

'Vibrafuge' Gives Added Capabilities for Weapon/Space Component Tests

Traveling at several thousand miles per hour, a reentry vehicle from a missile enters the atmosphere and begins to decelerate. As the air thickens, the decelerating force rises to many times that of gravity. The deceleration pulls at every component of the RV and the warhead it carries, threatening to find any weakness, any flaw of design, and cause a failure.

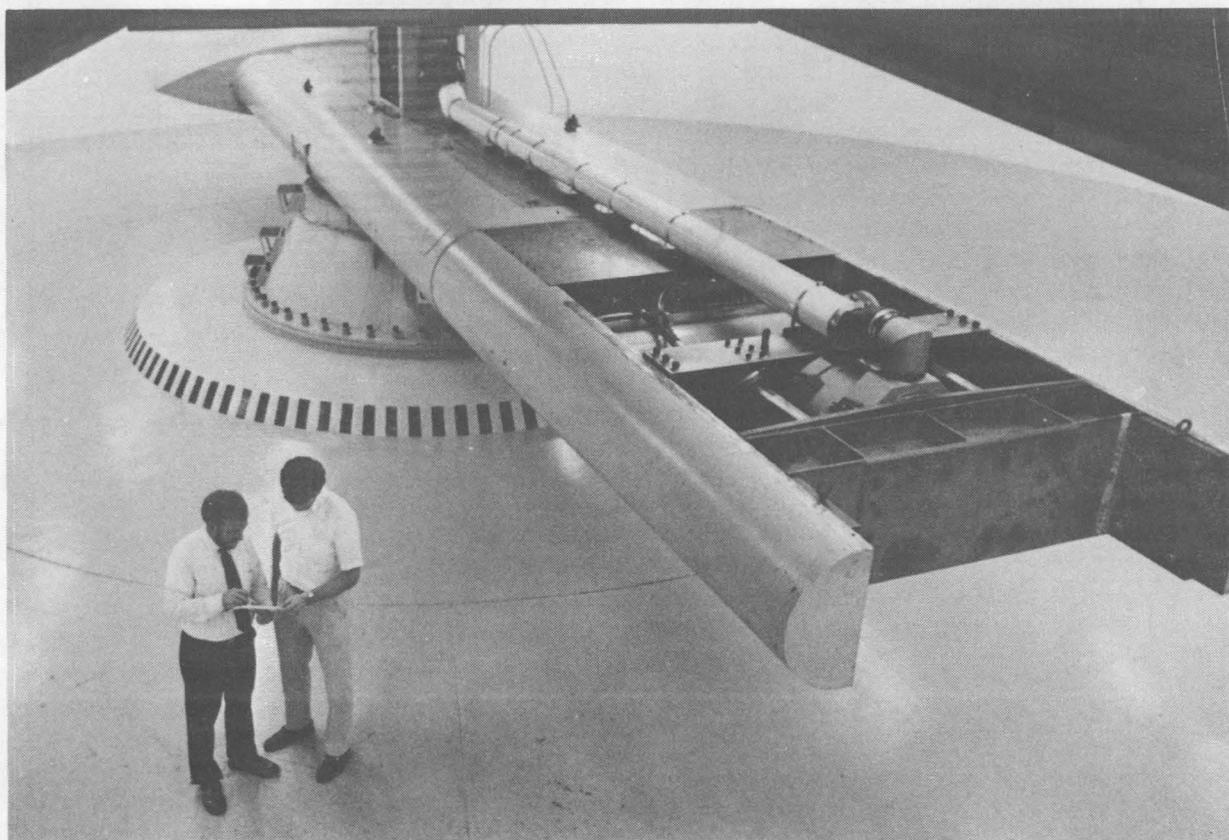
At the same time, the buffeting of the air makes the RV and everything in it vibrate. Again, the vibratory forces may be many times that of gravity. And again, any flaw of design or manufacture could cause a major failure.

How can we know that critical components, electrical and mechanical, will survive? Particularly, how can we know *before* we have designed all the components, assembled them, and flight-tested the whole system? (That's an expensive time to start remedying design problems.)

For decades, on-the-ground tests have simulated what a component must endure if it is to function reliably. And for decades, the nation's testing capabilities have been gradually improved, to further increase confidence that our weapon and space hardware will function as intended. In the case of nuclear weapons, tests can help confirm that a weapon will not detonate prematurely, even in accidents such as an aircraft crash.

A significant improvement in Sandia's component-testing capabilities — and a corresponding increase in the confidence our nation can have in its weapons and space hardware — occurred with the recent completion of the "vibrafuge," which simulates the combined acceleration and vibration of reentry from space, a missile launch, or a hard turn in an aircraft.

Like the ultimate carnival ride, the vibrafuge can give weapon and space components a centrifugal



DAVE SCHAFER (7531, left) and Jon Rogers (7544) discuss details of the vibrafuge's performance. The shaker that provides the vibration is partly visible as a cylinder near the end of the centrifuge arm. The white pipe along the top of the arm carries cooling air to the shaker.

whirl at 50 times the force of gravity, adding another 50 g's of vibration in either of two directions.

Spin and Shake

Sandia has long been able to conduct vibration and acceleration tests — but usually separately. Now

the vibrafuge — a term coined by Tom Lane, manager of Experimental Mechanics Dept. 7540 — allows both tests simultaneously, on components weighing up to 18 pounds. (That's the weight of the component plus any test fixtures, for a test at 50 g's acceleration; the weight can be greater for lower acceleration.)

The vibrafuge applies new concepts that simplify its design, make it convenient, and promise high reliability. It will be used for testing Sandia-developed hardware and (on a reimbursable basis) that of other agencies.

The vibrafuge consists of the 29-foot-radius centrifuge operated in Area III by Dynamic Loads and Facilities Development Div. 7531, with a shaker added by Experimental Mechanics Divs. 7542 and 7544, plus a right-angle fixture invented and devel-

(Continued on Page Six)



LAB NEWS

VOL. 41, NO. 6 SANDIA NATIONAL LABORATORIES MARCH 24, 1989

'Monumental Effort'

Spare-Time Author Ron Iman Publishes Major Statistics Text

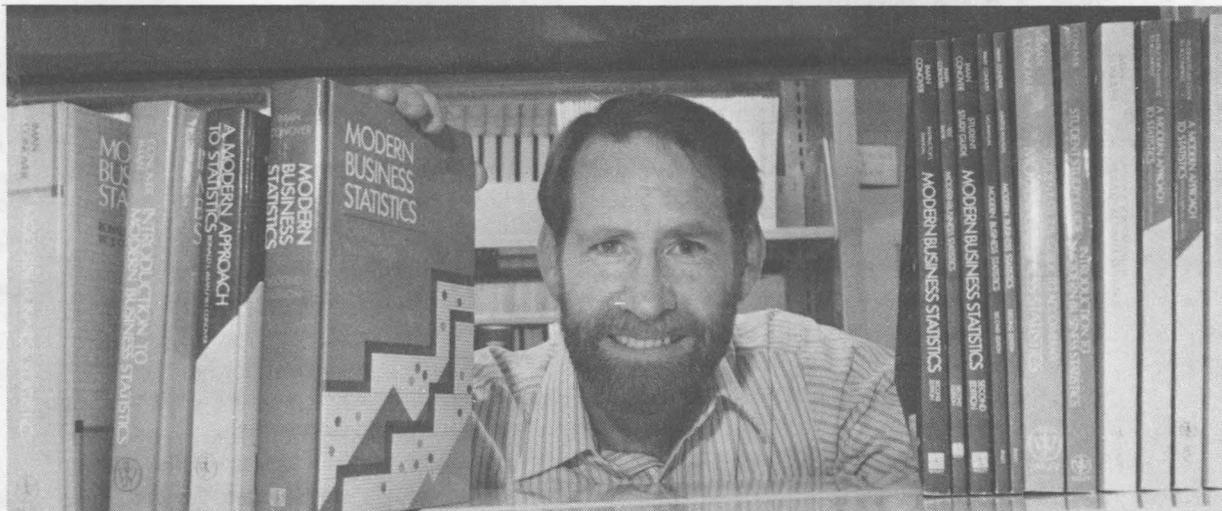
Ron Iman (DMTS, Safety and Reliability Analysis Div. 6415) and coauthor W. J. Conover (Texas Tech Univ.) had a definite objective for the second edition of *Modern Business Statistics*: to add to the innovative ways of presenting statistical methods that they had pioneered in the first edition.

In the first edition, published in 1983, the coauthors broke new ground by creating the first statistics text that presented parametric and nonparametric techniques side by side. These are two methods of statistical analysis that are valid under different conditions; the book shows students how to judge which technique to apply.

The first edition has been used at about 100 universities, says Ron.

The recently published second edition, 928 pages long, adds another unusual feature: Among an additional 950 pages of supplementary study guides and special manuals is material introducing students to the use of complex statistical software.

"The current text," says Ron, "took five years of work on evenings and weekends — the text itself, the supplements, and related personal-computer soft-



HE WROTE THE BOOK on statistics — these books, anyway. That's Ron Iman (DMTS, 6415), flanked by statistics texts he and coauthor W. J. Conover of Texas Tech Univ. have published.

ware. It was a monumental effort!"

The coauthors are now working on the second edition of another book, *A Modern Approach to Statistics*, which is about one-third complete. They hope to have it out next year.

And that's not all, says Ron: "I'm also about one-fourth of the way through a graduate-level text on robust statistical procedures based on ranks."

His present work at Sandia has potential for another book, Ron believes: "It's been impossible to find the time so far, but I'd like to write a text on

the techniques I've developed for analyzing uncertainty and sensitivity in complex computer models."

These techniques are part of a Sandia project, NUREG 1150, intended to give the Nuclear Regulatory Commission a set of reliable methods for assessing the risks associated with commercial power plants. The computer models used in such assessments generate probabilistic answers, rather than an absolute "yes" or "no." Ron's techniques help determine the uncertainty of a model's output, given the uncertainty of the input. ●

This & That

There IS a Free Lunch -- Your chance for minor fame and a free lunch. This column needs a good name. Because I couldn't think of anything better, I tagged it "This & That" in the March 10 issue -- my first as editor. We need a better name -- something with a little flair -- maybe combining Sandia and Southwestern/Western connotations.

Here's the deal. Send your entries -- only one column name per person, please -- along with your name, to Div. 3162. To be eligible, your entry must arrive by Monday, April 3. If I adopt the one you suggest, I'll buy you lunch and give you credit in the next issue. Livermore, Tonopah, and other non-Albuquerque Sandians are welcome to submit entries, but we may have a problem arranging lunch.

If you creative Sandians don't come up with a better name than "This & That," we'll continue to use it. And I may ask everyone who submitted entries to buy me lunch -- individually.

* * *

Goodbye, Irwin -- One week from today, March 31, is President Irwin Welber's last day before retirement. He's become a true New Mexican -- he'll continue to live here and chair a State Commission on Economic Development and Tourism. We wish him the very best.

On March 13, Irwin gave testimony to the DOE Defense Nuclear Facilities Panel of the House Armed Services Committee in support of the FY90 budget. It is reprinted in this issue. We think it's interesting reading and indicative of the pride that Irwin has in Sandia.

* * *

Hello Again, Al -- On April 3, Al Narath becomes Sandia's tenth president. Al joined the Labs in 1959, worked his way up through the management ranks, and was elected executive vice-president in 1982. He left in 1984 to become vice-president for government systems at AT&T Bell Labs. Welcome back, Al.

* * *

CPR Training Pays Off -- Thanks to Sandia's CPR program and some quick action by Jim Chavez (6217), Div. 6215 supervisor John Otts returned home several weeks ago -- still breathing.

John, Jim, and other Sandians were attending a solar conference in Washington early this month. In the hotel lobby during a break, John tried to swallow an antihistamine with water, but the pill lodged in his throat and cut off his air supply.

Jim walked by and saw John clutching his throat, gagging, and waving for help. Luckily, both Jim and John have taken Sandia's CPR training course, which includes a session on the Heimlich maneuver. Because he couldn't talk, John signaled Jim to apply the maneuver, which he did. Out popped the pill, allowing John to breathe again.

John suffered a few sore ribs from Jim's vigorous application of the maneuver, but otherwise recovered quickly.

Preventive Medicine and Special Programs Dept. 3330 offers CPR training regularly -- for employees and retirees. Courses are announced in the Weekly Bulletin. CPR program coordinator Elaine Squyres (844-7169) can provide more information.

* * *

So Whatza Difference? -- I heard it in a local radio commercial for mobile telephone systems: "Keeping communication lines open is no longer a necessity; it's a must." ●LP

Congratulations

To Mary Ann Dew (4000) and Thomas Lindsay, married in Albuquerque, Jan. 18.

To Cynthia and Dennis (2632) Tenorio, a daughter, Victoria Beth, Feb. 25.

To Lisa Ellis and Tony Edwards (2858), married in Albuquerque, Feb. 25.

To Susan and Keith (7841) Outlaw, a daughter, Jordan Jo, Feb. 28.

To Kim (3155) and Lawrence Atchison, a son, Stephen Nicholas, adopted March 1.

To Lilia (1534) and Tito Martinez, a daughter, Jessica, March 9.

To Francine (21-1) and Raymond Island, a son, Raymond Fletcher, March 10.

Sympathy

To Cynthia Romancito (3216) on the death of her mother in Zuni, March 1.

To Mary Resnick (5128) on the death of her mother in Albuquerque, March 10.

To Alice Adams (1266) on the death of her father in Wyoming, March 12.

Welcome

Albuquerque

Mona Aragon (3155)

Edward Cordova (3426)

Ace Etheridge (3161)

Raymond Griego (3426)

Michael Lanigan (3155)

Valerie Roberts (7851)

Arizona

Michael Arviso (6322)

Darrick Jones (7844)

David Mays (3144)

Daniel Zimmerer (6232)

Florida

Laura Lea Halbleib (7251)

Illinois

Steven Berlage (2853)

Missouri

Walter Ruby, Jr. (2851)

Ohio

William Morse (5221)

Utah

Richard Robison (2854)

A Dog's Life Isn't So Bad



Doghouses designed by architecture students at the State University of New York at Buffalo include a Victorian cottage and a castle.

Wall Street Journal

Favorite Old Photo



FRIGHTMARES 1965-STYLE — Some now-fearless Sandians had some mighty fearful looks while they were engrossed in a scary TV movie about attacking killer ants. From left are Cindy Myers (3426), Doug Trump (7533), Jeff Myers (3423), and Doug's sister, Dana Trump. Cindy and Jeff are the children of Lois (3141) and Harold (7243) Myers. Doug and Dana are the children of Betty (former Sandian) and Wayne (3521) Trump.

—Harold Myers (7243)



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LARRY PERRINE, Editor (505/844-1053)

PHYLLIS WILSON, Writer (4-7842)

DONNA RIX, Writer (4-7842)

CHARLES SHIRLEY, Writer (6-5542)

RANDY MONTOYA, Photographer (4-5605)

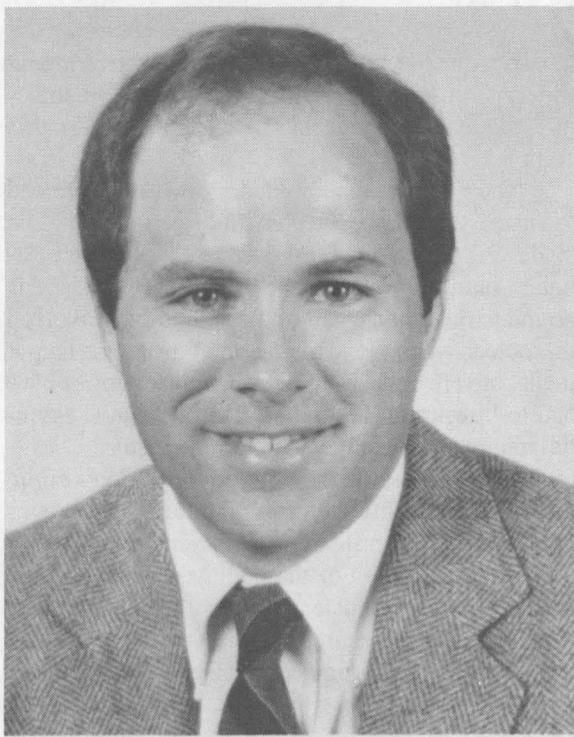
GERSE MARTINEZ, Asst. Photographer (4-5605)

JANET WALEROW, Editorial Assistant (4-7841)

RUTH GABALDON, Assistant (4-7841)

BARRY SCHRADER, Livermore Reporter

(415/294-2447; FTS 234-2447)



RUSS MILLER to supervisor of W89/SRAM II Electrical Systems Div. 8155, effective March 1.

Russ joined Sandia Livermore in June 1976 as a technician in the model labs, then worked on the W84 program. After earning a master's degree in electrical engineering, he became a firing-system engineer. He received a DOE Award of Excellence in 1984 for his participation in resolving the B83 and W84 electrical system noise problem. Russ's next assignment was in the W87 program as a flight test engineer. He was then named lead electrical engineer on the SRAM II/W89 project.

He holds a BS in electrical engineering technology from the Milwaukee School of Engineering and an MS in EE, earned through Sandia's Educational Assistance Program, from San Jose State University. He's a member of IEEE, and is working on a professional engineering license as an Engineer in Training.

In his spare time, Russ enjoys bicycling and skiing. He and his wife Maureen have three children and live in Manteca.

Congratulations

To Jo Ann (8534) and Wally Sandelin, a daughter, Whitney Lee, March 14.

January 1989 Earnings Factors

	Earnings Factors
Savings Plan for Salaried Employees (SPSE)	
AT&T Shares	1.0952
Government Obligations	1.0088
Equity Portfolio	1.0728
Guaranteed Interest Fund	1.0071
South Africa Restricted Fund	1.0714
Diversified Telephone Portfolio	
Unrealized Appreciation	1.0734
Realized Appreciation	.0068*
Savings and Security Plan — Non-Salaried Employees (SSP)	
AT&T Shares	1.0952
Guaranteed Interest Fund	1.0073
South Africa Restricted Fund	1.0761
Diversified Telephone Portfolio	
Unrealized Appreciation	1.0745
Realized Appreciation	.0046*

*The 1 has been removed from the earnings factor. Current month's DTP earnings may be calculated directly: Earnings Factor x DTP Current Worth = Current Month's Earnings.



RON STOLTZ to supervisor of Chemistry and Advanced Materials Div. 8316, effective March 1.

Ron joined Sandia Livermore in July 1976 as a staff member in the Materials Department, where he worked on hydrogen effects in metals. He was appointed supervisor of the Weapons Support Division in that department in 1981.

He left the Labs later that year for a position with Exxon's R&D Lab in New Jersey. He returned to Sandia in 1983 to work as a project scientist in the area of gas transfer systems. He subsequently became a project leader in the Systems Studies Department, where he worked on reimbursable programs for the US Army. He returned to the Engineering Technology Department in 1987 to do applied research on materials development for gas transfer systems.

Ron's education includes a BS, MS, and PhD

in metallurgy, all from the Massachusetts Institute of Technology. He's a member of the American Society for Metals and the American Institute of Metallurgical Engineers. He was named a Distinguished Member of Technical Staff last month.

His spare-time activities include coaching boys' soccer and teaching in an East Bay gifted-children's program. He and his wife Susan have two sons and live in Walnut Creek.



Take Note

Monte Nichols (8313) and E. H. Nickel, vice-chairman of the International Mineralogical Assn. Commission on New Minerals and Mineral Names, recently co-authored a reference book in PC database format. The book, "Mineral," contains mineralogical and crystallographic data for more than 3700 mineral species and unnamed minerals. A user manual accompanies the computerized reference. A commercially available data-base system allows rapid retrieval of information on any mineral species named in the book.

Buy Me Some Peanuts and Crackerjacks

Members of Kids & Kubs, a St. Petersburg (Fla.) senior citizen softball team, wear white trousers and shirts and black bow ties. Granted, with an average age of 81, players have slowed down and can't hit the ball as far as they used to, but, boasts 95-year-old George Bakewell, "we're not bad." They walloped the younger Sacramento Graduates (average age: late 70s), 21-0, this year.

With no encouragement, Mr. Bakewell offers his rendition of the team's song, to the tune "Home on the Range":

"The years have rolled by, we'll admit with a sigh,
Our reflexes are just not the same.
The spirit says go, but the flesh it says no,
But we still play a pretty good game."

Wall Street Journal

SANDIA
LIVERMORE NEWS

VOL. 41, NO. 6 SANDIA NATIONAL LABORATORIES MARCH 24, 1989



HONORED FOR OUTSTANDING PERFORMANCE in his position as rangemaster for Advance Security, Inc., is Dennis Steinhagen (third from left). He earned third place in ASI's nationwide competition for Supervisor of the Year. Dennis joined ASI at Sandia Livermore in February 1986 as an inspector. He became the firearm instructor in June 1986 and was promoted to rangemaster in July 1987. With Dennis are (from left) Don Charlesworth, supervisor of Physical Security Div. 8531; Marilyn Mulhall, Vice-President of Administration for ASI; and Marlin Pound, manager of Administrative Services Dept. 8530.

President Welber's Testimony To DOE Defense Nuclear Panel

President Irwin Welber gave the following testimony on March 13 to the DOE Defense Nuclear Facilities Panel of the House Armed Services Committee, in support of the FY90 budget.

I represent Sandia National Laboratories, one of the three Department of Energy nuclear weapon design laboratories. We three laboratories (Sandia, Los Alamos, and Lawrence Livermore) have been entrusted with the special mission to design, develop, and maintain our nation's nuclear deterrent.

It has been my privilege to serve as President of Sandia for the last three years. Because I will retire at the end of this month, this is my last testimony to you.

As I approach my retirement, I find myself reflecting upon the important issues that I have been associated with during my tenure at Sandia. I want to bring some of these issues to your attention on this occasion.

Sandia's particular mission is to link DOE and DoD technologies by weaponizing nuclear explosives.

Briefly put, Sandia's role is one of engineering. We "weaponize" the nuclear explosive device so that it can function with the DoD-supplied delivery system, be it missile, airplane, or artillery piece.

Recent Contributions to Stockpile

Our most recent contributions to the strategic stockpile include the W87 warhead for the Peacekeeper missile and the development of the W88 warhead for Trident II. In addition, Sandia has developed the arming and fuzing system for the Trident II warhead. The Trident II will achieve Initial Operational Capability this fall, on schedule.

The nuclear weapon laboratories help ensure that our nation's nuclear deterrent is reliable and safe.

Nuclear weapons and nuclear-capable forces are acquired and maintained to support US national policy and security objectives. There is no other reason. Deterrence remains the underlying foundation of US defense policy and rests on US and Allied capabilities, potential adversaries' understanding of those capabilities, and the perceived will to exercise them, if necessary. Therefore, the credibility of our nuclear forces is vital. That credibility rests in our stockpile of deployed weapons.

Sandia's stockpile responsibilities include periodic evaluation and maintenance to ensure that reliability, functionality, and safety are never compromised. Our focus in reliability centers on a stockpile evaluation program, which includes a Joint Flight Test program for each weapon type. The stockpile evaluation program provides data for reliability assessment of the stockpile. Our current assessment is that stockpile reliability satisfies military needs.

The stockpile's nuclear safety, however, is a somewhat different issue. Our stockpile represents a collection of technologies that has evolved over many years. Our goal has always been to incorporate the best features that technology can provide to prevent unintended nuclear explosions. We have ana-

lyzed and reported risks associated with each weapon type in its application through the environments to which it is or might be exposed.

Nuclear Safety

Through extensive R&D, we have made progress in technologies related to nuclear safety and we've learned a lot about the performance of mechanisms and materials in abnormal (or accident) environments over the past decades. But many weapons currently in stockpile were designed before all of that understanding and technology was available; thus, a number of weapons do not meet currently desired or prudent standards for safety. Older weapons generally do not incorporate the safety features found in modern designs. This is a continuing concern for Sandia and should be a concern for this committee.

We have reported these concerns to the appropriate DOE and DoD offices, as well as to DOE's predecessor agencies.

Fifteen years ago, we recommended reassessment of operational need versus safety risks for weapons in stockpile. As a result, several modifications were made to weapons in the stockpile and others are being considered or are under way.

We believe our organizational separation from the DoD, which requires a shared but separate safety responsibility, can assure that safety needs and operational needs are addressed in a balanced manner.

During my tenure as President of the Laboratory, I have tried to increase awareness of this problem within Sandia and the nuclear weapons community. We must ensure that programs are under way to replace weapons that do not have modern safety features.

Nuclear safety should be a consideration in crafting future arms control agreements.

Sandia is a strong proponent of arms control endeavors with adequate verification. As some of you know, we designed and constructed the prototype Technical On-Site Inspection facility to be used at Votkinsk in the Soviet Union to implement the INF treaty. However, it is ironic that the INF treaty removes from the stockpile two of our newer weapon systems that had nuclear weapons with fully modern safety features. Unless carefully crafted, future arms control agreements could result in old weapon designs remaining in the stockpile for inordinately long periods.

Weapon Complex

The DOE labs have a unique responsibility.

Let me briefly remind you that, after the first atomic bomb was developed, our nation decided that nuclear weapons were such a powerful new technology that the capability to develop and manufacture them should be closely held. After considerable debate, a new agency under civilian control called the Atomic Energy Commission (AEC) was established by Congress to manage the nuclear weapon program. A complex of university- and industry-managed design laboratories, nuclear material production facilities, and production plants was created

to carry out the technical work under government supervision. The capability to design and manufacture nuclear weapons has been confined to this complex.

The nuclear weapon laboratories were created to ensure that the best technical direction would be made available to programs that are not popular, profitable, or appropriate for the private sector. There is no industrial counterpart to the technology involved in nuclear weapons. This technology is not taught in the universities. Therefore, these laboratories have had to hire, train, and retain the staff that is essential to this nation's nuclear deterrent posture.

These laboratories represent the nation's entire technical capability for designing nuclear weapons to meet changing military requirements and for evaluating the condition of the deployed nuclear deterrent. We develop nuclear weapon designs to meet evolving military requirements, test these designs and evaluate their performance, oversee their manufacture, and ensure their quality before transfer to the DoD.

Further, these labs represent a major element of the national capability to evaluate the technical feasibility of what a potential adversary might be able to develop in nuclear areas that could place the US at a disadvantage.

As a member of this three-laboratory team, I feel a sense of pride for these contributions over the years, and I'm sure that my colleagues from the other labs do as well. In great measure, it is the knowledge that our work is so directly connected to the nation's defense posture that motivates us. It is a feeling that "If we don't do it, who will?"

Decentralized Management Philosophy

The success of these laboratories is due in large measure to the decentralized management philosophy originally established by the AEC.

These laboratories have flourished under the wise guidance of the DOE and its predecessors — ERDA and the AEC — for forty years. They have responded to the changing needs of the military and have kept the nation's stockpile of weapons in good shape.

I would like to take this opportunity to comment on this management philosophy, which traces its roots to the first chairman of the Atomic Energy Commission, David E. Lilienthal. This decentralized management approach has allowed the technical decisions to be made where the most current information and capabilities are available to do the job. This management strategy, a national-need mission, and the continuity of support by the DOE over the years have facilitated the recruitment of some of the best technical people in the land and have inspired their creative talents.

These laboratories are government-owned, contractor-operated labs, or GOCOs, rather than government laboratories per se. The Blue Ribbon Task Group, commissioned by this body and the Senate Armed Services Committee, issued a report in 1985 citing these laboratories as "national assets, not solely DOE assets," and noting that "... it is important that the excellence and vitality of the national laboratories be preserved."

In its 1987 Summer Study on Technology Base Management, the Defense Science Board also called attention to the advantages of the GOCO laboratory mechanism for performing technical R&D work and suggested that consideration be given to conversion of certain DoD laboratories to GOCOs. The report states, "The GOCO mechanism is the mechanism of choice for establishing any new laboratory or center that undertakes significant amounts of technical work."

Better, Not 'Tighter'

Better, not "tighter," management should be the goal of DOE reforms.

(Continued on Page Five)

SOON-TO-BE-PRESIDENT Al Narath (right) was at the Labs earlier this month for a one-day visit. Here, he chats with departing president Irwin Welber before a Small Staff meeting. Al's first official day on the job will be April 3; Irwin's last day is March 31.



Pike and Loehman Named Fellows Of American Ceramic Society

Gordon Pike (supervisor of Electronic Properties of Materials Div. 1815) and Ron Loehman (manager of Chemistry and Ceramics Dept. 1840) will be inducted as Fellows of the American Ceramic Society at its annual meeting April 25. Both are being honored for making significant contributions to the basic understanding of ceramic materials.

Gordon — whose work at Sandia has spanned superconductors, semiconductors, insulators, and heterogeneous electronic materials — is being recognized for his contributions to understanding the electronic properties of grain boundaries in semiconductors generally, and in varistors — var(iable res)istors — in particular.

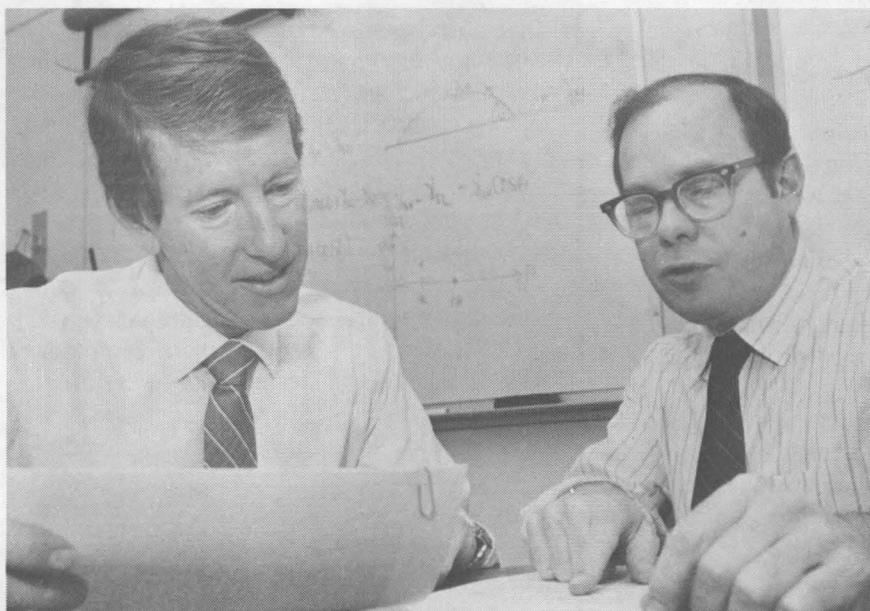
Unusual Materials

Varistors are unusual materials — polycrystalline zinc oxide, in this case — that can switch from an electrically insulating state to a conducting state according to the levels of voltage applied to them. They are used in special high-voltage weapons applications and, more commonly, to protect television sets and other home appliances from being damaged by electrical surges.

Connected in parallel with the components or circuits they are protecting, varistors normally act as insulators, allowing only negligible amounts of electrical current to flow. But if the voltage applied to them exceeds a critical value — the switching voltage — they act as conductors, diverting excess current harmlessly to ground.

To better understand this switching behavior, Gordon undertook an extensive experimental program that culminated in the development of a theoretical model that describes what happens at grain boundaries — the regions between individual zinc oxide grains where resistance is dominant — during the switching process.

“Any model,” notes Gordon, “builds on what others have already discovered. The new thing that my model proposes is that positive charges — ‘holes’



TO BE INDUCTED AS FELLOWS of the American Ceramic Society are Ron Loehman (left), manager of Chemistry and Ceramics Dept. 1840, and Gordon Pike, supervisor of Electronic Properties of Materials Div. 1815.

— created in the zinc oxide at a certain threshold voltage act to neutralize the electrons trapped at the grain boundaries, causing the material to switch from an insulating state to a conducting state.”

Gordon stresses that the research underlying his model involved collaborations and contacts with people from many organizations throughout Sandia — from, for example, Chemistry and Ceramics Dept. 1840, Compound Semiconductor and Device Dept. 1140, Neutronics and Passive Components Dept. 2560, and Process Development Laboratories Dept. 7470.

“The ease of making these collaborations is one of the outstanding strengths of the Labs,” he says.

The model has been confirmed experimentally and has been useful in predicting the reliability and performance of varistors use in a variety of conditions.

“We were also able to use our results to help design a whole new class of chemically prepared [ultra pure], high-field varistors [those used with

very high voltages],” notes Gordon.

Ron is being named a Fellow in recognition of his technical contributions in understanding the behavior of nitride ceramics, and for his work in the area of ceramic joining. He echoes Gordon’s assessment of the importance of collaborating with others.

He also cites the opportunities afforded by Sandia for doing fundamental research. “That’s another of the stimulating things about working at the Labs — often, work on applied problems generates ideas for basic research. Fortunately, we have the internal support that allows us to pursue it.”

His work with Tom Headley (1822) on the mechanisms involved in glass crystallization is a case in point:

“While working on a project to develop an advanced actuator [a device that initiates gas transfer within a weapon], Tom and I got interested in trying to understand just how glass crystallizes to form glass-ceramics.”

Glass-Ceramics

Glass-ceramics — materials formed as glasses and then converted to crystalline ceramics by heat treatment — are used in applications, such as actuators, that require glass to be bonded to metal. The glass-like properties of glass-ceramics are used initially to flow molten glass into complex metal parts where the glass bonds to the metal.

Additional heating crystallizes the glass to make the glass-ceramic, which has better mechanical strength, electrical resistivity, and chemical durability than simple glass and requires fewer processing steps than conventional ceramic-to-metal seals.

Glass-ceramics are particularly useful in these applications because of the wide range of thermal expansion coefficients [the fractional change in length for each degree change in temperature] that can be obtained. Because glass and metal expand or contract at different rates when heated or cooled, design objectives involve matching the thermal expansion coefficient of the glass-ceramic to that of the metal to which it is bonded.

“The actuator project called for glass-ceramics with thermal-expansion coefficients that matched those of various metals,” notes Ron. “Our research into basic glass-crystallization mechanisms provided a better understanding of the processes for producing glass-ceramics with the desired thermal-expansion coefficients — and made it possible for us to achieve better control of the production processes.”

Ron’s work on the actuator project, in collaboration with Randy Watkins (7471) and Stephanie Kunz (2512), also prompted his interest in another area of basic research — the mechanisms involved in the bonding of ceramics and glass-ceramics to metal. This research earned him the Richard M. Fulrath Pacific Award, given jointly by the American Ceramic Society and the Japanese Ceramic Society (1988). ●DR

(Continued from Page Four)

Welber

While the management of the DOE nuclear weapon program can be improved, reverting to the centralized model typical of federal agencies would, in my view, begin to degrade the effectiveness of the laboratories. Better management can be fostered within the proven decentralized model that has worked so well over the years to provide our nation with a nuclear capability second to none.

It is vital that the US nuclear weapon program have “the best possible technical direction” President Truman called for. I believe that this can be achieved only if the laboratories have the technical authority and flexibility to manage their responsibilities in accordance with the best engineering, scientific, and business practices available. One of the attributes required for this level of performance is freedom — the freedom to consider new ideas, to try things that might not work the first time, to hire the best technical talent for the job, and to make operational changes as necessary to accomplish the mission.

In delegating authority to make technical decisions to the laboratories, responsibility is also passed along in equal measure. We at the laboratories feel very strongly the connection between the nation’s needs and our contributions, and are inspired to meet those needs. At the same time, the laboratories feel a burden to act responsibly and cooperatively in meeting our obligations for the nation’s national security objectives. This responsibility includes acting in disciplined ways . . . recognizing the limitations of technology, as well as its potential; when to apply a new technology and when it needs more development; when to talk and when to remain silent; when to high-

light problems and when to work harder; when to ask for money and when to tighten our belts.

With regard to belt-tightening, we have met with the DOE and have negotiated our budget requests. We agree that, in the process, we’ve done our best and that while there may be individual items where we prefer that things were done differently, in the final analysis, this is the Department’s budget request, and we stand fully behind it.

I recognize that there are those who espouse tighter, more centralized government control, but I ask you to consider the total contributions made by the laboratories to the nation’s security; these could not have come without the decentralized management environment that has existed these past four decades and that has encouraged creativity at these laboratories.

This fall, AT&T celebrates its 40th anniversary as operator of Sandia National Laboratories. In 1949, President Truman requested AT&T’s industrial management of Sandia’s activities. As a good corporate citizen, AT&T accepted. I’m proud that AT&T has performed this public service for 40 years without profit or fee.

I am personally very pleased to have been able to contribute for the past three years to the continued strength of our nation’s nuclear deterrent. And, as I am about to retire, I would like to recognize the contribution of General Kavanaugh, who will retire July 1. I feel fortunate to have had the opportunity to work with General Kavanaugh, and I wish him well in his next endeavors. [Brig. Gen. Paul Kavanaugh is DOE Deputy Assistant Secretary for Military Application.]

I feel that Congress continues to serve a vital role in the operation of its national laboratories by sharing its guidance for the future, and by instilling the passion to provide “exceptional service in the national interest.” ●

(Continued from Page One)

Vibrafuge

oped by Div. 7542 to vibrate test objects perpendicularly to the axis along which the shaker vibrates.

Tested Stronglink

This equipment underwent its first no-load trial in late January, says project leader Jon Rogers (7544). By the end of February, the vibrafuge was being used to test the detonator-safing stronglink being developed by Sandia for the W89 warhead for the Short-Range Attack Missile (SRAM).

(Stronglinks are one of the safety devices preventing weapons from being armed or detonated accidentally.)

The design used for this particular stronglink prompted a request for testing in a combined acceleration-vibration environment, according to Vic Johnson (2545), project leader for development of the stronglink.

"We've always known it would be a good test for electromechanical devices such as this," says Vic, "because there are possible interactions between acceleration and vibration that don't show up when you do the tests separately. This component has features that could make it sensitive to the combined effects. That gave us a definite need for combined testing."

Upon receiving the request in October 1987, the people in Development Testing 7500 first thought they could simply buy what was needed, says Dave Schafer, supervisor of 7531: "A purchasing package was prepared to buy something 'off the shelf' and was sent out for bids. But we discovered that we were pushing the state of the art. No company would commit itself to meet all our requirements."

While the attempt to make an "off-the-shelf" purchase was in progress, Div. 7542 was pursuing a backup concept: redirecting a shaker's vibration. By last spring, when it became apparent that 7500 would have to start its own development project, Div. 7542 had already demonstrated the feasibility of a right-angle fixture. So the project began, with Dick Wavrik as project leader. After he transferred to 6314 in May, Jon took over.

Idea Interchange

"A lot of people were involved," says Jon, "and we had free interchange of ideas. We met the schedule, and we're really pleased with the vibrafuge's performance."

"Our team included John Garcia and Mary Young from 7531. This was Mary's first major assignment after joining Sandia. She designed the mounting brackets for the shaker, as well as the rotary joint assembly that lets us get wiring and cooling air out to the shaker on the end of the centrifuge arm. John and Mary's supervisor, Dave Schafer, was lead supervisor."

"From 7542, Fred Cericola [DMTS] and Terry Ernest designed the right-angle fixture that gives us a second direction of vibration. Terry was responsible for the fixture used in the stronglink tests. Also from 7542, Jim Doggett, with assistance from David Beightol [7544], did most of the work in specifying the combination of a reinforced shaker and an oversized amplifier to drive it. As supervisor of 7542, Tom Priddy had both a technical and a managerial interest in making it all work."

"To round out the team, we had 7540's department manager, Tom Lane, and my supervisor, Dave Smallwood."

Dave Smallwood picks up the story: "I was involved because I was around when we were using an earlier system in the late '60s. It had two shakers, in a push-pull arrangement, out on the end of the centrifuge arm."

"It worked well, when it worked, but it failed a lot. And it took a week or more to set up. When you wanted vibration perpendicular to the centrifuge arm, instead of along it, you rotated the shakers themselves. That took about two days."

"We learned from the shortcomings of that design. We can mount this shaker on the centrifuge

New Sandian Enjoys Working With Seasoned Engineers

Mechanical engineer Mary Young (7531) began work at Sandia about the time the vibrafuge project was starting — March 1988. As a newly graduated engineer coming to a large company, she might have expected a long wait before being assigned a challenging project.

That wasn't the way it turned out.

"Almost immediately after I came to Sandia," says Mary, "I was involved in designing the rotary joint assembly for the vibrafuge. It had to tolerate eccentric rotation. Even though I used a laser to center the rotary joint over the centrifuge hub, a small bearing runout in the hub can result in a significant eccentric rotation at the top of the rotary joint."

She also designed the support fixture that holds the shaker on the centrifuge arm.

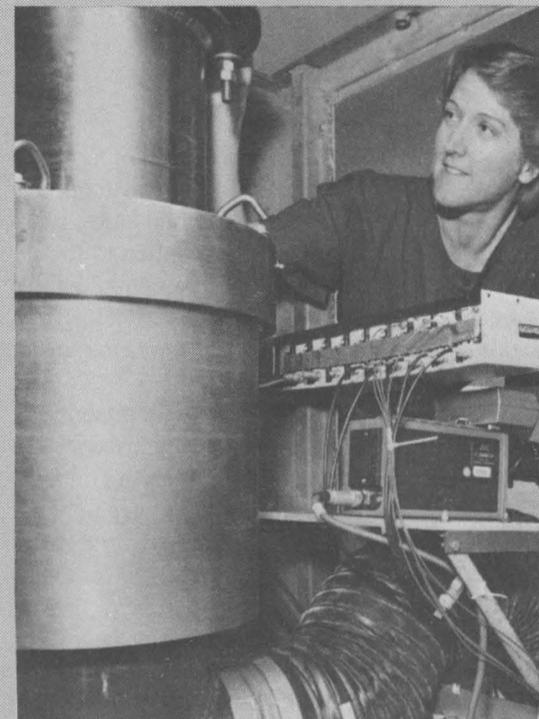
It helped that Mary's pre-Sandia experience wasn't purely academic: "While studying mechanical engineering at the University of Arkansas, I worked as a machinist. That experience — about six years of it — was incredibly useful on the project. It gave me a sense of what can be fabricated easily and what can't."

Mary took a major turn in career direction to get into engineering: "I was working in a child-welfare office in St. Louis. Looking back, I think I started in social work because I saw it as the acceptable thing for a woman to do. But I really wanted to be an engineer. It took me a while to realize that I should use my life to do that, not just work at what seemed socially acceptable."

Why Sandia? "I had seen Sandia mentioned a lot in technical magazines, and I had visited New Mexico and liked it. From everything I heard, Sandia was an outstanding place to work, and an excellent place to develop as an engineer. It was my first choice."

Her initial year at Sandia has been rewarding, Mary says: "I enjoyed the team effort. It was good experience, working with a group of seasoned engineers."

"I didn't know what to expect when I got out of school and went to work for a big organization — particularly, how well people would work together. Here, the environment has been conducive to working as a group. The primary focus doesn't seem to be personalities or competitiveness, but getting the job done."



MARY YOUNG (7531) checks the rotary joint assembly atop the centrifuge. The rotary joint, which Mary designed, allows wiring and cooling air to reach the shaker even when the centrifuge is spinning.

and be ready to run a test in less than a day.

"Two important things we did this time were to choose an air-cooled shaker and to mount it in only one direction, with its axis along the centrifuge arm. On the earlier one, we had maintenance problems caused by having to pump fluids around at high g's — water for cooling and oil for the bearings. Pumping air is easy!"

Tom Priddy echoes the importance of air cooling: "Choosing an air-cooled shaker limited the capacity, but we knew it was better to have a reliable vibrafuge for testing relatively small components than to have an unreliable one for testing larger things."

Cooling is necessary because of the heat that could otherwise build up in the electrically powered shaker. The cooling air comes from a 10-horsepower blower, although, says Jon, "When we spin the centrifuge at 50 g's, we aren't sure we need the blower."

The right-angle fixture, according to Tom Lane, is a key design feature: "The unique thing about this, compared to any other vibration machine that's been attempted, is that the shaker shakes in only one direction — along the centrifuge arm. To get vibration perpendicular to the arm, the right-angle fixture just redirects the motion. It's so confounded simple that it works! Attempts in some other places have been more complicated, less successful, and sometimes incredibly expensive."

How It Works

To understand what's going on, it's necessary to visualize the arrangement. The centrifuge itself is a 29-foot arm, with balancing counterweights on the opposite side of the central hub. When the arm rotates rapidly, anything on it "feels" a centrifugal (outward) force.

You feel that same force if you tie an object to a string and whirl it around, but the centrifuge can produce a force up to 300 times that of gravity. The tip of the arm may be swinging around in its circle

at more than 500 feet per second (more than 350 mph), but it's the radial force, along the arm, that affects an object attached to the tip of the arm. That outward force within a test item mimics the effects of missile or aircraft acceleration.

The arm and hub of the centrifuge weigh some 40 tons. The shaker and additional steel members that convert it into a vibrafuge add about five tons.

"We needed a really big centrifuge to mount this on," says Jon Rogers. "We had two reasons for so much mass. One is that all the steel gives us a tremendous amount of stiffness, so things aren't going to move relative to each other. The other is that we had to have a large inertial mass on which we could have a pivot point for the right-angle fixture."

Gargantuan Hi-Fi

"The shaker itself is like an oversized voice coil for a hi-fi speaker," Jon goes on. "You could imagine it driving a 40-foot-diameter woofer. We power it with a 16-kilowatt amplifier. The shaker is rated at 4,000 pounds of force."

"Like anything else on the centrifuge, this 38-pound voice coil — let's use the more correct term, 'armature' — gets slung outward. So we had the shaker modified for load-balancing. It has air bags that automatically inflate to help keep the armature in position, and we use circuits in the amplifier to put direct current into the armature coils and create a magnetic field for balancing."

"So between those two, we can bring the shaker back to its zero location even at high g's. We can balance a dynamic load of 2800 pounds — that's the combined mass of the armature, the test object, and the test fixturing, multiplied by the g's of acceleration. If the centrifuge is running at 50 g's, that gives us 18 pounds for the component plus its fixturing. At 25 g's, we could handle 36 pounds."

The design team is happy with the performance

(Continued on Next Page)

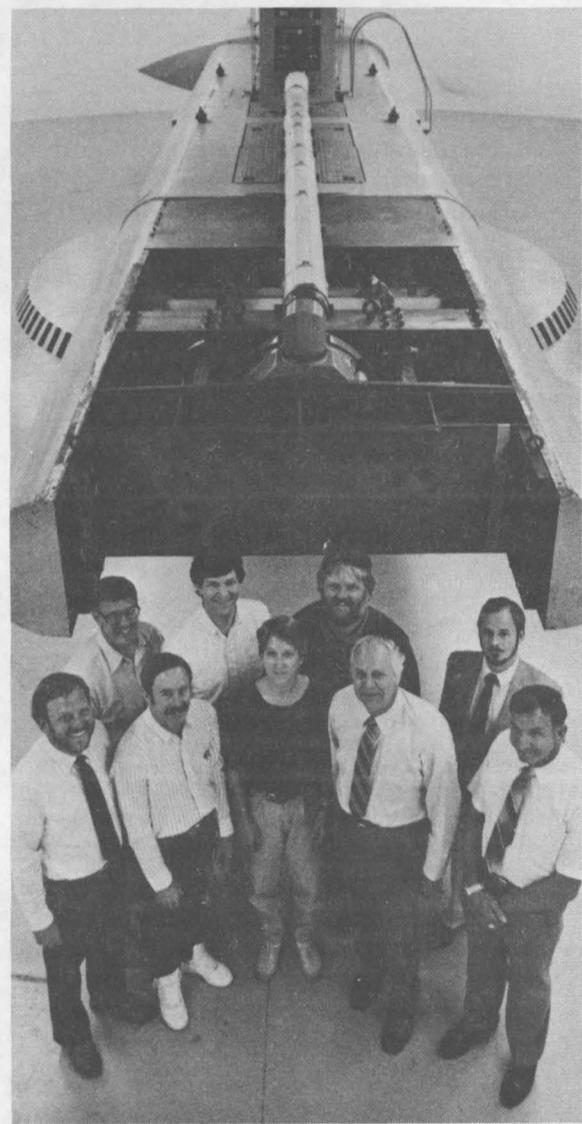
of the vibrafuge. Says Tom Lane, "What we get here, on a centrifuge at 40 g's or more, is lab-quality vibration — that is, the same as we would get in a standard vibration test. That's up to several kilohertz of controlled random vibration."

Jon elaborates: "In vibration testing, we're always concerned about distortion of the vibration waveform — the acceleration waveform, that is — on the head of the shaker. We need to control that extremely well."

"And at 40 g's, under full-rated force, pouring all 16 kilowatts out of that amplifier, we didn't see any distortion beyond what we normally see in our best vibration testing. There were a few little 'funnies' that are always part of a vibration test, but there were no special problems. None at all."

Conducting realistic tests to increase confidence that weapons and other devices will work as designed — and in the case of stronglinks, not until they're supposed to work — is what Jon sees as his and his colleagues' mission. The vibrafuge is one more step in accomplishing that mission.

"This project helps us meet our goals," says Jon. "We want to keep making our tests closer to reality. We want to closely simulate the actual environment that the hardware will experience in use. With the new vibrafuge, we're making progress." ●CS



SOME OF THE PEOPLE who worked on the vibrafuge are (from left) Dave Schafer, Doug Cotter, Rick Weatherbee (all 7531), Jon Rogers (7544), Mary Young (7531), Mike Gallagher (contractor), Jim Doggett (7542), Terry Ernest (7542), and Fred Cericola (DMTS, 7542).

Promoting Science Careers for Women

Despite all the attempts in the last few years to promote [historical role models to increase the participation of women in science], I find two disturbing themes: first, the emphasis on glorifying "the first woman to do X" where X would be unremarkable if done by a man—what is the incentive to be the second or the 100th woman to do X? Second, there is the implication that what women actually do in science is tedious drudgery which rarely leads to an exciting discovery—or if it does, the discovery is made by a man. Thus, in addition to all the other social and cultural factors that discourage girls from going into science, especially the physical sciences, one has the impression that "the few women now in science may not present models of success to female students". . . If we are going to use examples from the history of science to inspire girls to become scientists, and perhaps also to persuade male scientists to let women have opportunities to do important work, then these examples must show women as discoverers, not just as drudges.

Stephen Brush, Physics Teacher

Makes a Meek Mouse

Forty-Ton Flywheel

Although the shaker is what's new about the vibrafuge, the centrifuge is noteworthy in its own right.

First operated in 1964 and substantially overhauled in 1985-86, the underground centrifuge on which the shaker is mounted is one of two large centrifuges in Area III. The other is an outdoor facility that has a longer arm-radius than its companion but is capable of only about a quarter of the dynamic load (450,000 g-pounds).

The underground centrifuge can handle the largest dynamic load in the free world: 1.6 million g-pounds. That means a 16,000-pound object can be spun at a steady-state acceleration of 100 g's. Lighter objects can be accelerated up to 300 g's, as long as the product of weight times acceleration is less than 1.6 million.

By comparison, a pilot may black out at 8 g's or less, though humans have tolerated as much as 20 g's for several seconds. In an automobile, a comfortable stop reaches about 0.25 g, and even during hard braking the deceleration will be well under one g.

The arms of the centrifuge — a 29-foot one for mounting the test object and a shorter one holding counterweights — weigh more than 20 tons. Add the rotating hub, and the whole thing weighs about 40 tons.

"That weight makes quite a flywheel," says Dave Schafer, supervisor of Dynamic Loads and Facilities Development Div. 7531, which operates the centrifuge. "When you see it going around at 175 rpm — you see it on closed-circuit TV — and you realize you're only a few feet away, it's kind of, well, impressive."

Besides testing weapon and space hardware, the centrifuge is used for geotechnic testing. Scale models of geological structures — sometimes including human alterations such as underground mines — are placed on the centrifuge and subjected to high acceleration. Things that might not happen for hundreds of years in the real structure — such as ground subsidence above a mine — can be modeled, measured, and evaluated in the lab.

It's especially valuable — a true national

asset, says Dave — because of the hard-to-match combination of size, load capacity, and security for large classified hardware. (Dave also says that his division and Div. 7544 are the contacts for anyone needing centrifuge tests.)

Indoor Whirlwind

The centrifuge is powered by hydraulic pumps driving hydraulic motors. For braking, the motors are reversed; they become pumps and provide the braking force.

While operating, the centrifuge creates a strong wind in its circular room. "Before you can go in, you have to wait a little while even after the centrifuge stops," says Dave. "The pressure difference keeps you from opening the door."

Although people are cleared from the room before the centrifuge is turned on, Dave says there's the story of an Area III mouse that stayed in the room during a test. Afterward, the crew came into the room with the centrifuge stopped but the wind still whirling. By one wall was a small wad of yellow tape and a mouse desperately trying to burrow under it — looking for protection from the indoor windstorm.

Among those who set up, maintain, and operate the centrifuge (and the vibrafuge, when the shaker is mounted) are Doug Cotter, Rick Weatherbee (both 7531), and Mike Gallagher (contractor). To ensure safety for operators — mice generally have to take their chances — the centrifuge is instrumented and interlocked.

Dave lists some of the safety devices: "We have sensors to monitor the input and output pressures of the hydraulic fluid, the temperature of the bearings and their lubricating oil, the motion of the centrifuge base relative to the building foundation, and things like that. If there's a problem, the centrifuge will shut down automatically."

"Recently we added a strain-gauge system on the housing of the bearings, so that we get a readout of how well the centrifuge is balanced."

"You might say we've got belts and suspenders both."



ONE OF TWO NEW MEXICO STATE FLAGS flown at the Semipalatinsk Nuclear Test Site in September 1988 was presented to the commanding officer of the test site, Soviet Gen. Arkadiy Ilyenko (second from right), along with a message from Gov. Garrey Carruthers. Members of the technical team that went to the Soviet Union to gain a better understanding of how the Soviets conduct and monitor underground tests included three Sandians: Horace Poteet (DMTS 9115, back row in sunglasses); Jack Schendel (9112, far right); and George Patton (9241, not pictured). Don Eilers (LANL), the US on-site manager of the unprecedented joint verification experiment (holding flag, left) also presented a second flag flown at the site to Gov. Carruthers, along with a commemorative medal struck by the Soviets, a message from the general, and agate from the test site.

Take Note

Joann Danella (21-1) is stage manager for the Albuquerque Little Theatre's production of "Murder at the Little Theatre" by Jeff Hudson. Dolores Gravning (4050) plays Detective Darlene Love. Joann and Dolores already know "who dunnit," but you can try to solve the mystery — and win a prize — at this second annual fund-raiser for the theatre April 8 at 8 p.m. and April 9 at 2 p.m. Admission is \$15 per person. Call 242-4750 for information and reservations.

* * *

In honor of Women's History Month, the Sandia Women's Program Committee is hosting New Mexico writer and actress Deborah Blance, who will do a dramatization of Emma Tenayuca, an outspoken Depression-era labor activist, March 28 at the Technology Transfer Center (Bldg. 825) from 11:30 a.m. to 12:30 p.m. The program covers the early days of labor rallies, union meetings, women's struggles for equal rights in the workplace, and Mexican Americans' stand for full-fledged citizenship.

* * *

Daffodils for Hospice Day is March 31. Hospice seeks volunteers to deliver daffodils to businesses on March 30 and to sell flowers at bank offices around the city on March 31. Proceeds benefit the Hospice Patient Care Fund at Hospital HomeCare, which provides care for indigent patients and those whose medical expenses have depleted their insurance and personal resources. Contact Lezlie Ann Schubert on 842-7100 for information.

* * *

Friendship Force, a private, non-profit citizens' foreign exchange program, is sending several members to Holland May 17-31. Bert Lindsay (2173), state Friendship Force director, will be one of the goodwill ambassadors who will live with a Dutch family in Arnhem for a week. Other Sandians involved in Friendship Force include treasurer Jim Giachino (3411) and Ann Shiver (6413). For information about Friendship Force and the trip to Holland, contact president Joe Birmingham on 293-4162 or 243-6916.

Sandia Colloquia

P. Yanev, Earthquake Engineering Company, will talk about "The Armenian Earthquake and Structural Fragility" at the Technology Transfer Center (Bldg. 825) March 31, 9 a.m. Call host Walt von Riesemann (6442) on 4-2430 for information.

Mildred Dresselhaus, Massachusetts Institute of Technology Physics Dept., will speak about "Frontiers of Solid-State Science" at the Technology Transfer Center April 7, 9 a.m. Call Venky Narayanamurti (1000) on 4-4553 for information.

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A Look at Lovelace: Aviation/Space-Medicine Pioneer



"A visionary with tremendous persuasive powers." That's the way Jake Spidle of UNM's History Department describes the late Dr. William Randolph (Randy)

Lovelace II, who almost single-handedly turned an obscure medical institution into a world leader in aviation- and space-medicine research.

Spidle will detail the history of Lovelace Medical Center (formerly called Lovelace Clinic) — and Dr. Lovelace's involvement — during a Community Focus talk Friday, April 7, at noon in the Technology Transfer Center.

"Lovelace Clinic was founded by Randy Lovelace's uncle back in the '20s," says Spidle. "It was a relatively small place located in the old First National Bank Building in downtown Albuquerque, and most of its patients were people from the East who had moved here for health reasons. Some years later, the Clinic moved to its current location on Gibson Boulevard." (Lovelace also operates seven urgent-care centers in various sections of Albuquerque.)

"Uncle Doc' had raised Randy — sent him to all the best schools, and that sort of thing," Spidle continues. "I'm sure he [Uncle Doc] expected Randy to take over the Clinic sometime in the future."

"Randy had other ideas, though. After World War II — during which he established all kinds of contacts with folks in Washington and with people at some of this country's top medical institutions — he went to work at the Mayo Clinic in Rochester [Minn.]."

"But when their two sons contracted polio and died, Randy and his wife decided they needed a change of scene. They came home to Albuquerque in 1947 and, much to Uncle Doc's delight, Randy took over the reins at the Clinic."

Friendly Persuasion

By the late '40s, Randy Lovelace, using his wartime contacts and his by-then impressive professional credentials, had persuaded a handful of experts on problems associated with flight and high altitude to join the Clinic staff.

In relatively short order, Lovelace's pioneering research resulted in its recognition as a national and international leader in aviation and space medicine — and its selection in 1958 as the site for medical examination and testing of the first Project Mercury



JAKE SPIDLE

astronauts. (The April 7 talk will include slides showing the "astronaut days," as well as other scenes in Lovelace's history.)

Jake Spidle, a UNM associate professor, received his PhD in history from Stanford University. His Lovelace research is part of his work on the history of medicine — the focus of his teaching and research for about 10 years. He's the author of two books and several articles in that field. Two books in the offing are a history of the UNM hospital and a centennial history of, in his words, "a real wonder-drug" — aspirin.

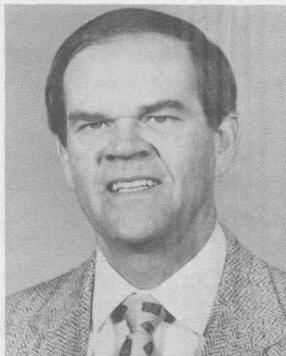
Housebroken, Too



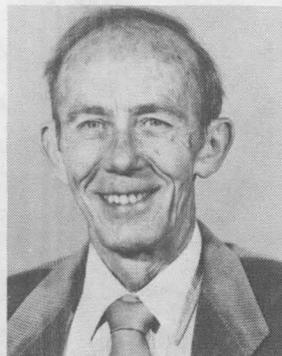
Flea farming apparently isn't as simple as it sounds, so parasitologists at Cornell University have developed an artificial dog to raise fleas in a closed environment where they can keep an eye on the pesky critters. A mongrel arrangement of tubing, sieves, and glass jars, the "dog" carries its fleas near a plastic skin-like membrane, flooded on the other side by warmed blood circulating through the tubes. After feeding on the blood through the membrane, the contented fleas produce eggs, which fall through sieves and are collected. With several generations of fleas at hand, the scientists thus far have concluded that fleas actually prefer walking to hopping.

Science News

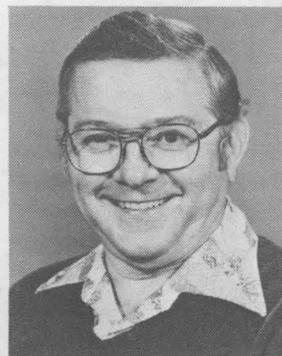
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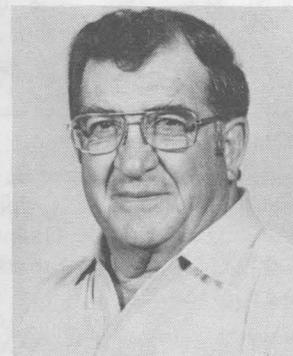
Ed Burgess (400)



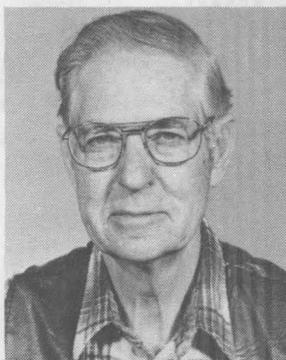
Jack Smith (5153)



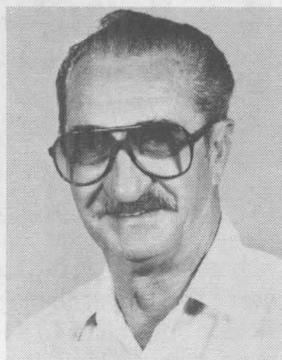
Sam McAlees (1553)



Matt Bustos (3425)



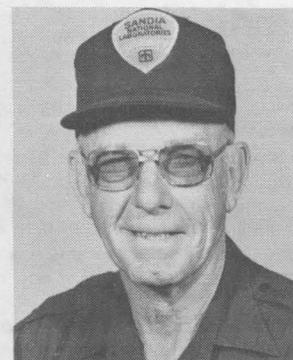
Ruben Kilpatrick (3426)



Orville Howard (5215)



Peggy Poulsen (3141)



Gene Cox (3434)

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Supervisory Appointments

CHRISTOPHER CHAVEZ to supervisor of Equipment Maintenance Section 7812-4, effective Feb. 15.

Chris joined Sandia in October 1973 as an apprentice assigned to the Mechanical Utility Systems Section. He has worked in refrigeration mechanics, boiler operations, water treatment, and maintenance planning.

He has an air-conditioning, heating, and refrigeration diploma from TVI. He completed Sandia's five-year mechanical apprentice program in 1978 and the Technical Institute Equivalency program in mechanical technology in 1988. He attended UNM's College of Engineering from 1965 to 1968 before joining the US Navy, where he served as a radar technician, second class, from 1968 to 1972. He worked for Circle K Corp. in refrigeration and maintenance before joining the Labs.

In his spare time, Chris enjoys sports, especially basketball and baseball. He and his wife Jeanette have two children and live in the NE Heights.

* * *

GERALD WALTERS to supervisor of Zone C Operations Section 7812-3, effective Dec. 1.

Gerald joined the Labs as a mechanical apprentice in September 1975. After completing the apprentice program, he was assigned to a Facilities Operations division as a refrigeration mechanic. In 1981, he transferred to the Construction Inspection Section as an inspector. He was lead mechanical inspector for the Microelectronics Development Lab (Bldg. 858) when he was promoted.

In his spare time, Gerald enjoys playing basketball, boating, and bass fishing. He and his wife Pat have two children and live in the NE Heights.

* * *

REGINALD TIBBETS to supervisor of Painting, Sheet Metal, and Wood Shop Section 7813-3, effective Nov. 16.

Reggie joined the Labs as a custodian in October 1978. He transferred to Sandia's structural technician apprentice program in December 1978, and worked as a structural planner/analyst in the Maintenance Operations Planning Division from 1983 until his promotion.

He is currently working on a bachelor's degree in business administration at the College of Santa Fe. Before joining Sandia, Reggie was a sheet-metal technician with several Albuquerque firms.

He's a member of the Professional Bowlers Assn. He was named Albuquerque Bowler of the Year in 1985, and received an award for a 300 game in October 1981. He also enjoys automotive customizing in his spare time.

Reggie and his wife Margret have two daughters and live in the NE Heights.

* * *

RICK HARTZELL to supervisor of Construction Inspection Section 7852-1, effective Dec. 16.

Rick has been a member of the Facilities organization since he joined the Labs in July 1979. His work has been in various utilities and facilities modifications, including the construction of Bldgs. 855, 870 Annex I, 870 Annex II, and 858.

He was first trained as an electrician, then received an AS in electrical technology from Pennsylvania State University. He received a BS in engineering from UNM through Sandia's Educational Assistance Program.

Before coming to the Labs, Rick worked for Brooks Instrument Division in Hatfield, Pa. He is a member of the International Assn. of Electrical Inspectors and the Construction Specifications Institute.

In his spare time, Rick enjoys music, works on home projects, and plays softball and volleyball. He and his wife Joanne have two children and live in the NE Heights.

* * *

JAMES KADLEC to supervisor of Zone E Operations Section 7814-1, effective Feb. 17.

Jim joined Sandia's Custodial Services Division in March 1977. He entered Sandia's mechanical apprentice program in September 1977 and gradua-



(FROM LEFT) CHRIS CHAVEZ (7812-4), GERALD WALTERS (7812-3), REGGIE TIBBETS (7813-3), RICK HARTZELL (7852-1), and JIM KADLEC (7814-1)

ted in 1981. From 1981 until 1983, Jim worked in the Facilities Operations Division in Area I; from 1983 until his promotion, he was in Facilities Operations in Area IV, providing support to magnetic pulsed-power subsystems and building HVAC systems. He served on the Plant Maintenance Joint Apprenticeship Committee (JAC) from 1982 to 1983, and was secretary of the JAC from March to August 1983. He also teaches classes for the apprenticeship program.

He studied liberal arts at UNM and refrigeration and controls at TVI. Before joining the Labs, he worked for several local firms.

Jim's spare-time activities include hunting, fishing, gardening, snow and water skiing, softball, and cooking. He's currently Cubmaster of Boy Scouts of America Pack 8.

He has two children and lives in the SE Heights.

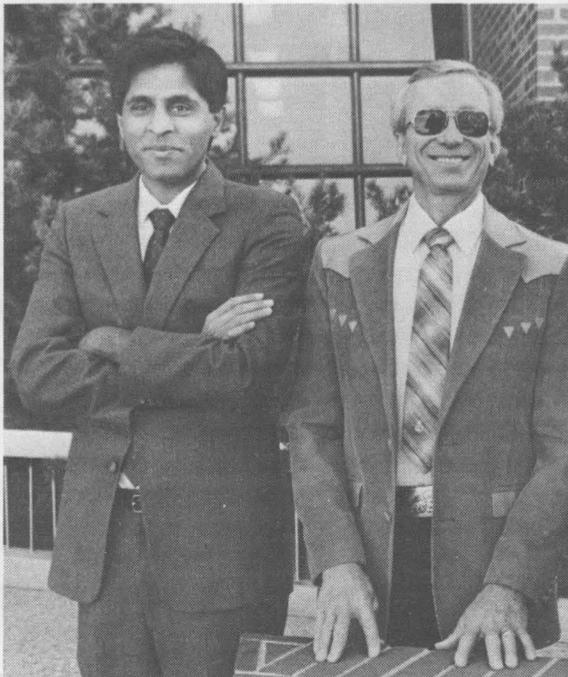
* * *

SUDIP DOSANJH to supervisor of Reactor Safety Theoretical Physics Div. 6425, effective March 1.

Sudip joined the Labs in October 1986 as a member of the division he now heads. His specialty is computational physics with an emphasis on heat transfer, fluid flow, turbulence, and combustion.

He has a BS in engineering physics, and an MS and PhD in mechanical engineering, all from the University of California, Berkeley.

Sudip enjoys running, basketball, bridge, and reading in his spare time. He and his wife Lynn



SUDIP DOSANJH (6425) and DAVE DAVIS (7532)

(6423) have one son and live in the NE Heights.

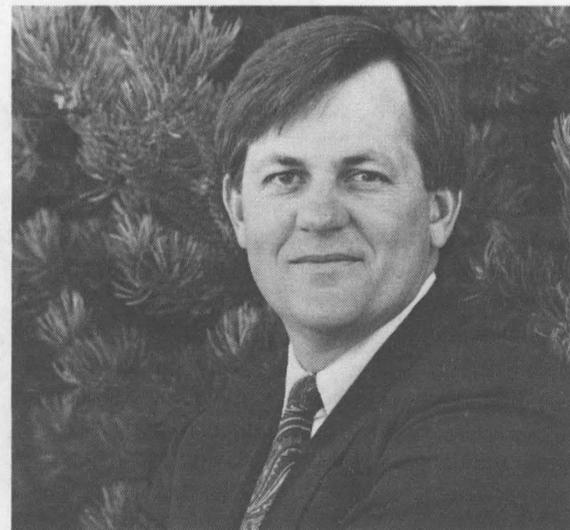
* * *

DAVID DAVIS to supervisor of Data Acquisition and Instrumentation Div. 7532, effective Jan. 1.

Dave joined Sandia as a member of the Mail Services Section in April 1962. Through the Labs' Educational Assistance Program, he earned a BS in electrical engineering from UNM, then an MS in EE from UNM through the Labs' Computer Science Development Program.

He has been a member of the Environmental Mechanical Shock Testing, Instrumentation and Facility Development, Automated Tester Development, Central Solar Receiver Test Facility, Integrated Circuits, and Digital Systems Development divisions.

In his spare time, Dave enjoys country-western dancing, furniture design and construction, and gardening. He and his wife Judi have two children and live in the NE Heights.



DONALD MCCOY to manager of Design Definition Dept. 2850, effective Nov. 1.

Don first came to the Labs in February 1969 as a member of Sandia's One-Year-On-Campus (OYOC) program, and became a full-time employee the following year. He provided analytical support for various weapon programs and did mechanical engineering on advanced development programs.

Since January 1978, he has been a Systems Engineering supervisor in the B61-3,4; B61-6,7,8; W80-0,1; and W61 programs.

Don has a BS in mechanical engineering from the University of Missouri at Rolla and an MS in the same field from Purdue.

His spare-time interests include golf, fishing, and camping. He and his wife Debbie have two children and live in the NE Heights.

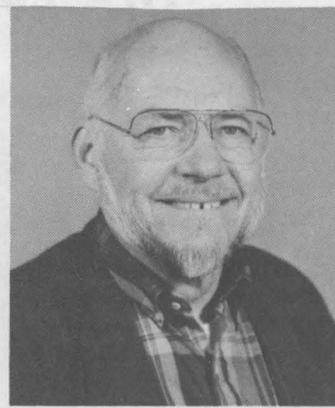
MILEPOSTS

LAB NEWS

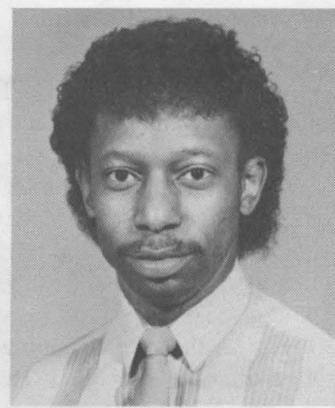
MARCH 1989



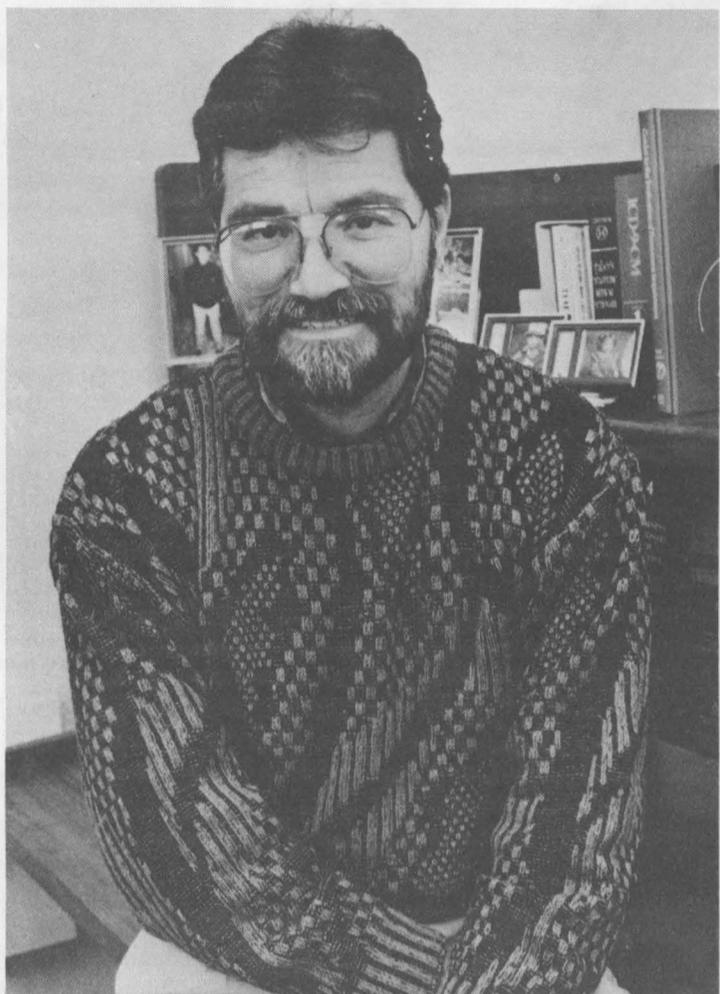
Pat Childers (9000) 25



Jack Puariea (2174) 30



Vernon Koonce (5122) 15



Juan Griego (3321)

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John Zubersky (7222) 15



Don Fulton (7125)

30



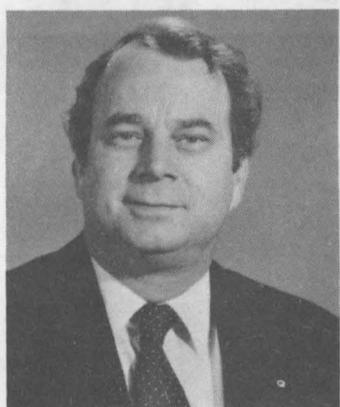
Connie Visbeck (8286) 30



Ron Snidow (7476) 30



John Campbell (3423) 15



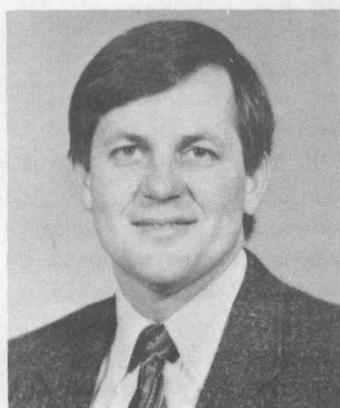
Gary Ferguson (2530) 20



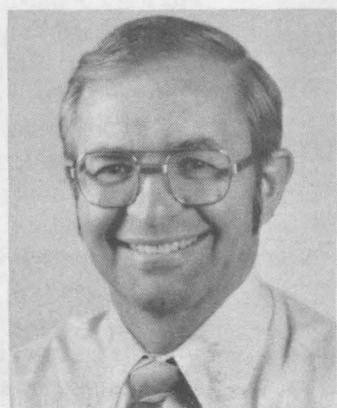
Ed Cull (8445) 20



Sherwood Duliere (2172) 30



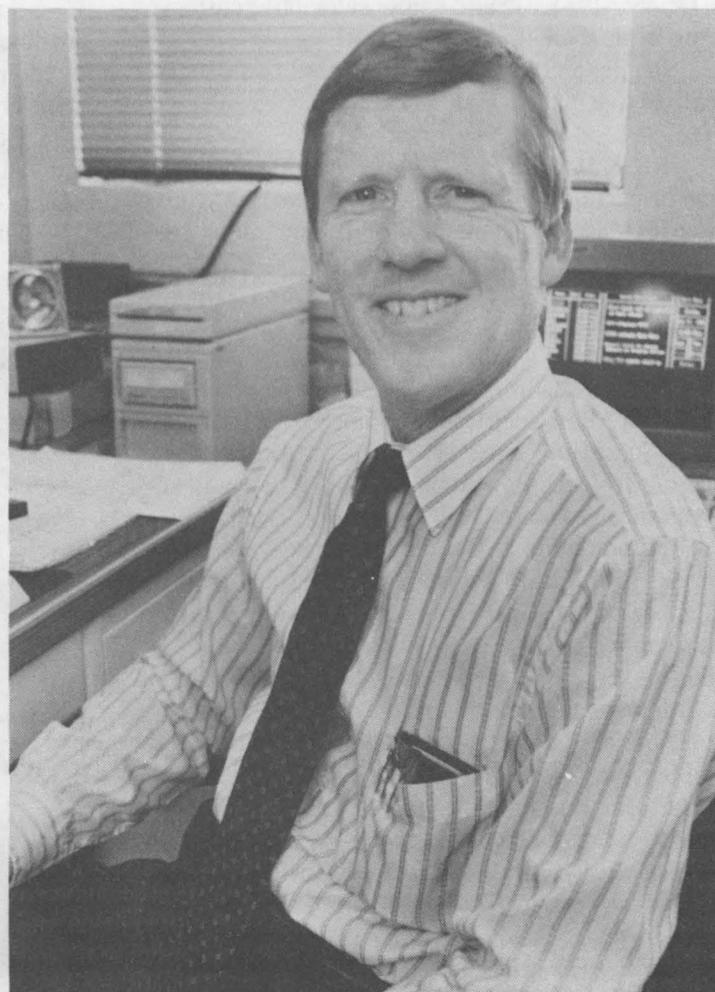
Don McCoy (2850) 20



Bruce Nevin (8163) 25



John Williams (3734) 30



Tom Wright (9249)

20



MODERATOR KAY HAYS, supervisor of Interfacial Chemistry and Coating Research Div. 1841, puts a question to VP Dan Hartley (6000, left) during a panel discussion, "Men in Women's Issues," at Sandia's third Career Conference for Women. Besides Dan, other members of the panel were (from left) Harry Saxton (2100), Bob Eagan (1800), John Cantwell (3150), and Chief Schwyzer (152). More than 400 Sandia women employees attended the conference March 8 at the Convention Center. Other workshops during the day-long session featured topics such as assertiveness training, dual careers, time- and stress-management, and communication/negotiation.

Peter Piper Picked a Peck . . .



Pickle Pickers International (PPI) suggests how people can celebrate International Pickle Week, an end-of-May American tradition since 1948: Call up people named Dill, Mustard, Pickle, Gherkin, Hamburger, or Frankfurter and wish them a happy Pickle Week; Sing "America the Beautiful" in honor of Amerigo Vespucci, "who gave his name to this continent, and saved the lives of countless early seafarers and colonists by recommending pickled vegetables be eaten to ward off the sickness known as scurvy"; Write to the Supreme Court bemoaning the fact that a Frankfurter (Felix) and a Burger (Warren) have served as justices, but no Pickle.

Then there's Texas Rep. J. J. Pickle, named Pickle of the Year by PPI on several occasions. The high point of his career, he says, was introducing some early-70s legislation co-sponsored by Claude Pepper (D., Fla.) and John Heinz (R., Pa.) that came to be known familiarly as the Heinz-Pickle-Pepper Bill.

Andrea Rothman, *Wall Street Journal*

UNCLASSIFIED ADVERTISEMENTS • UNCLASSIFIED ADVERTISEMENTS • UNCLASSIFIED ADVERTISEMENTS • UNCLASSIFIED ADVERTISEMENTS

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

Ad Rules

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

MISCELLANEOUS

- ELECTRIC GUITAR, Fender Jazz copy, w/hard shell case, 50-watt Univox amp, \$275. Snyder, 298-9826 after 6.
- CINDER BLOCKS, 8" x 8" x 16", 60, 40¢ ea.; six 6' metal fence posts, \$1.50/ea. Benton, 877-2473.
- '68 CAMARO GRILLE, \$100; window chrome, \$25; '70 Camaro rear axle 276 gears, \$40; 15" mag wheels, \$25. Nance, 243-3168.
- MAN'S GOLF CLUBS, Jack Nicklaus Golden Bear woods and irons, \$100; room dividers, various widths, \$3-\$5. Houghton, 299-3386.
- RCA COLOR CONSOLE TV, 25", w/ RCA VCR, both remote control, \$350/both. Honeycutt, 275-9744.
- EXERCYCLE, 6 months old, cost \$2400, sell for \$1500. Kjeldgaard, 268-8835.
- AMDEK 600-CGA MONITOR, graphics card/cable, \$200; 90-lb. weight set, w/weight bench, \$25. Witek, 296-5198.
- ANTIQUA (ca. 1926) OAK 3-MIRROR VANITY, w/caned bench, matching 4-drawer dresser w/wishbone mirror, \$480 OBO. Clouten, 243-6384.
- QUEEN-SIZE WATER BED, Aqua Firm, solid wood, padded rails, mirrored bookcase headboard, heater, extras, \$175 OBO. Lucero, 831-0125.
- BICYCLE HEADLIGHT, new, \$3; mechanical speedometer for bicycle, \$5; assortment of bicycle wheels, \$3-\$15. Krieg, 298-2895.
- QUEEN-SIZE WATER-BED MATTRESS, w/heater, extra firm, Hibernation series, \$20. Misak, 892-3033.
- RADIO-CONTROLLED CARS, 4, 1/10-scale, Hornet, Rockbuster, Mad Wolf, gas-powered truck, \$175 or will separate. Gibson, 344-8056.
- HP-71B HAND-HELD COMPUTER, digital cassette drive, thermal printer, IL-Loop, extras, new in boxes, retail \$2100, asking \$400 OBO. Hutchinson, 260-1138.
- '79 CHEVY LUV ENGINE, disassembled, make offer on any or all parts. Ripple, 293-4718.

- REAR WHEEL BEARINGS for 3/4-ton Ford truck, \$10; grille for '79 Monte Carlo, \$30. Chavez, 842-6374.
- STP 15,000-MILE OIL, low-50 API, SD-SE, 10 qts., 70¢ ea. Henry, 266-6467.
- KENMORE ELECTRIC CLOTHES DRYER, white, needs power cord, \$50. Jungst, 821-8546.
- RADIO-CONTROLLED CAR, w/electronic speed control, Futaba radio, extra wheels, tires, parts, tools, body, \$150. Buttz, 822-1448.
- MACINTOSH SE COMPUTER, 20MB, hard drive, ImageWriter II printer, modem, software, \$2500 OBO. Hernandez, 266-5395 after 5:30.
- TORO LAWN MOWER, 21" rear bagger, fingertip start, hand-propelled, \$75. Hawley, 299-2516.
- OAK BEDROOM SET: nightstand, chest of drawers, double and triple dressers w/mirrors, headboard, \$700. Garcia, 298-2898.
- '67 FORD TRUCK SHOP MANUAL, complete, microfilm, \$15. Schaefer, 281-3271.
- FOUR-DRAWER WOODEN DESK, w/ chair, \$45; gray foam sofa, \$150; Panasonic home stereo, \$50. Blotner, 292-6058.
- ENTERTAINMENT CENTER, L-shaped, holds TV, VCR, and stereo, refinished deep-rust color, \$100 OBO. Ahr, 884-1470.
- COMMODORE COMPUTER, C128, 1541 & 1571 disk drives, RGB/40c monitor, MPS 1000 printer, desk, printer table, software, \$650. Hale, 298-1545.

- AIR HOCKEY TABLE, 3' x 6', made for Wards by Brunswick, \$50. Tarbell, 292-0141.
- 35mm OLYMPUS, teleconverter, focusing zoom 105mm, new case, tripod, \$400. Shelton, 898-2723.
- 35mm SLR CHINON CAMERA, includes lens, \$75 OBO. Heifetz, 275-2648 leave message.
- SOFA AND MATCHING CHAIR; 7-piece dinette; coffee- and end tables; lamps; 12' x 12' area rug; student desk. Gendreau, 268-3436.
- HORIZONTAL BAND SAW, heavy-duty Carolina, \$650; Bostitch air-nailer, \$250; Makita drywall screwdriver, \$50. Gwinn, 281-9897.
- LATHE, metal, 10", quick-change. Stott, 294-2292.
- REALISTIC VCR, bed w/box spring; bullet reloader kit; typewriter; Christmas tree; radial arm saw; toaster; chain saw. Tolman, 266-6995.
- REFRIGERATOR/FREEZER, 18 cu. ft., Sears Coldspot, coppertone, \$100 OBO. Cotter, 897-1470.
- CUSTOM FRONT BUMPER, w/grille guard, for Jeep CJs, sell or trade for stock bumper. Loucks, 281-9608.
- BEDROOM SET: queen-size headboard, desk, dresser w/mirror, nightstand, \$395. Barger, 296-0676.
- DOUBLE BED, w/bookcase headboard, mattress, box spring, \$125. Marder, 291-8140.
- TIMESHARE, Eagle's Loft, Fairfield Pagosa (Colo.), 3rd week in June, sleeps 8, recreational facilities, fishing, golf course available. Segovia, 892-8148 after 6.
- DALMATION PUPPY, male, purebred, all shots, house-trained, \$350; small dog kennel, \$15. Richards, 299-2672.
- RUGER MINI-14 RANCH RIFLE, .223 cal., scope rings, 5-round plus two

- 20-round clips, \$375. Zeuch, 296-4969.
- SINGLE BED: headboard, frame, satin sheets; full-size mattress and box spring; answering machine; skis, boots, poles; Bronco II/Blazer nose bra. Burke, 294-7548.
- CABLE UPRIGHT PIANO, original finish, \$475. White, 266-1779.
- EIGHT-INCH JOINTER, Grizzly, w/extra knives, \$625; 6 mounted tires for VW Bug, \$100. Zanner, 281-1789.
- CAMPER SHELL, for LWB, insulated, \$250; one 8-hole Chev. wheel w/9.50 x 16.5 tire, \$50. Eisenberger, 877-7041.
- ATARI 7800 GAME SYSTEM, 1 yr. old, 9 game cartridges, \$40. Girard, 821-5529.
- HAVILAND CHINA, Apple Blossom pattern, service for 12 w/serving pieces, retail more than \$2000, sell for \$600. Chapman, 884-3067.
- TERRI-POO PUPPIES, seven weeks old. Martinez, 345-2149.
- THREE RADIAL TIRES, 175/70 SR-13, \$10/ea.; garage door, 16' x 7', \$15; desk, \$25. Dunn, 296-4904.
- TWO AIRPLANE TICKETS, Albuquerque to Chicago, one-way, May 24. Moss, 298-2643.
- WEIGHT BENCH and weights, \$100; Ross mountain-bike frame w/fork and brakes, 19", \$75. Kovacic, 256-9867.
- PARTS for '76 Datsun King-Cab pickup. Steinfort, 281-9893.
- '82 NU-WA TRAVEL TRAILER, 19', self-contained, tandem axle, awning, TV antenna, \$4500. Melvin, 298-6402.
- CAB-OVER CAMPER, 9', queen bed, new upholstery, corner-mounted jacks, \$750. Breeze, 294-3756.
- '85 PALOMINO POP-UP CAMPER, sleeps 7, furnace, battery, water pump, awning, portable toilet, \$2900. Hass, 299-3506.

TRANSPORTATION

- '77 LUND ALUMINUM PIKE BOAT, 18', w/'81 Johnson 75-hp outboard, open deck, console, trailer. Averille, 344-2236.
- '82 JEEP CJ-5, soft and bikini tops, 6-cyl., PS, PB, AM/FM, tilt, new tires. French, 865-3686.
- '87 CAMARO, Z28, dark red/gold, 21K miles, power everything, AM/FM cassette, extended warranty. Rex, 344-6552.
- '88 CHRYSLER LE BARON COUPE, loaded, warranty, 8K miles, blue/silver. Phillips, 298-0814.
- ALUMINUM FISHING BOAT, 14', new, \$750. Riley, 293-5868.
- '77 MERCEDES BENZ CONVERTIBLE, both tops, Blaupunkt AM/FM, metallic brown, \$21,500. Eagan, 281-9589.
- '76 HOLIDAY RAMBLER MMH, new tires, new dual exhausts, 50K miles, roof and dash ACs, \$12,000. Revels, 344-3033.
- '79 CORVETTE, 44K miles, 350, AT, midnight blue, 2 sets of T-tops w/locks, \$12,500. Slezak, 299-2685.
- GIRL'S BICYCLE, 16", Schwinn Pixie, \$50. Behr, 292-0549.
- KAWASAKI KZ440 MOTORCYCLE, w/windshield and 2 helmets, \$485 OBO. Heifetz, 275-2648 leave message.

- CANECUTTER BOAT, 16', w/85-hp Chrysler motor, trailer, extras, \$3500. Edrington, 292-4831.
- '88 RANGER STX, LB, 4x4 w/custom top, power everything, bed liner, green/gold, \$12,500. Sargent, 865-3227.
- '77 FORD PICKUP, 8-cyl., new rebuilt motor, radiator and clutch, needs tires, sell or trade. Shelton, 898-2723.
- '87 KAWASAKI VOYAGER XII, \$1000 in extras, 13K miles, always garaged, \$5750. Stott, 293-8533.
- '85 SAAB 900S, 5-spd., AC, cruise, sunroof, PW, black/rose interior, \$7000. Shaw, 821-5998.
- '82 PLYMOUTH RELIANT SW, 4-spd. Schaub, 265-0004.
- '84 BUICK CENTURY OLYMPIC, V-6, \$5000; '85 Ford Ranger XLT, V-6, LB, 5-spd., camper shell, towing package, 19K miles, \$7000. Eaton, 294-4209.
- '83 DODGE ARIES, 4-dr. sedan, AC, AM/FM, cruise, 35K miles, \$2500. Winter, 294-1369.
- '72 TOYOTA CELICA ST, 2-dr. coupe, new engine, small electrical problem, \$600. Underhill, 266-0432.
- '86 DODGE RAMCHARGER, 360 w/4-barrel, Royal SE pkg., AT, automatic 4-WD, \$11,000. Erwin, 888-1659.
- '85 HONDA SCOOTER, 150 Elite, red, 6.7K miles, \$500 OBO. Homer, 836-5043.
- '88 CHEV. S-10 PICKUP, LB, matching camper shell, 5.6K miles, \$7400. Holmes, 344-3154.
- '85 NINJA 900, 7K miles, \$2300; '79 Yamaha IT-175 dirt bike, \$300. Hubbard, 281-1779.
- '83 TOYOTA TERCEL SW, SR-5, 4-WD, stereo tape, silver. Douglas, 281-9843.
- '78 HONDA HAWK 400 MOTORCYCLE, 4.2K miles, \$395. Barger, 296-0676.
- SCHWINN VOYAGER BICYCLE, 10-spd., 25" frame, \$150. Hansen, 883-7137.
- SAILBOAT, Force 5, 14', w/trailer, \$800. Dunn, 296-4904.
- '76 LINCOLN MARK IV, white over white/black, rebuilt transmission. Kerschion, 299-8652.
- '78 CHEV. MONTE CARLO, 70K miles, engine needs work, \$500. Martinez, 345-2149.
- '68 CHEV. CAMARO, 250, 3-spd., 6-cyl., AM/FM cassette, silver-gray, \$3850 OBO. Weaver, 255-2385.
- '77 LINCOLN TOWN CAR, loaded, 69K miles, \$3600. Corley, 281-1349 after 6 weekdays.
- REPOS: '83 Chev. Cavalier, 4-cyl., AT, cruise, sunroof, AC, as is; '78 Chev. K-10 pickup, 4-WD, AC, PS, as is; bids accepted through April 9, we reserve the right to refuse all bids subject to prior sale. Sandia Lab Federal Credit Union, 293-0500.

REAL ESTATE

- 2-BDR. HOME, 2 baths, FP, 5 yrs. old, under appraisal, assumable, no qualifying, terms negotiable. Gabaldon, 836-5154.
- FIVE ACRES, 17 miles so. of Belen bridge, owner financing, \$95 down, \$95 month, 10% interest. Sanchez, 1-864-9297.

- 3-BDR. HOME, for rent or sale, 4 yrs. old, semi-custom built, 9-1/2% 15-yr. fixed, near Spain and Tramway. Lau, 294-2687.
- 3-BDR. MOBILE HOME, '84 Vogue Fleetwood, 2 full baths, new roof, appliances, North Hills, \$18,500. Reed 821-6315.
- LANCER MOBILE HOME, 72' x 14', Rhoads, 298-6157.
- 2-BDR. 2-STORY TOWNHOME, 1-3/4 baths up, 1/2 bath down, 2 yrs. old, landscaped, skylights, FP, Copper/Tramway area, assume FHA loan, \$75,900. Powell, 298-5335.
- 3-BDR. HOME, 1-3/4 baths, LR, den w/FP, shop area, 1675 sq. ft., \$60,500. Barger, 296-0676.
- 3-BDR. HOUSE, 1700 sq. ft., 1-3/4 baths, double garage, near Eubank and Candelaria. Moss, 298-2643.
- 4-BDR. CUSTOM HOME, Glenwood Hills, 3300 sq. ft., views, \$195,000. Dunn, 296-4904.
- 3-BDR. MOBILE HOME, 2 baths, all appliances, get \$3000 cash if refinanced at Credit Union. Gilbertson, 869-3468.
- 3-BDR. MOBILE HOME, '84 Vogue, 14' x 80', 2 baths, vaulted ceilings, ceiling fan, mini-blinds, patio cover, \$17,500. Gardiner, 823-2018.
- 2-BDR. TOWNHOUSE, 1 bath, skylights, FP, garage, solar, no association fee, 1072 sq. ft., assumable 9.5%, \$63,500. Williams, 265-7960.
- LAND, northern NM, San Juan Mountains, 20 to 85 acres, crossed by Rio de los Piños River. Reynolds, 1-864-6224.

WANTED

- INFORMATION about recumbent bicycles. Huddle, 881-2971.
- MANUFACTURER INFORMATION for Kodak disc 8000 camera, to borrow. Scheiber, 298-0904.
- TWENTY SPLIT-CEDAR PICKETS, weathered, 3" x 6", any condition. Krieg, 298-2895.
- EDITOR AND SPICER for Super 8mm. Stefanov, 299-7009 after 7.
- MOTORIZED RV or tent trailer, to rent for 1 week. James, 294-6837.
- PERSONS TO JOIN ME on trip to Peru (Cuzco, Machu Picchu, Nazca Lines, Lake Titicaca, Lima, etc.). Schubeck, 821-3133.
- IBM SELECTRIC TYPEWRITER, correcting capability not needed. Brooks, 292-9899.
- NO-BARK COLLAR, for Labrador, will buy, rent, borrow. Stoever, 296-3717 after April 3.
- PAIRS OF SKATEBOARD WHEELS, for project, reasonably priced. Smathers, 298-0613.
- TANDEM BICYCLE, 10 speeds or more, medium-size frame. Turpin, 281-5933.
- CARPET, good condition, 150 yds., neutral color. Vandewart, 298-4741.
- ENTERPRISING PERSON, to haul away tree cuttings. Brooks, 275-0056.
- BACKPACK CARRIER, for infant or small child. Hogan, 292-8879.

SHARE-A-RIDE

- VANPOOL NEEDS RIDERS, Edgewood/I-40 East, monthly or daily rates. Hansche, 4-3469.

Hoppy Easter! Kids Celebrate Tomorrow

KIDS KNOW EGGSACTLY WHERE TO BE tomorrow morning between 10 a.m. and noon — at the C-Club for their annual Easter party. On the agenda are an egg hunt and all kinds of games (and, naturally, ribbons and prizes). Chief entertainer is that furry fellow with the long, floppy ears. It's free cookies and punch for children and coffee for parents (accompanied by a cookie or two if the Easter Bunny thinks they've been *very, very* good). Festivities are open only to members' children; admission's free — but bring along the membership card.

IF YOU'RE LUCKY, there still may be space at the Easter champagne brunch this Sunday (March 26). The menu boasts an absolutely astounding array of items, including Virginia baked ham with cherry sauce, carved turkey and giblet gravy, baron of beef, that famous green chile stew, western omelets and scrambled eggs, etc., etc. Mr. P. Cottontail makes his second appearance of the weekend between 11 a.m. and 1 p.m. The price is \$10.95/adults, \$5.95/child.

dren ages 5 to 11, and free/ankle-biters 4 years old and younger. Better make that reservations call right now (265-6791).

GETTING IT ALL TOGETHER AGAIN is what the T-Bird card sharks are doing next Thursday morning (March 30). Fun and games start at 10 a.m., with free refreshments and door prizes thrown in to ensure an outstanding day. Wheeler-dealer Jim McCutcheon says he's glad there's not another holiday coming up for a while, because he has run out of costumes!

A SHRIMPY DELICIOUS PRIME OPPORTUNITY awaits those who head for the two-for-one special dinner next Friday night (March 31). Prime rib or fried shrimp are your entree choices (two dinners for \$19.95). Afterward, join that thrilling threesome, Trio Grande, for dancing from 8 p.m. to midnight.

Events Calendar

March 24 — Annabelle Gamson/Dance Solos, Inc., modern dance; 8 p.m., KiMo Theatre, 848-1370.
March 24-April 2 — "A Coupla White Chicks Sitting Around Talking," by John Ford Noonan, earthy humor mixed with the dark side of life in the '80s; 8 p.m. Fri.-Sat., 6 p.m. Sun.; Vortex Theatre, 247-8600.
March 24-April 2 — "Man of La Mancha," Albuquerque Civic Light Opera presentation; 8:15 p.m. Fri.-Sat., 2 p.m. Sun.; Popejoy Hall, 345-6577 or 277-3121.
March 24-April 9 — "Sea Stars," Smithsonian Institute traveling exhibit of star fish, organized by the Monterey Bay Aquarium; 9 a.m.-5 p.m., New Mexico Museum of Natural History, 841-8837.
March 25 — Concert, Seraphin Trio, featuring Faure's "Piano Quartet"; 8:15 p.m., Keller Hall, 277-4402.
March 25 — Family Days Workshop: Weaving in Albuquerque, program of guided tours and hands-on activities related to current museum exhibits (children of all ages welcome); 2-4 p.m., Albuquerque Museum, free with paid museum admission, 243-7255.
March 26 — Doc Watson, folk-song artist from Deep Gap, N.C.; 8 p.m., KiMo Theatre, 243-4500.
March 26-30 — Composers' Symposium, featuring performances by the UNM Symphonic Wind Ensemble, Symphony Orchestra, University Chorus, faculty soloists and ensembles, student assemblies, and the Chamber Orchestra of Albuquerque; 8:15 p.m. (2 p.m. Tues.); Keller Hall, 277-4402.
March 27 — Chamber Series #1: New Mexico Symphony Orchestra; 8:15 p.m., First United Methodist Church (4th & Lead SW), 842-8565.
March 28-April 9 — Exhibit, "Fundamentals of Photography: Early Beginnings," works from museum's permanent collection featuring an overview of the history of photography, coinciding with the sesquicentennial of its discovery in 1839; 9 a.m.-4 p.m. Tues.-Fri., 5-9 p.m. Tues. evening; UNM Art Museum, 277-4001.
March 31-May 7 — "Spanish Fly," La Compania de Teatro de Alburquerque interpretation of Machiavelli's romantic comedy, "Mandragola"; 8 p.m., Menaul Theatre (301 Menaul NE), 242-7929.
April 1 — David Gordon/Pick-up Company, witty dancing and dialogue; 8 p.m., KiMo Theatre, 848-1370.
April 1-2 — "License to Dance," spring concert with David Chavez (NM Ballet Company artist/director), contemporary to classical; 8:15 p.m. (2:15 p.m. Sun.), Kiva Auditorium, 299-7798.
April 1-2 — African Violet Show and Sale; 2-6 p.m.

Sat., 10 a.m.-4 p.m. Sun.; Albuquerque Garden Center (10120 Lomas NE), 296-6020.
April 1-15 — "Family Folklore," Smithsonian Institute traveling exhibit; 9 a.m.-9 p.m. Mon.-Thurs., 9 a.m.-5 p.m. Fri.-Sat.; Albuquerque Public Library, 768-5154.
April 1-22 — "Visions of Excellence III," Albuquerque United Artists; noon-6 p.m. daily (except Mon.); Fine Arts Gallery, NM State Fairgrounds, free, 842-8305 or 265-1791.
April 2 — Quintessence — Choral Artists of the Southwest, music from the Renaissance through the Romantic periods; 4 p.m., Keller Hall, 277-4402.
April 3 — UNM Performing Arts Series: "My One and Only," hit Broadway musical; 8:15 p.m., Popejoy Hall, 277-2131.
April 5-16 — "A Flea in Her Ear," by Georges Feydeau, New Mexico Repertory Theatre production, mistaken identities, mysterious perfumed letters, and slamming doors send the characters flying about in this turn-of-the-century French farce; 8 p.m. Tues.-Sat., 2 p.m. Sat. & Sun.; KiMo Theatre, 243-4500.
April 7 — Wine Tasting, 8th Annual Wine Makers Conference-Opener; 14 New Mexico wineries represented plus food prepared with local wines, sponsored by the NM Vine & Wine Society; 5:30-8:30 p.m., Ramada Hotel Classic, 294-6217 or 867-2100.
April 7-8 — Classical Concert Series: "First Lady of the Flute," New Mexico Symphony Orchestra with guest flutist Carol Wincenc and guest conductor Louis Lane (Cleveland Pops), 8:15 p.m., Popejoy Hall, 842-8565.

Fun & Games

Bowling — SANDOE Bowling Assn. February Bowlers-of-the-Month include: Scratch — Glenn Folkins (5153), 596; and Micki Archuleta, 601; Handicap — Dick Radtke, 585 and 627; and Dora Gunckel (6400), 554 and 662.
 * * *
Soccer — A Sandia Soccer Assn. summer league organizational meeting is scheduled April 4 at 5 p.m. at the Coronado Club, Coronado Rm. This is a coed league, and everyone is invited to attend. Contact Ken Osburn (2821) on 4-0385 for information.

Take Note

Tom Picraux (1110) was recently elected vice-chairperson of the American Physical Society steering committee for the Topical Group on Materials Physics.

* * *

Dave Ginley (1144) participated in the First Symposium on the Frontiers of Science sponsored by the National Academy of Sciences March 2-4 in Irvine, Calif. His topic was superconductors. "It was like being in an issue of *Scientific American*," he says, "only you got to ask questions."

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Free advance registration is open now to attend ISE '89, the 10th-anniversary Ideas in Science and Electronics Exposition and Symposium being held at the Albuquerque Convention Center May 16-18. Both exhibit and technical program admission is free to advance registrants, but two items involve charges — the May 16 luncheon (with keynote address on SEMATECH) costs \$20, and the complete technical *Proceedings* is \$15. Both require advance orders and payments. IEEE Section and Rio Grande Chapter/Electronics Representatives Assn. are ISE '89 co-sponsors. For information, contact exposition manager Becky Rouse on 262-1023.

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The New Mexico Wildlife Federation's Diamond Jubilee annual convention, "75 Years of Service to Wildlife Conservation," will be held March 31 and April 1 at Albuquerque's Sheraton Old Town Inn. Sandians involved in the Albuquerque and New Mexico Wildlife Federation are Dave Weingarten (2552), Joe Padilla (7485), and Cliff Mendel (DMTS, 1253). Banquet and luncheon reservations are due at the NM Wildlife Federation office by March 27. All other events are free. Contact Joyce Mendel on 265-3840 or Mary Reed on 299-5404 for information.

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Professional Secretaries International is launching Professional Secretaries Week with its annual seminar at the Holiday Inn Midtown April 22, 9 a.m. to 3:45 p.m. Seminar theme is "The Power of Humor in the Workplace." Contact Barbara Saya (6512) on 4-4169 for information.

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Julia Guerra (6220) dances with the Mexican Fiesta Dance Company in "Fiesta de Flores en la Primavera" (A Celebration of the Flowers of Spring) March 25 and 26 at the KiMo Theatre. Julia Gabaldon (3510) is master of ceremonies. Saturday show-time is 8 p.m.; Sunday, 2 p.m.



DOE CERTIFICATE OF APPRECIATION was awarded earlier this year to Dave Carlson, supervisor of Advanced Nuclear Power Technology Div. 6513 (right), for "significant contributions toward making nuclear power plant life extension a viable option for future electrical supply." David McGoff, Associate Deputy Assistant Secretary for Reactor Deployment, made the presentation at DOE's Germantown complex. Others involved in the effort to add productive years to the nation's existing nuclear power plants are Hugh Bundy, Art DuCharme, John Linebarger, Ben Roscoe, Stan Rosinski (all 6513), Larry Bustard (6447), and Donnie Whitehead (6412).