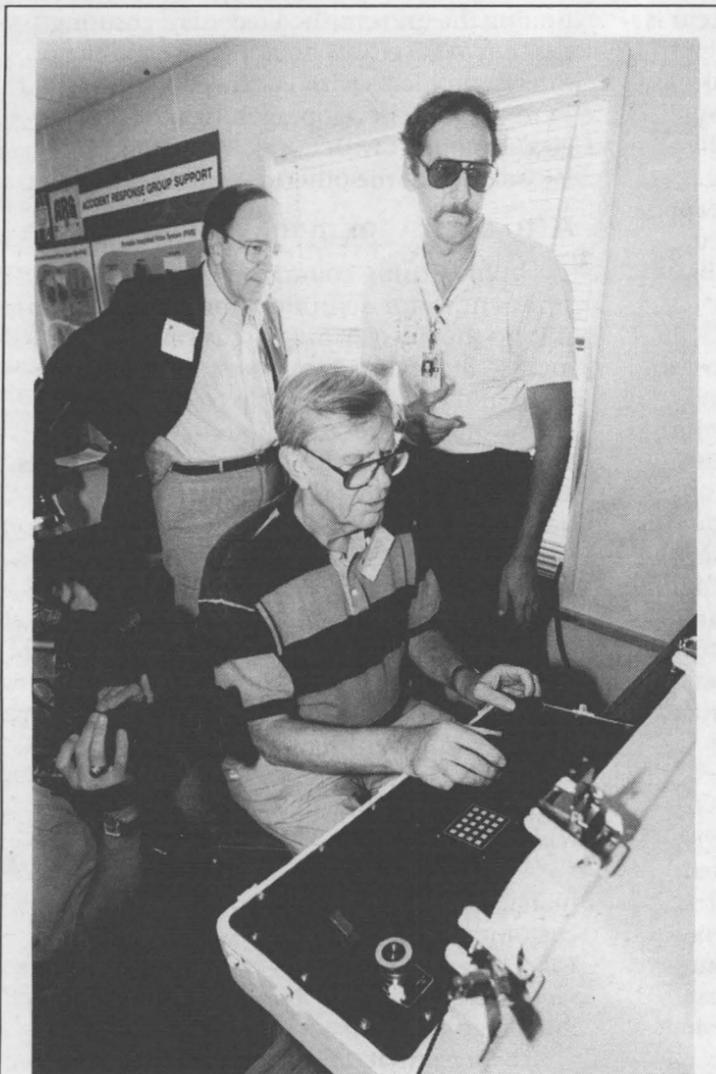
Sandia signed an agreement on Oct. 6 pledging to work with Don and seek patents jointly on future intellectual property relating to the transmission. Under the agreement, Don and Sandia can pursue specialty applications or licenses for the basic technology, and they agree to split any royalties that emerge from those ventures.

"I'm counting on the staff at the Labs to combine their various backgrounds and come up with some of these uses," says Don.

"I'm counting on the staff at the Labs to combine their various backgrounds and come up with some of these uses."

Sympathy

To Don Coates (10402) on the death of his brother, John Coates, in Long Beach, Calif., Sept. 28.



SUNDAY DRIVING — Members of the House Committee on Government Reform and Oversight visited Sandia Sunday afternoon in a tour arranged by Rep. Steve Schiff, R-N.M., a committee member. Here the committee's chairman, Rep. William Clinger, Jr., R-Pa. (center), takes a turn at remotely driving Sandia's Robotic All-Terrain Lunar Exploration Rover (RATLER) at the Robotics Vehicle Range. Behind him are, at left, committee member Rep. Steve Horn, R-Calif., and, at right, Paul Klarer of Advanced Vehicle Development Dept. 9616. The committee members also received a Sandia overview and tour of the Microelectronics Development Laboratory from Laboratory Director C. Paul Robinson. The committee visited Sandia to learn more about the contributions of the national labs to federal science and technology priorities, part of a four-city tour to hold field hearings on streamlining the government for the 21st century.

Renaissance

(Continued from page 1)

to pump in energy to produce an excited state of creativity throughout Sandia; to set some "mirrors and lenses" that will favor the best ideas, especially those that align with the nation's greatest needs; and to let a "stimulated emission of ideas" process take hold.

Work should be fun

He also challenged all Sandians to increase their enjoyment at work. "We all need to make work fun, for each other and for every Sandian," he said at the opener. "Creativity depends on having fun."

Paul likened his own management style to Eisenhower's reliance on "convincing people to do the things you believe ought to be done." His self-image as "servant-manager" surfaced repeatedly throughout the meeting.

"I pledge to work harder for you than you can work for me," he said. "We are all trustees — the heroes are out there throughout the labs. We are lucky to be here to help them. Try to manage as if you had no power whatsoever."

He added: "I didn't get a 'papal infallibility' clause in my contract for my job. When I make a mistake, tell me so I can learn."

And at a time when the Labs' management structure is being realigned, he said: "I hate 'turf.' It stands in the way of developing and implementing system solutions. Why waste our energies through sub-optimized local solutions? Please join me in a declaration of war against the sixth, unwritten Sandia value — autonomy — in a move to true interdependence."

Later Deputy Director John Crawford echoed Paul's sentiments that "we re-create ourselves for taking on the search for high-risk, high-payoff solutions, where failure is part of the game," in an environment where autonomy is replaced by trust. "Divisional lines are becoming less and less important, fuzzier and fuzzier, as teamwork increases with focus on the customer. Organizations almost don't matter so long as people care."

Paul described Sandia's reorganization as a work in progress. With a wry comment that he is trained as an experimentalist, he stressed that "we can make changes later and fix errors then as well."

In the "fast and furious" process so far, he added, his team has resisted the temptation to over-organize: "As our mutual trust builds,

It's official: Production is part of Sandia's work

Is production part of Sandia's business? Will Sandia be doing more of it in coming years?

These questions have surfaced frequently this year as the Labs began fabricating neutron generators and looked toward possible production of molybdenum-99, a precursor for radiopharmaceuticals, at the Annular Core Research Reactor.

"The answer to question No. 1 is 'yes,'" John Crawford told attendees at the 1995 Fall Leadership Forum. "The answer to No. 2 is 'possibly,'" he said.

Production is the responsibility of Div. 14000. Div. 14000 now also includes Production Integration Center 14100 (Leonard Martinez), Production Management Center 14300 (Lew Butler), Production Operations Center 14400 (Lew Butler, acting), and Military & Operations Services Center 14700 (Carol Yarnall).

New divisions support research base, competencies

With the dissolution of the former Research and Exploratory Technology Div. 1000, Sandia's research and technology base is now vested throughout the technical divisions. Two new divisions, announced in the Sept. 29 *Lab News*, will strengthen research functions and help integrate R&D transfer processes within the Labs. They include what Deputy Director John Crawford calls "synergistic centers" from the previous Orgs. 1000, 2000, and 9000:

- *Electronics, Materials, and Components Research Div. 1000* (Bob Eagan, VP) — Along with the bulk of Sandia's basic research activities, this division incorporates thrust efforts in

electronics, plus the applied research elements that can best support and derive benefit from them. Bob now oversees two core competencies — materials, and microelectronics and photonics.

- *Information and Pulsed Power Research and Technology Div. 9000* (Gerry Yonas, VP) — This division incorporates the Advanced Information Technology thrust and the Pulsed Power thrust, along with the key centers needed to speed what John calls "the revolution to synergistically join simulation and test activities." Gerry also has oversight for two competencies — engineering analysis, and information and computation.

organizational details will be less important and less urgent."

In later discussion, forum participants noted that they are concerned that Sandia is somewhat top-heavy, and that there may be too many managers.

Paul agreed in general, but said he is "more concerned by how it works than how it looks. It's important to be leaders, not managers, as we operate in this process of continuous change. When will it be over?" he asked, referring to the current pace of change. "My feeling is, never."

'Act like a national lab'

One place where change is likely to occur is in the forging of new teamwork alliances with other laboratories. Paul noted that a useful "system of labs" could be created with Los Alamos and Lawrence Livermore — recently given a boost by President Clinton's declaration that the nation needs three robust weapon labs — and/or with the two other Lockheed Martin Energy and Environment Sector labs, Oak Ridge National Laboratory and Idaho National Engineering Laboratory.

John noted that Sandia's new focus on two sectors — Defense Programs and Energy and Environment — marks a "slight but rather fundamental change" in the Labs' business outlook, in which there is a greater emphasis on Department of Energy projects.

At the same time, he said, "we should act like a national laboratory — by extending our talents to other customers when appropriate." But he cautioned that care must be taken to avoid problems that could result from "everyone going out for a pass," and from tendencies to propose smaller projects where funding comes in only at principal investigator amounts.

John stressed a central precept of reengineering that holds that Sandia will have "balanced divisions" with six main roles ranging from program leadership to industrial interactions (*Lab News*, Sept. 29). This will distribute customer focus more evenly than in the past, when customer interactions were orchestrated only from the sector level.

"We must be more strategic than this," he said. "A single Sandian will be assigned the responsibility for customer interactions for each major, and many minor, customers. The assigned Sandian will arrange all marketing efforts with that customer, will speak for all Sandia, and will have an expected frequency of customer contacts, to listen and to inform."

Laboratory Development

More information also was disclosed on the expanded functions of Laboratory Development Div. 4000, where VP Dan Hartley has taken on its existing responsibilities along with others that include managing a "change cell" for reengineering (*Lab News*, Sept. 29). The change cell idea, conceived originally by

VP-5000 Roger Hagengruber, is seen as particularly valuable because, in John's words, "we have not been very successful yet in reengineering; organizations are unlikely to reengineer themselves."

Laboratory Development, which already included Technology Transfer activities, is now also responsible for aligning laboratory-directed research and development (LDRD) and program development efforts, and will take on the Work for Others (WFO) support organization. The latter will provide proposal support and interface with DOE/AL for approvals and funding.

"Dan will take on the responsibility of continuing the unblemished record of ensuring that our WFO efforts do not create conflict of interest problems with Lockheed Martin," said John, "and for developing mitigation strategies" in concert with Roger, VP-6000 Joan Woodard, and the other vice presidents.

A 'to do' list for management

In his closing comments, John noted strides in sector definition and their relationship to the line (including customer assignments) and in program investment/development and their relationship to the line. A reassessment of research foundations is also under way, along with integrated capabilities and other elements that define "what business we are in."

John also enumerated a "to-do" list that should be accomplished "in days and weeks, not months." This includes implementation of the first stage of realignment; streamlining the AMCO (Administrative Management Council) process; smoothing the operation of enabling functions such as corporate finance, record-keeping, and property management; and moving ahead with the next stages in reengineering.

Paul closed with the observation that management has pledged to broaden Sandia's customer base, to increase coherence in the Labs' investment strategy, and to distribute sector responsibilities and authority among line organizations.

He urged that directors and managers be rotated to different responsibilities, noted that "selective downsizing" will be enabled by the new laboratory realignment policy (*Lab News*, Sept. 29), and urged that Sandia proceed with a strategic hiring program that will bring in "leaders, contributors for the next century — people who care."

And he introduced a new philosophy for compliance issues — a "graded approach that replaces proscriptive rules" and encourages mindfulness and remembrance of the principles that underlie compliance. "Let's bring back common sense to compliance," he said.



APS group gets 'jump start' at Sandia's High Performance Team Training facility

As part of its long-term relationship with the Albuquerque Public Schools, Sandia has made its team-building resources available to help the school district "jump start" its Strategic Issues Management (SIM) process.

During a recent training session at Sandia's High Performance Team Training facility in Tech Area 3, the APS SIM group members went through the Trust Fall, the Walk of Life, Animal Farm, and a number of other exercises designed to challenge their ability to work as a team.

APS established the community-based SIM group in December 1994 to provide the public an opportunity to work directly with educators in developing the school district's long-range plans.

The SIM group includes teachers, administrators, school board members, parents, students, and individuals from business and community organizations. Community Partnering Manager Dick Fairbanks (3610) and Krista Edmonds (contractor) have worked with APS for several months to get the SIM process up and running.

Dick says Sandia's collaborations with the school district supports DOE's position of encouraging diversity and systemic change in education.

"For us, it's really a workforce issue," Dick says. "As an organization, we have a compelling interest in working with APS to encourage strategic plans that emphasize science and math instruction. We need students coming through the pipeline who are well prepared to carry on the work of the Labs and otherwise function successfully in tomorrow's work world."

Jump starting the SIM team

Krista says Sandia's goal in inviting the APS group to go through the High Performance Team Training program was to make the team as effective as possible as soon as possible.

"You might say we are trying to jump start the SIM team," Krista says. "Sixty percent of the people met for the first time just two weeks before this training. They come from all over



ALL STRUNG OUT — Members of the Albuquerque Public Schools Strategic Issues Management team try to follow a rope trail while blindfolded. The exercise was meant to show that it is hard to get anywhere without a definite goal. The exercise was part of the group's recent training at the Sandia High Performance Team Training site in Area 3.

the community, from nearly every segment of the community.

"It's a diverse group, to say the least, and anyone who studies group dynamics and team performance knows that any really diverse group is likely to be dysfunctional at first.

"The team will improve its performance, anyway, over time, but we're accelerating that process by providing this High Performance Team Training program."

Some 450 Sandians have gone through the "Adventure Base Training" program at the

High Performance Team Training course (*Lab News*, July 23, 1993), but the APS group is the first outside organization to use the facility. The facility, which resembles an obstacle course, was built by Maintenance Operations Dept. 7818 in 1993. The course is conducted under contract by Roberts Training and Consulting, Inc., of Little Rock.

'Adventure Base Training'

In Adventure Base Training, participants learn team skills through a combination of classroom work and field exercises. In the field, participants work together to solve a variety of physical and intellectual challenges, such as scaling a 12-foot wall with no tools except their collective creativity, and passing a team member through a "spider web" without touching any of the ropes that form it.

"Participants learn — in a hands-on sense — valuable lessons around team leadership, trust, communication and inclusion," Dick says.

"The training program for the SIM group was excellent; the people just loved it," Dick says. "The evaluations were high. The folks who went through it feel they have taken a big step forward as a team."

Dick, who works with a variety of community-based organizations around issues of diversity and education, was so impressed with the APS response to the training that he has become something of a crusader for the program on an internal basis as well. He said he hopes to work with Center 7800 to encourage more Sandia organizations to take advantage of the team training facilities located in Sandia's own back yard.

For information on the Adventure Base Training program, call Jim Rush (7817) on 844-1962.

Favorite Old Photo



V-2 IN TOW — This photo of a German V-2 rocket was taken by my father, Ellis Dawson, Sr., near my hometown of Winfield, La. The year was approximately 1948. The youngster near the tail is me. The convoy was apparently transporting the rocket either to or from White Sands Missile Range, N.M. I suspect it was used to demonstrate to military organizations the V-2 system.

— Ellis Dawson, Jr. (contractor)

— Bill Murphy

Demonstration project may lead to more effective hazardous waste landfill covers

By Bill Murphy

Lab News Staff

A better, less expensive way to cap hazardous waste landfills, particularly those in the arid West, may be the outcome of a project being conducted by Sandia for the DOE Office of Science and Technology.

Sandia is conducting a large-scale "Alternative Landfill Cover Demonstration" to test several approaches to covering hazardous waste landfill sites. The tests will seek to demonstrate which alternative covers effectively control water infiltration and flow through a landfill and prevent waste leachate from being carried into the soil and groundwater below.

More than 100 private and public sector environmental waste management professionals from several western states participated in a recent briefing and tour of the demonstration site in Area 3.

The DOE, with an estimated 3,000 landfill sites under its management, is interested in identifying more cost-effective and environmentally friendly ways to seal off each site as it reaches the end of its useful life. According to estimates developed at Los Alamos National Laboratory, the cost of installing a Resource Conservation and Recovery Act (RCRA)-approved cover can reach more than \$2 million per acre in arid regions.

"We plan to evaluate a number of alternative cover designs that we believe will demonstrate better performance and long-term reliability than standard RCRA covers," says project leader Steve Dwyer of Sandia's Environmental Restoration Technologies Dept. 6621. "We also think some of the alternatives we're looking at will prove to be significantly cheaper to install and maintain than standard covers."

Sandia and DOE aim to gain approval for use of alternative cover designs. RCRA guidelines stipulate that an approved alternative can be substituted for the standard cover design. Approval can come through the US Environmental Protection Agency or through a state environmental agency in locations where states have jurisdiction.

Sandia's work has been endorsed by the Western Governors' Association Committee to Develop On-site Innovative Technologies (DOIT), whose members have expressed interest in arid-environment alternatives to current landfill cover designs.



CHECKING IT OUT — Steve Dwyer (6621), project manager for the Alternative Landfill Cover Demonstration project, checks out the synthetic liner and sand strata that make up two of the layers of a landfill cover. The project is designed to test a number of cover designs optimized for performance in arid environments.

Nationwide, there are some 250,000 RCRA Subtitle "D" municipal landfill sites and approximately 6,000 Subtitle "C" hazardous waste landfills. Operators of many of those sites are interested in viable alternatives to existing cover designs, Steve says.

Standard covers crack in dry climates

Steve says it is widely agreed in the landfill management industry that current federal guidelines for landfill covers in arid environments can be improved. Even the EPA, Dwyer says, acknowledges as much. "In arid regions," states the *EPA Design Guideline — Design and Construction of RCRA/CERCLA Covers*, "a barrier layer composed of clay and a geomembrane is not very effective. Since the soil is compacted 'wet of optimum', the [clay] layer will dry and crack."

Steve explains that these cracks create potential pathways through the soil for water to reach hazardous materials in a waste site. The resulting leachate, Steve says, poses a threat to groundwater.

Also, Steve notes, at many western landfill sites clay is not readily available. To comply with RCRA guidelines, Steve says, many site operators must truck in a soil additive such as bentonite and mix it with the native soil to create clay-like compaction characteristics.

At a multi-acre site, this process can be a massive and costly undertaking and carries its own negative environmental side effects, such as large-scale excavation at the bentonite source, and over-the-highway hauling demands, Steve says.

A five-year plan

Sandia will conduct the five-year project in two phases. In the first, three model landfill sites measuring 300 feet by 40 feet are under construction in Area 3. The sites, which become operational this fall, replicate three landfill cover types: an RCRA-standard municipal landfill site cover (Subtitle D); an RCRA-sanctioned hazardous waste landfill cover (Subtitle C), and an alternative hazardous waste landfill cover. The alternative design will use a manufactured "geosynthetic clay liner" instead of the natural two-foot clay layer stipulated in the RCRA guidelines. The geosynthetic clay liner, Steve says, is engineered to block water passage far more effectively than a natural clay layer. During the demonstration, that liner's performance will be gauged against the RCRA standard, Steve says.

A number of innovative cover designs are being considered for testing and evaluation in phase two of the project, Steve says. Among them:

- A dry barrier cover, in which air circulates in the cover layers to remove moisture
- A capillary barrier method in which the capillary action of water impedes its migration from a higher, fine cover level to a lower, coarser level
- A so-called "enhanced evapotranspiration cover" that, through engineered vegetation design, enhances evaporation and plant transpiration, removing moisture from the soil.

Evaluation of the covers will be based on their respective construction costs, ease of construction, and physical performance, Steve says.

Half of each cover — a 150-foot by 40-foot section — will be evaluated under ambient conditions; the other half will be evaluated under stressed conditions where sprinkler systems will simulate various precipitation events. A sophisticated suite of instruments — some developed specifically for the project, Steve says — will measure how effectively the covers prevent water penetration.



CAPPING IT OFF — A heavy equipment operator levels dirt during application of a final, topsoil layer of a demonstration landfill cover in Area 3. The work is being done as part of the Alternative Landfill Cover Demonstration project being conducted by Sandia for DOE.

★ Congratulations

To Cathie (10231) and Mike Stropki, a daughter, Nakita Maria, Sept. 20.

To Nancy Rodarte (10248) and David Martinez, married in Albuquerque, Aug. 26.

🤝 Welcome

New Mexico — Samuel Bono (12670), Thomas Chavez (1822), Victor Echeverria (5848), Joan Hezlep (12670)

Sense of urgency drives Sandia's involvement in assistive technologies

By Bill Murphy

Lab News Staff

"There's a real sense of urgency here," says A. Keith Miller, Manager of Special Projects 9818. Keith is explaining Sandia's role in developing assistive devices for the disabled while Sandia engineer Gordon Groves (2631) demonstrates a high-tech wheelchair seat designed to eliminate the pressure ulcers that are a serious and chronic problem for the wheelchair-bound.

The prototype seat, which Gordon, Mark Vaughn (9818), and Ed Constantineau (9812) are developing along with industry partner Numotech, uses a microprocessor controller to sequentially inflate and deflate different parts of the seat cushion. This "active" seat shifts a user's weight around so that not too much pressure is exerted on any given point for an extended period. Numotech, a small Sun Valley, Calif., firm, had already developed a bulky version of the seat, which has been shown in clinical settings to cure decubiti ulcers — the pressure sores caused by long periods of immobility — without surgery.

Now, Numotech and Sandia are refining the concept to create an active seat for everyday use. The new, improved version not only cures pressure sores, it is expected to prevent them from ever forming.

The urgency of the Sandia work in this arena comes from two sources, Keith says.

"Certainly, there's a personal sense of



PRESSURE-FREE — Gordon Groves (2631, left) and Mark Vaughn (9818) and make adjustments to an "active" wheelchair seat designed to reduce or eliminate the incidence of pressure sores that afflict the wheelchair-bound.

urgency," Keith says, "especially after you've visited a hospital or a long-term care facility. You see a problem that needs to be addressed, and you know it's within your grasp to solve it. That's a great motivator."

Also, Keith says, partnering with Numotech has injected a sense of urgency from a business perspective, as well. "You're dealing with a product that may have a great influence on a company's fortunes," Keith says. "That colors the way you think about the project."

Gordon adds, "Working with industry, you learn pretty quickly that you don't have three or four years to solve a problem; you've got to get it done yesterday or someone else will beat you to the marketplace."

Keith and Gordon are among a group of Sandians involved in an initiative that applies the Labs' multidisciplinary capabilities to the development of assistive devices for people with disabilities.

Assistive technologies: those are high-

falutin' words for something that can be as mundane as a pair of eyeglasses or as complex as a voice-operated computer control system.

The term is a recent one, coined during the drafting of the Americans with Disabilities Act; simply put, it means any equipment that is used to restore function that can't be re-acquired through normal healing and rehabilitation.

Other technologies have potential

The wheelchair seat isn't the only assistive technology Sandia is developing. Over the past few years, for example, Sandia has developed several technologies — sensor, materials, and wireless communications — that can be combined in a compact device that monitors an individual's physiological vital signs such as pulse rate, respiration, blood oxygen content, orientation, activity level, and impact/fall events.

Through the use of such a device, a patient recovering from illness at home can be in real-time continuous communication with a physician or nurse.

"Patient 'panic buttons' have been around for a while," Keith says, "but the experience with them is that, if people use them once or twice in situations that turn out to be false alarms, they tend not to use them again, even in a real emergency. The smart distress monitors we're developing will alert a health care professional of a problem without the intervention of the patient. We think it has the potential to save a lot of lives."

Sandia's world-leading capabilities in batteries, photovoltaics, and a number of other technologies are finding application in a variety of assistive technologies. (See "Labs' technologies enhance assistive devices.")

Sandia became formally involved in assistive technologies about two years ago, Keith says. "At that time," he recalls, "we were being encouraged to find areas where our talents could help meet critical national needs in non-defense areas. It turns out there is a perfect match between many of our weapons technologies and the kinds of capabilities needed in developing assistive devices."

"In our weapons work, we need ultra-high reliability; so do assistive devices. We need ultra-high quality; so do assistive devices. We

(Continued on next page)

Many agencies working in assistive technologies

Sandia's work in assistive technologies stems primarily from its involvement in the Technology Reinvestment Program, an Advanced Research Projects Agency (ARPA) initiative. The program was established to help small defense contractors make the transition into non-defense work through the commercialization of defense-related technologies, including DOE defense technologies.

As part of the reinvestment program, ARPA, in association with DOE Defense Programs and the State of New Mexico, instituted the New Mexico Technology Deployment Pilot Program (NMTDPP), which was conceived by John Bode (5009) and Gary Adamson at the University of New Mexico. That program, in turn, spawned the Assistive Technologies Research Alliance, or ATRA. ATRA links assistive technology product developers and entrepreneurs with technologists, investors, policy makers, and consumers and assists in determining customer needs and finding new product ideas, new technologies, and funding sources.

The NMTDPP participants — the University of New Mexico, Sandia National Laboratories, and Laguna Industries, Inc. — are actively coordinating and developing partnerships within ATRA. The ARPA portion of the program is managed by Celdon Aragon of DOE's Albuquerque Operations Office through a cooperative agreement with UNM.

Labs' technologies enhance assistive devices

A series of focus groups conducted by the New Mexico Technology Deployment Pilot Program identified some 300 assistive technology products (so-called Consumer-Identified Products, or CIPs) that have marketplace potential. These products range from sensors on wheelchairs to avoid obstacles, to stain-proof bedsheets, noiseless Velcro, and voice-controlled cellular phones.

From among the list of CIPs, a group of Sandians identified a "top ten" list of Sandia technologies with a potential for near-term assistive products. Here's the list, along with a few possible applications:

- (1) Tagging and tracking technologies — personal ID system to interact with environmental control; personal authentication system; personal locator system
- (2) Power systems for mobility — powered wheelchairs and scooters
- (3) Indoor photovoltaic technology — talking signs; emergency flashers; relay systems for individual emergency alerting

devices

- (4) Digital signal processing and electronic systems design — voice-controlled cellular phone; voice-controlled portable intercom

- (5) Materials and design — walkers; gurneys; wheelchairs

- (6) Wireless digital communication technologies — individual bar code scanners; remote communications between computers

- (7) Command and control technology — programmable universal interface device for environments and appliances

- (8) Mechanism design and analysis capabilities — transmissions and mechanism designs for improved manual wheelchairs; gripping and manipulation device design; structural analysis and reliability improvement (mobility and prosthetics)

- (9) Robotics technologies — design and control of "third hand" mechanisms

- (10) Virtual reality technologies — independent living training; patient assessment

Ship fires

(Continued from page 1)

regulatory bodies such as the International Atomic Energy Agency (IAEA).

Although the technical issues associated with accident scenarios in overland cask transport — typically by truck or rail — have been the subject of years of Sandia testing, the issues associated with sea transport are not as fully explored, says test director Joe Koski of Transportation Systems Dept. 6642.

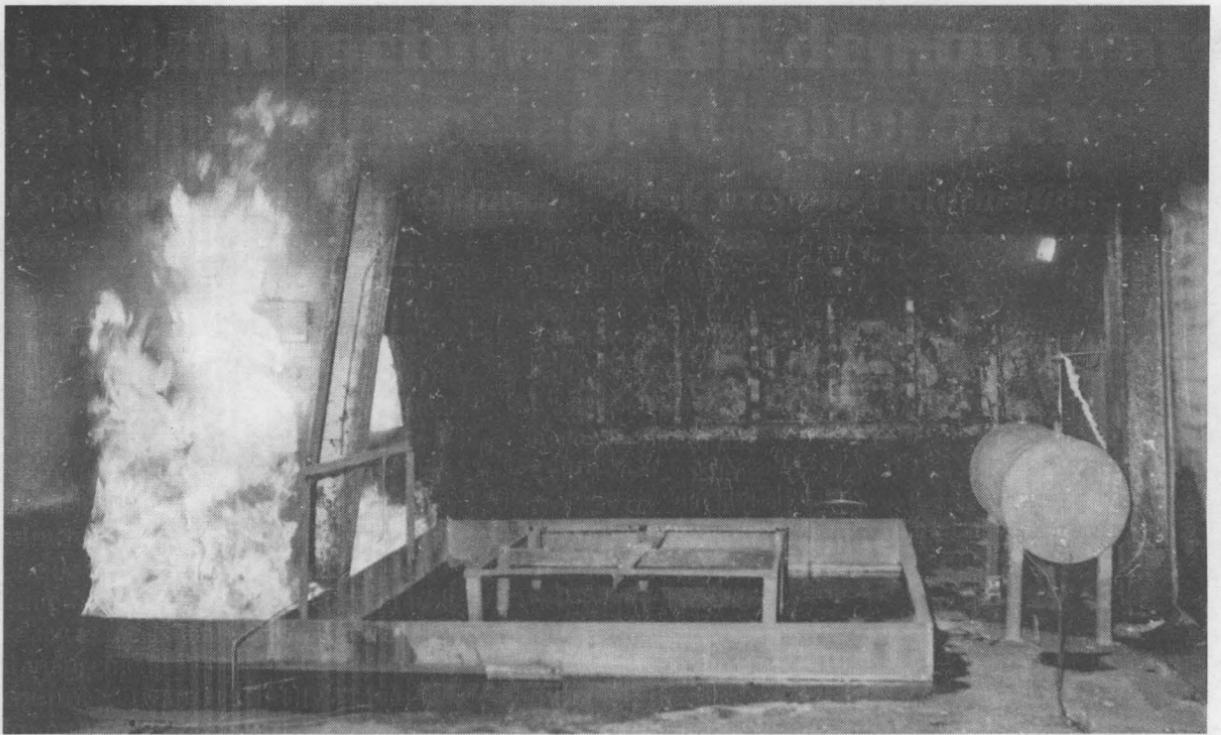
In land transport, he explains, likely worst-case scenarios involve a collision between a cask-carrying truck and a tanker truck or a rail tank car, with the cask ending up in a burning pool of flammable liquid.

In sea transport, however, accident scenarios and their corresponding technical issues differ significantly. Because international regulations prevent shipping radioactive materials in the same ship hold with flammable cargoes, a hold fire would involve flames adjacent to the cargo or in another hold. Also, fluid dynamics inside a cargo hold would differ from those in a pool fire.

"We're interested in measuring how heat transfers to the cask by the normal modes — convection, conduction, radiation — and in understanding flow patterns and thermal radiation within the room geometry of the cargo hold," he says.



IN PREPARATION for cargo hold tests, Jeff Bobbe (left) and Mike Arvisó (both 6642) install thermocouples on Sandia's simulated nuclear material transport cask, a five-ft-long, two-ft-diameter steel pipe. (Photo by Diana Helgesen, 2732)



ONE OF FOUR blazes set by Sandians, this one a hydrocarbon spray fire meant to approximate an engine room fire, heats up a nearby simulated nuclear material shipping cask. (Photo by Diana Helgesen, 2732)

The tests took place inside *Mayo Lykes*, a World War II-era cargo freighter located at the Coast Guard Fire and Safety Test Detachment on Little Sand Island in Mobile Bay, Ala.

To take the measurements, the Sandia researchers placed calorimeters simulating casks in the ship's hold and in an adjacent hold. Then they set four fires — two hydrocarbon (heptane) spray fires and two wood ("crib") fires — and recorded thousands of readings.

The ultimate goal is to compare thermal transfer data gathered during the tests to expected figures arrived at by Sandia computer models. The comparisons will take several months but should tell researchers whether the computer models are accurate predictors of thermal behavior given the cargo hold's geometry. If so, then the Sandians will be able to use the models to predict thermal

transfer in a variety of other geometries and accident scenarios.

"We are providing thermal data that can be used to refine SeaRAM's engineering models," Joe says. "That should help engineers provide more accurate, credible analyses."

Because *Mayo Lykes* was being readied for salvage, the Coast Guard asked Sandia to avoid going above 1000 degrees F. "They wanted to make sure they could still tow her away," he says.

In return, the Coast Guard will have access to the data gleaned from the tests. "They're interested in engine room fires also, but for crew safety and fire fighting reasons," he says.

During the week of the tests, Sept. 11-15, some 10 Sandians and 20 visitors from various regulatory agencies — all members of the nuclear materials transportation community — were on-hand to witness the first-of-a-kind tests. Included were several foreign visitors representing the IAEA and foreign companies.

In coming years, as DOE continues to fulfill its obligation to various foreign countries by accepting spent reactor fuel back into the US for reprocessing, adds Joe, nuclear materials transport by sea likely will become an increasingly critical issue to DOE and the nation.

"The US agreed to take back US-origin reactor fuel from countries like Taiwan," he says. "The time has come to return those fuels to the US, and it'll have to be transported on ships."

Assistive devices

(Continued from page 9)

need agile manufacturing capabilities; so do assistive devices — each individual's needs are slightly different."

Stigma may lessen as population ages

"There's always been a stigma associated with having a disability or with using an assistive device," Keith says. "That's one of the reasons I'm especially pleased to be involved with Disability Awareness Month. I think it will help all of us recognize some of the biases we have toward people who need functional help. It may help us realize, after all, that a majority of us here at Sandia actually use assistive technologies every day. Many of us literally couldn't do our jobs without eyeglasses, and that's a very basic assistive technology.

"I really think the stigma is going to die as

the number of people who need assistive technologies continues to increase — and that number is increasing rapidly for a number of reasons."

Among them:

- As a result of improvements in medical care, people who in years past would have died after illnesses and accidents now survive in increasing numbers. These people often do not recover full physical functionality. They require assistive technologies.

- Medical science is keeping low-birth-weight babies alive who in years past would not have survived birth. Statistically, these children are much likelier than the general population to develop multiple disabilities earlier in their lives. They require assistive devices.

- People are living longer, contributing to a generally aging population.

In 1960, 7 percent of the US population was aged 65 and over; today, that number is doubled — 14 percent — and by the year 2000, more than 20 percent of the population — 1 in 5 Americans — will be older than 65.

This aging population, Keith says, is growing older with a new set of expectations: they expect to stay active; they expect to be able to continue to contribute in the workplace and the community far longer than their parents or grandparents.

"In fact," Keith says, "I think you'll see that the generation now approaching 65 will demand an active life; they'll demand technological solutions to the functionalities they lose as they grow older.

"The potential interest in new assistive technologies is immense," Keith says. "The key to all of this, though, is cost and effectiveness. We have to learn to engineer better devices and we have to learn to do that more efficiently than ever before. I think we are seeing the beginning of that capability right now at Sandia."

Editor's note: October is Disability Awareness Month at Sandia. This article is the second in a series intended to heighten Sandians' awareness of issues around disabilities in the workplace, the home, and the community.

Sandia Classified Ads Sandia Classified Ads Sandia Classified Ads Sandia Classified Ads

MISCELLANEOUS

RIFLE, Ruger 77/22, 4X scope, sling, extra magazines, excellent condition, \$300. Ard, 299-0863.

INSULATION, fiberglass, new, R-19, 75 bats, 15" x 6" x 94", \$90 OBO. Ghormley, 293-6466.

GARAGE SALE, Oct. 14-15, 8 a.m.-3 p.m., 134419 Reo Road N.E., furniture, clothes, household items. Hubbard, 293-2819.

EXERCISE STEPPER, nearly new, electronic, \$50. Kallio, 856-1350, leave message.

'86 GUITAR, Gibson Les Paul standard electric (made in Nashville), \$450. Cerutti, 254-0799 or 292-0186, ask for Steve.

LANDSCAPE ROCK, 1-1/2" gray rock, free. Scott, 294-4240.

REFRIGERATOR, Whirlpool, icemaker, like new, white, \$300. Romero, 821-3113, after 5 p.m.

FREEZER, G.E., 14 cu. ft., white, only used 2 wks., \$300 OBO. Atkins, 266-3082.

WINDMILL, 6-ft. diameter Aeromotor, 31-ft. galvanized tower, rods, new 3-in. cylinder, two 1,100-gal. Kohlhaas tanks, tank tower. Conklin, 847-2280.

WOMAN'S JACKET, Overland sheepskin shearing, petite size, worn very little, paid \$700, asking \$450 OBO. Babcock, 299-3121.

GUITAR, Ibanez, solid maple, electric, 24-fret rosewood fingerboard, hard case, excellent condition, \$400 OBO. Manginell, 296-7961.

UPRIGHT PIANO, good condition, \$300 OBO; violin, full-size, \$95. Nguyen, (510) 443-6562.

LAWN SWEEPER, Craftsman, \$45 OBO; ClarisWorks V2.1 PowerMac native software for Mac, \$60 OBO. Poulter, 291-0607.

WOOD STOVE, Totul, heats 1,500 sq. ft., \$200. Stewart, 281-7906.

WELSH SPRINGER SPANIELS, AKC lines, 8 wks. old, tail block, dew claws, 1st shots, 3 males, \$450 ea. Dobias, 856-7841.

PUPPIES, 7 wks. old, Samoyed-lab mix, male and female, free. Moffat, 281-8230.

HUMMEL FIGURE COLLECTION, pre-'60s, some rare, call for description and price. Robbins, 823-2492.

DAYBED, white, new mattress, no trundle, \$150; treadmill, electric Vita-master 325P, monitors time/speed/distance, \$75. Kelly, 821-9680.

CAMPER SHELL, fiberglass, custom top, fits small truck w/6-ft. bed, w/carpet for floor of bed, \$250. Bronkema, 291-1323.

FUR COAT, Norwegian blue fox, \$800; kitchen table w/2 leaves, 6 swivel chairs, \$225; microwave, \$45. Jogi, 275-3542.

KERO HEATER, Aladdin, \$60; Bollinger row machine, \$40; old-style home AM/FM, \$50; greenhouse trees, \$10-\$20. Crafts, 831-5234.

DINING ROOM TABLE, oak, contemporary, 4 chairs, 1 leaf, excellent condition, \$800. Yourick, 822-8148.

LIQUID OXYGEN SYSTEM, complete \$100; treadmill, Sears, \$125; bathroom door, \$10 OBO. Singleton, 299-1613.

COMPUTER, 386, co-processor, 40 & 120MB HD, VGA color, 2MB ram, DOS 6.21 & Win 3.1 software. Schone, 821-2944.

FORMULA RACE CAR BED, twin, w/mattress, \$200 OBO. Soltau, 823-9673.

KING-SIZE SHELF HEADBOARD, Ethan-Allen, \$150; Westinghouse stove/oven, \$45; Fisher Price picnic table, \$25. Newman, 266-6928.

RECLINER, 2 months new, blue, paid \$269, asking \$169; solid oak desk, 5'4" long, \$100. Kovarik, 897-2188.

COCKTAIL RING, round fire opal, surrounded by 10 smaller fire opals, 14K, size 5-1/2, lovely, \$350. Anderson, 296-3352.

CHILD'S WOODEN ROCKING HORSE, old-fashioned style, sturdy, good condition, \$35. Hartwig, 298-5048.

COUCH, tan, good condition, \$50; Goldstar computer, printer, floppy drive, \$300. Vigil, 345-9590 or 344-2454.

REEL-TO-REEL TAPE RECORDER, plus more than 50 tapes, \$50. Ginn, 265-1948.

BEDROOM FURNITURE, maple, queen/full headboard, frame, queen mattress set, chest, dresser/mirror, great condition, \$600. Ortiz, 869-3278.

TWO END TABLES & one coffee table, \$25. Campbell, 888-3135.

LAWN MOWER, electric, 18-in., side discharge, excellent condition, \$40. Vigil, 271-1328.

MACINTOSH POWERBOOK 170, portable, great for students/home use, w/fax/modem, \$925 OBO. Miller, 856-7271.

EPSON PRINTER, F86e, good condition, \$20. Nist, 293-6229.

APPALOOSA SPORT HORSE, large yearling gelding, flashy, athletic, super disposition & bloodlines. Conner, 281-9370.

TIRE CHAINS, fit 185/70R14, 195/70R14, other sizes, \$25; will trade, need chains for P215/75R15 tires. Brosseau, 856-7894.

SHOTGUN, Miroku "Charles Daly", 20-gauge, 3-in., over & under, 26-in. barrel, \$450. McAvoy, 822-8853.

ROWING MACHINE, Vitamaster Stowaway, new condition, \$40. Gentry, 298-3574.

BASEBALL CARDS, stars, commons, inserts, mostly Topps '60-'75, others available, 20-50% off Beckett. Holloway, 294-5815.

AT&T 6200 COMPUTER, w/40MB hard card and monitor, \$250 OBO. Iman, 856-6500.

CARVING KNIFE, Hamilton Beach, battery-operated, never used, \$25 OBO. Liguori, 256-3613.

HANDGUNS, AMT backup, .380ACP, 3 mags box & manual, \$225; FIE, .380ACP w/manual, \$185. Salmen, 881-8612.

BUNK BEDS, sweetheart design, \$500. Carter, 294-3267.

MORRIS CHAIR, 1910 carved oak, original finish, cushions, wheels, 34"D x 30"W x 41"H, \$160. Dybwad, 296-9047.

BUNKBEDS, heavy pine, w/mattresses & comforters, \$195; blue swivel rocker/ottoman, \$125; all like new. Dunivan, 296-3937.

UPRIGHT PIANO, Stark Bros., good condition, \$500 OBO; occasional chair, avocado velour, \$100 OBO. Ricker, 296-2191.

SHOW BARS, black w/2chrome lights, fits mini-truck, \$50. Montavon, 343-1961, after 5 p.m.

FILL DIRT, free for the hauling, 200-300 yards available. Dreike, 299-6670.

TOPPER SHELL, white fiberglass, w/tinted windows, sliding-boot window, fits Dodge Ram 50 pickup, \$500; alto saxophone, \$400. Knowles, 856-5987.

HOT TUB, for 5 people, Cal Spas, \$2,500 OBO. Hunter, 865-5745, after 7:30 p.m.

UPRIGHT FREEZER, Sears, 12 cu. ft., not frost-free, \$100. Quinn, 296-7743.

"BILLING CLERK" SOFTWARE, for billing, invoices, accounts receivable, cost \$140, asking \$50 OBO. Hall, 298-8617.

WATERBED, pedestal-style, 6 drawers, bookcase headboard, pine, walnut stain, California king, complete setup, \$50. Leger, 880-0434.

FIREWOOD, free, cutting permit for downed trees, only 15 miles from base, pinon, cedar, oak, while it lasts. Atkins, 298-5762.

ROWING MACHINE, Precor 6.2, like new, \$125; headboard/queen-size bed, bookcase style, w/caning doors, \$50. Hansen, 883-7137.

WASHER, Maytag, great condition, \$75; Panasonic answering machine, time/date stamp, \$50; starter dinette set, brass/glass, \$20. Hoke, 292-4823.

UTILITY TRAILER, heavy-duty, 2,000+ pound capacity, bed-size, approx. 8' x 3', \$400. Greer, 281-4688, leave message.

CROSSWALK TREADMILL, w/arm exercise, like new, \$250; weight bench w/legs & butterfly, w/165# steel weight set, \$100. Ludwigsen, 294-7076.

GARAGE SALE, Oct. 21-22, 4734 Tierra Encantada NE, multiple family possible, some power tools. Ayers 888-8922.

WASHER & DRYER, Kenmore, heavy-duty, large-capacity, looks/works great, \$300. Parry, 884-7934.

STORM DOOR, Sears, metal w/screen insert, 36 in., \$55. Chorley, 296-1454.

YARD SALE, Sat. Oct. 14, 9 a.m., furniture, toys, clothes, more, 11304 Holly Ne (Paseo del Norte/Eubank). Bentley, 856-7661.

OAK DINING ROOM SET, 5-piece, 60" x 42" table, light brown cushions, excellent condition, \$475. Adelman, 899-8699.

CUTTING/CRAFT TABLE, w/mat, 39" x 72" x 34", 1 drawer, folds to 18" x 39", \$100. Breeze, 275-9002.

FURNACE, woodburning forced air, \$75; Yashica SLR camera & 400mm lens, \$90; couch, \$45. Rector, 286-1217.

'76 TRAILER, 4' x 7', fully enclosed, U-Haul-style, w/locking doors, \$200 OBO. Haulenbeek, 839-4092.

WASHER, Kenmore, \$75; Class III receiver hitch for Chev. truck, \$50. Galle-gos, 293-5634.

GOLF BALLS, all brands & colors, like new, 4 for \$1; golf clubs, Tour Model II, 3-SW irons, \$100. Dwyer, 271-1328.

SMALL REFRIGERATOR, Kenmore, 14 cu. ft., white, \$65. German, 883-7002.

DEADLINE: Friday noon before week of publication unless changed by holiday. MAIL TO Dept. 12622, MS 0413, or FAX TO 844-0645. You may also send ads by e-mail to Nancy Campanozzi (nrcampa@sandia.gov). Questions? Call Nancy on 844-7522.

Due to space constraints, ads will be printed on a first-come, first-served basis.

Ad Rules

1. Limit 18 words, including last name and home phone (We will edit longer ads).
2. Include organization and full name with the ad submission.
3. No phone-ins.
4. Use 8 1/2-by 11-inch paper.
5. Type or print ad; use accepted abbreviations.
6. One ad per issue.
7. We will not run the same ad more than twice.
8. No "for rent" ads except for employees on temporary assignment.
9. No commercial ads.
10. For active and retired Sandians and DOE employees.
11. Housing listed for sale is available without regard to race, creed, color, or national origin.
12. "Work Wanted" ads limited to student-aged children of employees.

GAME GEAR, w/4 games, adapter, w/carrying case, excellent condition, \$80. Anderson, 897-2772.

TRANSPORTATION

'69 FIREBIRD, convertible, 2-dr., V8, 350 AT, \$4,700 OBO. Padilla, 831-8763.

'85 TOYOTA PICKUP, kingcab, SR5, campershell, bedliner, AC, 39K miles, new tires, excellent condition, \$5,500 firm. Bullen, 281-0142.

'91 CHEV. BERETTA, red, excellent condition, sunroof, 49K miles, AT, AC, new tires, 31 mpg, \$7,500. Shoemaker, 869-2775.

'92 TOYOTA CAMRY LE, 44K miles, spotless/clean, new tires, PWR package, antitheft system, \$13,500. Coconelli, 293-1304.

'89 SENTRA, 2-dr., 4-sp., equipped for tow car, \$2,500. Yingst, 835-0749.

'88 MERCURY TRACER, good gas saver, new battery/tires, spotless, low mileage, must see, \$4,000. Rael, 884-4778.

'95 SUZUKI SWIFT, set up for towing, AC, under 6K miles, \$7,995. Seamster, 275-2644.

'66 CORVETTE, coupe, 327/350-hp, Nassau blue, blue interior, K.O.'s, 4-sp., AC, NCRS top flight award, \$35,000 firm. Cerutti, 299-4658, ask for Brian.

'86 CHEV. CAMARO Z-28, 5.0L, 4-sp., AT, T-tops, AC, fully loaded, luxury cloth, nonsmoking, extremely clean, 63K miles, \$7,900. Eberhard, 828-2541.

JEEP CHEROKEE LIMITED, 4x4, 6-cyl., AT, loaded, excellent condition, 4-dr., leather, 55K miles, \$19,200. Heinstein, 837-1675.

'84 TOYOTA 4RUNNER, 4x4/SRS, AC, PS, PB, PW, 2-dr., 4-cyl. standard, high mileage but good condition, \$5,500 OBO. Branscombe, 881-4589.

'76 FIAT 28X, hard-top convertible, 4-cyl., good transportation, \$850. Guinn, 898-9339.

'82 FORD PICKUP, 3/4t supercab longbed, 351 V8, AT, PS, PB, white, good condition, 85K miles, \$3,550 OBO. Pritchard, 293-5297.

'90 FORD PROBE GL, excellent condition, PB, PS, AC, AM/FM cassette, \$6,300 OBO. Tafoya, 899-0228.

'85 HONDA CIVIC, 4-dr., 5-sp., 96K miles, runs great, very reliable, \$2,000. Blankenship, 296-9580.

'73 TVR, 2500M, rebuilt engine w/Webers, green w/tan interior, new BFGS, \$5,500. Yamanaka, 899-4327.

'88 FORD BRONCO II, 2WD, PS, PB, standard 5-sp., AC, Alpine sound system & alarm, clean, \$4,000. Armstrong, 888-1887.

'85 CHEV. CELEBRITY EUROSPORT, 4-cyl., tan, 2-dr., AC, PS, cruise, good tires/mileage, \$2,500. Pounders, 864-2902.

'92 FORD TEMPO, 4-dr., AT, PS, PB, FWD, DS airbag, beige, excellent condition, below NADA, \$6,000. Romero, 869-5610.

'95 DODGE DAKOTA SPORT PICKUP, 12K miles, 4-cyl., 5-sp., AC, AM/FM cassette, \$10,500. Sands, 865-0861.

'78 CHRYSLER CORDOBA, V8, AT, AC, PS, PB, cruise, tilt, AM/FM cassette, PW, 33K original miles, \$6,000. Baca, 877-1136.

'77 FORD LTD, 4-dr., green, 59K original miles, inherited, excellent condition, V8, all power, \$2,450. Honest, 832-6046.

'89 DODGE CONVERSION VAN, 37K miles, 318 V8, trailer hitch, large gas tank, loaded w/extras, excellent condition. Romero, 271-4774.

'86 FORD RANGER PICKUP, navy blue w/blue striping, 5-sp., AC, AM/FM cassette, 95K miles, \$2,000 OBO. Gaylord, 869-3744.

'87 FORD ESCORT, AT, AC, AM/FM stereo w/cassette, 75K miles, reliable, excellent gas mileage, \$3,000 OBO. Conaway, 857-0688.

'94 DODGE RAM PICKUP, loaded, alarm, camper, carpet kit, many options. Crawford, 247-9638.

'85 JEEP CHEROKEE LAREDO, 4x4, midnight blue, exceptional condition, engine has 14K miles, everything perfect, \$3,500 OBO. 858-0828.

'83 PLYMOUTH RELIANT, AT, fully loaded, runs well, body good condition, \$1,500. Aubert, 296-4173.

'88 SUZUKI SAMURAI, 62K miles, 4x4, 5-sp., one owner, maintenance records, w/snow tires, book price \$4,225. Mora, 281-9815.

'90 SUBARU LEGACY GSW, AT, all power options, 92K highway miles, \$6,900. Barnette, 281-2154.

'88 TOYOTA, 4x4, extracab, V6, AC, CD, bedliner, 102K miles, original owner, covered, absolutely mint condition, \$8,795. Dobbs, 899-1665.

'95 ACURA LEGEND, 4-dr., white, CD, keyless entry, 4-yr./50K mile bumper-to-bumper warranty. Spray, 884-8453.

'87 SUZUKI SAMURAI, convertible, 90K miles, 4x4, American racing wheels, good shape, \$2,900. Kovacic, 256-9867.

'87 DODGE CARAVAN LE, V6, EFI, AT, AC, PW, PL, gunmetal blue, well maintained, below book, \$4,900. Kerschen, 821-2848.

'86 TOYOTA 4RUNNER, new engine, CV joints, runs great, SR5 package, must sell. Roybal, 296-8493.

'92 GEO METRO, red, sport hatchback, excellent condition, 5-sp., AC, new tires, AM/FM cassette, 30K miles, \$4,500. Halbgewachs, 268-1584.

'82 PORSCHE 911SC TARGA, mint, new top, tires, paint (Guards Red), \$17,000. Wright, 856-6923.

'83 SAAB 900, turbo, 4-dr., 5-sp., 66K miles, sunroof, AC, immaculate, \$3,900. Ross, 299-3023.

'68 GMC, black w/red interior, \$3,600; '86 Buick, red; both excellent condition. Archuleta, 877-5806.

'65 CLASSIC MGB, convertible, new paint (red), electric overdrive, 2 tops, excellent throughout, \$8,000. Stewart, 291-1311.

RECREATIONAL

MOTORIZED MOUNTAIN BIKE, 18-in. Rincon, 21-sp., grip-shift, Mitsubishi 2-cycle engine, works great. Paid \$750, asking \$500 OBO. Hesch, 299-1844.

BOY'S and girl's bikes, \$35 ea. Lee, 294-3483.

ROAD BIKE, Peugeot, 23-in. lugless frame, 12-sp., like new, \$125. Barlow, (505) 820-6845.

'90 MOTOR HOME, 34-ft., turbo-diesel pusher, 230-hp, 6-sp. World Alison transmission, must sell, health reasons, \$68,000. Padilla, 864-4787 or 873-5847.

'79 MOTOR HOME, low mileage, good tires, roof air, large closet, rear bath, sleeps 6, \$8,000 firm. Sifford, 869-3982.

'92 HARLEY-DAVIDSON, Heritage Softail, turquoise/creme, 71 original miles, lots of chrome, brand new condition, \$19,500. Lucero, 877-6878.

XC TOURING SKIS, 215cm, 3-pin bindings, \$60. Heffelfinger, 281-1733.

'82 HONDA CB 650, 10K miles, stored w/cover, chrome, best motorcycle in town, \$1,200. Stuppy, 875-6535, page John.

PICKUP CAMPER, 8-ft. Mitchell, icebox, 3-burner stove, 4 corner jacks, good condition, \$1,100 OBO. Martin, 296-8154.

'90 TRAVEL TRAILER, 24-ft. Jayco, rear island bed, radials, awning, equalizer jacks, TV antenna, monitor panel. Gehrke, 299-2817.

'85 FISH & SKI BOAT, Thunderbolt, 16 ft., 90-hp Johnson outboard, easy-load trailer fast, \$4,000. Whittet, 281-2216.

3 BDR. CABIN, sleeps 6, loft, 2 porches/views, completely furnished, Angel Fire, 1 wk. available before 11/19, \$175. Lagasse, 298-0977.

'78 MOTORHOME, Tioga Arrow, 21 ft., 360 engine, sleeps 6, AC, bunk beds in back, \$8,300. Long, 296-2590.

1-BDR. TIMESHARE, Los Abogados, Sedona, AZ, luxury resort/spa, sleeps 4, w/partial kitchen, available 12/31/95, 1/7/96, \$100/night or \$600/wk. Castillo, 294-5182.

REAL ESTATE

3-BDR. HOME, 1-3/4 baths, LR, FR, DR, beautiful neighborhood, Louisiana & Constitution, great condition, FSBO, \$137,500. Tomasi, 268-0919.

3-BDR. MOBILE HOME, 2 baths, affordable, luxurious model, double-wide, textured walls, cathedral ceilings. Miller, 831-4541.

4.19 ACRES, east Sandia mountains, Magic Valley, breathtaking views, water system, utilities, 20 minutes to Albuquerque, \$63,900. Gabbard, 294-6904 or (510) 833-1935.

3-4 BDR. HOME, 2 baths, 2-car garage, 2,580 sq. ft., open house Saturday, 10 a.m.-2 p.m., 1605 Georgia NE, \$179,900. Boverie, 255-1071.

4-BDR. HOME, 2 baths, LR, FR, sunroom w/hot tub, private yard, new stucco/carpets, N.E. Heights, 2,350 sq. ft., \$156,000. Dawson, 828-0873.

WANTED

MOUNTAIN BIKE, 18-sp., rapid-fire shifting, any extras would be great. Roybal, 296-8493.

HOUSEMATE, nonsmoker, male or female, to share N.E. Heights home, pets allowed, \$450/month plus utilities. Jensen, 837-1675.

HOUSEMATE, 11/1, share 3-bdr. home w/one young, professional male, UNM area, \$275/mo + utilities, nonsmoker. Hulett, 292-5762.

REFRIGERATOR, apartment or full-size, good/excellent condition. Montano, 821-1235.

WEED WACKER, heavy-duty, gas powered. Underhill, 294-5774, after 6 p.m.

HOME OR MORTGAGE, N.E. Heights area, will purchase, above-average property; long-hair Dachshund puppy. Brown, 883-7028 or 884-0345.

SHOP SMITH, older model, good condition at fair price. Aragon, 292-8883.

JEEP WHEEL, 15x7, factory chrome spoke, from Laredo package. Mulder, 294-5858, leave message.

GAME BOY, w/Tetris & other games. Matlock, 292-7997.

USED OBOE for high school band student. Bradley, 836-6650.

ENDOSCOPE or similar device for looking in auto combustion chambers. Prevender, 296-8586.

SINGERS AND MUSICIANS for a casual variety band. Dempsey, 281-9101.

YAKIMA BIKE, (SRL), ski attachments. Heffelfinger, 281-1733.

SMALL GASOLINE ENGINE, lawn-mower size, for use in high school class, prefer 4 stroke but will accept 2 stroke. Rima, 281-6918.

BABY JOGGER STROLLER. Jones, 877-9073.

POTTERY WHEEL, electric or kick. Graham, 294-0325.

WOODEN SHUTTERS w/mounting hardware to fit 3' x 6' window. Wilson, 255-1536.

CONDO, sleeps 6, Dec. 23-25, in Taos or Purgatory. Vandewart, 298-4741.

SOMEONE to repair old organ. Stefanov, 299-7009.

US NAVY MEMORABILIA, all types, sizes, etc. Fate, 293-2131.

HOUSE SITTING, by young married couple attending UNM graduate school, spring semester, details negotiable, referrals available. McGee, 299-0988.

LOST & FOUND

LOST: Gold diamond tennis bracelet, on Sept. 7, 802 vicinity, great sentimental value, reward offered. Harris, 844-7352 or 298-4756.

New senior health plan offers enhanced benefits for retirees

Lovelace Senior Plan replaces Lovelace Senior Options

Effective Jan. 1, 1996, the Lovelace Senior Plan (LSP) will replace the Lovelace Senior Options (LSO) plan for Sandia retirees 65 and older, and for any dependents of retirees who are Medicare eligible and who are currently enrolled in the LSO Plan. In return for assigning your Medicare benefits to the Lovelace HMO, LSP offers an enhanced level of benefits, including no limit on the number of prescription drugs.

Important: When you assign your Medicare Part A & B benefits to the Lovelace HMO, you are required to receive all your medical care through Lovelace (except for emergency and urgently needed care while temporarily outside of the service area).

Neither Medicare nor Lovelace will pay for routine medical services that are not provided or authorized by Lovelace.

Please note that you and any Medicare-eligible dependent(s) must have both Medicare Parts A & B to be enrolled in the LSP. If you and your Medicare-eligible dependent(s) do not obtain both parts, you and your Medicare-eligible dependent(s) will be dropped from Lovelace coverage altogether, and coverage will not resume until both Parts A & B have been secured. Also, you and your Medicare-eligible dependent(s) will not be eligible for coverage under the Triple Option Plan (TOP) unless you, the retiree, select this option during the Fall Open Enrollment period, to be effective the first day of the following calendar year. If you

do switch to the TOP during Open Enrollment, and you and your Medicare-eligible dependent(s) do not have Medicare Part A & B, the TOP will estimate what Medicare would have paid, and will pay only the appropriate secondary portion.

Open enrollment begins Oct. 20 and ends Nov. 9. If you are enrolled in the LSO plan, you are asked to review the Lovelace materials provided in your Open Enrollment folder. All retirees should have received their Open Enrollment packages via first-class mail the week of Oct. 9 at their home addresses.

If you are enrolled in the Lovelace Senior Options plan and you wish to be enrolled in the Lovelace Senior Plan, you do not need to change your election through the Open Enrollment Phone System. However, if you are enrolled in the Lovelace Senior Options plan and you wish to receive coverage under the new Triple Option Plan, you do need to change your election through the Open Enrollment Phone System. Also, if you are retired, or planning to retire, and will turn 65 during the next year, and you are in the Lovelace HMO, you will need to enroll in the Lovelace Senior Plan, beginning with the first day of the month in which you turn 65. Therefore, both you and your spouse, as you reach age 65, need to contact the Benefits Department at least three months prior to turning 65 to convert from the Lovelace HMO to the Lovelace Senior Plan.

Coronado Club

Oct. 13 — Friday night dinner/dance. \$7.95 all-you-can-eat buffet, 6-9 p.m. Music by Isleta Poorboys, 7-11 p.m.

Oct. 19, 26 — Thursday bingo nights. Card sales and buffet start at 5 p.m., early birds' bingo at 6:45 p.m.

Oct. 20 (Friday) — Kids' bingo night. Buffet, 5 p.m., with cartoons and movies. Bingo starts at 7 p.m. Free hot dog and soft drink for all kids playing bingo. Cost is \$2.50 for a bingo packet.

Oct. 22 — Sunday brunch buffet, 10 a.m.-2 p.m. \$7.95 adult members, \$8.95 guests, \$2.95 for children 4 to 12, free for children 3 and under. Music for buffet by Bob Weiler and Los Gatos, 1-4 p.m.

Oct. 27 — Friday night dinner/dance. \$7.95 all-you-can-eat buffet, 6-9 p.m. Music by Isleta Poorboys, 7-11 p.m.

Oct. 29 — Kids Halloween Party, \$1.50 per person, 6-9 p.m.; members only.

Nov. 2, 9, 16 — Thursday bingo nights. Card sales and buffet start at 5 p.m., early birds' bingo at 6:45 p.m.

Employee recognition nominations sought

For the third consecutive year, Sandians are invited to nominate colleagues and managers for Employee Recognition Awards. Nominations will be accepted from Nov. 1 through Dec. 1. The recognition awards program was instituted when Martin Marietta (Lockheed Martin) assumed management of the Labs in 1993. Formal programs to recognize employee achievements are a long-standing tradition among Lockheed Martin facilities.

Last June, more than 100 Sandians were recognized at a special awards banquet at the Albuquerque Marriott; a similar banquet for 1996 winners is scheduled for next May.

The Sandia Employee Recognition Awards program is intended to call special attention to superior results in four general categories: exceptional service; teamwork; technical excellence; and leadership. Any current Sandia employee may be nominated for any category in which he or she meets the criteria (which are listed on the nomination forms). Teams may be nominated, but are limited to 15 employees who are major contributors to accomplishments. Team nominations must specify a single name as team representative. Nominees must have been Sandia employees since Oct. 1, 1994; nominations must be for an accomplishment during FY95, between Oct. 1, 1994 and Sept. 30, 1995.

Nomination forms are available at all vice presidents' and directors' offices as well as from all personnel representatives. (Check with your organization secretary if you do not know the name of your representative.) Nomination forms will also be available on Sandia's Internal Web.

The primary requirement of the nomination process is that the nominee's achievements be described in 250 words or less. For each nomination, supplemental material supporting the achievement may be added. If included, this material may be a maximum of one page.

Benefits	Lovelace Senior Options (Current Plan)	Lovelace Senior Plan (Effective 1/1/96)
Prescription Drugs	\$5 for each prescription or refill, up to a 30-day supply or 100 units, whichever is less. Maximum of 20 prescriptions/year	\$5 for each prescription or refill, up to a 30-day supply or 100 units, whichever is less. No limit on the number of prescriptions/year
Inpatient Services	\$100 per admission	No copayment
Hospital Services	Unlimited days	Unlimited days
Outpatient Care	\$75 copayment	\$20 copayment
Outpatient surgical services		
Urgent Care	\$10 per visit Lovelace facility only	\$10 per visit Available outside the service area (within the US)
Mental Health Services		
Inpatient	\$100 per admission	No copayment
Outpatient	Limited to 20 visits per contract year with \$5 copayment per visit	Unlimited visits per contract year with \$5 copayment per visit

This table lists only the differences in those benefits that are being enhanced through the Lovelace Senior Plan. For a complete description of benefits, refer to the Lovelace materials in your Open Enrollment folder.

Sandia News Briefs

Sandia technology aids Virgin Islands in hurricane relief effort

Sandia is assisting in relief efforts to the US Virgin Islands in the aftermath of Hurricane Marilyn. Fifteen solar-powered systems are being shipped this week from Sandia to St. Thomas. The systems being sent to the Virgin Islands have been stored at the Navajo Tribal Utility Authority (NTUA) in Fort Defiance, Ariz. The NTUA agreed to make the systems available for relief efforts to the people of the Virgin Islands.

Each unit consists of a cabinet the size of a refrigerator and weighs approximately 430 pounds. Originally designed as residential systems, it is anticipated that they will be used to supply interior lighting or to run applications such as computers or radio service. The 200-watt collector on each system can provide about one kilowatt-hour of electricity per day — enough to power five 20-watt fluorescent bulbs for 10 hours or to run a computer or ham radio for five to seven hours. Sandia is also including two small solar ovens in the shipment and technician support to assist in installation.

Send potential Sandia News Briefs to Lab News, Dept. 12622, MS 0413, fax 844-0645.