

Sandia Builds a Building Block for Space Communications

After three years of working on a shoestring, a Sandia team developing a high-frequency space communication system hopes that growing interest in their successful prototype will translate into an opportunity to see the hardware tested in space.

Sandia and Martin-Marietta Denver Aerospace are cooperating on the project: Martin-Marietta is developing the receiver, and Sandia is developing the transmitter.

The original application was in the Strategic Defense Initiative, which needs crosslinks between space-based SDI systems to ensure reliable communication under hostile conditions. That's still a likely application, but there are broader possibilities as well.

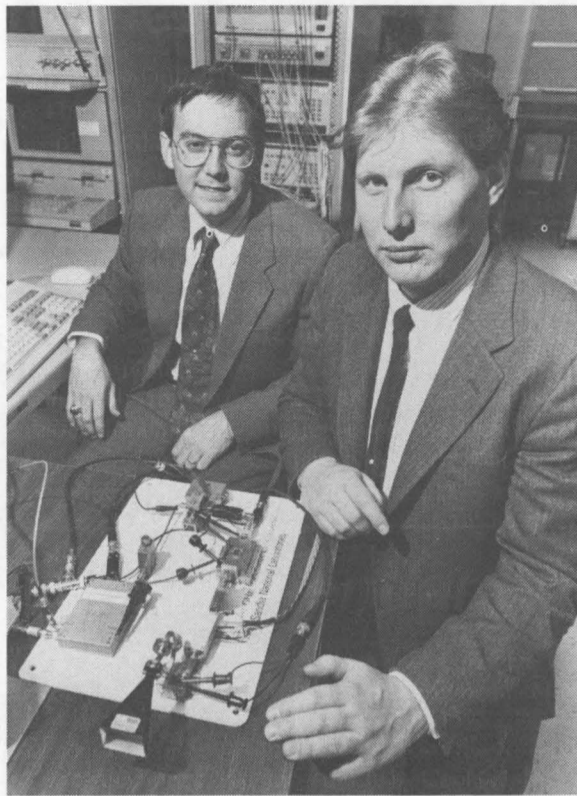
The team includes Sandians in three divisions: Special Semiconductors Div. 2175, Electronic Development Div. II 2346, and Power System Electronics Div. 6474. Team members include overall project manager and Div. 6474 Supervisor Ted Wheelis, technical manager and Div. 2175 Supervisor Jeff Meyer, technical project leader Perry Robertson, Lynn Sloan, Jim Heise, Marcelino Armendariz (all 2175), Div. 2346 Supervisor Bob O'Nan, Brian VanLeewuen (2346), and John Aragon (6474).

Their system is designed for digital communication, which means sending information encoded as patterns of 1s and 0s. In this case, the 1s and 0s are represented by rapid shifts in frequencies (the method is called frequency-shift keying). The transmitter is based around a "direct digital synthesizer" that generates the frequencies.

A Natural for Space

"A small, lightweight, high-frequency system like this is a natural for all sorts of space applications," says Ted Wheelis. "We've had inquiries from various organizations and programs inside and outside the government."

So far, however, the project has had to rely on what one of the sponsors calls "quilted patchwork funding."



LAB MODEL of a 60-gigahertz space communication system was recently demonstrated to project sponsors. Setting up for the demo are technical project leader Perry Robertson (left) and team member Lynn Sloan (both 2175).

And indeed the resources have been pieced together quilt-fashion, says Ted. "We've had to demonstrate to our various sponsors — including the Phillips Lab, Air Force Space Systems Division, and SDI organization — that we could make technical progress in meeting their particular needs. I think this project is an example of what Sandia is moving toward — being a technical leader in a reimbursable environment where you constantly have to prove yourself and your products to sponsors."

Jeff Meyer says, "The primary issue for this project is whether we can make a 60-gigahertz [GHz] radiation-hard system." The emerging answer, he and Ted agree, is yes.

The choice of 60 GHz isn't arbitrary. It's a microwave frequency that is absorbed by the atmosphere, so satellite-to-satellite communication can't be jammed by strong microwaves from an earth-based transmitter. (Microwaves range in frequency from about 500 megahertz, or 1/2 GHz, to about 300 GHz for millimeter waves. The FM broadcast band is about 100 MHz, or 1/10 GHz.)

Most satellite communication links now use 20 or 44 GHz; higher frequencies present some tricky technical challenges. Part of what impresses observers of the Sandia/Martin-Marietta system is the successful use of gallium arsenide (GaAs) microwave and digital integrated circuits (ICs) in the system, needed to meet the high-speed requirements of 60-GHz operation.

Though GaAs has long been recognized as a material that could outperform silicon-based electronics, processing problems have delayed production of GaAs ICs for widespread use. This is one of the first such applications of GaAs at Sandia, says Jeff. (See "GaAs Gains Respect.") Among the chips developed for the project are MMICs — monolithic microwave integrated circuits — which combine such devices as transmission lines, resistors, capacitors, inductors, transistors, and diodes on a single small integrated circuit a few millimeters wide and long.

Rad-Hard Chips a Must

GaAs has the added advantage of being inherently more resistant to some types of radiation than silicon-based circuits. Radiation hardness is important for space applications in general, because of the natural radiation found in space (the earth's atmosphere shields us from much of it). It's doubly important for space-based military

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Sandians Receive Weapon Excellence Awards — Page Six
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LAB NEWS

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SANDIA NATIONAL LABORATORIES

JULY 12, 1991

Sandia to Survey Employees

Employees' Opinions Will Provide Basis for Labs Improvements



Using a proven survey process, Sandia's Change Management Org. 5 will

create a picture of the Labs' culture called "Sandians' Perspective" by asking for employee opinions on many workplace issues.

The survey will be administered the week of July 22 to Albuquerque employees in the Technology Transfer Center (Bldg. 825) and to Livermore employees in the Livermore Auditorium. Employees will be scheduled according to the first letters of their last names. A schedule will reach employees at all sites next week. Sandians at remote sites will receive their surveys in the mail.

"Sandians' Perspective is an opportunity for employees to express their candid opinions on

Labswide issues," says Dan Hartley, Vice President of Change Management. "This gives everyone a chance to participate actively in upcoming progress."

Results will be shared with all Sandians in October and will be used to design improvements. (The survey — known by many Sandians as the Stanek survey — could become an annual event at the Labs if the results of the first one are as helpful as hoped.)

A cornerstone of this improvement process, says Dan, is a recognition that every organization at Sandia must identify its own problems, assess where change is necessary, and implement appropriate changes.

Company and organizational goals will be
(Continued on Page Seven)

AI Discusses the Management Moves

Labs Reorganization Reflects Increasing Customer Emphasis

No new faces, but lots of Sandia faces in new places. That's what happens Aug. 1 when the Labs' reorganization goes into effect and many Sandia managers get new responsibilities.

Approved by the Sandia Board on Tuesday afternoon and announced to employees shortly thereafter, the reorganization creates a new management group — the Sandia Program Council (SPC) — to provide enhanced oversight and accountability for direct and indirect programs, laboratory development, and core competencies (see "Sandia Program Council: What's It About?" and SPC chart on page four).

The reorganization also includes naming, re-naming, and moving several vice presidencies and directorates, changing assignments for some VPs and directors, promoting/designating five Sandians as VPs, and promoting nine persons to director (see "Major Management Moves" and new organization chart on page five).

(Additional realignments may take place in coming months at the department, division, and section levels as the new organization evolves.)

Customer-Oriented Change, Says AI

"It will take some time for the new reporting relationships to become established and for new duties to be defined and understood," says Sandia President AI Narath. "However, I believe that once this happens, we will have a laboratory that's more

(Continued on Page Four)

This & That

Movin' Around and Movin' Up - That's what lots of Sandians will be doing next month when the reorganization becomes effective (see article on page one). It'll take us all a while to get used to the new organization numbers and some new managers, but I'll bet the Sandians with the biggest initial challenge are the folks in the mail room. They'll probably be doing the "Sandia Shuffle" for a while as they route mail to many Sandians who have new organization numbers.

* * *

George at Tonopah? - A new publication recently sent a complimentary copy of its very first issue (Vol. 1, No. 1) to George Bush, President, Sandia National Labs, Tonopah, NV 89049. Makes me wonder if they sent another copy to Al Narath at the White House. Also makes me wonder if that publication will ever make it to Vol. 1, No. 2.

* * *

Something's Missing - While doing a little dictionary work the other day, I came across a word that I first learned while training for this job at the Famous Writers' Institute and Transmission Exchange. The word - oology - has always looked incomplete, along with its derivative, oologist. Don't know what they mean? Go look 'em up. I can't do everything for you.

* * *

Paper Blitz - In a Feedback item at right, Harold Folley of Legal Dept. 4010 echoes the feelings of many of us in the communications biz, namely that we're increasingly blitzed with reams of paper carrying information that will soon be forgotten - if ever read. Harold, who gave special permission for us to associate his name with this item, sends along a passage from a college psychology text that bears on the problem: "Forgetting goes on rapidly at first, and then very slowly . . . 30 percent forgotten the first hour, 32 percent in 24 hours, 50 percent in six days, 80 percent in 30 days, and 97 percent in 120 days." So, four months from now, you'll probably remember only about four words from this entire item.

Seriously, the drive to improve communication among all levels at the Labs is a great thing. But I hope we'll all keep in mind that improved communication doesn't necessarily mean more and longer communications.

* * *

Better, But Still "Dead Last" - New Mexico motor vehicle crashes claimed 499 victims in 1990, 7 percent below 1989's death toll of 538, according to figures released several weeks ago by the State Highway and Transportation Dept. That's good news, but preliminary National Safety Council figures again show New Mexico's rate of 32.3 traffic deaths per 100,000 population is the highest among the 50 states. This rate is 74 percent above the national rate of 18.6 traffic deaths per 100,000 population.

* * *

Maybe We Could Split the Proceeds - After reading in the last issue that I'd written myself a couple of notes and then signed them, Paul Merrillat (5173) sent a note suggesting that it's time I start writing my book, *Confessions of a Schizophrenic*, by Larry Perrine as told to Larry Perrine.

•LP

feed liback

Q: Time and again we have heard the criticism that Sandia does not communicate well - between employees and management, between employees, and between organizations. Yet today we are generating mounds of paper for the sake of generating paper that cannot be understood, much less remembered, and that will likely never be read. We generate horribly complex, legalistic documents that run on for many pages, cross-referencing endless other documents that themselves cross-reference endless documents, with meaningless acronyms and references that can be understood by only a select few initiates. And all to convey a message that could be expressed in a few clear sentences.

The human mind can recall only a small fraction of real information, even if it is easily understood. Each new bit of information serves to obscure that which has already been remembered as well as that which follows. When we communicate, shouldn't we use what we learned in Psychology 101? Or have we forgotten that, too?

A: I agree completely. We've gone from not nearly enough to way too much in a short period. Most of us fail to consider thoroughly what our audience really needs to know. As has been said in a number of ways by smart people - please take the time to write a short message.

Herb Pitts (3100)

Q: Many Area IV residents are commenting that after-hours access can take from 15 to 50 minutes. When will a Mardix booth be installed at either Bldg. 962 or 960? The installation would save Area IV residents the inconvenience of waiting for a security inspection, and the security inspectors the inconvenience of having to unlock the gates and log in employees.

A: A Mardix booth for the 960/962 area has been discussed, but is not planned in the immediate future. Recent changes in the fence lines in Area IV will allow Bldg. 970 or PBFA II to be "bubbled out" into their own secure areas during classified experiments. The modifications will allow Bldg. 960 to serve as a central entry and exit point for the area. Proposals have been made to extend the hours of Bldg. 960 security inspectors and to open this gate on Saturdays. It is hoped that this will help reduce the inconveniences you have mentioned.

Jim Martin (3400)



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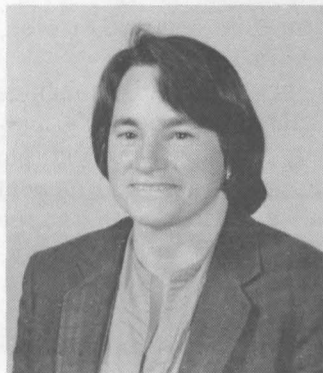


REAR ADMIRAL GERRY ELLIS (second from left) toured Sandia recently in preparation for his new assignment as DOE Deputy Assistant Secretary for Military Application. He replaces Admiral Mike Barr, who left for a new assignment July 1. Among those who briefed Admiral Ellis about Sandia programs were (from left) Roger Hagengruber, VP-9000; Al Chernoff, Manager of DOE's Kirtland Area Office; and John Crawford, VP-8000. Admiral Ellis has 31 years of Navy service and most recently was Commander of the Submarine Force of the US Atlantic Fleet.

Supervisory Appointments

CAROLYN PURA to Supervisor of W89 SRAM II Test and Evaluation Div. 8156.

Carolyn joined Sandia in 1977 as a mechanical engineer in the Solar Division, analyzing the solar central receiver. After a One-Year-On-Campus master's degree program at UC Davis, she returned to Sandia to perform test unit design and tolerance studies for the W82 program.



CAROLYN PURA (8156)

She later moved to the Phase I & II Division, working on the Corps Support

Weapon System, Phase I, and the ABM System, Phase II. Next, Carolyn transferred to the Special Projects Division as lead mechanical engineer, doing SDI work on the DELPHI weapon platform, and then to SRAM II Mechanical Systems Division. She later became lead test engineer for the SRAM II Test and Evaluation Division.

Carolyn has a BS and an MS in mechanical engineering from UC Davis. She is active in the American Society of Mechanical Engineers and has chaired the Mt. Diablo section.

She enjoys softball, racquetball, volleyball, and church-related activities. Carolyn resides in Livermore.

KATHIE CRIDER to Supervisor of Mail Distribution Sec. 8533-1.

Kathie joined Sandia in 1983 as a secretarial trainee. She worked in the Financial Division handling payroll, then moved to the Property Management Division as office equipment investigator. She was selected in 1987 as the staff secretary for the new Livermore Administration Directorate. She has also served as a Sandia Secretarial Council mentor.



KATHIE CRIDER (8533-1)

Before joining Sandia, Kathie worked as secretary for the Alameda County Probation Department, Westinghouse, and Clorox Co., and as



SANDIA'S CHILE TEAM participated in the annual Buenas Vidas Youth Ranch Benefit Chile Cookoff in downtown Livermore for the second year. Stirring up their specialty, "New Mexican-Style Chile," were (from left) Michael and Janet (8532) Brooks, Ruth Ann Padrick (8400), Nancy and Herb (8532) Myers, Larry Morice (Judy Morice's husband), Barbara Combs (8532), Ken Tschritter (8011), and Judy Morice (8523). Chairperson for the fundraiser was Fred Perez (8513). Paul Brewer (8500) was one of the judges.



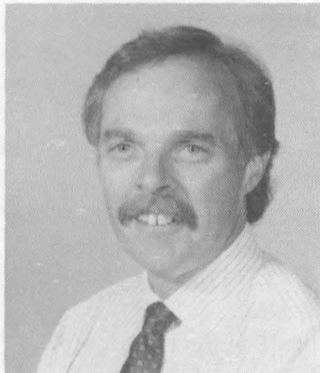
SANDIA LIVERMORE NEWS

administrative assistant for Mission Resources, an energy and investment firm.

She enjoys traveling, reading, and hiking. Kathie and her husband Jack have two grown children and reside in Livermore.

DOUG HENSON to Supervisor of Phase I & II Studies Div. 8171.

Doug joined Sandia in 1975 to work on Phase I & II studies, performing concept and feasibility studies. He then became lead mechanical engineer on the W87 program and the Operations and Deployment Experiment Simulator (ODES) program, where he was lead engineer for SDI work. Later he became lead mechanical engineer for the W89 program. He has been acting supervisor for the W89 Alt/Mk5 Studies Task Force Division since December.



DOUG HENSON (8171)

He has a BS in aerospace engineering from the University of Kansas and an MS in the same field from Stanford University. Before joining Sandia, Doug served in the Air Force for four years as a

fighter pilot. While on active duty, he earned an MSA (master's of science and administration) in management engineering from George Washington University.

He enjoys woodworking (including building his own home) and target shooting and is a licensed soccer referee. Doug and his wife Shirley have two children and reside in Livermore.

Earnings Factors April 1991

Long-Term Savings Plan for Management Employees (LTSPME)	Earnings Factors
AT&T Shares	1.0900
Government Obligations	1.0096
Equity Portfolio	1.0046
Guaranteed Interest Fund	1.0070
South Africa Restricted Fund	.9986
Long-Term Savings and Security Plan (LTSSP)	
AT&T Shares	1.0908
Guaranteed Interest Fund	1.0070
South Africa Restricted Fund	.9985
Equity Portfolio	1.0045
Employer Stock Fund	1.0911



TAKING HOME the Mayor's Trophy in the recent Livermore Red Flower Sunday Car Show was Ken Tschritter (8011). He exhibited his 1964 Buick Riviera, a sporty coupe with a 425-cubic-inch V-8 engine. His family has owned the car since it was six months old; Ken had it restored.



FORCE AND MOTION — Sandians recently conducted a weeklong workshop to help Livermore area elementary school teachers teach physics fundamentals. The workshop included demonstrations using rolling balls, falling objects, air bearings, and a Hovercraft. Team members include (from left) Dick Steeper (8364), Jay Keller (8364), Pam Barr (8362), Mike Hardwick (8446), and Marvin Kelley (8441).

(Continued from Page One)

Reorganization

responsive to our external customers' needs and more alert to the interesting new challenges and opportunities that face us."

The LAB NEWS talked with Al about the reorganization early this week.

"This is important to our future," says Al, "and involves lots more than just drawing boxes on a new chart and moving people around. Although there are many reasons for reorganizing, the main ones are to align the Labs better with our customers' needs and to strengthen our program management functions for translating customer needs into action. This is something that's emphasized strongly in all of our strategic planning efforts — customer orientation."

Other, related reasons, explains Al, are to consolidate core competencies and support functions, and to treat Albuquerque and Livermore as two sites of a "single Sandia," not as separate groups.

This is evidenced by the new arrangement that has weapon development directors at both sites reporting programmatically to Roger Hagenruber,

new Defense Programs 5000 VP. Also, Dona Crawford, new Director of Scientific Computing 1900, is assigned to Livermore but reports programmatically to Research & Exploratory Technology 1000 VP Venky Narayanamurti. The

Weapon directors in Albuquerque and Livermore will report to the Defense Programs VP.

reorganization separates scientific computing from the administrative computing function. What's now Business Information Systems Dept. 2920 will report Aug. 1 to Information and Communication Services 3100 Director Herb Pitts.

The reorganization also designates site managers for both Albuquerque and Livermore, Executive VP Lee Bray and VP John Crawford, respectively.

New Vice Presidency

"We elevated the Laboratory Development organization [now 400] to a vice presidency [4000]," explains Al, "to recognize the increasingly vital

roles that this group will serve. The four directorates in 4000 under new VP Paul Robinson will strengthen our efforts in many areas, for example, quality, change management, strategic planning, technology transfer, coordination with political and military leaders, and development of Lab-wide information systems and standards."

Three other Sandians were promoted to vice president — Gerry Yonas to VP of Systems Applications 9000, Heinz Schmitt to VP of Engineering Design and Development 2000, and Paul Stanford to VP, Chief Financial Officer.

VPs with new assignments on Aug. 1 include Roger Hagenruber, Defense Programs 5000, currently VP of Exploratory Systems 9000; and Dan Hartley, who returns to Energy and Environment 6000 after serving as VP of Corporate Change Management 5. VPs with only slightly altered organizations include Glen Cheney, ES&H and Facilities Management 7000; John Crawford, Livermore Programs and Site Management 8000; and Venky Narayanamurti, Research and Exploratory Technology 1000.

Why Reorganize Now?

Al says the reorganization was needed now because of the current large number of acting VPs and directors at the Labs. "Many of the acting management positions and special assignments were created to fill specific needs that we had — in change management and ES&H, for example," says Al, "and some of those needs have evolved to the point that they can be integrated into our permanent organization, some at different management levels."

"Our Change Management and Quality organizations are good examples," he explains. "We are

Sandia Program Council: What's It About?

Created in the reorganization is a new management group, the "Sandia Program Council (SPC)." Chaired by President Al Narath, the group includes most (but not all) VPs and the Director of Planning and Staff Support 4500. The concept of this group certainly isn't new, says Al, because Sandia has long had program and activity managers.

What is new, he adds, is the formal organization of the council to "drive home the decision made some time ago that Sandia will increasingly shift authority from organizational managers to program managers. The creation of the Sandia Program Council underscores that shift."

Al says the SPC will meet at least quarterly, and more frequently if needed, to "review exhaustively the status of our programs, projects, and core competencies. It will also be involved in long-range planning and make investment decisions in four primary areas — Indirect Programs, Direct Programs, Laboratory Development, and Core Competencies [see chart]."

A significant feature of the Sandia Program Council, he says, is the way it is organized into

three separate business sector responsibilities for Direct Programs. Executive VP Orval Jones (20) will coordinate this activity, with John Crawford (8000) serving as his deputy, and is supported by three VPs, each responsible for one of the sectors: DOE Defense Programs under Roger Hagenruber (5000), Energy and Environment (including work for the Nuclear Regulatory Commission) under Dan Hartley (6000), and Work for Others (reimbursables) under Gerry Yonas (9000).

"Most of the effort for managing programs and planning them will be done by these three sector heads," Al says. "This will give us a customer focus that we haven't had before."

The Sandia Management Council (SMC — Al, all EVPs and VPs, Quality Improvement Director Charles Tapp, ES&H Director Nestor Ortiz, Human Resources Director Ralph Bonner, and Planning and Staff Support Director Virgil Dugan) will continue to be responsible for setting operational policies, explains Al. SMC meets frequently and does so in two different forms — as the Sandia Quality Council and the Sandia ES&H Council.

"By combining our change and quality initiatives in a single directorate, we'll provide a focal point for integrating these activities into our culture."

totally committed to our objectives in these areas, and we want our empowered Sandia work force to continue the progress we've made. In fact, I consider quality and empowerment to be inseparable elements in our quest for improved performance and increased customer satisfaction. By combining our change and quality initiatives in a single directorate [Quality Improvement 4300] under Charles Tapp, we'll provide a focal point for integrating these activities into our culture and gaining efficiencies in the process."

One more reason for reorganizing, says Al, is simply to give vice presidents and directors broader experience in different areas. "I think managers — especially senior managers — can get stale and lose their creative, dynamic edge if they stay in one organization too long. Changing their job responsibilities can be healthy for the managers and for Sandia."

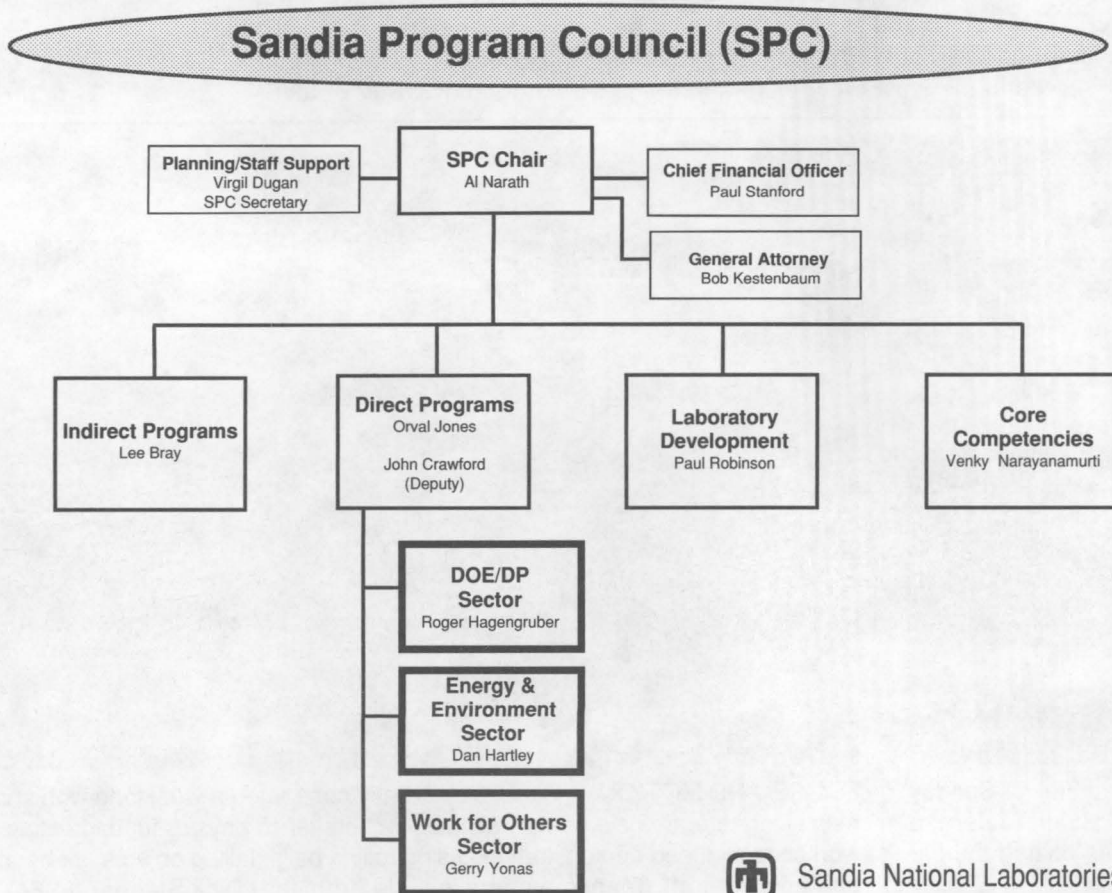
Reorganize Now, Restructure Later?

The Sandia reorganization is not tied to the restructuring study that's being coordinated by Dan Hartley. Restructuring could involve reducing the number of management levels at the Labs or possibly changing the duties of managers at some levels, notes Al, but that is far from certain.

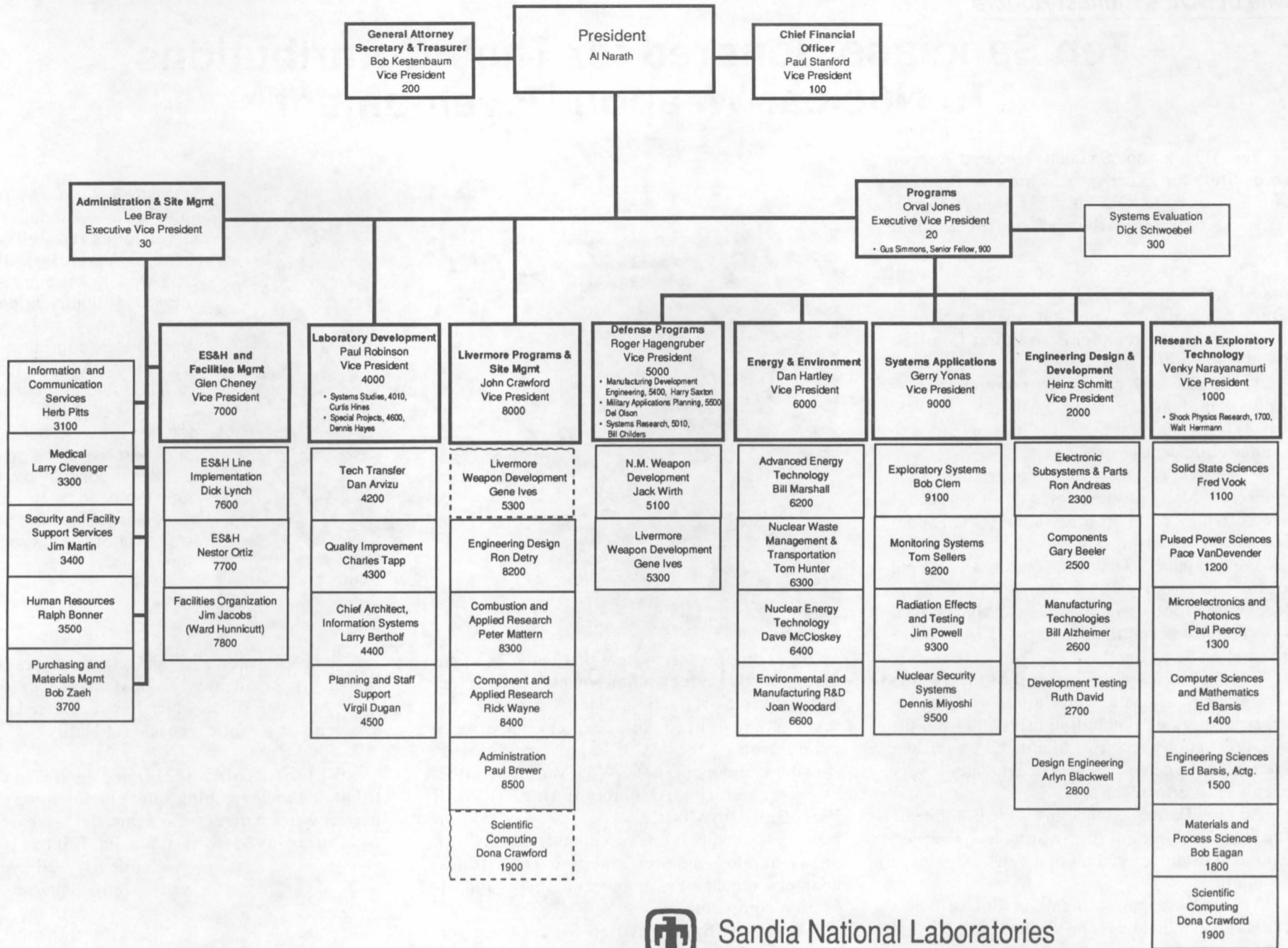
A broad group of Sandians is involved in the restructuring study. The group is studying management structures of various industry and government groups, and will make its recommendations to Al, perhaps this fall. "I'll not guess what the conclusions will be," says Al. "I want the group to formulate unbiased recommendations, then I'll take a look and decide what restructuring would benefit us and our customers."


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(The LAB NEWS will report other reorganization and restructuring news in future issues.)



Sandia National Laboratories



 Sandia National Laboratories

Major Management Moves Resulting from Reorganization

Here are the *major* changes only (by organization) in VP and director ranks resulting from the reorganization that goes into effect Aug. 1: (Some title changes and reassignments are not listed here, but are shown on the organization chart. For brevity, individuals' pre-Aug. 1 assignments are not listed, and pre-Aug. 1 organization names are not shown.)

- **Research and Exploratory Technology 1000** — Paul Peercy promoted to Director of Microelectronics and Photonics 1300, a new organization. Dona Crawford promoted to Director of Scientific Computing 1900; reports programmatically to 1000, but assigned to Livermore site.

- **Engineering Design and Development 2000** — Heinz Schmitt promoted to VP. Ron Andreas promoted to Director of Electronic Subsystems and Parts 2300. Gary Beeler promoted to Director of Components 2500. Ruth David promoted to Director of Development Testing 2700.

- **Laboratory Development 4000** — This organization elevated to VP level (takes 4000 org. number assigned now to General Attorney). Paul Robinson promoted to VP. Dan Arvizu promoted to Director of Technology Transfer 4200. Charles Tapp moves to Director of Quality Improvement 4300. Larry Bertholf moves to Chief Architect, Information Systems 4400. Virgil Dugan moves to Director of Planning and Staff Support 4500. Dennis Hayes, Director of Special Projects 4600 (currently on assignment in Washington), and Curtis Hines, Manager of Systems Studies 4010, will report directly to the 4000 VP.

- **Defense Programs 5000** — Roger Hagengruber moves to VP of this group. Jack Wirth moves to Director of New Mexico Weapon Development 5100. Gene Ives, Director of Livermore Weapon Development 5300, now reports program-

matically to 5000, but is assigned to Livermore site. Three Sandians with special assignments will report directly to the 5000 VP: Harry Saxton, Director of Manufacturing Development Engineering 5400; Del Olson, Director of Military Applications Planning 5500; and Bill Childers, Manager of Systems Research 5010.

- **Energy and Environment 6000** — Dan Hartley returns as VP. Bill Marshall promoted to Director of Advanced Energy Technology 6200. Tom Hunter promoted to Director of Nuclear Waste Management and Transportation 6300.

- **ES&H and Facilities Management 7000** — This vice presidency, led by Glen Cheney, takes the organization number of former Technical Support vice presidency (most of that group has been integrated into other vice presidencies) and reports to Lee Bray, Executive VP of Administration and Site Management 30. (The new 7000 organization brings together the ES&H and Facilities directorates to allow a closer working relationship between organizations that plan and monitor ES&H compliance and remedy ES&H problems.) Jim Jacobs moves to Director of Facilities Org. 7800; current 7800 Director Ward Hunnicutt will remain as Director on special assignment to provide continuity to 7800 before he retires.

- **Livermore Programs and Site Management 8000** — No major changes, other than programmatic reporting changes noted with Orgs. 1000 and 5000.

- **Systems Applications 9000** — Gerry Yonas promoted to VP. Dennis Miyoshi promoted to Director of Nuclear Security Systems 9500.

- **Chief Financial Officer 100** — Paul Stanford promoted to VP and reports directly to the president.

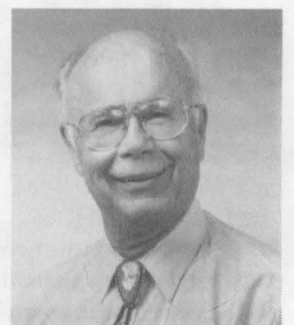
- **General Attorney, Secretary and Treasurer**

200 — Bob Kestenbaum (already a Sandia corporate officer) officially designated as VP.

- **Systems Evaluation 300** — Dick Schwoebel moves to Director of this group (formerly 7200), which is responsible for stockpile evaluation, and reports directly to Programs Executive VP Orval Jones (20).

•LP
(The LAB NEWS will profile new VPs and directors and their areas of responsibility in upcoming issues.)

Recent Retirees



Clarence Mehl
9248

36



Tom Hoban
7520

40



Glenn Mills
7265

38

One of DOE's Highest Honors

Ten Sandians Honored for Their Contributions To Nuclear Weapon Development

Ten Albuquerque Sandians received Weapon Recognition for Excellence Awards for 1990 last month — one of DOE's highest honors — recognizing their contributions to the nuclear weapon program.

The awards were presented by Admiral Mike Barr, former DOE Deputy Assistant Secretary for Military Application, in a Sandia ceremony for the recipients and their families, friends, and colleagues.

These 10 awards plus the four awarded to Livermore Sandians earlier this year (LAB NEWS, May 3) bring the total to 14, the most awarded to Sandians in recent years.

Executive VP Orval Jones congratulated the honorees: "Many of these folks don't get recognized often by regular professional societies because much of their work is classified and can't be discussed in public. That's one reason why we put so much internal emphasis on these Weapon Recognition for Excellence Awards. My personal congratulations and thanks go to all 14 of these outstanding Sandians."

Orval also noted that several of the awards were given to teams of individuals working together on a project, including members from the DOE production agencies. "Maintaining a nuclear deterrent in the defense of the United States is very much a team effort," he said.

Admiral Barr noted that this is the last time he would be handing out the awards, as he earned another star and moved on to a new assignment this month.

Although Weapon Recognition for Excellence Awards go to individuals and small teams, Admiral Barr emphasized that the awards almost always reflect outstanding work by many people and "recognize the excellence of the Labs as a whole."

The recipients are:

JIM NEY (7200), for sustained exceptional contributions to the nation's nuclear weapons safety and command and control technology.



JIM NEY (7200)

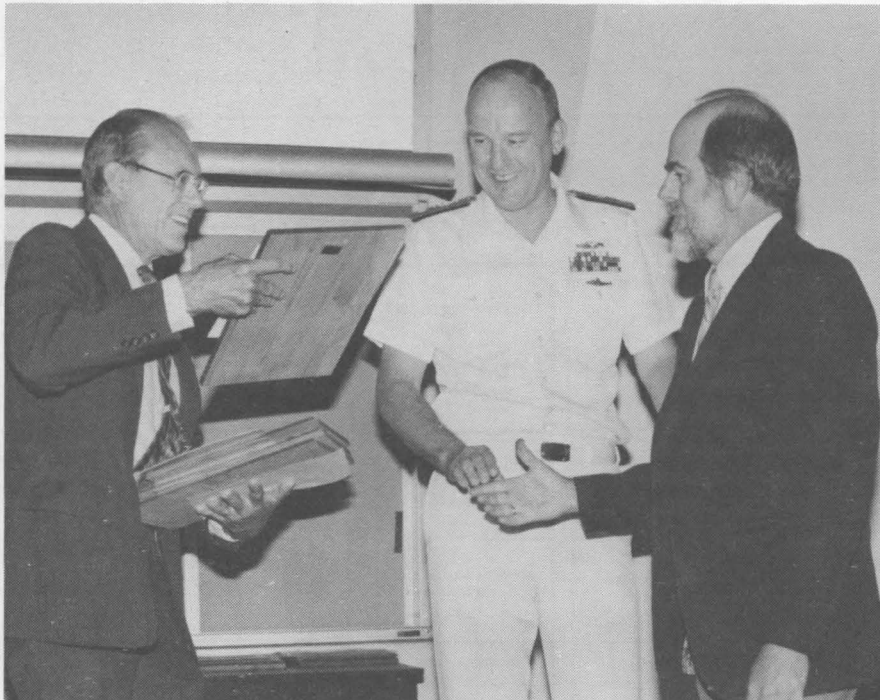
A Sandian for 28 years, Jim has made significant contributions in many Sandia areas, including weapons, energy, safeguards, transportation, and management.

For the past six years, Jim has been a leader in Sandia's Nuclear Safety program, contributing to stockpile assessment, design technology and evaluation, safety standards and criteria, and adversary analysis in both hardware and software technologies. His efforts have been fundamental in defining the Labs' approach and position regarding national surety issues.

During his early years, he was an innovator in weapons command and control technology, particularly in the area of adversary analysis. He was instrumental in developing techniques to evaluate the potential for adversaries to defeat control and security systems and in applying these technologies to assess weapon control capability.

PAT WALTER (7557), JIM KANNOLT (7267), DAN MURPHY (2533), MIKE ROGERS (7522), AND JERRY WYMER (7525), for exceptional performance in developing a production acceptance tester for the W88/Mk5 integrating accelerometer.

The major challenge to this team was devel-



PASSING OUT AWARD PLAQUES — Executive VP Orval Jones (20, left) and Admiral Mike Barr, then DOE Deputy Assistant Secretary for Military Application, recently presented Weapon Recognition for Excellence Awards to the 10 Albuquerque recipients. Jerry Wymer (7525) is seen getting his award here. Admiral Barr has since moved to another position and has been replaced by Rear Admiral Gerry Ellis (see page two for photo of his recent Sandia visit).

oping a complex test system that includes a centrifuge with accuracy requirements never before achieved in a production tester. Ultimately, the test system — used for acceptance testing in production of the MC3813, an acceleration sensing component in the W88/Mark 5 Arming, Fuzing, and Firing Assembly for the Trident II Fleet Ballistic Missile — consisted of two in-process testers, two final acceptance testers with an associated indexer and two centrifuges, adapters, mechanical gages, and shock and vibration equipment.

When the Sandia-Allied Signal team was formed in 1984 to develop the test system for the Force Balance Integrating Accelerometer (FBIA), Allied had determined that the centrifuge couldn't be produced because it could not meet the acceleration accuracy requirement of 1 part in 10,000 and the production inspection capability of 40 FBIAs per month.

But the team developed a world-class precision air-bearing centrifuge that exceeds the accuracy requirement at up to 150 g's and that achieved a production inspection capability of 50 FBIAs a month. The full FBIA Test System was qualified and released seven months in advance of first production.

Since its qualification and release, the test system has been in nearly constant use by Bell Aerospace and Allied, which have expressed pleasure with its performance and reliability.

BILL HARTMAN (5214), for significant contributions in developing safety methodology for nuclear weapon transport systems.

During his 33 years at Sandia, Bill has spent nearly 20 years providing technical foundations for safe transport of DOE material and weapons in Safe-Secure Trailers. His work is also the basis for demonstrating that the safety provided to the public by the DOE's shipment methods is equivalent to or surpasses the safety required for items transported in general commerce.

This equivalent safety is shown by the use of
(Continued on Next Page)



BILL HARTMAN (5214)



DAN MURPHY (2533), JERRY WYMER (7525), MIKE ROGERS (7522), PAT WALTER (7557) and JIM KANNOLT (7267).

(Continued from Preceding Page)

probabilistic risk assessments, and DOE utilization of this methodology has resulted in a cost-effective, safe, and secure transport system for nuclear weapons.

LARRY POSEY (9351), for significant contributions in W88/Mk5 electronic subsystems radiation hardness testing.

In his 24-year Sandia career, Larry has performed fundamental work in simulation fidelity, radiation dosimetry, advanced radiation threats, and radiation hardening of weapons.

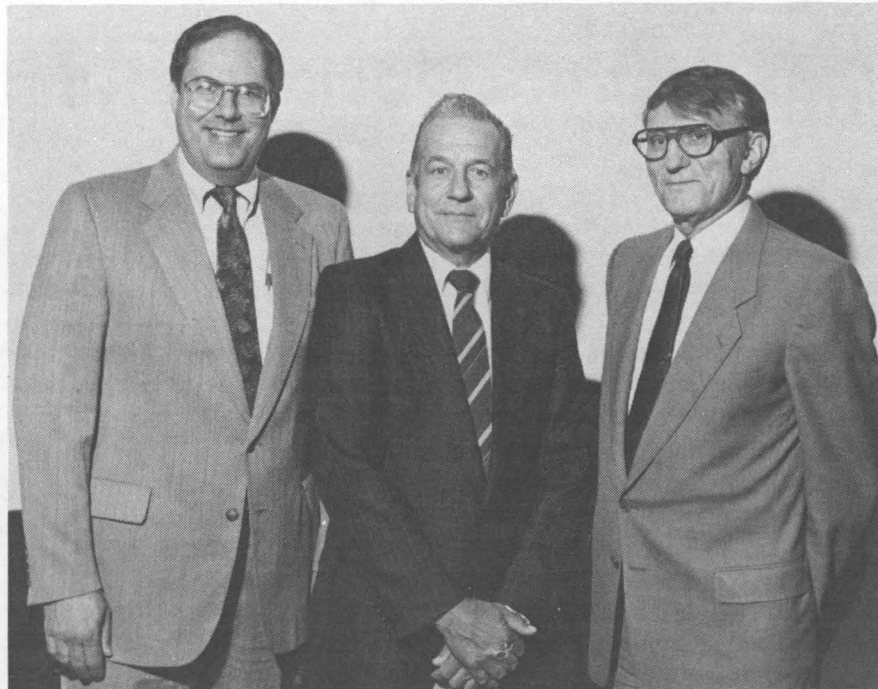


LARRY POSEY (9351)

He has made major contributions to the Mark 5 Arming, Firing, & Fuzing program by developing and overseeing radiation survivability testing for all W88/Mk5 elec-

tronic subsystems and major components. He addressed a variety of challenges, including interpreting and testing radiation environments, recognizing and resolving simulation fidelity issues, scheduling a large test program, and directing and solving instrumentation and data analysis tasks.

Larry directed or performed hundreds of radiation effects tests related to the W88/Mk5. Under his direction, radiation hardness was verified for the MC3811 programmer, the MC3812 radar, the MC3813 FBIA (Force Balance Integrating Accelerometer), the MC3814 fire set, and other major components. He continues to act as project



RICHARD KING (Allied Signal), RON OELSNER (7267), and DON ARQUETTE (2342).

leader on assurance testing during production of W88/Mk5 hardware and has made significant radiation-hardening contributions to other weapon programs.

He also helped develop the initial design concept for several radiation-simulation facilities, including HERMES III, Saturn, and the Annular Core Research Reactor.

DON ARQUETTE (2342), RON OELSNER (7267), RICHARD KING, and DON RICHARDSON (both of Allied Signal), for work on implementing a Sandia-Allied Signal team approach to radar test equipment development.

Historically, development and production testers for radars have been designed and fabricated independently by Sandia and Allied. The nominees worked together with Richard King and Don Richardson of Allied Signal Aerospace to

jointly develop radar test equipment.

Their approach was to design a set of 12 different development and production testers using common hardware and software. Both organizations shared design responsibility, thus eliminating duplication and reducing the overall size of the team, while providing individual designers more time for their tasks.

The team approach was proven in development of Trident II radar testers, and has been carried over to the B90 radar program. As a result, Trident II radar test equipment cost \$3 million less than the initial estimate. Their efforts also led to early discovery and resolution of tester and radar problems. Experience thus far on the Trident II has borne out the soundness of this approach by showing good data correlation among test systems and minimal maintenance problems. ●LD

(Continued from Page One)

Sandians' Perspective

pursued by process owners and by quality teams formed in November. These teams will include Sandians who are closest to the problems. With the help of trained facilitators, members will identify and resolve their own specific problems.

Linda Logan (5), project coordinator for administration of the survey, says the focus of the first round is to "take a snapshot of the Labs" that will be used to make "before and after" comparisons and help document a record of progress.

Opportunity to Share Ideas

In the Sandia survey, anonymity is guaranteed so employees can answer questions freely and honestly. Sandians will be asked to provide basic demographic information, such as age, gender, and length of service, and then rank degrees of agreement with some statements. Examples of statements include: "Our emphasis on quality has resulted in measurable improvements," "I often don't believe what management says," and "My work gives me a sense of personal accomplishment."

The final page of the questionnaire gives Sandians a chance to share their ideas and asks the question, "If you could make ONE change to improve the overall effectiveness of your part of Sandia, what would it be?"

The question of how to track and measure Sandia's progress was at least partially answered by studying the results of similar surveys done at AT&T's Consumer Products division.

"It was impressive," says Dan. "AT&T uses survey results to develop and implement corrective action plans — both companywide and within organizations. I am convinced the process will do great things for Sandia as well."

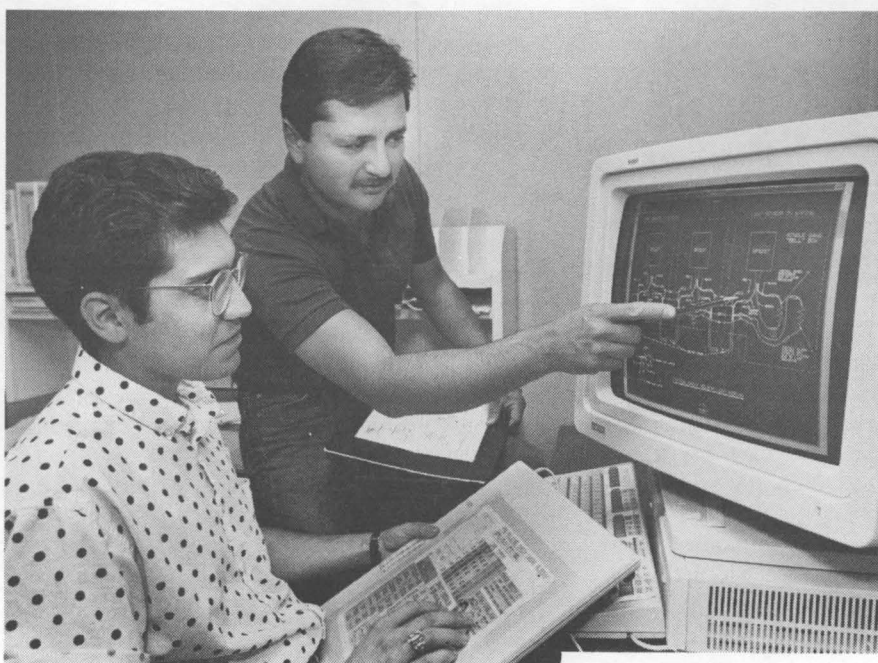
The effect of the assessment on AT&T's Consumer Products division after several years proved to be dramatic. In 1985, Consumer Products was one of the worst performing divisions at AT&T. By 1990, the division had improved its AT&T standing dramatically and outscored the national norm in 13 of 16 performance categories. "It was an amazing turnaround," says Dan. "I have rarely seen an organization cover as much ground and increase overall quality at the rate it did. I attribute that to commitment to act on issues raised in the survey."

Labs President Al Narath was at AT&T when its survey process began, and his experience indicates that there is much to be learned from such employee surveys.

"Sandia management will use the survey as another tool in building improved communications," says Al. "Management has committed itself to listening very carefully and acting on what employees have to say." ●DT

Take Note

UNM will again offer Entrepreneurial Engineering ME 456 during the fall semester. Working engineers and graduate and senior engineering students take the course, typically starting four new businesses each semester. Engineers who plan to start a business venture someday are encouraged to take the class and to bring their ideas. The class meets Tuesdays, beginning Aug. 27, from 6:30 to 9:30 p.m. in the UNM Mechanical Engineering Bldg., Room 218. Enrollment must be completed in the Student Services Bldg. Registration Center (277-5548) by Aug. 30. Cost is \$194.25 for the three-unit class. For more information, call Prof. Bill Gross on 277-6297.



TWO LVTI students, Rick Gallegos (left) and David Garcia, work on a wiring diagram in Design Dept. 2850 as part of a new summer hiring agreement between Sandia and Luna Vocational-Technical Institute (LVTI, Las Vegas, N.M.). The goal of the program is to strengthen the school's drafting program by providing LVTI students summer design and drafting experience at the Labs. The agreement was formalized at a signing ceremony July 2.

procedures are good, but documentation was found to be inadequate.

Q: Do we have any record of having ever released a radioactive item to the public through sale of scrap or surplus equipment?

A: Gloria Chavez and Phil Apodaca (both 3222): There is no documented or rumored case of radioactive material ever having been released to the public. Division 3222 is implementing a more detailed documentation system to ensure that there continues to be no radioactive material released to the public.

Q: Where was the depleted uranium that was listed in the Tiger Team findings, and why was it there? How radioactive was it? Can it be removed? Or should it simply be isolated?

A: Mark Garrett (7535) and George Tucker (3212): Depleted uranium is natural uranium from which most of the fissionable isotope 235 has been removed. It is predominantly an alpha and beta emitter. Two pea-size particles of depleted uranium were found about 60 feet from the south end of the rocket sled track in Area III. They had been underground and were probably scraped to the surface during recent earth grading.

Depleted uranium has been used in impact tests at the rocket sled track to simulate special nuclear material in weapons impact tests, and for use as a high-density ballast, which is a common industrial practice. Depleted uranium is used as ballast, for example, in most commercial aircraft. In impact tests, the test unit typically breaks into pieces and spreads over an enclosed area at

Statistics for 1990-91

Incident statistics for 1990 and the first quarter of 1991 show the following:

1990 (Jan. 1 to Dec. 31): Total number of incidents reported was 860. Of those, 335 were OSHA recordable. For incidents that resulted in lost work days, following are the causes and number of work days lost:

- Tripping, 17 work days lost.
- Fall, 115.
- Foreign object entering eye, 1.
- Caught between objects, 1.
- Cutting/piercing objects, 36.
- Lifting, 44.
- Chemical contact, 1.
- Fume exposure, 5.
- Twisting, pushing, pulling, 109.
- Motor vehicle incident, 2.

First Quarter 1991 (Jan. 1 to March 31): Total number of incidents reported was 231. OSHA recordable incidents numbered 87. Causes of lost work days:

- Lifting, 3 days lost.
- Twisting, pushing, pulling, 2.

the south end of the track. Health Physics routinely does a survey after tests and recovers all pieces detected as uranium. However, very small particles cannot always be detected.

Currently, the area at the south end of the track is roped off and the gates to the area are locked. Health Physics reviews the activities of anyone who goes into the area. All personnel and material are monitored as they leave the area. There is no radiation threat. There is no health or safety risk because depleted uranium has a toxicity level very similar to lead. The main concern is to prevent the particles from causing any contamination outside Area III.

Q: What's the toughest challenge to come out of this compliance review? How have you addressed it?

A: Joe Stiegler, Nestor Ortiz, and staff: Recognizing we weren't as good as we thought we were. Being criticized for not doing a better job, when we felt we were doing a safe job. To deal with this, we had to rethink our businesses and put together a program from the top down. Then we had to get buy-in from everyone. This amounts to a need to change the Sandia culture to reflect a more formal awareness of ES&H issues.

Sandians have always proceeded on the basis that the best safety precautions are to hire good people and ask that they do a good, safe job. The approach to safety has been informal. Now, DOE orders and other requirements — essentially growing out of public demand — are requiring that this system be made formal. These requirements recognize that a structured, disciplined approach is best in an increasingly complex world.

Q: Are we doing things today that are in compliance with all ES&H regulations that will become problems in the future?

A: Joe Stiegler, Bob Park, Nestor Ortiz, and Gary

Yeager (3221): In all likelihood, yes. Being in compliance today is never an assurance that we will be tomorrow. Environmental regulation is extremely dynamic. Last year, for example, the Clean Air Act was rewritten, placing scores of new requirements on institutions like Sandia.

It's also important to remember that in the legislative arena a struggle continues over the issue of "how clean is clean?" Should laws be written to the limits of detectable measurements for pollutants, or to the limits of our technical ability to clean them up? This tension has not been resolved, and laws whipsaw back and forth between these two goals. In turn, these affect requirements on institutions like Sandia. The Sandia policy is to remain alert and to do our best to conform to new requirements as they occur.

Q: Can you give an example?

A: Joe Stiegler, Bob Park, Nestor Ortiz, and Gary Yeager: Landfill disposal is a good example. When Sandia disposed of chemicals and low-level radioactive materials in appropriate landfills on Kirtland Air Force Base, we did so in complete compliance with regulations. But as the regulations changed, we could no longer continue to dispose of these hazardous materials and comply with applicable laws. As a result, Sandia stopped using landfills for these purposes and switched to a hazardous-materials handling concept that calls for classifying wastes by type, packaging them, and shipping them to an EPA-certified disposal facility.

Q: Can we anticipate the possibility of future non-compliance and try to head it off?

A: Bob Park, Jim Fish (3220), and Gary Yeager: Staying alert and responding to legislative changes are the key ways. We try to anticipate future regulation. An example is our treatment of medical wastes as hazardous. No regulations are yet written to address most of these wastes, but some are under consideration. We are ahead of the law in this area, because our medical group has worked with Sandia's hazardous waste handling facility to properly dispose of these wastes.

Our waste minimization network is another example. This is a group of representatives from the line that studies the waste handling and chemical use processes in their organizations and then plans ways to reduce the volume of chemicals purchased, as well as otherwise improving processes.

Because the trend has been to regulate the use and disposal of more hazardous materials, we can expect that cutting down on the quantities used will be to the Labs' advantage. Disposal of hazardous materials is expensive, so using less will help keep costs down. Also, better tracking of all chemicals reduces costs by preventing "unknown" chemicals. These unknowns, with no documentation of their content, require expensive testing to determine how they are to be disposed of, adding expense to the waste process.

Q: Does the complexity of Sandia operations suggest or require that we shut down facilities or avoid activities that take more compliance dollars and personnel than they are worth?

A: Nestor Ortiz and Joe Stiegler: It's unlikely any large facilities will be shut down or that any of the Labs' core businesses will change as a result of the Tiger Team assessment. But it is likely that we will become very selective in our smaller operations if we feel an activity isn't cost effective because of ES&H requirements.

Sandia has stopped work and turned down projects before for safety reasons. During the past year, we closed a film processing facility and a small glass fabrication shop and began contracting for those services. There is no reason to suggest we will not do this in other cases in the future.

With the new Sandia awareness, there is certain to be more consideration of the environmental, safety, and public health implications of any project before it is accepted. For example, it is impossible right now to dispose of mixed waste in any EPA-approved way. Any project that might involve generation of mixed waste would have to be looked at carefully.

Q: Should we do less field/environmental testing, for example? Should we do more computer modeling/simulation?

A: Dave Bickel, Nestor Ortiz, Joe Stiegler, and Dick Schwoebel (2500): The answer is not a simple yes or no. There has been a trend toward more computer modeling at Sandia for more than 20 years. But testing is a part of the computer modeling process. Testing is needed to validate the models. When Sandia initiated its efforts to increase computer modeling and simulation work, researchers found they also needed more tests. Now 90 percent of the testing work done at Sandia is to tell computer modelers if their mathematical models are

Cheney Thanks Sandians

After the Tiger Team assessment, Glen Cheney (VP for ES&H Improvement and Compliance Program Management) offered some reflections on the audit and on Sandians' efforts:

"Now that the Tiger Team audit has been completed and the report released, I think it's accurate to say that the process led to a fair and



GLEN CHENEY

balanced assessment. The Tiger Team praised Sandia for our attitude about ES&H and our commitment to it. They recognized that we have made remarkable progress in a very short time. But they also noted many deficiencies and areas that need improvement.

"Sandians can take pride in our achievements and our commitment to ES&H progress. At the same time, we must maintain our commitment and focus on the task ahead. We have much to do.

"Currently, we are formulating our Action Plan to respond to the Tiger Team assessment. It will affect our work lives at Sandia for years to come — indeed, for the rest of our careers. The next major hurdle is the implementation of the ES&H Management Programs set to begin this summer.

"To all Sandians who contributed so much to our progress to date, a sincere thank you! And then, thank you again for all that I know you will be contributing as we go to work on completing the Action Plan."

accurate and how they can improve them. In predicting complex events, computer model makers must make many assumptions. To find out if their assumptions are correct, they must do tests. Researchers can then take test results and fine-tune the model.

Clearly, ES&H concerns will impact testing work because there are significant hazards in testing. The challenge will be to embrace new ES&H requirements and continue to provide testing support in a way that is responsive to the customers. One way of doing that may be the consolidation of some activities with a potentially large ES&H impact. A study group is now examining how this might be done with several dozen small high-explosives sites, permitting more efficient use of safety personnel during operations.

Q: Will these changes lead Sandia to become more of a scientific laboratory and less of an applied engineering laboratory?

A: Joe Stiegler, Nestor Ortiz, and staff: The changes we foresee are not changes in our technical strengths, but changes in the way we compete and remain responsive to our customers' requirements. It is not our plan to dilute Sandia's strong applied engineering bent.

Q: Isn't it inevitable, given funding restraints, that the Labs will shift some people from research science and engineering jobs to ES&H, plant engineering, and other support areas?

A: Joe Stiegler and Nestor Ortiz: It has already happened and will continue to happen. In fact, the Tiger Team praised Sandia's commitment to ES&H, as evidenced by the assignment of experienced senior managers to ES&H leadership positions. The shift is not unlike others Sandia has experienced from time to time. When research on a new energy form or weapons component has come to Sandia, management has directed appropriate resources to the new assignment. This is a similar situation.

Q: Can we tolerate increased overhead/indirect costs and still stay competitive? Can we continue to pride ourselves in quick turnaround of projects?

A: Joe Stiegler and staff: We have to find ways to do this to survive. There is an assumption that more formality in safety and environmental protection is not consistent with doing good solid technical research and development work. A good argument has already been made in several of Sandia's directorates that this is not the case.

●WKeener/ASotts(3163)

Turning Good Ideas Into Good Products**Sandia, Other New Mexico Groups Form Photonics Alliance**

A weakening of the US competitive position in the "critical technology" of photonics has prompted the formation of a New Mexico alliance including Sandia.

On July 8, President Al Narath joined University of New Mexico President Richard Peck; Ron Barks, Los Alamos National Lab's Director of Industrial Applications; and James Romero, Deputy Director of the Air Force's Phillips Laboratory, to sign a Memorandum of Agreement formally creating the Alliance for Photonic Technology (APT).

The Alliance is directed by UNM, which also is designated lead lab for the group. Interim Director and former Sandia VP Larry Anderson

"Companies that fail to recognize critical technologies may not survive."

says the mission "is to enhance US industrial competitiveness in the global marketplace in selected areas of photonics — lasers, optoelectronics, and fiberoptics.

"We will accomplish this by matching the

unique photonic capabilities of Los Alamos, Sandia, Phillips, and UNM's Center for High Technology Materials (CHTM) to the product-specific technology needs of US industry."

Photonics Deemed a 'Critical Technology'

Photonics is a "critical technology" because the magnitude of improvements possible by harnessing its potential can replace older competing technologies, says Larry. "The role of fiberoptics in telecommunications is a good example of this," he says. "Companies that fail to recognize critical technologies may not survive."

DoD and DOE labs now have tech transfer as a part of their primary mission. Recent legislation encourages federal R&D facilities to expand efforts and work with private industry to transfer and commercialize technology.

But because of certain barriers, this is often easier said than done, says Larry. This is especially true, he says, with firms that have limited experience in cooperative efforts. They often perceive difficulty in communicating and dealing with universities and federal labs. That's why APT is

strongly emphasizing that it will be a user-friendly group — to smooth the path for private firms to work with its R&D participants.

The Alliance, idea of Gerry Yonas, Director of Laboratory Development 400, met with "enormous enthusiasm" when discussed with CHTM Director Steven Brueck and UNM VP for Academic Affairs Paul Risser last year, says Gerry. Since then UNM has moved the idea steadily along, acquiring Larry as interim director, getting start-up funding from each R&D group, developing a business plan, negotiating the Memorandum of Agreement, and talking to potential industrial customers.

Says Gerry of the deal, "Photonics is a highly competitive technology around the world. No single lab has all of the technology needed, but by pooling the efforts of our local university and federal R&D facilities, our capabilities should be formidable."

APT is targeting five technology development areas: semiconductor-diode-based visible lasers, high-power diode lasers, multi-dimensional optical interconnects, high-speed optoelectronics, and optical sensors. Larry explains, "We looked at what the labs were good at, looked at potential industrial customers and where their products were headed, and came up with these target areas where there was a match."

Sandia's Special Capabilities

The Alliance will utilize Sandia's internationally recognized R&D programs in compound semiconductor materials, physics, and devices as well as in quantum electronics, lasers, and sensors, says Del Owyong, Manager of Optoelectronics and Microsensor Research Dept. 1160. Sandia's special facilities include the 3,700-sq.-ft. compound semiconductor research laboratory clean room, extensive characterization facilities for photonic and optoelectronic devices, and severe environment test facilities.

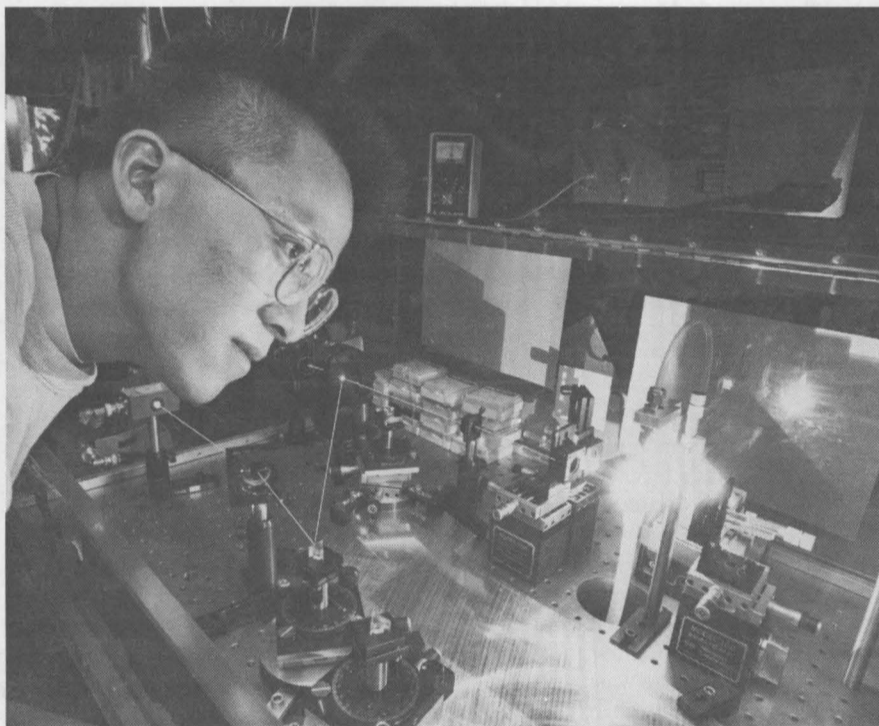
Several Sandians serve on Alliance committees. Venky Narayanamurti (1000) is chairman of the Advisory Board, and Del Owyong and Paul Dressendorfer (2530) are on the Research and Development Committee. Dave Myers (1141) has been active in the Market Study Group, and Sam Varnado (430) has been working with APT to develop technology transfer initiatives.

The Alliance can also contribute to statewide economic development, says Larry, by helping small businesses that are already in New Mexico or that may be interested in relocating here and by attracting more joint development projects with industry, leading perhaps to local spin-offs and possibly attracting some large out-of-state industries.

He concludes, "Though APT cannot directly solve America's industrial problems in photonics, it is a step in the right direction. Our goal is to capitalize on advanced technology and help industry turn good ideas into good products."

Gov. Bruce King, Sen. Pete Domenici, Rep. Steve Schiff, Albuquerque Mayor Louis Saavedra, and other political leaders attended the July 8 signing ceremony at UNM. •DT

STANFORD GRADUATE student Winston Fu (1164) studies the basic physics of lasers applicable to photonics, optical computing, and pattern recognition aspects of artificial intelligence. Optoelectronics and Microsensor Research Dept. 1160 will play an important role in the Alliance for Photonic Technology.

**Sandia News Briefs****Sandia's Newest Board Member Given Global Duties**

AT&T Vice Chairman and Sandia Board member Randall Tobias was given responsibility for AT&T's international business on June 25. He will now oversee all AT&T planning, development, and operations outside the US.

The move is part of an AT&T globalization effort aimed at increasing the company's share in the international telecommunications market. "The growth opportunities outside the United States are just enormous," Tobias said in a June 26 *New York Times* article.

Until now, Tobias has been responsible for AT&T's domestic and international long-distance business, communications products and systems, and Universal credit card business. He will continue to serve on the Sandia Corp. Board of Directors, to which he was named May 21.

Sandia to Manage Aging Aircraft Research Center

Sandia will soon begin a five-year project aimed at establishing a research center to develop non-destructive inspection (NDI) techniques for monitoring the safety of the nation's aging commercial aircraft, says Ruth David, Manager of Non-destructive Testing, Electromagnetics, and Optics Dept. 7550. Non-destructive inspection techniques evaluate the quality and condition of parts without altering or disassembling them.

The center, called the Aging Aircraft Non-destructive Inspection Development and Demonstration Center, will be operated by Sandia for the Federal Aviation Administration (FAA) at KAFB. Possible NDI techniques for aircraft include detecting tiny fractures or materials under stress using computer-aided tomography (X-ray imaging), radiography (radiation imaging), ultrasonics (acoustic detection), holometry (laser imaging), and acoustic emission recording (material stress detection).

Among Sandia's tasks will be evaluating techniques for detecting cracks and flaws in engines and fuselages, measuring probabilities of detection using multiple inspection techniques, establishing an information base on aging aircraft, and recommending future research projects to the FAA. "The ultimate goal is to transfer advanced testing technology to airline operators, who will then carry out fleet inspections on their own," says Ruth.

Send potential Sandia News Brief items to LAB NEWS, Div. 3162.

Employee Death

Dolores Just of Communications Development and Support Div. 3151 died June 19 after a long illness. She was 49 years old.

She had been at the Labs since 1984.

Survivors include a daughter and three sons.

(Continued from Page One)

Space Communications

systems such as those being developed for SDI because a nearby nuclear explosion could produce severe radiation environments and disable an unhardened system.

Sandia's long experience with radiation hardening is a plus for this system, says Ted Wheelis. "When work began on SDI a few years ago, Sandia pointed out that space systems would have to be more radiation-resistant than current satellites, but not as resistant as nuclear weapon RVs [reentry vehicles]. Therefore, Sandia's RV expertise and experience could be applied to satellites to significantly improve their nuclear survivability."

Though use of GaAs provides additional radiation tolerance, says Jeff, many other factors have to be taken into account. For instance, circuit layout, component selection, and material compatibility become key issues. "People have to get some experience in radiation hardening," says Jeff, "to be aware of all the subtleties and of what can happen when you put your components together in a system."

Sandia got started in this communications area by aiding SDI prime contractors in radiation-hardening their systems. Eventually, the Labs became not just an advisor, but one of the developers. As a result, radiation hardness is being built in — the components of the system have already been

"Sandia's RV expertise could be applied to satellites to significantly improve their nuclear survivability."

radiation-tested, for instance at Sandia's gamma-ray test facility Hermes III in Area 4. Says Jeff, "Results have been excellent." This year, the project is moving into module testing — the complete transmitter and receiver — and an underground nuclear test (to subject the system to high dose rates) is scheduled for 1992, according to Ted.

The technology for systems such as this has gone along with building up Sandia's testing capability. That meant acquiring some advanced test equipment. "Now we can do on-wafer probing of chips at 60 GHz and high-speed digital testing," says Jeff. "We couldn't do that two years ago. This increase of in-house capability shows the Labs' commitment in this area."

'Not Just Viewgraphs'

Of course, the proof of the pudding is whether you can come up with a working system. That's what impressed recent visitors, including sponsors, at the system demonstration this spring. "We had a working system to show them," says Jeff. Ted adds, "The sponsors said they liked seeing hardware as a result of their funds, not just viewgraphs."

Rising Ceiling of Frequencies

Ted Wheelis (6474) describes Sandia system-designers' increasing expertise in systems involving higher and higher microwave frequencies: "We've gone from dealing with systems that operate at a few gigahertz [GHz] to 60 GHz for this system in about three years. We believe the next generation of communication systems will operate in the 94-128 GHz frequency range. Because of the capabilities and experience gained at 60 GHz, Sandia is in a good position to be a major contributor for any future high-frequency communications systems."

No Longer Just What It Might Do

GaAs Gains Respect for What It Can Do

Most of today's semiconductor products — the transistor-packed "chips" in everything from home hi-fi to computers — are based on silicon. For about three decades, another material has seemed to have the potential of outperforming silicon devices. It's gallium arsenide (GaAs, pronounced "gas").

GaAs is a compound semiconductor — not a single chemical element, but a combination of two, gallium and arsenic. For several years, it has been used for special purposes such as satellite-dish receivers and the lasers used in compact-disk players, to name two everyday applications.

It's a desirable technology for a number of reasons. Electrons can move faster through GaAs than silicon — 5 to 7 times as fast — which allows higher-frequency operation. It also requires less power, which in turn means chips produce less heat and require less cooling. GaAs can be the basis for devices that emit and detect infrared and visible light, which makes it ideal for circuits involving both electronics and light (optoelectronics, or photonics). It has much better total-dose radiation survivability than radiation-hard silicon, an important characteristic for space and defense applications.

What's the Catch?

So all in all, GaAs looks like a winner — the technology of the future. The trouble is, goes a common joke, it's the technology of the future and always will be. The reasons are practical: GaAs is hard for manufacturers to work with, and the small size of the market limits funding.

The manufacturers of GaAs have to combine two elements precisely, rather than deal with a single element (silicon) as the basis of their product. They have to pay about 100 times as much for GaAs raw materials as for silicon. They must control the processing of GaAs material more tightly than silicon. The resulting wafers are smaller, so each yields fewer chips. So, until recently, they have been

able to produce some GaAs devices, but not to make them as compact, intricate, and cheap as silicon devices.

Despite these difficulties (or maybe because of them) more scientific papers have been published about GaAs than about silicon, says a thick 1990 compendium titled *Properties of Gallium Arsenide* — this for a material that makes up only about 1 percent of semiconductor sales in the world.

The research represented by such a volume of publication may be paying off at last, in improved ability to produce GaAs circuits. Currently, some GaAs manufacturers can produce chips that have more than 30,000 logic gates and are competitive in price and performance with their silicon counterparts. Computer and other electronic hardware manufacturers are using GaAs in increasing quantities. So are hardware developers at Sandia, for systems such as space communication systems (see main story) and synthetic aperture radars.

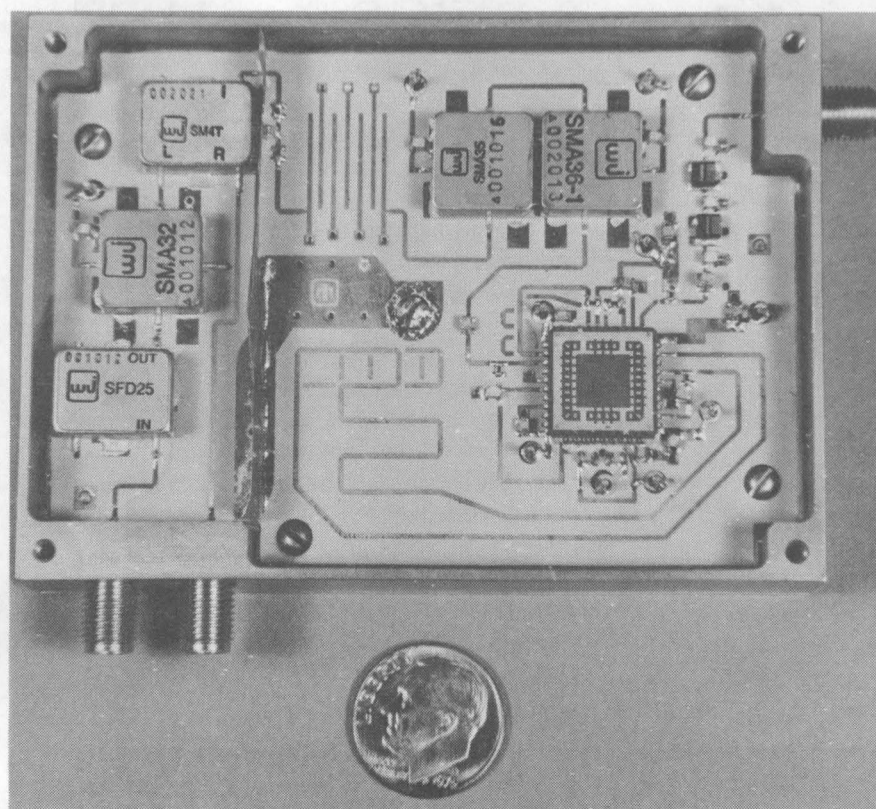
For example, Special Semiconductors Div. 2175 and Exploratory Radar Development Div. 2345 teamed to work with one of the few companies specializing in digital GaAs integrated circuits, GigaBit Logic, to get the necessary chips produced and delivered for a synthetic aperture imaging radar. "We did some failure analysis, and also worked on solving production problems," says Jeff Meyer (2175). "It's really only within the last year or so that we could realistically expect to get the GaAs chips needed for a system such as this. I think a lot of Sandia groups have been staying away from GaAs because production difficulties have made deliveries unreliable — they might or might not get the hardware they needed. But production processes are mature enough now to give users a reasonable degree of confidence that they'll get what they need."

Risky as any prediction is, it's beginning to look as if the technology of the future is finally on our doorsteps.

Jeff and Ted point out that many issues remain, such as space qualification of the system, and some specifics such as the antenna and the final power amplifier. But they also see opportunities. For instance, because the system is modular, it could be altered slightly to operate at the communication frequencies of current satellites. It could also be multiplexed to operate on several frequencies si-

multaneously, without duplicating all of the hardware for each frequency.

"We don't have all the answers," says Ted. "But we think if the program goes on, and especially if this system is included in an SDI flight test, Sandia will be in a strong position as a leader in this technology area." ●CS



CONTAINING BOTH digital and microwave circuits, this module corrects for spurious effects that can be caused by digital communication and processing. The hardware was designed and fabricated by Electronic Development Div. II 2346. For size comparison, note dime at bottom.

flexed kiback

Q: Why does Sandia recognize, officially or unofficially, "Secretaries Week"? Of the many job classifications at Sandia, why is this particular one of such special significance?

As the flowers begin to arrive, and the parade of managers and secretaries on their way to lunch begins, one wonders: Why not have a week for, let's say, managers or staff members or technicians or custodians?

A: Sandia does not officially recognize Professional Secretaries Week. Unofficial recognition comes through an article in the LAB NEWS, which features some aspect of secretarial life at the Labs, usually published the Friday before Professional Secretaries Week. This article is done at the request of the Secretarial Committee in cooperation with LAB NEWS Editor Larry Perrine.

Professional Secretaries Week (a registered trademark of Professional Secretaries International — PSI) was established in 1952 to recognize the secretary upon whose skills, loyalty, and efficiency the functions of business and government offices depend. Traditionally, the honoree is treated to lunch and in many instances is given flowers or a plant suitable for the office. Over time, the custom has expanded, and supervisors in most companies throughout the United States, Canada, and Japan, to name a few countries, continue to honor secretaries during the last full week of April. PSI has affiliates all over the world, including Puerto Rico and the Virgin Islands. PSI suggests that a good way to honor secretaries is to provide educational opportunities, such as seminars, workshops, and courses in related areas.

Florists and restaurant owners play no small part in Secretaries Week; advertisements abound from the first through the last week of April.

Perhaps if custodians or technicians or other groups had established such a week some 40 years ago, we would now also be honoring them.

By the way, there is also a "Bosses Day" each year. It occurs on the third Tuesday in October.

Carol Kaemper (21-1)

Q: Each workday morning seems to bring a long line of backed-up traffic at the stop sign at 14th and O streets on the south side of Tech Area I. I think this congestion could be eased substantially by either removing the stop sign at O Street or, if this is considered unsafe, by widening O Street another 100 feet or so to provide a right-turn lane without a stop sign. Ninety percent of the vehicles using the stop sign in the morning turn right, anyway. This would save hundreds of people at least five minutes each workday, which is probably the equivalent of several full-time employees a year when you add it all up.

A: The issue of constructing a right-turn lane on westbound O Street where it turns north onto 14th Street has been raised several times in the past year. Obviously, a turn lane would help relieve congestion on O Street during the morning rush hour. Due to budget constraints, Facilities will not be able to fund the design and construction at this time. However, the Traffic Liaison Committee will keep this issue open as an "action item" and pursue the feasibility of improving the intersection of O and 14th streets in the near future.

Ward Hunnicutt (7800)

Q: Practically every morning when I come to work, I see vehicles idling in the area east of Bldg. 882 and south of Bldgs. T20 and T21. By "idling," I mean unattended vehicles are left with their engines running. Albuquerque has an ordinance against this practice, but I don't know if Sandia follows city ordinances or not. In view of our current ES&H awareness, I'm surprised that this is allowed, both because of the air pollution it creates and the safety hazard associated with unattended, running engines. Is this practice approved by

Sandia? Personally, I would prefer not to have to walk through an area filled with carbon monoxide and other combustion products. I have counted as many as eight vehicles running in the area.

A: Albuquerque has been classified as a non-attainment area for carbon monoxide (CO) by the Environmental Protection Agency (EPA). One of the most significant sources of CO in Albuquerque is automobiles. Ambient air quality standards for CO are 13 ppm for any one-hour period, not to be exceeded more than once a year, and an annual average of 4 ppm. The law is clear. The city, as part of the New Mexico State Implementation Plan, must submit a plan to the EPA as to how it will address and improve this problem.

No person shall leave his/her vehicle unattended with the engine running. It is Sandia's policy to comply with all local environmental regulations and to prevent air pollution problems. Besides the CO emitted when vehicles are idling, there are potential safety issues associated with unattended vehicles. I strongly prohibit this practice, especially for Sandia's vehicles.

If you have additional questions related to the city's Air Quality Control Regulations, please contact Su Hwang (3223) of my staff at 6-8821.

Nestor Ortiz (3200)

Q: In response to the last question on page 11 of "Questions and Answers from Employee Dialog Sessions 12/4/90," Al Narath states that the new Senior Fellow and Research Scientist Positions "are available to all members of technical staff of exceptional merit." Where are the qualifications for nomination and procedures for selection documented? After all, there's more than enough reading material on how to move up the other steps of the technical ladder. Try to avoid an answer of the form, "we just haven't gotten to it yet"; it's not very convincing support for Al's answer, given the number of years that Gus [Simmons] has been Senior Fellow and we have had not one, but three, research scientists.

A: The position of Senior Fellow was announced in the Dec. 19, 1986, issue of the LAB NEWS. The guidelines listed in that article remain unchanged. Basically, the Senior Fellow position "is to recognize a very limited number of technical professional staff at Sandia who have demonstrated continuing contribution of truly exceptional breadth, depth, and creativity in fields impacting the technical mission of the Labs."

Candidates are nominated by their Vice Presidents and selected by the President based on the recommendation of the Sandia Management Council. Senior Fellows are considered equivalent to Directors in rank and report directly to an officer.

The LAB NEWS on Jan. 27, 1989, carried an article on the creation of the Research Scientist position. While explicit nomination and selection procedures were not listed, the article indicates that it is a process by which managers who have maintained a strong personal research program may return to research full time. The appointments were approved by the President and a Vice President.

Ralph Bonner (3500)

Q: Service organizations that operate through a work order system should be required to provide cost information upon completion of a job.

A: It is Sandia's policy that accurate cost/budget information be made available to case and organization managers. Responsibility for work-order subsystem reporting lies with the individual service centers. The customer's interaction should be with the service center incurring the actual charges. If you are having trouble obtaining this information, contact the appropriate service center manager.

SLI 9160, "Internal Financial Information," states: "Sandia will provide organization and case

managers with accurate and timely financial information." SLI 9110, "Direct Support Costs," states: "Cost reports for work order numbers are produced and distributed by Financial Systems Design Div. 2925. Microfiche copies of these reports are filed with Div. 151. Detailed information on costs or status of work order numbers is also available from the appropriate direct support service center."

The Controller's office is currently involved in development of additional service centers throughout the Labs. It is anticipated that these centers will be phased into operation over the next several years. One of the major requirements being considered is that service centers be able to provide customers with detailed reporting of costs incurred, including costs incurred on work orders. It is anticipated that detailed reporting capabilities will improve in the future.

Paul Stanford (100)

Q: I like to review SCAN announcements for reports on microfiche, but seldom do I actually order a report. I fear we waste more paper printing the SCAN announcements than we save by putting the reports on microfiche.

Would it be possible to keep a copy of the SCAN announcements in the library, perhaps in the same rack as the SAND documents, and have some blank order forms nearby? I visit the library about twice a month and could order any reports I wanted at that time.

A: In response to your suggestion, the Technical Library will begin displaying issues of unclassified SCANS (NTIS/NASA Microfiche, DOE Microfiche, Books, and Unclassified Reports) in the new Sandia Reports display rack. Request forms will be with the SCANS.

Although we are glad to get suggestions on improving our manual systems, our long-term goal is to make SCANS available electronically.

Herb Pitts (3100)

Q: During my annual physical exam, the doctor always recommends I lose weight and increase my activity through an exercise program. I committed to an exercise program and joined a health club (at a cost of \$50 a month), which I visit five times a week when in town.

My work assignments require me to travel two or three times a month. This travel has made it difficult to utilize the exercise program in my home town. I recently attended a health club while on a business trip and vouchered the \$5.35 cost. I was told the expense was not voucherable. This may seem trivial, but I think a principle is involved. Does Sandia support improved employee health? I thought the company supported this philosophy through the wellness program, TLC, and other programs. If we support improved health, these kinds of expenses should be voucherable.

A: Your question is reasonable. However, it appears to confuse two very different concepts: Sandia's concern for the health of its employees, and reimbursement of business travel expenses.

Sandia supports employee wellness through funding for such things as medical services, TLC, and health care insurance. Employee membership in health clubs, or participation in other health maintenance activities, is considered a matter of personal choice and is not reimbursed by Sandia.

Business travel is performed for Sandia's benefit, so Sandia pays for most travel expenses. Personal travel expenses, such as detours or layovers for personal matters, entertainment expenses, and health club costs, are not paid by Sandia. This policy complies with AT&T's contractual responsibilities to DOE, and with its fiduciary responsibilities to taxpayers.

For more information, please refer to SLI 4600 or call Employee Accounting Div. 152.

Paul Stanford (100)

Picnic Draws 1,750 Retirees

Approximately 1,750 Sandia retirees and their spouses gathered at the Coronado Club June 27, as they do every year, to renew old friendships, reminisce about the old days, relax, and enjoy the good food and music.

Photos by Mark Poulsen (3162)



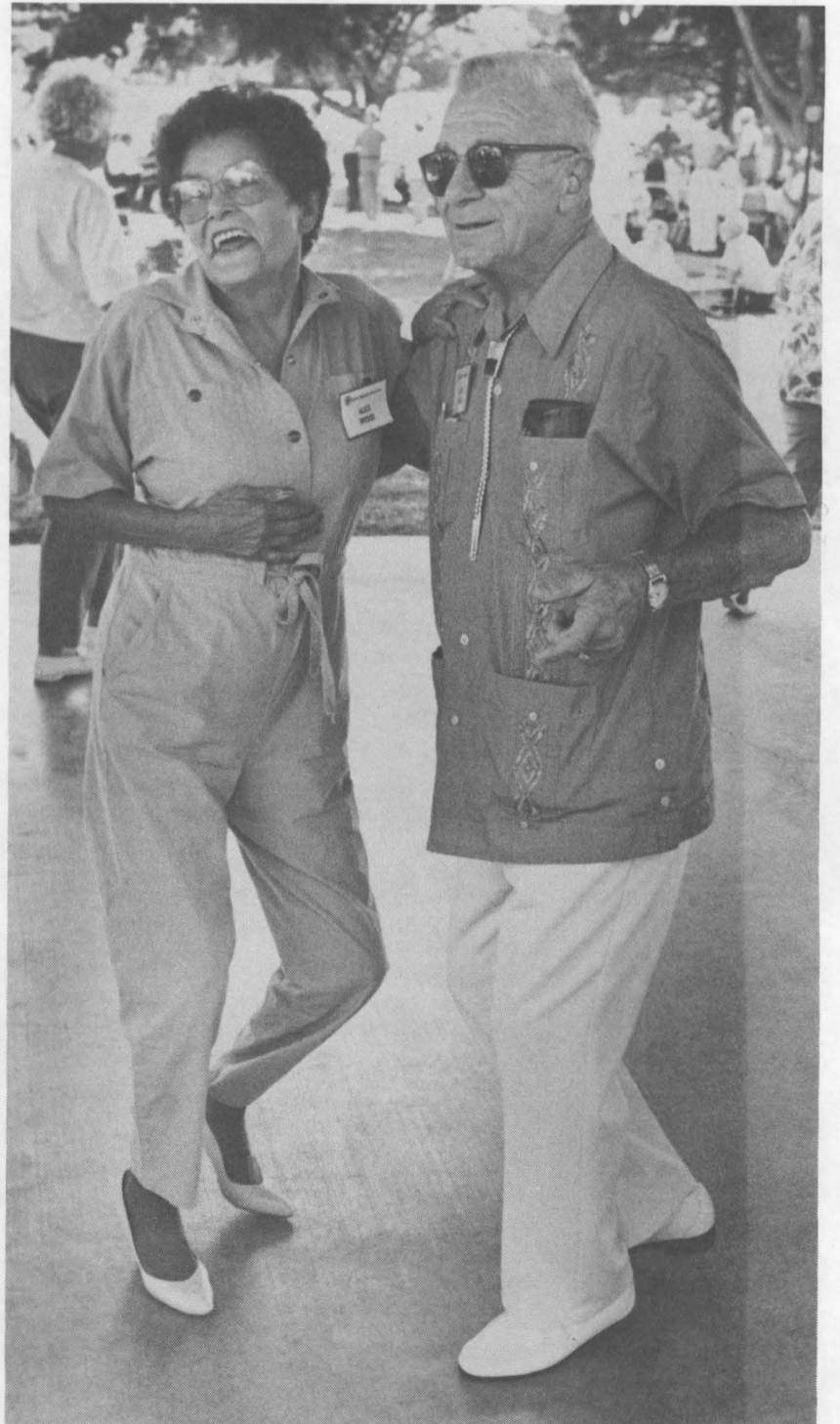
ELFEGO SANCHEZ and Marilyn Newton share a hug.



PROCOPIO LOPEZ receives a kiss from his wife, Maryann, in honor of their 49th wedding anniversary, which was the same day as the picnic.



BOB WEILER belts out a tune. Bob and his "Los Gatos" dance band provided the music.



ALICE MOSSE and Charlie Kaspar cut a rug.



SANDIA RETIREES gather in the shade to eat and reminisce.

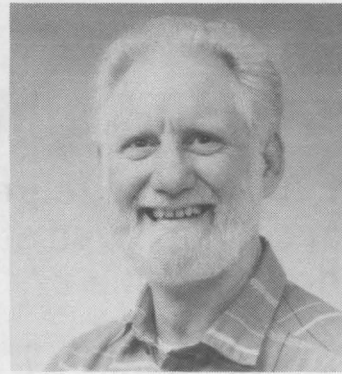
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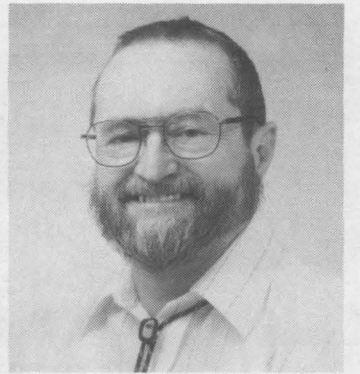
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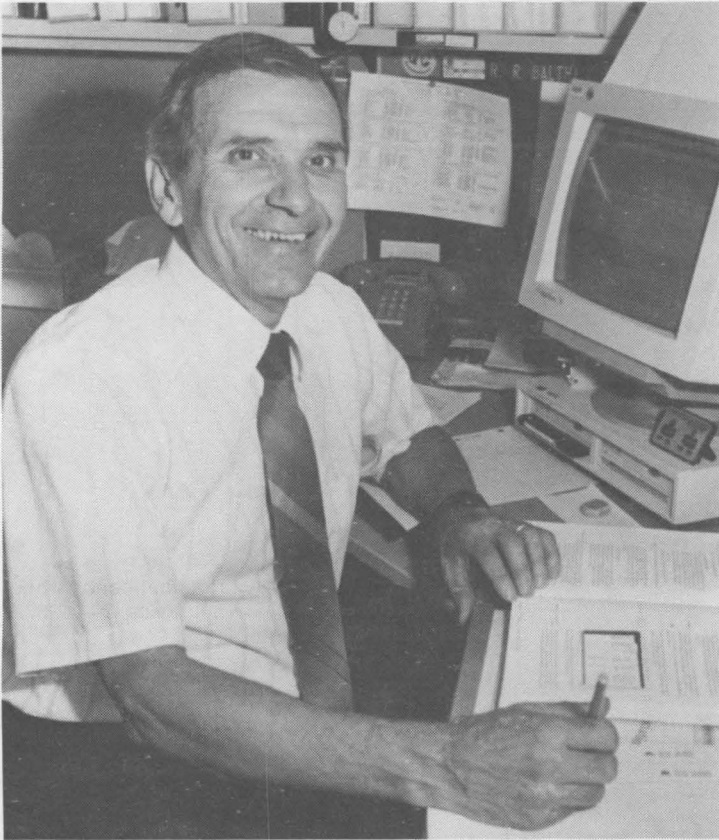
Charlie Zaffery
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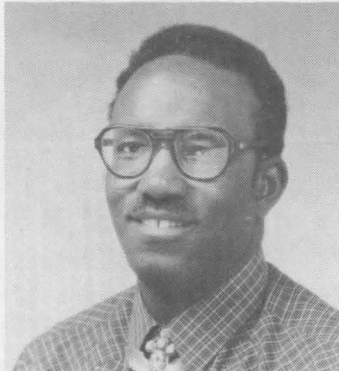
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Warren Windle
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Robert Balthaser
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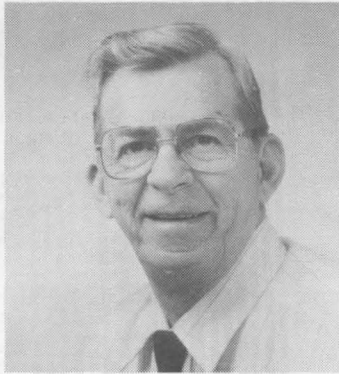
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Tommy Teague
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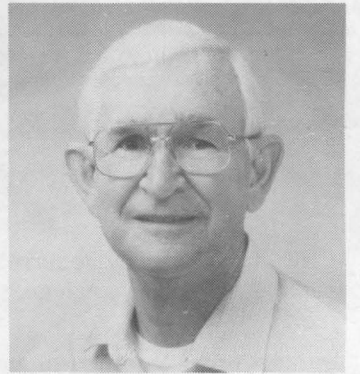
Charles Johnson
5217 35



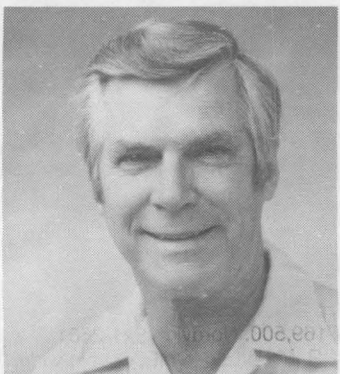
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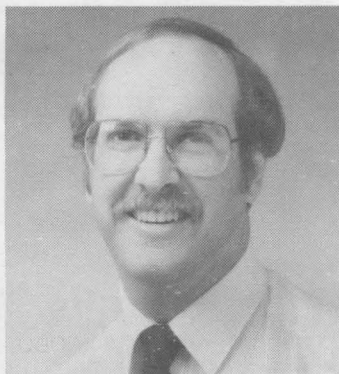
Richard Newell
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Bruce Ercole
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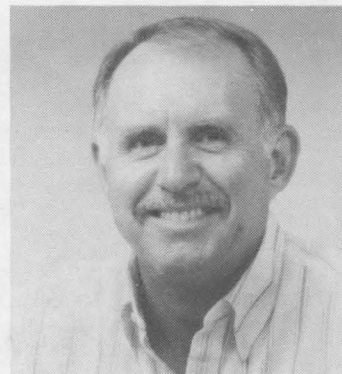
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Dave Carlson
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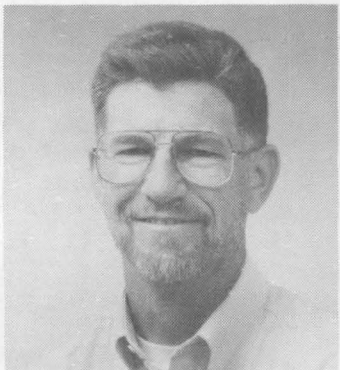
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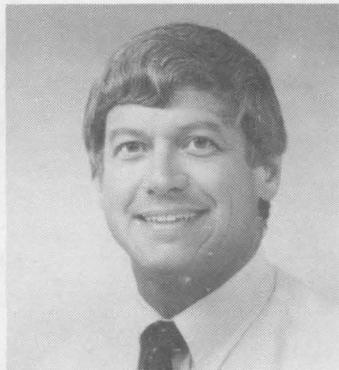
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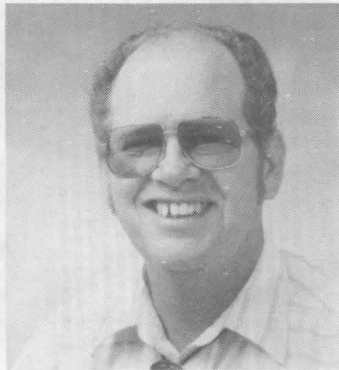
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Charles Riney
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Tony Sill
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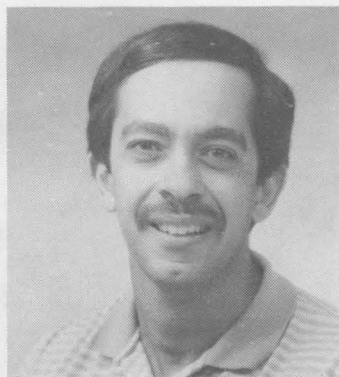
Pete Rand
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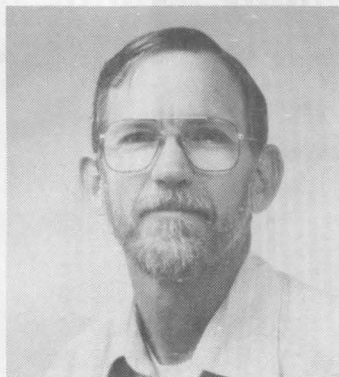
Jerry Foley
1545 35



Kenneth Harper
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Wilbur Martin
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Robert Edgar
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Coronado Club Activities

Club Plans Another Wet & Wild Weekend

WEEKENDS get wet and wild at "Friday Dollar-Daze," beginning at 5 p.m. today. The pool and patio are open until 9 with activities planned for the kids all evening. An a la carte patio buffet is served from 5 to 7 p.m., and the Club patio stays open until 10. The cost: free for members with pool passes, \$1 for Club members without passes, and \$2 for non-member guests.

BEAT THE HEAT at July's two champagne brunches, Sunday, July 14, and Sunday, July 21, from 10 a.m. to 1 p.m. Cost is \$6.95 for adults, \$1 for children 4 to 12 years old, and free for toddlers. Also, on the 21st, Bob Weiler and Los Gatos play their cool

favorites at a special tea dance from 1 to 4 p.m.

"BACK AT THE RANCH," that foot-stompin' c&w band, is back at the Club Friday, July 19, from 7 to 11 p.m. Menu items include salmon steak or prime rib (two-for-one price \$16.95), filet mignon (\$9.95), fried shrimp (\$9.95), and soup & salad bar (all you can eat for \$3.95). Reservations recommended (265-6791).

TAKE A DIP (in the pool) and a bite (at the buffet) every Wednesday from 11:45 a.m. to 8 p.m. at family pool days at the Club. Regular admission rates apply.

Take Note

New Mexico Volunteers for the Outdoors is looking for help with the La Luz Trail Project on Saturday, July 20. Work includes trail maintenance and improvements to the old La Luz trail on the west side of the Sandias. Volunteers will meet at the La Luz trailhead by 8 a.m. Saturday. Work is expected to last until 3:30 p.m. Bring your own food and water, gloves, rain gear, and sunscreen. Hard hats and tools will be provided. Children under 18 must be accompanied by a parent or guardian. Children under 12 and pets are not allowed. For information, contact Frank Hill on 256-0350.

Small/Large Staff Retiree Luncheon

The Small/Large Staff Retiree Annual Luncheon will be held July 18 at the Coronado Club. Small/Large Staff retirees and current Sandia Management Council members should RSVP to Yolanda Moreno on 844-2745 by July 16.

Events Calendar

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

July 12 — Zoo Music Series: the Frontiersmen with Hi Busse; 6:30-9:30 p.m., Rio Grande Zoo, 843-7413.

July 12-14 — Albuquerque Bestfest, New Mexico arts and crafts, food, entertainment, Hoop-It-Up basketball tournament, sponsored by Albuquerque Convention and Visitors Bureau; 5-9 p.m. Fri., 11 a.m.-9 p.m. Sat., 11 a.m.-6 p.m. Sun.; State Fairgrounds, 243-3696.

July 12-28 — Exhibit, "Figure It In: The Human Figure in American Art Since 1945"; drawings, paintings, photographs, prints, and sculptures featuring the face and human body; 9 a.m.-4 p.m. Tues.-Fri., 5-9 p.m. Tues., 1-4 p.m. Sun.; UNM Art Museum, 277-4001.

July 12-28 — Exhibit, "Late Style," recent works by Charles Mattox, Enrique Montenegro, Lucy Lewis, Clinton Adams, Garo Antreasian, Beaumont Newhall, Ann Noggle, and Joe Herrera; 9 a.m.-4 p.m. Tues.-Fri., 5-9 p.m. Tues., 1-4 p.m. Sun.; UNM Art Museum, 277-4001.

July 12-Aug. 11 — "The Bad Seed," drama by Maxwell Anderson about a young girl who seems innocent at first meeting, but is less innocent than she seems; 8 p.m. Fri.-Sat., 6 p.m. Sun.; Vortex Theatre, 247-8600.

July 12-Aug. 16 — Exhibit, "Raymond Jonson Paintings from the Chicago Period"; 9 a.m.-4 p.m. Tues.-Fri., 5-9 p.m. Tues.; Jonson Gallery (UNM), 277-4967.

July 12-Aug. 18 — Exhibit, "Treasures of the Tar Pits," ice-age fossils from the Rancho La Brea Tar Pits in Los Angeles, produced by the Natural History Museum of Los Angeles County, features complete skeletons of dire wolves, a coyote, a giant ground sloth, and a cast from the skeleton of a 9,000-year-old La Brea woman; 9 a.m.-5 p.m. daily, New Mexico Museum of Natural History, 841-8836.

July 12-Sept. 20 — Exhibit, "Impressions of Nature," features the work of F. G. Hochberg, co-founder of the Nature Printing Society and curator of Invertebrate Zoology at the Santa Barbara Museum of Natural History, images printed directly from natural subjects including plants, fish, and shellfish; 9 a.m.-5 p.m. daily, New Mexico Museum of Natural History, 841-8837.

July 13 — Summerfest: Cajun/Caribbean/French Night, food, entertainment, exhibits, arts & crafts; 5-10 p.m., Civic Plaza, free, 768-3490.

July 13 — Children's concert, the Desert Chorale; 11 a.m., free, Albuquerque Public Library, main branch, 1-800-244-4011.

July 13 — Second Saturday Storytelling: Storyteller Deborah Mirabai Rothrock combines elements of music, dance, and drama in her storytelling; 1 p.m., New Mexico Museum of Natural History & Science, West Gallery, 841-8837.

July 13-14 — 14th Annual Greater Albuquerque Collector Car Auction: antique, collector, sports, exotic, and other cars & trucks; 9 a.m., State Fairgrounds, 292-0082.

July 18-21 — American Horse Shows Association and American Vaulting Association National Championships: gymnastics on horseback; call for time, State Fairgrounds, indoor & outdoor arenas, 898-0236.

July 13-28 — "The Magic of Color and Light," hands-on exhibit for children and the child in all adults; call for times; free, South Broadway Cultural Center, 848-1320.

July 19 — Feria De Los Niños: celebration of youth and the Mexican culture; 10 a.m.-1 p.m., Civic Plaza, free, 764-1525.

July 19 — "Due North," the Desert Chorale perform music by Copland, Rorem, and Schafer; Sunshine Music Hall, 1-800-244-4011.

July 19-Aug. 3 — "Nonsense," musical comedy by Dan Goggin, Albuquerque Civic Light Opera; 8:15 p.m. Fri.-Sat., 2 p.m. Sun.; Popejoy Hall, 345-6577 or 277-3121.

July 20 — Summerfest: Greek/Carpathian/Polish Night, food, entertainment, arts & crafts, exhibits; 5-10 p.m., Civic Plaza, free, 768-3490.

July 21 — Sunday Jazz: Caribe and the New Mexico Jazz Workshop Latin Jazz band; 12:45-5 p.m., Rio Grande Zoo, 255-9798 or 843-7413.

July 25-27 — Albuquerque Children's Theater: "The Shoemaker and the Elves," children's play written and directed by Sue Ann Gunn; 10:30 a.m. and 1:30 p.m. Thurs.-Fri., 1:30 and 3:30 p.m. Sat.; Rodey Theater (UNM), 898-6679.

July 26 — Crownpoint Rug Auction, Navajo rugs; 3-6:30 p.m. viewing, 7 p.m. auction; Crownpoint Elementary School (Crownpoint, N.M.), 786-5302.

July 26 — Zoo Music Series: Eliza Gilkenson; 6:30-9:30 p.m., Rio Grande Zoo, 843-7413.



Favorite Old Photo



BOUNTY FOR THE TABLE — This picture of my Aunt Lucile Rembold shows that the hunting and fishing were good that fall morning in 1942. Aunt Lucile ran her trotlines and Uncle Frank went hunting on their ranch near Junction in the Texas Hill Country. Food rationing in WWII had little effect on their table fare. My cousin lives on the ranch today and says the wildlife is still plentiful. — Max Marrs, 2931