

With an Eye on Treaty Verification, Soviets Look Over Unique Facility

Certainly it was an unusual happening. Soviet officials rarely visit Sandia.

The event could also be called a technical and human-relations success, according to John Holovka, supervisor of Systems Research Div. 9111 and a Labs host when the visitors toured Sandia's Technical On-Site Inspection (TOSI) facility a little more than two weeks ago.

"I certainly can't put words in our visitors' mouths," says John, who's project manager for TOSI. "But I believe they thought we were sincere in our efforts to develop effective verification techniques that possibly might help assure compliance with future arms-control agreements.

"It appeared that whatever doubts about sincerity they may have had at the beginning of the tour

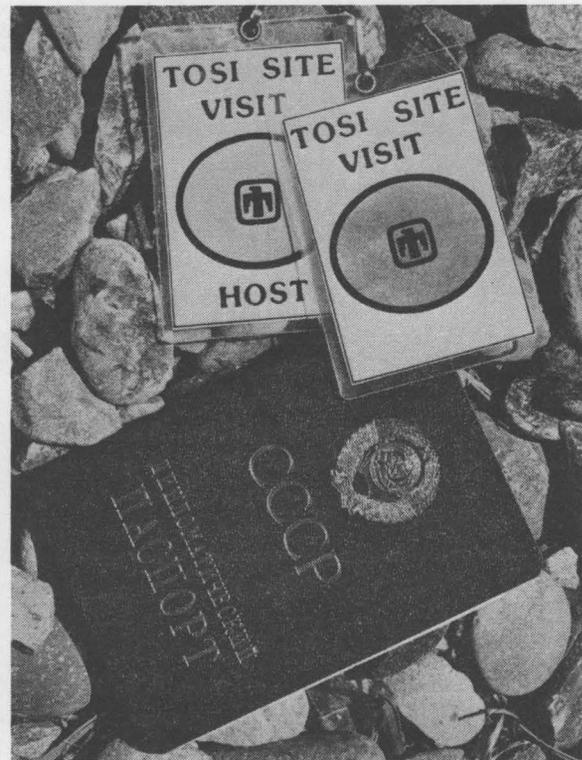
evaporated by the time they left," John continues. "What we saw was a very positive attitude on their part, and a genuine interest in the monitoring technologies we demonstrated."

These Sandia-developed technologies — or more precisely, the concepts on which they're based — may play a prominent role in assuring compliance with future treaties such as INF (Intermediate Range Nuclear Forces Treaty; see "INF Inspection Protocol") — signed by President Reagan and Soviet General Secretary Mikhail Gorbachev in December, and now being considered by the Senate.

TOSI was one of two US stops by the Soviets outside of Washington, D.C. They also visited the area surrounding a rocket-assembly facility, the Hercules Plant (Magna, Utah), where a Soviet inspection/monitoring facility would be located if INF is ratified.

"TOSI is a one-of-a-kind facility," says John. "To the casual observer, it may look as if we're testing concepts similar to previously developed perimeter surveillance systems. That's not the case, however. Normal perimeter surveillance techniques control the movement of people; at TOSI, we test ways to control the movement of treaty-limited items."

Treaty-related technologies being assessed at the TOSI testbed include portals for monitoring move-



REMINDEES OF AN UNUSUAL VISIT: Host and visitor badges, along with a Soviet passport.

ment of traffic exiting a facility. The portals include automated sensors, designed to assure that a vehicle leaving a monitored site is not carrying a treaty-limited item such as a large rocket motor or missile stage.

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Sandian in US Delegation to USSR

Don Bauder (DMTS, 9111), at the invitation of the US On-Site Inspection Agency, was a member of the US delegation that visited Votkinsk (USSR) this week.

In a fact-finding mission similar to that of the Soviets' US visit a couple of weeks ago, the US team sought information about Votkinsk and environs. If the INF Treaty is ratified, a US inspection/monitoring facility — probably including technologies similar to those tested at TOSI — would be installed outside the Votkinsk missile plant.

The US delegation traveled from Moscow to Votkinsk on Monday and left the site yesterday.



LAB NEWS

VOL. 40, NO. 9 SANDIA NATIONAL LABORATORIES MAY 6, 1988

Superconductivity Research Heats Up

High-Temperature, High-Current Thin Films Developed

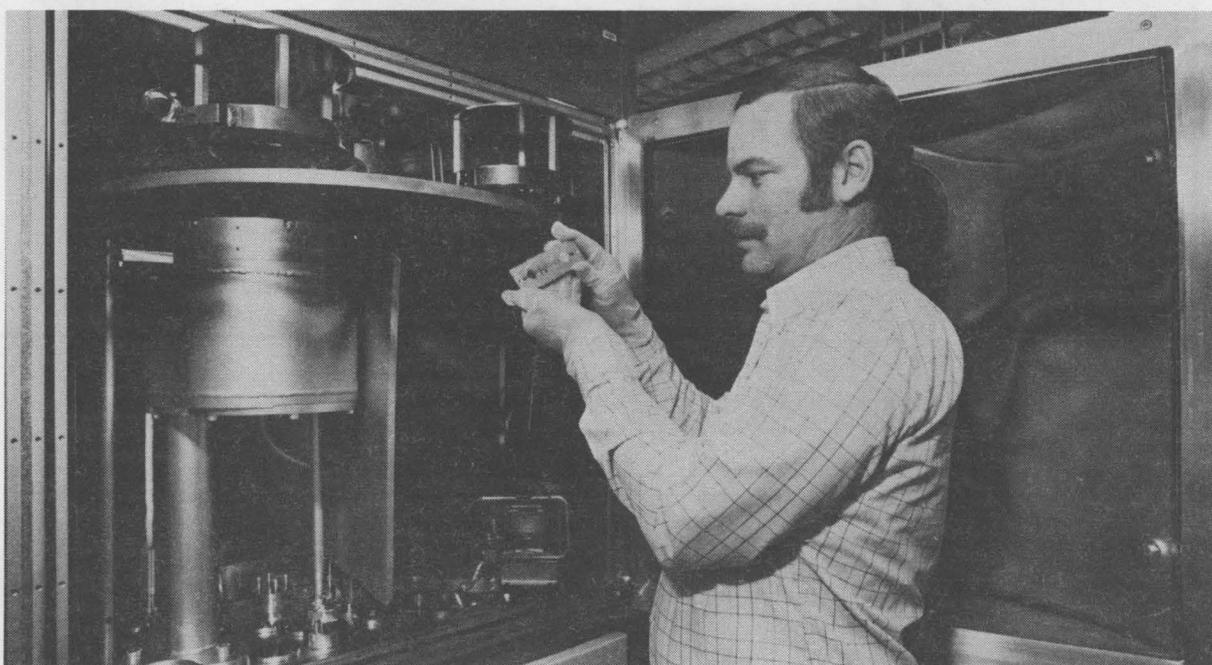
A week ago, a research team in Fred Vook's Solid State Sciences Org. 1100 announced the first thin films made of new thallium-based superconducting materials. The new films have zero resistance at 97K, the highest temperature for any thin film yet made.

Furthermore, at the easily achievable temperature of liquid nitrogen (76K), the new films can carry current densities of 110,000 amps per square centimetre without observable resistance. That "critical current density" is by far the highest ever achieved in a polycrystalline superconducting oxide film at any temperature. Moreover, preliminary results indicate that the critical current is much less sensitive to magnetic fields than were those of previous polycrystalline materials. (Polycrystalline materials are those made up of many small grains.)

"These are crucial findings, and they put Sandia among the forerunners in the superconducting materials race," says Dave Ginley (1144). "It's the first time that anyone has demonstrated superconducting films that are made up of a randomly oriented polycrystalline material and that have potentially useful properties at liquid nitrogen temperatures. The performance of previous polycrystalline oxide films has been abysmal. But the new films can be put down on many substrates, so our demonstration of feasibility for applications is exciting." (see "Promise for Microelectronics.")

Other members of the research team are Jim Kwak (1152), Ron Hellmer, Dick Baughman (both 1144), Gene Venturini, and Bruno Morosin (both 1131). Although the team members are experts in certain areas involved in superconductivity research, they prefer to emphasize their group decision-making — "We interact with each other almost by the minute,

(Continued on Page Five)



HOLDER in Ron Hellmer's (1144) hands shows three substrates he'll place in this electron-beam evaporator, which will deposit the new thallium-based superconducting thin films on the substrates. After e-beam deposition, the films will be annealed (heated and cooled).

Important Scientific Result

Research VP Venky Narayanamurti (1000) sees the superconductivity research team's recent accomplishment as "an exciting achievement. The team is making tremendous progress."

Specifically, "the high critical currents, combined with the weak magnetic field dependence, represent an important scientific result," Venky continues. "It suggests that the coupling within the superconducting grains in these

new materials is different from the polycrystalline yttrium-barium-copper-oxide superconductors that have been studied so far.

"Sandia's achievements should provide a new impetus to the field — and should encourage our researchers to continue their search for new materials with even more impressive properties."

Antojitos

How Do I Procure a Posturepedic? -- Our superconductivity researchers are working both nights and weekends. But maybe that's not enough. According to New Scientist, "Research into superconductivity has reached fever pitch in Japan since researchers there have come up with their own recipe for high-temperature superconductors. British visitors report that most laboratories are working a seven-day week, with many of the laboratories sporting mattresses among the crucibles and electron beam machines.

"More worrying for Western researchers, perhaps, is the news that one Japanese company has adopted the slogan 'Conquer materials and control the world.' "

* * *

Note to Payroll (Re: the "stagecoach" photo in last issue) -- It's not how you deliver our paychecks; it's whether (and, in my case, when).

* * *

There IS Such a Thing as a Free Lunch -- and I partook of same last week when the Albuquerque Museum offered a free lunch-and-lecture combo to us press types. Lunch was salad and sandwich. Lecture was more substantial -- Bernard Cohen, professor of science history at Harvard and an expert on Leonardo da Vinci, talked about Leonardo's notebooks, the importance of his contributions to engineering . . .

And, of course, the Museum's current exhibit, which runs through June 12. Sponsored by IBM, the traveling exhibit (this is the largest of six) consists of a bunch of working models IBM derived from the specifications in Leonardo's notebooks. I enjoyed the hands-on experience immensely. And I recommend it to gadget-oriented Sandia engineers (and their families). Where else can you play with the creations of one of the greatest imaginations of Western society?

Some of the creations in the exhibit: an odometer, a military tank, a scaling ladder, a double-hulled ship, a parachute, a transmission-like gear arrangement, a "heliicopter," a "side-wheeler" paddle boat, and more. (If he'd only had a power source other than man . . .)

So what question about Leonardo is Prof. Cohen most often asked by the media? It's "So how could a great artist also be a great scientist?" (The second-most-often-asked is "So how could a great scientist also be a great artist?") The answer is suggested by Leonardo's comment that "All our knowledge has its origins in our perceptions." That is, he was a skilled empiricist who saw clearly, and tried to understand fully, the world around him. Sometimes art ensued from that understanding, sometimes engineering or science.

The real value of the question is that it makes a point about modern society's tendency to pigeon-hole: Scientists wear white coats and are dangerous, engineers carry calculators and are dull, artists are unappreciated and creative. As the preacher in Porgy and Bess put it, "It ain't necessarily so." ●BH

* * *

Some of Leonardo's Observations: Learning is the only thing the mind never exhausts, never fears, and never regrets.

My intention is to consult experience first and then with reasoning show why such experience is bound to operate in such a way.

It is not enough to believe what you see. You must also understand what you see.

He who wishes to become rich in a day is hanged in a year.

Supervisory Appointments



DAVID CHADWICK to supervisor of Command and Control Div. I 5126, effective Feb. 1.

David joined the Labs in December 1975 as a staff member in the Advanced Facilities Protection Division, where he worked on safeguards for nuclear fuel cycles. In May 1978, he transferred to the Command and Control Division, working on use-control system design. In August 1986, he joined Stockpile Evaluation Div. III, and worked with the W88 Mk5 evaluation team.

He has a BS in EE from UNM and an MS in the same field from Arizona State University.

In his spare time, David enjoys biking, hiking, woodworking, and music. He and his wife Norma live in the NE Heights. They have two grown children.

* * *

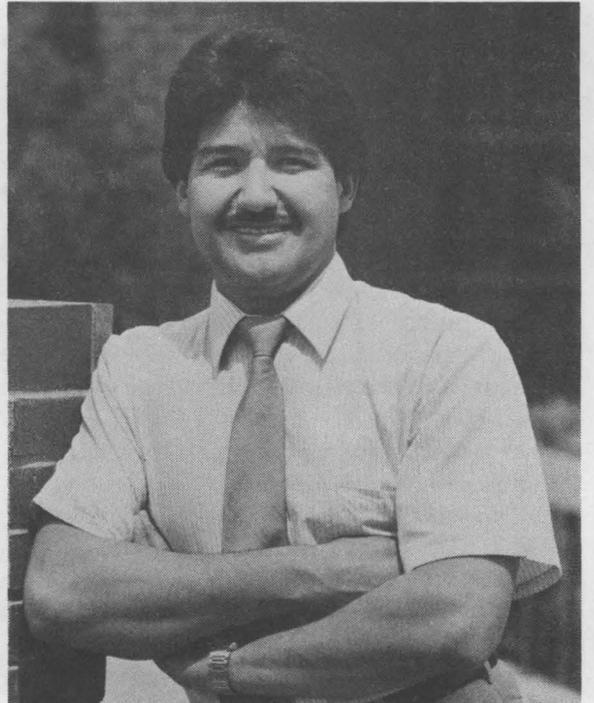
GILBERT HERRERA to supervisor of Product Engineering: Discrete Semiconductors Division 2159, effective March 16.

Gil has been a member of Facility Systems Development Div. 5212 since he joined Sandia in May 1981. His work has been in the analysis, design, and implementation of physical security systems at DOE nuclear facilities, and in the development of alarm communication systems. In 1986, he was on temporary assignment at DOE Headquarters in Washington, D.C., where he conducted an analysis of inspection and evaluation criteria for DOE physical security systems.

He has a BS in computer engineering from UNM and an MS in EE from UC Berkeley. He is a member of IEEE, Tau Beta Pi, Eta Kappa Nu, and Kappa Mu Epsilon.

In his spare time, Gil enjoys playing SERP basketball and softball, and city-league flag football.

Gil is a native of Albuquerque. He and his wife Cynthia live in the North Valley.



GILBERT HERRERA (2159)

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ALBUQUERQUE, NEW MEXICO 87185
LIVERMORE, CALIFORNIA 94550
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BRUCE HAWKINSON, Editor (505/844-1053)
PHYLLIS WILSON, Writer (4-7842)
DONNA RIX, Writer (6-6888)
RANDY MONTOYA, Photographer (4-5605)
GERSE MARTINEZ, Asst. Photographer (4-5605)
JANET WALEROW, Editorial Assistant (4-7841)
CARLOS MARTINEZ, Assistant (4-7841)
BARRY SCHRADER, Livermore Reporter
(415/294-2447; FTS 234-2447)

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Retiree Picnic Set

Sandia retirees, their spouses, and surviving spouses of retirees are invited to the Annual Picnic May 26 from 4 to 7 p.m. at the Coronado Club.

In addition to refreshments, musical entertainment will be provided by the "Old Cooters" starting at 4 p.m. Videotapes of last year's picnic will run from 5 to 6, and videotapes of this year's gathering will run after 6.

Members of Large Staff will be on hand to meet with attendees. Sandia's retirees and surviving spouses now number more than 3800 people spread among 39 states and 2 foreign countries.

Parking: Use the Coronado Club, the Chapel, the Que Pasa Recreation Center, the Base Hospital, or the Sandia Base Elementary School parking areas. (A shuttle bus will run between the Club and the parking areas on "B" Street.) Avoid parking in residential areas. Handicapped parking is at the Club's front entrance.

SRAM II Reaches Phase 3

The W89 warhead for the new SRAM II (Short-Range Attack Missile) recently entered Phase 3, the engineering development phase. Sandia and Lawrence Livermore national laboratories are jointly assigned to the project by DOE.

According to Jim Wright (8150), whose department is responsible for systems engineering for the program, Sandia's responsibilities include the warhead structure; mounting the warhead on the missile; environmental protection; the gas-transfer system; and the safing, arming, and firing systems. LLNL is designing the nuclear explosives package for the warhead; Boeing Aerospace is developing the missile that will carry the warhead from its delivery aircraft to the target.

SRAM II will replace the SRAM-A (which has been in the nation's nuclear stockpile since 1972), and will be carried aboard the Strategic Air Command's B1-B penetrating bomber. The new SRAM has upgraded features, both in terms of maneuvering capability and range.

Sandia Livermore's SRAM II project officer, Dave Havlik (8154), explains some of the features of the new missile: "It has an all-digital electronic interface designed specifically for the B1-B. The warhead's diameter is smaller than the SRAM-A, which will enable the bomber to carry an increased number of weapons in its on-board rotary launchers.

"The bomber crew's risks are reduced because they don't have to fly directly over an intended target," Dave continues. "Instead, they will be able to program these missiles hundreds of miles away, release them, and then fly out of the danger zone. The missiles can even attack strategic relocatable targets such as the Soviet SS-22s."

New Safety Features

SRAM II also has improved safety features: "The W89 warhead incorporates Sandia's modern nuclear safety design philosophy," says Dave. "By closely coupling the strong links [safety components that prevent unintended nuclear detonation] with the weak links, we can ensure nuclear safety even in abnormal [accident] environments. Furthermore, LLNL is incorporating insensitive high explosives [IHE] into the warhead, greatly reducing the risk of scattering plutonium around the site should an accident occur.

"Boeing has also worked hard to simplify the

Take Note

Marlin Pound (8530), current chairman of the Livermore Area Recreation & Park District board of directors, has also been elected vice-chairman of the California Association of Park and Recreation Insurance board. He has served on the local park board since 1968 and has been chairman five times.

* * *

An aerobics class is part of the Total Life Concept (TLC) wellness program being offered Sandia Livermore employees. The first group is led by instructor Judy Harven; along with Kristen Costello, she conducts the class after work three times a week at the Valley Care Center in Livermore. Sometime during the next three years, all Sandians will be offered an opportunity to participate in the program, which includes health screening and training in skills designed to improve a person's lifestyle and physical and mental well-being.

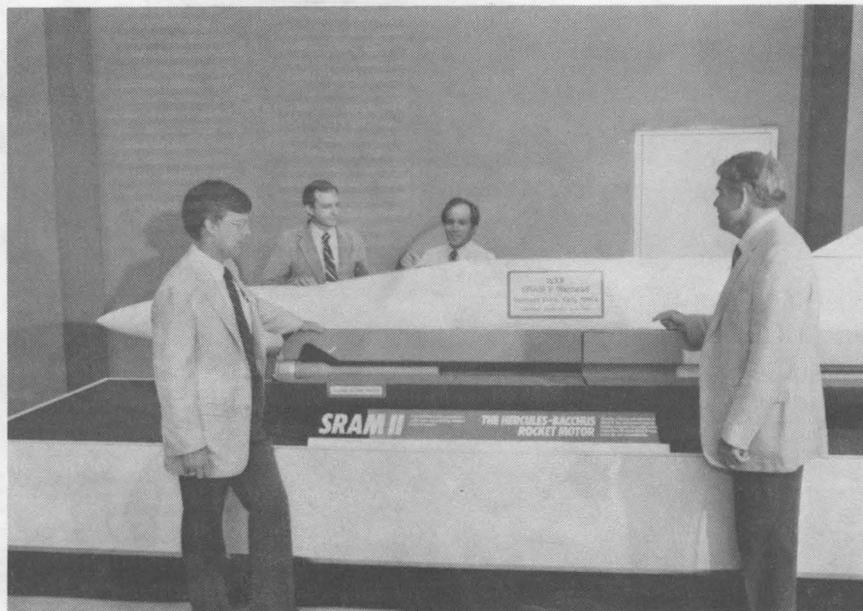
Wrong-Year Hangover



Stanley Kubrick named his famous movie "2001, A Space Odyssey" for a very good reason: He wanted it to begin in the *next* century and he knew that the first century ran from A.D. 1 to the year 100, the second from 101 to 200, and the 21st from 2001 to 2100. This is because there was no year zero.

A lot of misinformed people are going to get drunk on the night of Dec. 31, 1999, thinking they are celebrating a new century and a new millennium.

Science News



EXAMINING A FULL-SCALE mockup of the SRAM II missile are (from left, front) Jim Woodard (8155) and Dave Havlik (8154); (back) Carl Pretzel (8154) and Russ Miller (8155). SRAM II's W89 warhead recently went into Phase 3, engineering development.

fairly complex tooling and assembly equipment originally required for the SRAM-A," Dave continues. "For the SRAM II, hardware-store-variety tools can be used in most assembly operations."

Jim credits several Albuquerque organizations for their contributions to each phase: "The firing set is being designed in Div. 2364. The programmer is being designed by Div. 2314, the neutron generators by Divs. 2561 and 2513. In addition, Sandia has taken over the design responsibility for the mechanical safe and arm device (MSAD), which was initially developed by LLNL, this work is being done by Div. 2545 in Albuquerque."

Other groups in Livermore and Albuquerque are involved in various phases of the program. Jim Woodard's Electrical Systems Div. 8155 and Dave's Mechanical Systems Div. 8154 are the Sandia Livermore systems divisions. The early SRAM II work was done in Div. 8151 under John Marion (now 8274). Ed English's Div. 8442 is developing the gas

transfer system; Art Hull's Div. 8144 is responsible for both the development and post-development telemetry systems; and Morey Reynold's Div. 8161 is providing program planners and coordinators. Test program support will be provided by Div. 8133 and Dept. 8280 in Livermore and by Directorate 7500 in Albuquerque.

Depts. 8240, 1510, and 1520 are furnishing people for both thermal and structural analysis work. Joan Woodard's Div. 8316 in Livermore and Dick Schwoebel's Materials Research Org. 1800 in Albuquerque are providing materials support. "And we're using virtually all of Sandia's administrative support resources, including Tech Art, Tech Writing, and Purchasing," Dave adds.

The Sandia W89 development effort will average 100 FTEs (full-time equivalents) over the next five years, with a peak of nearly 140. Approximately 45 percent of the effort will be in Livermore, the balance in Albuquerque.



SANDIA LIVERMORE NEWS

VOL. 40, NO. 9

SANDIA NATIONAL LABORATORIES

MAY 6, 1988



THREE SANDIANS were among those recognized recently for their service to the community at the annual Tri-Valley Corporate Volunteer Council luncheon. (From left) Chuck Hartwig (8244), a founder and past president of Del Valle Fine Arts; Carol Knapp (8236), who volunteers as a counselor and Bible-study class leader for inmates at Deuel Vocational Institute in Tracy; Carl Melius (DMTS, 8356), who introduced a science-grant program for Livermore elementary teachers and funded it himself; and VP John Crawford (8000), who presented the awards on behalf of the Council.

Events Calendar

- May 6-8** — Demonstrations by Ojibwas from Mille Lacs Indian Reservation in Minnesota (birchbark boxes, Chippewa moccasins, porcupine hair roaches); special event for Lost and Found Traditions exhibit; 10 a.m.-2 p.m. Fri., 1-5 p.m. Sat.-Sun.; Albuquerque Museum, 243-7255.
- May 6-15** — "Screwing Around," play by Grubb Graebner, a contemporary look at sex and power in the Duke City; 8 p.m. Fri.-Sat., 6 p.m. Sun.; Vortex Theatre (2004-1/2 Central SE), 247-8600.
- May 6-22** — "Bus Stop," classic American drama by William Inge, presented by New Mexico Repertory Theatre; 8 p.m. Tues.-Sat., 2 p.m. Sat. & Sun. (no matinee May 21); KiMo Theatre, 243-4500.
- May 6-June 6** — "Dinosaurs in Action": exhibit of 7 near-life-size mechanical dinosaurs including stegosaurus, parasaurolophus, ankylosaurus, dimetrodon, and pteranodon; 10 a.m.-5 p.m., New Mexico Museum of Natural History, 841-1374.
- May 6-June 12** — "Leonardo da Vinci: The Inventions," hands-on exhibit sponsored by IBM; 10 a.m.-5 p.m. Tues.-Fri., 1-5 p.m. weekends; Albuquerque Museum, 243-7255.
- May 6-June 12** — "Lost and Found Traditions, Native American Art 1965-1985," national traveling exhibit organized by the American Federation of the Arts; 10 a.m.-5 p.m. Tues.-Fri., 1-5 p.m. weekends; Albuquerque Museum, 243-7255.
- May 7** — Exhibit opening, "Viva Mexico! Serapes from the Andrew Nagen Collection," Mexican serapes woven between 1830 and 1920; entertainment and food; 1-4 p.m., Maxwell Museum of Anthropology, 277-4404.
- May 8** — Annual Mother's Day concert, New Mexico Symphony Orchestra performing pops favorites, conducted by Roger Melone; 2 p.m., Rio Grande Zoo, 843-7657.
- May 8** — UNM Opera Studio, directed by Marilyn Tyler, featuring one-act operas and scenes and duets from popular operas; 4 p.m., Keller Hall, 277-4402.
- May 10 & 15** — "Sumer Is Icumen In," Musica Antigua de Albuquerque performance, medieval and renaissance music celebrating the month of May; 8:15 p.m., St. Thomas of Canterbury Episcopal Church (425 University NE), 842-9613.
- May 12** — "Side Street Strutters," Dixieland jazz band from Disneyland; 8 p.m., South Broadway Cultural Center, 848-1320.
- May 12-13** — Classical Concert Nine, New Mexico Symphony Orchestra and Chorus, featuring Gustav Mahler's Symphony No. 2 in C Minor ("Resurrection"); 8:15 p.m., Popejoy Hall, 842-8565.

GREETING AMBASSADOR FRANK ORTIZ (left), currently a Diplomat-in-Residence at UNM, is Bob Duff (3180). Ambassador Ortiz, who has served as ambassador to Barbados and Grenada (1977), Guatemala (1979), Peru (1981), and Argentina (1983), was the keynote speaker at a day-long seminar, "Global Affairs and US National Security," hosted by the 1606th Air Base Wing at the Kirtland Base Theatre April 22. The Reserve Officers Association and other military, veterans, and civilian organizations in Albuquerque and New Mexico co-sponsored the seminar. Bob represented the Air Force Association, one of the co-sponsors.



COMING TO TOWN — A B24 and a B29 similar to this one and a B24 will fly into Albuquerque sometime Monday. Each plane is the only airworthy craft of its type. In fact, the B24, *Diamond Lil* (which is probably a 1939 model), is the oldest one in existence; the B29, *Fifi*, is probably a 1944 model. The tour is sponsored by the Confederate Air Force, and the crew will be hosted by the local Lobo Squadron of the CAF. Visitors are welcome on Tuesday from 8 to 8; both planes will be on display near the Cutter terminal in the general aviation area south of the main airport. To help meet tour costs, the CAF asks a nominal donation from all viewers and from those who want to explore inside either plane. Or come out and watch them take off for the next stop on the tour at noon on Wednesday. (Photo from the collection of Bill Laskar, ret.)

- May 13-15** — Silversmithing demonstration by Roderrick Kaskalla of Zuni and Nambe Pueblos; special event for Lost and Found Traditions exhibit; 10 a.m.-2 p.m. Fri., 1-5 p.m. Sat. & Sun.; Albuquerque Museum, 243-7255.
- May 14** — Very Special Arts Festival, art experiences for handicapped and non-handicapped children; call for time, Los Griegos Library (1000 Griegos Rd. NW), free, 768-5188.
- May 15** — Spring Latin Music Festival, entertainment and refreshments; 1-6 p.m., Spanish Village, NM State Fairgrounds, 848-1320.
- May 15** — Storytelling in the Native American tradition by Harold Littlebird of Santo Domingo/Laguna pueblos; special event for Lost and Found Traditions exhibit; 2 p.m., Albuquerque Museum, 243-7255.
- May 16-19** — Mountain Bell Youth Concerts, for children in grades 4-5, presented by New Mexico Symphony Orchestra, conducted by Neal Stulberg, featuring music by Dvorak, Tchaikovsky, and Britten; 10:45 a.m. & 12 noon (10:45 a.m. only May 18); Popejoy Hall, 843-7657.



WOMAN ON THE MOVE — Frances Cheek-Martin (2601) received a Susan Zimmerman collage for winning in the business/non-managerial category of YWCA's "Women on the Move" program. President Welber attended the awards dinner. Other Sandians nominated: Mitzie Morrato (3155), Barbara Hoffman (3741), Etta Moore (3452), Alice Morgan (4020), Jan Vandermolen (132), Mary Beth Aragon (2901), Shanna Cernosek (142), Diana Suina (3551), Julia Gabaldon (3510), Mary Toledo Tang (6316), Patricia Newman (3144), Lydia Boye (9114), Ruth David (7121), Elizabeth Richards (6221), Melissa Smartt (2312), Ellen Stechel (1151), Mary Walker (1556), and Suzanne Weissman (1821).

High Conflict in High Tech



In scientists' eyes, managers are chronically shortsighted, too concerned with the fast buck, with hit-and-run prospects of short-term profit making. Managers regard scientists as remote from the real world of hard cash and, unless circumspectly supervised, liable to go off on experimental tangents.

John Pfeiffer, *Science* 86

Sneezing in the Southwest



...Once considered a haven for the allergy-afflicted, Southwestern desert cities now exceed many Eastern and Northern ones in pollen counts. Studies show Tucson now has twice the national rate of respiratory allergies. The picture is much the same in Phoenix, Albuquerque, Salt Lake City, Palm Springs, and even mile-high Santa Fe. The allergy problem is just one of the by-products of the rapid, uncontrolled growth of the Southwest, where millions of newcomers have brought with them what they came to escape: air pollution, traffic congestion, crime and, now, clogged nasal passages. "We've got a very strange state of affairs," said Mark R. Sneller, Pima County's [Tucson] official pollen and mold monitor. "We were attracting people with specific ailments, and then we were poisoning them with the exact things they were trying to avoid, by transforming the desert into something otherwise. . . ." Cities all over the region are encouraging native plants, which mostly are pollinated by insects rather than wind, both to reduce allergies and to save water.

Robert Reinhold, *New York Times*

(Continued from Page One)

Thin Films

and the group works incredibly well together. It's that synergism that keeps us going," says Dave.

The thin films created by the team are indeed thin — about 0.7 micrometre, or 7000 angstroms, thick. A stack of 100 of these films would equal the diameter of a human hair.

Thallium a Newcomer in Superconducting Recipes

The new superconducting material is made of thallium, calcium, barium, copper, and oxygen. The team uses electron-beam evaporation to deposit sequential layers of each constituent under a partial pressure of oxygen. The material is then removed from the deposition system and, in a crucial part of the process, put through two annealings (treatments of heating and cooling). "The key here is to carefully control the thallium content of the film during the annealing processes," says Ron.

The first superconducting materials containing the element thallium were reported on bulk ceramics by University of Arkansas researchers in late January. Sandia, IBM, and other labs immediately achieved superconductivity in thallium-based materials at temperatures as high as 125K.

But the new Sandia materials are the first superconducting thallium-based thin films reported.

According to Dick, nominal composition of the films is $Tl_2CaBa_2Cu_2O_{\sim 8}$ (where \sim means "approximately"). He used energy-dispersive X-ray analysis to determine the composition.

"The films appear to be quite uniform over large

Promise for Microelectronics

Enormous Potential for Microelectronics Applications

Although the popular press tends to focus on superconductor research only as an ongoing race toward higher and higher critical temperatures, temperature is not the sole important issue. And far-out applications such as magnetically levitated trains and superconductive power-transmission lines are not likely to be the most important applications in the short term. "What would be immediately important and useful would be hybrid superconductor-semiconductor systems," says Fred Vook, Director of Solid State Sciences 1100. "These would take advantage of the high switching speed and low power requirements of superconductors coupled with the high-density memories of semiconductors. This coupling requires relatively high temperatures for semiconductors and relatively low temperatures for superconductors — in other words, thin superconducting films at liquid nitrogen temperature. And this is where the Sandia team has made a key contribution."

"The outstanding properties of our thin films make them sufficient today for many types of practical application," says Jim Kwak (1152).

"Their high critical current [110,000 amps/cm²] means that we've made a significant step toward making a superconductive polycrystal-

line material useful in a broad range of microelectronics applications," explains Dave Ginley (1144). "Because polycrystalline materials can be put down on many substrates, we believe the potential for superconducting applications in microelectronics is enormous."

"For example, in electronics packaging, where long runs of wires are unavoidable, superconducting materials [which have no resistance] could result in higher data transmission speeds and increased packing densities without creating unwanted heat," adds Gene Venturini (1131).

Other microelectronic systems that could employ superconducting materials with these critical-current characteristics include monolithic devices, millimetre-wave devices, infrared detecting arrays, and discrete devices that need high amounts of power.

Thallium, one of the new material's constituents, is toxic. But it's far less toxic than some other substances (arsene, phosphene, and silane, for example) traditionally used in making microelectronic devices. Nevertheless, safe operating procedures must be followed in handling thallium. When properly packaged, a superconducting device made from the new material would not pose any unusual danger to users.

areas," says Gene. "And they're reasonably stable during and after environmental testing through a vari-

ety of air, water, and thermal cycles."

"We're beginning now to understand the materials aspects of the new superconductors," concludes Dave. "Thus far, our program has concentrated on materials development. That is, it's been primarily exploratory. But we're developing models that will allow us to achieve a fundamental understanding of superconducting phenomena as well as better materials for practical applications."

●BH/Ken Frazier (3161)

'High-Temperature,' But Still Cold!

In terms of everyday experience, "high-temperature," as used in the superconductor field, is a misnomer. It's true that in the progress toward ever-higher temperatures at which superconductivity can be achieved (LAB NEWS, March 13, 1987), anything above 77K can be called "high." That's because, for many decades, superconductivity could be achieved only a few degrees (less than 20) above absolute zero, and achieving such temperatures requires cooling with liquid helium, an expensive and difficult proposition.

Achieving superconductivity above 77K (76K at Albuquerque's altitude) means the phenomenon can be produced at the temperature of liquid nitrogen. Compared to liquid helium, liquid nitrogen is very abundant and much cheaper (about the price of milk), has a much higher heat capacity, doesn't evaporate as quickly, and is more easily handled.

But 77K is still cold. So are 97K and, for that matter, 125K (the highest confirmed critical temperature for superconducting materials). How cold? See the table below (the higher peg points are included for reference only, not as plausible goals of future superconductivity research).

Superconductivity: A Primer

The complete lack of electrical resistance is the major difference between a superconductor and an ordinary conductor (such as copper or aluminum) or a semiconductor (such as silicon).

The "zero-resistance" property is best understood in terms of atomic structure.

All materials are made of atoms. Each atom has a nucleus that contains two kinds of subatomic particles — positively charged protons and uncharged neutrons. The nucleus is surrounded by negatively charged electrons, which equal the number of protons. Most of the physical and chemical properties of a material result from changes in the arrangement of its electrons.

In electrical conductors, some electrons are not bound to individual atoms. Instead, they're

free to move about within the material; their motion constitutes the electric current. In ordinary conductors, however, these "conduction electrons" are scattered by impurities, dislocations, grain boundaries, and lattice vibrations (phonons). And scattering — think of it as electrons bumping into each other — creates friction and, thus, heat (much as rubbing your hands together creates heat).

Lower temperatures decrease this scattering. At the low temperatures required for superconductivity, in fact, the conduction electrons are ordered, which prevents scattering and thus allows electric current to flow with no resistance at all.

Researchers believe that BCS (Bardeen, Cooper, and Schrieffer) theory of superconduction adequately explains why this ordering takes place in low-temperature, traditional superconductors. But, thus far, "high-temperature" superconductivity contradicts this theory and is not understood well enough to allow the formulation of a new theory.

Deg. F	Deg. C	Kelvin	Peg Point
212	100	373	Water boils
136	58	331	Hottest day (No. Africa)
99	37	310	Body temperature
70	21	294	Room temperature
32	0	273	Water freezes
-22	-30	243	Freon-12 (refrigerant)
-38	-39	234	Mercury thermometer freezes
-108	-78	195	Dry ice
-129	-89	184	Coldest day (Antarctica)
-234	-148	125	Highest superconduction
-285	-176	97	Thin-film superconduction
-321	-196	77	Liquid nitrogen boils
-452	-269	4	Liquid helium boils
-459	-273	0	Absolute zero



Congratulations

To Luz and Richard (2115) Flores, a son, Eric Christopher, Feb. 25.

To Joan and Randy (9213) Kreinbrink, a son, Neil Allan, March 8.

To Lorie and Mark (3421) Crawford, a son, Luke Stephen, March 15.

To Anna and Paul (7485) Lefebvre, a daughter, Theresa, March 24.

To Margaret and Paul (7485) Cunningham, a daughter, Alicia, April 11.

To Vera and Rick (1261) Olson, a son, Nicolas Richard, April 24.

To Renee (2632) and Brian (3311) Philipbar, a son, Baer Tanner, April 25.

Fun & Games

Motorcycle Racing — The 11th Annual "Oh My God 100" New Mexico Motorcycle Desert Race is scheduled to take off on May 22 from NM 44 north of Bernalillo. Turn west between mile markers 41 and 42, then follow signs. The course covers arroyos, jeep trails, cow trails, and hills with 25-mile laps; experts go four laps, amateurs and over-40s go three laps, and beginners and women go two laps. New Mexico Desert Racing Assn. points will be given. Awards include cash pay-backs, trophies, gift certificates, and free finisher pins to all who complete the race. For more information, call Dwight Lewis (DOE/AL) on 296-7896.



GEN. ROLAND LAJOIE (left), director of the US On-Site Inspection Agency, shares a light moment with (from left) Aleksey Pokazayev (Soviet Foreign Ministry), Gen. Nikolay Shabalin (Soviet Ministry of Defense and the ranking visitor), and Sergey Kortunov (Soviet Foreign Ministry).

INF Inspection Protocol

The inspection protocol was the last of the items to be hammered out during INF (Intermediate Range Nuclear Forces) Treaty negotiations last year in Geneva. "In fact," says Stan Fraley (9111), "the pages [of the protocol agreement] were being initialed as a military aircraft carried the chief US and USSR negotiators — and the treaty — back to Washington on December 7, the day before the Reagan/Gorbachev signing."

Stan spent six months in Geneva (see LAB NEWS, Sept. 11, 1987) as the chairman of the working group that developed the inspection protocol for the treaty, so he's very familiar with the details. The details are many; Stan's copy of the INF documents has seven pages devoted to the treaty itself — and eight pages of inspection protocol.

The INF Treaty, which would eliminate ground-launched missiles with a range of 500 to 5500 kilometres (approximately 300 to 3400 miles), allows each signatory country to station up to 30 inspectors for 13 years at a missile assembly plant in the other's country.

US inspectors would be stationed outside the Votkinsk Plant, east of Moscow near the Ural mountains. The SS-20, one of the missiles assembled at Votkinsk, is banned by the INF treaty.

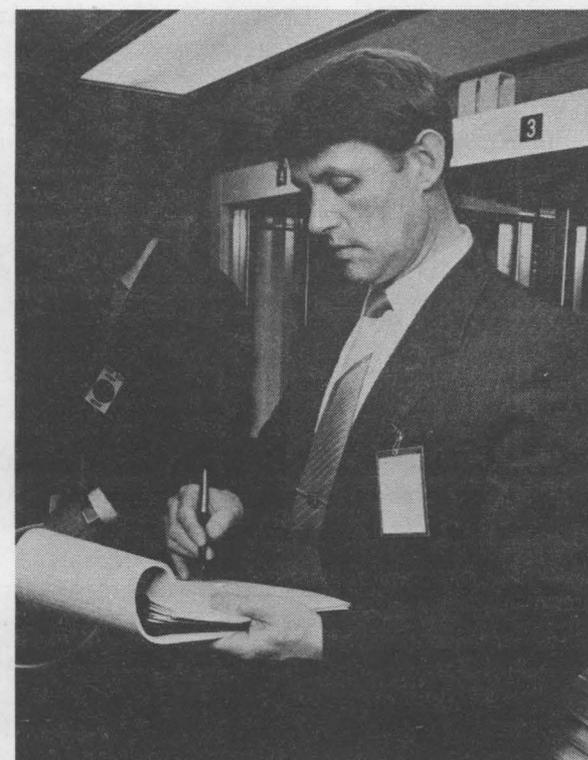
USSR inspectors would maintain a facility outside the Hercules Plant (Magna, Utah), producer of first- and second-stage motors for Pershing missiles — also banned by INF.

Besides the continuous monitoring provision, the treaty also permits — during the baseline period (30-90 days after the treaty enters into force) — inspections of all missile operating bases and missile support facilities related to banned items. Affected would be some 120 facilities in the USSR and 40 in the US.

Short-notice inspections at any of the facilities are also allowed, with the number of these inspections per year decreasing over a period of time (20 per year during the first three years, 15 per year during the next five, and 10 per year during the next five). Nine hours' notice must be given for a short-notice inspection, and the inspection can last up to 24 hours.

Following are some of the inspection protocol provisions for continuous monitoring (by no means a complete list):

- Verification devices allowed are weight sensors, vehicle sensors, surveillance systems, equipment to measure vehicle dimensions, and non-damaging image-producing equipment (X-ray devices, for example);
- Continuously monitored facilities will have only one "portal" — an exit for large heavy vehicles; two other exits for smaller vehicles are permitted (all portals are exits, but not all exits are portals, as Stan Fraley puts it);
- The inspection facility may consist of a warehouse (up to 500 square metres, or 5382 square feet) and three other buildings totaling no more than 150 square metres (1615 square feet) of floor space;
- On-site inspectors in host countries may not take "leisure travel" more than 50 kilometres (31 miles) from the site where they're stationed (and the host country may require that they be escorted even then).



LEV SOLOMONOV (Soviet Foreign Ministry) was busy with his sketch pad throughout most of the tour.

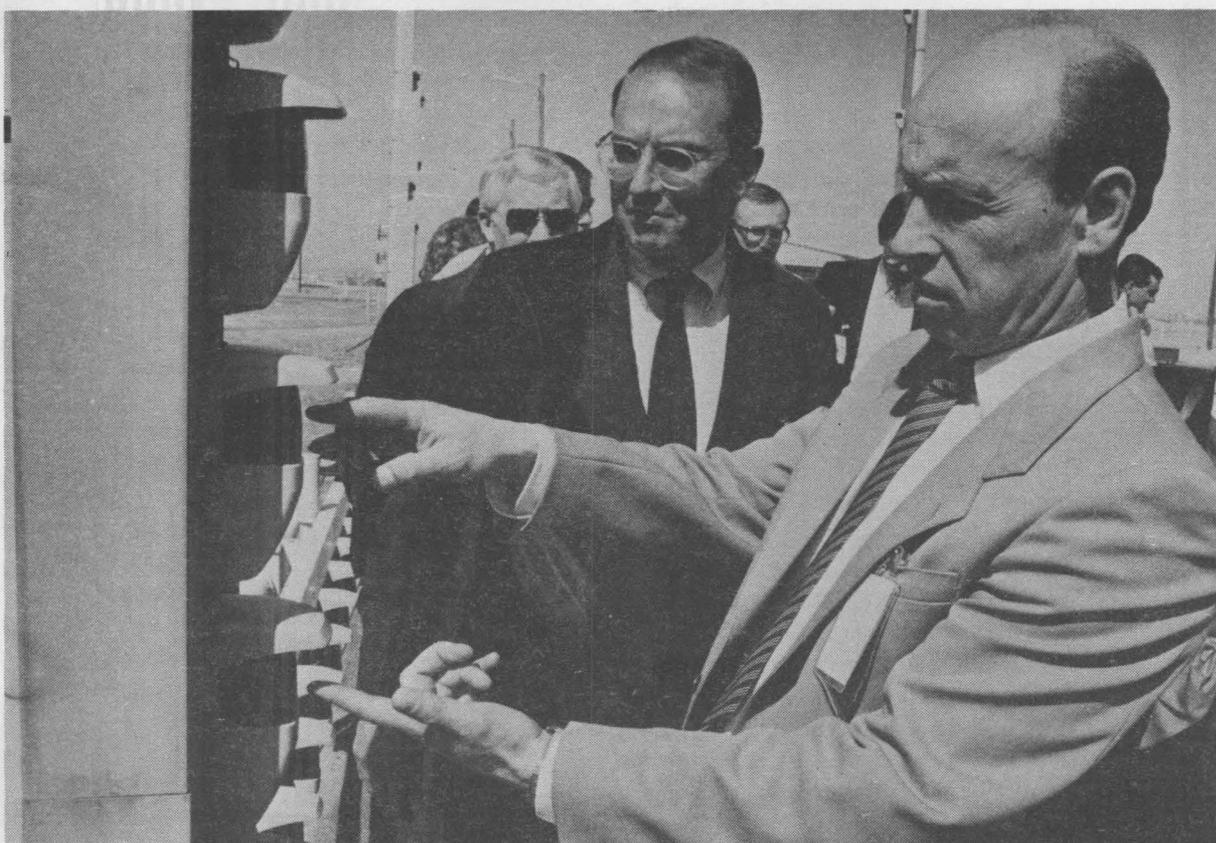
(Continued from Page One)

TOSI

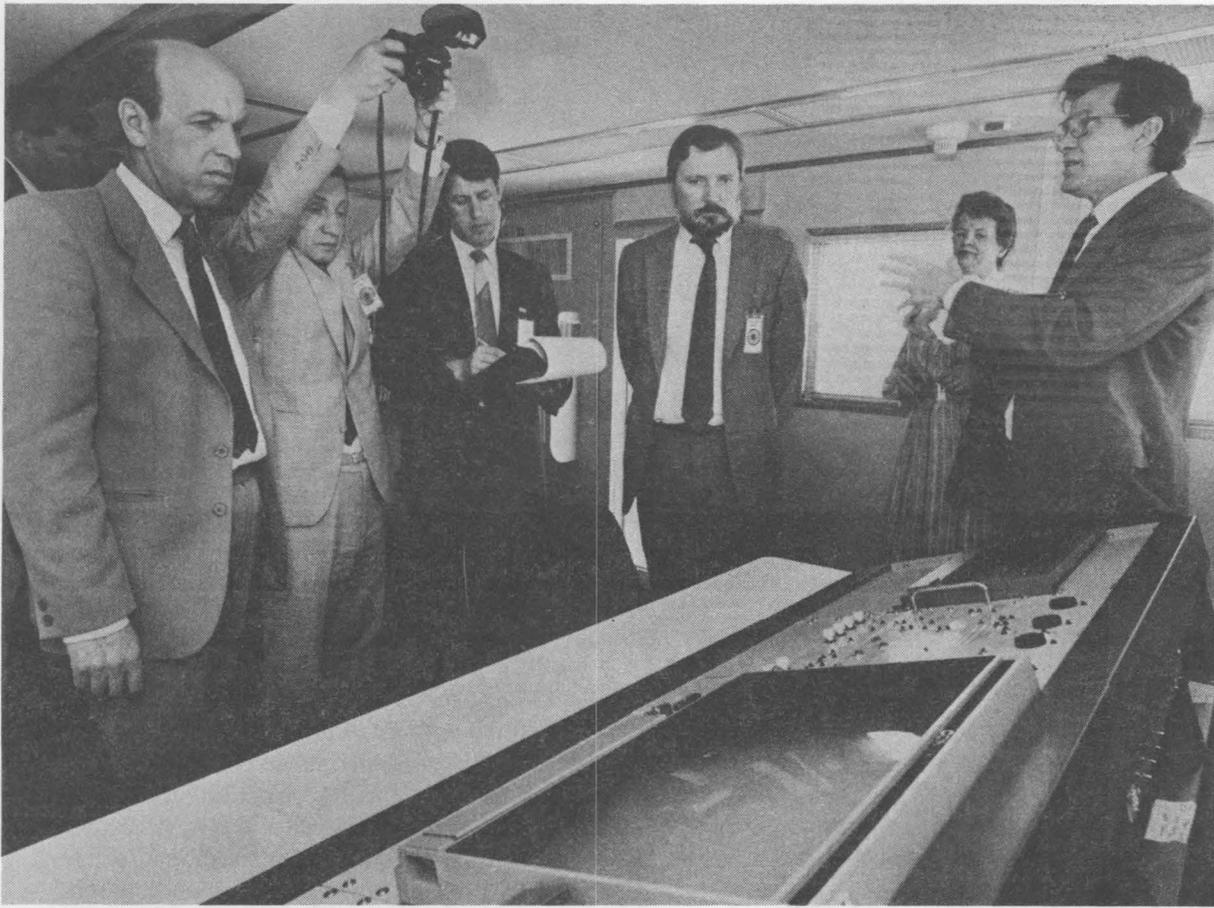
"TOSI is designed to do the inspection and monitoring job with minimum intrusiveness," John explains. "During our experiments, sensors do most of the work automatically; they supply information — on vehicle weight, size, and shape — that's analyzed and displayed by a computer system in the Operations Control Center [OCC]. Only then do humans get into the act."



EXAMINING EQUIPMENT RACKS in the portal operations center are Aleksey Pokazayev (left) and Sergey Kortunov, both of the Soviet Foreign Ministry.



GEN. ROLAND LAJOIE, director of the US On-Site Inspection Agency (left), and Gen. Nikolay Shabalin (Soviet Ministry of Defense) examine spacings between infrared break beams used to determine vehicle profile at a continuous monitoring facility.



COMMEMORATING THE CONCEPT—Stan Fraley (9111, right) explains control panel used for portal monitoring to (from left) Gen. Nikolay Shabalin, Oleg Shagov (Soviet Council of Ministries) with camera, Lev Solomonov and Igor Korobovsky (US State Dept. interpreter). Sandia interpreter Patricia Newman (3144) looks on. (Photos by Randy Montoya, 3162)

“In an actual treaty-verification situation, inspectors would observe the data and record results; if the vehicle’s cargo appeared to match the size and shape of a banned item, the host country would have to satisfy inspectors that the cargo — in fact — was *not* in that category. Various methods could be used to meet that requirement, including visual inspections.”

Three-Month Construction Period

During their visit to TOSI, the Soviet officials observed several portal demonstrations with different scenarios: vehicles that “passed muster” (too

light, not the right shape, heavy enough but the wrong size) — and a vehicle that was suspect (heavy enough and the right shape).

TOSI was built during a three-month period in 1986; completion was in December that year. “We received the go-ahead on TOSI from DoD and the Air Force Electronic Systems Division — our sponsor — in mid-August 1986,” says John. “Building a facility like TOSI in three months was not an easy task, but the job got done — mainly because of an outstanding Labs-wide effort.”

The Nuclear Security Systems directorate (5200), with its expertise in safeguards activities,



STAN FRALEY (9111) ponders a question from one of the Soviet visitors.

took on the task of TOSI engineering development. Dennis Mangan’s (5217) division had project responsibility for that engineering work during the crash construction program. After that initial period, Ron Moya’s division (5219) has been responsible for the engineering task.

“We also received excellent support from other organizations — for example, Plant Engineering, Purchasing, and the Shops,” says John.

Don Bauder (DMTS, 9111) served as TOSI project leader through most of the start-up period. Stan Fraley (also 9111) now has that job.

“TOSI development success depended, in large part, on solid technology bases developed at the Labs in the past,” says John. “Long-time experience in verification activities such as satellite and seismic systems was a real plus, as was 5200’s extensive work on safeguards programs.

“TOSI is in the news quite a bit right now because of the INF Treaty. But it’s not just an INF-related facility. TOSI was constructed to assess a variety of inspection problems — some unrelated to INF.”

●PW



SANDIA HOSTS AND VISITORS look over a break-beam assembly through which an exiting vehicle would pass at an inspection-facility portal. Infrared beams from

poles on either side determine the vehicle’s profile; vehicle image is instantaneously projected on a computer screen inside the portal control center.

How to Catch a Fine Kettle of Fish

I have laid aside business, and gone a-fishing.
— Izaak Walton, *The Compleat Angler* (1653)



Dr. William Black, pathologist for the UNM Cancer Center and professor at UNM School of Medicine, has a lot in common with Izaak Walton, author of *The*

Compleat Angler, the classic 17th century treatise on angling (the art of catching fish): He loves fishing — especially fly-fishing — and he loves talking and writing about the sport.

He'll talk to Sandians on "Fly-Fishing the Lakes and Streams of New Mexico" at the Technology Transfer Center on Tuesday, May 10, at 12 noon.

Like Walton, who argued that "as no man is born an artist, so no man is born an angler," Black believes fly-fishing is an art that can be learned. He's been teaching and writing on the subject for almost twenty years, striving to dispel the mystique and snobbery often associated with the sport.

"Fly-fishing," he says, "is truly the highest form of angling, but it is not a terribly complicated sport — it requires no special finesse. There are, however, a few essential skills involved in deceiving a trout with a fly that anyone can learn."

His pragmatic philosophy is reflected in the title of the Community College course he's taught every year since 1976: "Fly-Fishing for Everyone: A Non-Elitist Introductory Course in the Basics."

He takes the same unpretentious approach in the books he's written about fly-fishing. The how-to treatment and plain language of *Flyfishing the Rockies* and *Hooked on Flies* will be especially appealing to those new to the sport. In his latest book, *Creek Craft: The Art of Flyfishing Smaller Streams* — due out this spring — he indulges his preference for fishing small streams rather than lakes.

He hasn't always preferred stream-fishing: "Back when I was growing up in Denver and, later, when I attended Colorado College, I preferred fish-



DR. WILLIAM BLACK

ing the high mountain lakes," says Black. "I 'graduated' to streams and from medical school at the University of Colorado at about the same time [1956]."

Since then he's fished streams throughout the Rocky Mountains — in Idaho, Montana, Wyoming, Colorado, and New Mexico. He especially likes the "wild naturalness" of streams like the Brazos, Chama, and Pecos. "There's something about the rush of the water — the current — that makes stream-fishing more enjoyable than lake-fishing," he says.

But whether it's practiced in streams or lakes, he concurs with Walton's claim that angling is *always* "a rest to the mind, a cheerer of spirits, a diverter of sadness, a calmer of unquiet thoughts, a moderator of passions, and a procurer of contentedness."



"PROUD TO CARE," the theme of National Nurses Day (today), aptly describes the attitude of Sandia's nursing staff in Industrial Medicine Div. 3322. Headed by Dr. Larry Clevenger, the staff consists of five full-time nurses, one full-time nurse practitioner, four part-time nurses, and one part-time nurse practitioner. The care they provide Sandians ranges from administering allergy shots to conducting TLC and first-aid classes to serving as important members of the Medical Emergency Response Team (MERT). All members of the nursing staff are certified CPR instructors and have completed a special course at Oak Ridge, Tenn., in emergency care and treatment for radiation-related injuries. Pictured are (l to r) Pat Fasano, Carolyn Olona, Gwen Gorman (nurse practitioner), Denise Reed (head nurse), Wendy Pierce, and Carolyn Beeler. Not pictured are Marie Vaughn, Debi Edwards, Dolores Drexler, Christine Gonzales, and Mary Lou Stefanov (nurse practitioner).

Take Note

Craig Jones (2610) was recently named the 1987-88 distinguished alumnus of the Kansas State University mathematics department.

* * *

Several Sandians will present papers or moderate panels at the 10th annual Ideas in Science & Electronics Exposition and Symposium on May 10-12. Sponsored by IEEE and the Electronic Representatives Association, ISE '88 is the largest exposition ever to be held in the Convention Center.

Jerry Stauffer (2834) will present "Engineering Drawings and Changes: Storing and Controlling by the Tens of Terrabytes" during a Computer-Aided Engineering seminar. Ruth David (7121), chairman of the Albuquerque Section of IEEE, will moderate a New Applications in Optoelectronics and Electro-Optics seminar that features three other Sandians as presenters: Kurt Wessendorf (2534) will present "Phase Comparator for Range-Imaging Laser Radar" (on which Mark Grohman, 9127, and Marion Scott, 2531, were co-authors); Philip Garcia (2531) will present "High-Bandwidth Optoelectronic Signal Link for Use in an EMP-Plus-Radiation Environment"; and John Anthes (also 2531) will present "Analytical Design of a High-Bandwidth Optoelectronic Signal Link for Use in an EMP-Plus-Radiation Environment." Jim Schirber (1150) is among four presenters of a Superconductivity Tutorial; he will discuss the preparation of a superconducting superoxide. Advance registration and information from 262-1023.

* * *

Industrial Photographers of the Southwest (IPSW) will hold its Conference '88 on May 19-22 at the Holiday Inn Midtown. Featured banquet speaker Tom Smylie of the U.S. Forest Service will talk about "The Sandias — Mountains Not to be Taken for Granted." Program subjects range from the artistic to high-tech. Leroy Perea, Phil Apodaca (both 7556), and Louis Archuleta (3155) are members of the IPSW board. For more information on the conference, call Leroy on 4-4404.

* * *

The drone of bagpipes will be heard in Albuquerque on May 14 at the Rio Grande Valley Celtic Festival and Highland Games at Menaul School campus (301 Menaul NE) from 9 a.m. to 5 p.m. The festival extends into the night with the Ceilidh (a big Celtic party) at 8 p.m. at the Hilton Inn (1901 University NE). Daytime activities include official competitions in Highland dancing, solo piping and drumming, and pipe bands; Scottish and Irish athletic matches; children's competitions; Scottish, Irish, and Welsh entertainment and food; and Celtic heritage information. Competition winners will perform at the Ceilidh. See and learn Scottish and Irish country dancing and listen to the Welsh Choir. Games admission is a \$4 donation (children 12 and under, free). Ceilidh admission is a \$5 donation. Sandians involved in putting together the event include Jim Muir (6227), Nick Magnani (2520), and Jim Allensworth (ret.). Call Jim Muir on 883-7933 for more information.

* * *

The Friends of the Cumbres & Toltec Scenic Railroad has been organized to promote New Mexico and Colorado railroad history in general — in particular, as it relates to the Cumbre & Toltec Scenic Railroad, which runs between Chama, N.M., and Antonito, Colo. The 64 miles of scenic narrow-gauge railroad (more than 100 years old) is owned by the states of New Mexico and Colorado, and is operated by Kyle Railways of San Francisco. The new organization will work closely with the owner and operator of the railroad. Memberships are \$15/year, and include a newsletter that provides information about the Cumbres & Toltec Scenic Railroad. For information, contact Roger Breeding (6413) on 266-6473 or Bill Lock on 293-3210.

* * *

Hyang Cooper (2831) is looking for people to help the poor in Juarez, Mex. She goes there on regular trips with her church group to buy food and distribute it. Anyone wanting to join them can contact Bernadette at Victory Love Fellowship Church on 831-0961.

Who're You Gonna Call?

You have a complaint, a comment, a suggestion, even a compliment — but you don't know whom to contact.

Forget "Ghostbusters" — Sandia's Feedback program is the way to reach the person who could help. Most of the time, a supervisor knows the answer to a specific question you have about your job. But suppose you want to know why your building doesn't have vending machines, or you have questions about Sandia's pension plan.

Some of the typical concerns that turn up in Feedback questions: "What's the procedure for using Mardix booths when there are long lines?" "Can't someone move the boxes and equipment that have been blocking the hall in front of my office for months?" "What does 'customary charges' for medical procedures mean?" "Are parking lots patrolled regularly by Security?"

Whatever your question or comment, all you have to do is pick up a Feedback form, write in your question, fill out the address block stub, fold the form, and mail it to the Feedback administrator.

How Feedback Works

Here's what happens when you send in a Feedback: The administrator assigns an identification number to the Feedback and removes the portion with your name on it. That stub is kept in a locked box until an answer is received.

Your question is then forwarded to the appropriate director, who refers the question to the person most qualified to answer it. The director signs the completed answer and returns the question to the administrator, who then sends the reply to you. A turn-around time of two weeks is allowed.

Your home address is requested on the form. If the address block isn't filled in, the Feedback cannot be answered, although an information copy is sent to the appropriate director. Unless you request that your name be attached to your question, anonymity is assured. If not, your name is on the address stub only, and once that is returned, there is no record of who sent the Feedback.

Copies of the question and answers that are of general concern to employees are sent to the LAB NEWS editor for possible publication.

Feedback Goals

Since the Feedback program began in October 1973, it has served as a good barometer of current feelings and concerns among employees. That is, the

program is a way for management to determine what's bugging employees.

The formal objectives of the Feedback program are to expand communication among all levels of Sandia management and employees and to increase knowledge and understanding about the Labs.

Feedback does not encourage people to "bypass the boss." It is set up to handle questions that the supervisor, in all likelihood, is not able to answer authoritatively without considerable research.

Program Effectiveness

Since 1973, more than 4000 Feedbacks have been processed. Changes that have occurred as a result of Feedback questions/comments include designing a corporate flag, adopting several service award suggestions, revising the car pool reserved-parking program, improving in-plant feeding and vending operations, installing pay phones in the Tech

Area, making safety glasses available to employees at cost, installing outdoor metric thermometers, and correcting many safety and traffic hazards.

Recently, thanks to Feedback queries, Sandia changed procedures for obtaining a new ID card, and installed bike racks in the parking lot east of the water tower for employees who bike between their cars and their work areas.

Whom to Call

Feedback-form holders can generally be found next to bulletin boards in major buildings throughout the Labs. If the holder is empty, contact SNLA Feedback Administrator Janet Walerow (3162) on 4-7841, and she'll send the forms to you. She can't know when a holder is empty, so she relies on employees to call for forms and fill the holders for her.

For Feedback questions at SNLL, contact Tonni Nunley (8522) on 4-2235.

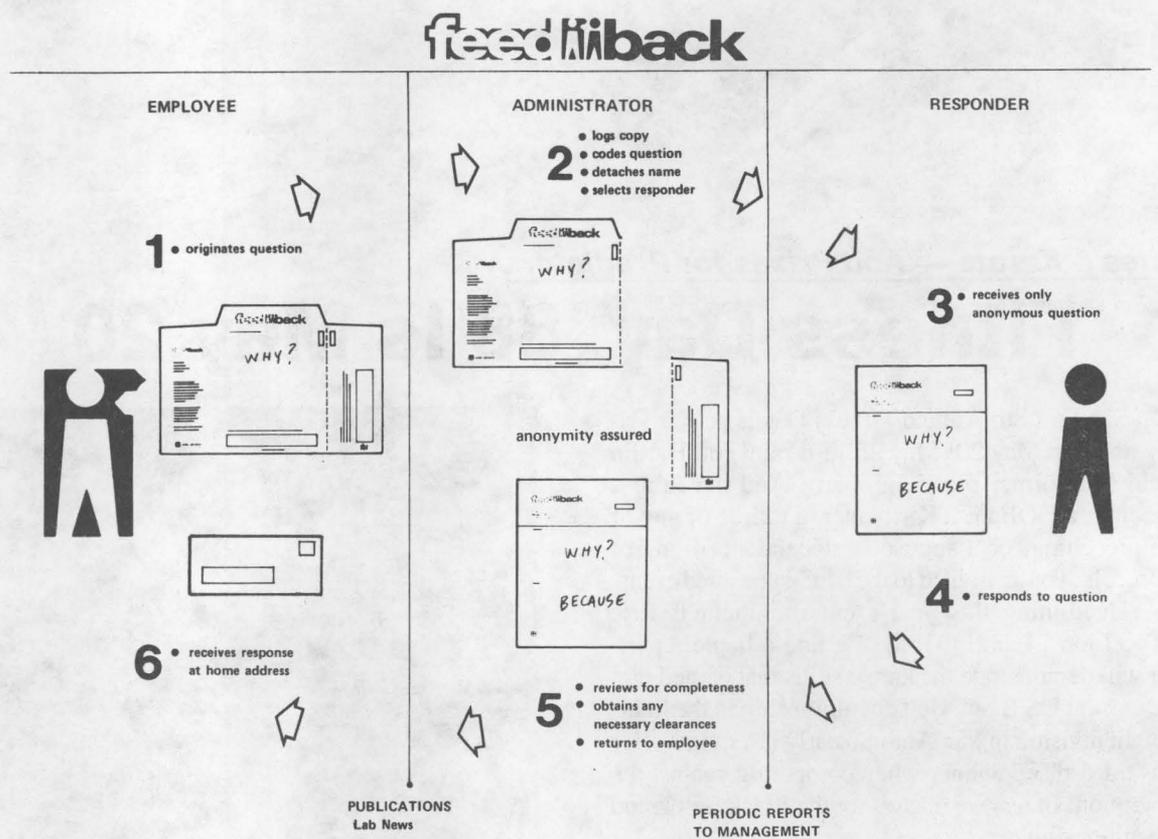


CHART SHOWS THE ROUTE A FEEDBACK takes during processing.

feedback

Q. When you were leaving for a long vacation in "the olden days," you were, with your supervisor's approval, able to get your paycheck early. I will be out of the country when my next paycheck arrives. When did the "advance paycheck" practice stop, and why?

A. Vacation advances were discontinued in August 1981 because of the large amount of manual effort required to provide the advance. Additional manual effort was required to prevent payment via the automated system when the regular pay period arrived.

You mention that you will be out of the country when your next paycheck arrives. Employees who have checks delivered to their work location, or home, may experience some delay in availability of funds when they are away from the delivery location. However, it's a needless delay — direct deposit of salary payments is available to all employees. With direct deposit, payment is made each payday into the employee's designated account at a bank, credit

union, savings and loan, or brokerage firm anywhere in the US. Once deposited, the funds are available through checks or Automated Teller Machine hookups in most US cities and in some foreign countries.

Paul Stanford - 100

Q. KAFB's policy concerning Sandia employees' use of base facilities now states that not only do we need to pay \$24 per year to use the facilities, but we are 17th in a list of 18 groups trying to use them. Is there any possibility of Sandia's building a gymnasium for our own use?

A. It is unlikely that Sandia will be able to build a gymnasium for our use. To do so would require construction funds, which are separately identified and appropriated by the Congress. There is much competition for construction funds. I suspect that a gym — as much as we would like to have our own — will be lower in priority than other construction projects.

R. W. Hunnicutt - 7800

Q. Contractors abuse the 2-hour limit on visitor parking spaces in the water tower parking lot. They park in these spaces all day long. Why aren't these cars ticketed like those of Sandia employees? And why isn't there a special placard that says "full-time contractor" instead of just an expiration date?

A. It is difficult for those patrolling these areas to identify vehicles that do not display a decal or placard. Designing another placard would not solve the problem. We will continue to cite offenders, but we encourage you and others to report violations by calling 4-6410 or 4-8902.

Jim Martin - 3400

Dress for Regress



to achieve.

Don't be too quick to mimic the expensive dress of a superior, says consultant Goodrich & Sherwood Co. The boss might resent an underling who tries to match a life style that's taken years of work

Selwyn Feinstein, Wall Street Journal



Kites & Karate — And Prizes for Predictors

Fitness Day '88 Is May 20

FITNESS DAY FEATURED ATTRACTION is a karate demonstration by Eric Lamb (3154). He recently took first place in the lightweight division of the US Black Belt championship competition in San Antonio.

Sandia's 8th Annual Fitness Day is set for Friday noon on May 20 (May 26, if it rains) on Hardin Field (the former parade ground). And if you're a Sandian, a DOEan, a Kirtlander, a retiree of any of the preceding, or a spouse or dependent of any of those folk, you're invited to the TLC-sponsored event.

Headlining this year's entertainment is Eric "The Lion" Lamb (3154). He and a hapless partner will demonstrate the karate skills that earned him the current US Black Belt championship in the lightweight division in San Antonio early last month. (He was third-place winner when competing against the champions of heavier classes for the Black Belt grand championship.)

More Entertainment — Kites!

During the whole noon hour (winds permitting), Randy Montoya (3162) and his wife Catherine will demonstrate their stunt kites. Now, these are not ordinary, Charlie-Brown-variety kites. In the hands of experts (Randy and Catherine have studied under Ron Rich, four-time world champion in the sport), these kites are capable of an amazing array of airborne acrobatic antics — at 65 mph.

In addition, the winner in the professional division of the NM Museum of Natural History's Pterosaur Ptournament was a prehistoric-looking kite designed, developed, fabricated, flight-tested, and launched by several members of Aerodynamics Dept.



FITNESS DAY JOG/WALK has some competition built into it this year. Participants in the 1.5-mile event will be asked to predict their elapsed times, and those guessing closest will receive prizes (including a sport watch). Participants in the 3-mile bike ride face the same prediction challenge.

1550 plus one hanger-on. The team, headed by Terry Jordan (1555), included Ron Greene, Brian Landrum, David Keese (all 1555), and Dave Salguero (9144). That kite, too, will be on airborne display.

Both the traditional 3-mile bike ride and 1.5-mile walk/jog have a new twist this year: Participants

will predict their elapsed times. And winners — the precise predictors — will get prizes. See below. (More info on time-predicting from Pete Eagan or Susan Harris, 3330.)

Another activity for the actively action-oriented is the opportunity to join selected volunteers from TLC's three current aerobics classes for a group workout. Wear your jogging shoes.

Prizes for Prime Predictors

The walkers, bikers, and joggers who most closely estimate their time-of-arrival at their respective finish lines will win a sport watch (two will be given away) from TLC, a free windsurfing class from SERP, a TLC T-shirt (two available), a lunch for two at the Sandia cafeteria from Marriott, or a lunch for two at the C-Club (four prizes).

Fun in the Sun for All

There's more: Music by Bob Banks (3531) and his trio. Pita sandwiches for the first 200 attendees with \$2 in lunch money (or bring your brown bag). Free juice and water. Enlightenment and encouragement by emcee Bruce Hawkinson (3162).

"THE BENCHMARK of a school is the product — the alumni," said Gilbert Sanchez (left), President of NM Highlands University, last month. The occasion was a dinner at which Gus Simmons (Senior Fellow, 200) won a Distinguished Alumni Award. Gus, who earned a BS in mathematics from Highlands in 1955, is an internationally recognized authority on cryptology and a recipient of DOE's highest honor, the E. O. Lawrence Award.



Eat Righters Succeed

By Susan Harris (3330)

HealthNet New Mexico's 1988 Eat Right campaign is officially ended. Three cheers for the Sandians who participated!

Of the original 590 participants, 394 (67 percent) completed the ten-week program. Most of them were pleased with their accomplishments — weight losses, positive changes in eating and exercise behav-

ior, or both.

Here are the final results:

Total Weight Loss = 1875 lbs.

Average Weight Loss/Participant = 4.76 lb.

(Goal Weight Loss = 5 lb./participant)

So, given favorable rounding conditions, we did it! Collectively, we've unburdened ourselves of

15/16ths of a ton.

The Get Fit program began when Eat Right concluded; 256 Sandians rose to the challenge and signed up. The 10-week Get Fit program will last through May. Sign-out ceremonies are set for Bldg. T-13 from 7:30 to 9:45 a.m. on June 1, 2, and 3.

UNCLASSIFIED ADVERTISEMENTS • UNCLASSIFIED ADVERTISEMENTS • UNCLASSIFIED ADVERTISEMENTS • UNCLASSIFIED ADVERTISEMENTS

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

Ad Rules

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

MISCELLANEOUS

DASH MAT for Pontiac Fiero, gray, \$10. DeReu, 275-2336.

GOLF CLUB IRONS, 3 sets, PGA (275-), Cameron (R), PGA (150-), Ryder Cup (S), Confidence (130-) S; some new drivers. Stang, 256-7793.

BUTLER CHEST/SECRETARY BUREAU, circa 1840, mahogany veneer, cherry, tulip poplar, brass locks, glass knobs, dovetailing, \$1500. Richter, 265-2347.

POOL TABLE, 3/4-size, w/rack, balls, cue sticks, \$100; kitchen cabinet, 32" x 80", w/double sink. Houghton, 299-3386.

SECTIONAL SOFA, Ethan Allen, gold & green, \$300; dining room table & chairs, \$150; recliner rocker, rust, \$75. Sandoval, 291-9004.

ONE-YEAR-OLD DOG, setter and St. Bernard mix, setter in appearance, neutered, needs large yard, \$25. Lopez, 345-7008.

SOFA, dark beige w/floral slipcover, \$125; oak-finish coffee table w/glass insert, \$90. Irvin, 884-8551.

CAMPER SHELL, for LWB pickup, \$300. Sanchez, 292-3852.

'83 KOMFORT LITE FIFTH-WHEEL, 20', self-contained, AC, miniblinds, w/hitch, \$8500. Molina, 299-8718.

ROPER ELECTRIC RANGE, green, \$85; Hotpoint washer, yellow, \$135. Romero, 821-7629.

TELEPHONE ANSWERING MACHINE, Record-A-Call model 60A, w/incoming and outgoing tapes, \$30. Noland, 293-0484.

TWO VETTA SUPERCORSA HELMETS: large-size, new, \$30; small, used, \$25. Schaub, 265-0004.

FOUR TIRES: BF Goodrich radial mud-terrain tires, 32" x 11.50" x 15", 1/3 tread left, \$120/all. Allen, 869-6680.

MGA PARTS, 1500cc engine block, tranny, 1600cc heads, misc., \$350/all. Schaub, 821-7242 after 5 and weekends.

TWO BICYCLE HELMETS: Brancale hard-shell, used twice, medium and small sizes, \$20/ea. Kelly, 281-9774.

DEPTH-FINDER FLASHER, used one season, \$60; 2 Firestone tires, 235/75/15, new, \$75. Dobias, 256-7476.

SMOKED-GLASS/CHROME PEDESTAL TABLE, \$125; solid maple sofa, \$210; exercycle, \$29; misc. items. Luther, 822-8289.

ROOM DIVIDER, wood decorative, 4-panel, \$85. Marchi, 291-9681.

SERVING PLATTER, European sterling silver, 15-1/4" x 10-1/4", best offer. Frames, 344-6451.

LOVE SEAT, Rowe, olive & lime; arm-chair, Sherrill, gold velvet. Wagner, 823-9323.

MAPLE DRESSER, 18" x 40" x 36",

\$40; component stereo for records & cassette tapes, \$50; exercise bike, \$30. West, 292-7091.

MERCURY OUTBOARD PROP, 14d x 21p, fit 6-cyl. in-line engines, \$25; manuals for Ford light trucks, '82 series, 6 volumes, \$15. Meikle, 299-4640.

WALNUT DINING TABLE, 4 chairs, \$125. Mead, 299-4868.

DOUBLE BED w/castered frame, \$100; Sears portable dishwasher, \$150; gold vinyl office chair, \$20. Thibeau, 281-5143.

ST. BERNARD PUPPIES, AKC-registered, champion bloodlines. Sargent, 298-7977.

VAN MOVING BOXES: wardrobes, mattress, mirror, dish packs, cost \$200, sell for \$50/all. Honsal, 821-0710.

AQUARIUMS: 29-gal., complete, \$75; 10-gal., \$25 OBO. Mozley, 884-3453 leave message.

YARD ROCK, 3/4" and 3", free; range hood, make offer. Lane, 884-4566.

STATION WAGON TENT, camping stove, 2 complete maple bunk beds, barbeque w/cabinet stand and electric spit. Jones, 299-9032.

PFUFF 809 SEWING MACHINE, w/ cabinet, used one year, cost \$800, sell for \$350. Rauch, 821-6992.

SCREEN DOOR, 80" x 36", right hinges, \$9; gasoline engine, 2-hp, 4-cycle, \$20; sandbox, 4' x 6', \$6; all prices OBO. Cole, 298-1464.

ELECTRIC GUITAR, practice amp, steel-sash windows, Mustang dashboard, Triumph motorcycle parts, '74 Sportster covers, typewriter, fireplace screen. Gonzales, 344-4933.

CHIPPER-SHREDDER, Sears, 8-hp, makes chips and compost, \$250; water-well jet pump, Sears, 1/2-hp, never used, \$90. Olsen, 294-2333.

UPRIGHT FREEZER, white, \$225. Ripi, 293-6067.

BABY ITEMS: cribs and mattresses, changing table, room decorations, girl's clothes for ages birth to 2 yrs., misc. Barr, 821-5870.

UTILITY TRAILER, 2-wheel; cartop carrier; rollaway bed. Randall, 299-3935.

AMES STEEL SHELVING, adjustable, two 7-shelf units, \$15/ea. Davie, 296-3950.

CLASS 3 RECEIVER and trailer brake kit, \$75. Nielson, 294-2643.

IBM-XT, two 5-1/4" and one 3-1/2" floppies, 30 Mb hard disk, 90087 coprocessor, AST 6-Pk., 1.2 Mb memory, mouse, \$1750. Mulholland, 266-2642.

WINE-MAKING EQUIPMENT, complete, worth \$100, make offer. Van Domelen, 299-3674.

CAR MASK, fits '81 280ZX, \$35. Sanchez, 831-4707.

NEIGHBORHOOD YARD SALE, Chelwood Gables, SW corner of Indian School Rd. and Chelwood Dr., 8 a.m.-3 p.m., May 14. Barnette, 292-5186.

CAB-OVER CAMPER, 8', sleeps 4, mounted side jacks, stove, icebox, sink, \$700. Garcia, 836-5661.

SUPER-SINGLE WATER BED, oak frame, \$100; sofa, dark rust, \$200; pair of custom-made woven woods, 46" x 72", earth tone, \$100. Ramirez, 821-8465.

TONTOURI ROWING MACHINE, \$100. Mancuso, 296-4178.

RAILROAD TIES, 8', \$5/ea. Smith, 293-0216.

TWO TWA ROUND-TRIP TICKETS, any TWA destination overseas, must use before Sept. 1, best offer. Mowery, 268-2803.

LAWN FERTILIZER SPREADER, drop-type, Red Devil brand, \$10. Scheffer, 294-3434.

QUEEN-SIZE BRASS BED (headboard and footboard), and frame, \$175. Tripp, 822-8580.

MIKUNI 27mm smooth-bores, \$225. Barnard, 831-4114.

SUNBEAM ELECTRIC MOWER, \$50; 4 bar stools, padded top, wooden pedestal, \$25. Hovorka, 299-0224.

LOVE SEAT & COUCH, contemporary style, \$325/both OBO. Beckmann, 296-1829.

RV AWNING, 17' Carefree, some hardware damage, \$145. Allen, 298-9833.

NU-WA TANDEM TRAVEL TRAILER, '83, 19', self-contained, foam insulation, refrigerator, other features. Goldenberg, 821-6209.

GARAGE SALE, 3 families: furniture, clothes, baby supplies, more, 9 a.m., May 7, 7408 San Francisco NE. Shrouf, 821-0765.

QUEEN-SIZE MATTRESS & BOX SPRING, Sealy Posturepedic, \$110. Martin, 255-6919.

LOVE SEAT, orange print, \$90; 1960 Silvertone AM/FM phono console, \$150; rocking chair, \$30; golf cart, \$15; end table, \$40. Trump, 299-5162.

RV EVAPORATIVE COOLER, 12-volt, new, \$175; portable evaporative cooler, 3-sp., \$60; love seat and chair, \$25. Bentz, 299-3448.

KING-SIZE MATTRESS, matching double box spring; fireplace screen, andirons; 9' x 15' Karastan area rug. DeWerff, 298-1029.

YARD SALE, 9:30 a.m.-4:30 p.m., May 7-8, 2201 Palomas NE (corner Indian School Rd. between San Mateo/ San Pedro). Sena, 256-0617.

MAGNAVOX 19" COLOR TV, \$125; 5 black wrought-iron light fixtures, \$50. Bixler, 293-7205.

EVAPORATIVE WINDOW COOLER, new; Whirlpool range, self-cleaning, gold; Dana 60 limited-slip carrier assembly, 3.73, new clutches. Stone, 298-4641.

POOL TABLE, 7', Brunswick Commodore, w/accessories, \$200. Doyal, 299-5688.

BELL BICYCLE HELMET, white, never used, foam adjustment pads included, \$30. Spilka, 888-9573.

ENCYCLOPAEDIA BRITANNICA, complete 29-volume set, one year old, \$1000. Aragon, 296-8092.

MATCHING OVERSTUFFED COUCH AND CHAIR, gray floral, \$150; rocker and ottoman, brown plaid, \$30; Quasar 19" color TV, w/remote, \$50. Graham, 293-7302.

COMMODORE 64 COMPUTER, disk drive, printer, color monitor, Kola pad, software, \$500. James, 296-3597.

ALCOHOL LAMP, for jewelry wax working, \$1.50; Taylor fisherman's thermometer in metal jacket, -40 to +120° F, \$8. Henry, 266-6467.

CARPET: turquoise, 12' x 12'; green shag, 12' x 15'; both include pad. Meyer, 256-9038.

FORD FALCON 144-cu.-in. engine, complete, free (you pick up). Martinez, 299-8204.

HORSE, registered 3/4-Arabian mare, \$1200; GE dryer, \$75. Neal, 299-4956.

HEWLETT-PACKARD HP-41C CALCULATOR, w/extended memory module, all documentation, equivalent to HP41CX, \$75. Carson, 281-5115.

'79 CELICA GT, liftback, AC, 5-sp., Blaupunkt stereo, \$1900. Caldwell, 821-7110.

'83 BUICK SW, one owner, V-6, loaded, below book. Winblad, 898-9762.

'66 MUSTANG, red, V-8, AT, pony interior, AM, \$3200. Stang, 256-7793.

'69 FORD LTD, needs brakes and body work, \$400. Ellis, 294-5432 after 5.

'75 TOYOTA COROLLA, 4-dr. sedan, light brown, sunroof, original owner, \$850. Schwartz, 294-1113.

'78 DATSUN F-10, hatchback, AM/FM stereo, new clutch, \$800. Potter, 299-6053.

'81 YAMAHA VIRAGO 750, new tires, garaged, 2 helmets, \$1000 OBO. Bishop, 822-8295.

'83 EL DORADO MMH, 27', Ford 460, loaded, rear bed, generator, awnings, 24K miles, \$21,500. Wenger, 822-1487.

'78 BMW 320i, AT, \$4500/offer. Renken, 243-1724.

'72 MGB CONVERTIBLE, silver, \$2400 OBO. Gomez, 256-1584.

'85 SUPRA, white, maroon cloth interior, 5-sp., power sunroof, 68K miles, \$10,500. Hesch, 268-6122.

'81 PRINDLE 16 CATAMARAN, double-trapeze, harnesses, barber-hauler, trailer, stored 3 years, \$2500. Murata, 881-8459.

'87 FORD ESCORT PONY, 2.9K miles, \$5700; '70 Ford Maverick, 71.5K miles, \$800; 24" 10-sp. bicycle, \$40; 20" racing bicycle, \$45. Baca, 296-8474.

'71 HONDA CB450, rolling chassis, includes all electrics, no engine, \$125. Barnard, 831-4114.

'87 DODGE OMNI, 5-sp., AC, AM/FM stereo, cruise, rear defrost and wiper, \$5300. Herr, 892-3024.

'75 SUBURBAN C20, equipped for trailer towing, 454 engine, 410 axle, AC, PS, PB, \$2500. Danclovic, 255-4628 after 6 or weekends.

'81 YAMAHA 400 SPECIAL II, windshield, book rack, case savers, maintenance record, factory manual, garaged, \$600 firm. Ukena, 293-9233.

'87 SUBURBAN, 4x4, loaded, 8K miles. James, 294-6837.

'70 FORD PICKUP, 3/4-ton, camper special, 92K miles, \$2850. Klentschy, 265-2016.

'84 KAWASAKI GPZ 750, new engine, tires, chain and sprocket, and brakes, \$2300 invested, offers considered. Wiseley, 275-3875.

'82 YAMAHA XV920RJ, European model (not Virago), trunk, windshield, \$900. Bickerstaff, 898-5529.

'83 VW QUANTUM WAGON, PS, PB, AC, 5-sp., AM/FM cassette, cruise, radial tires w/alloy rims, below book, \$5200 OBO. Drotning, 294-4807.

TANDEM BICYCLE, Bertin, 18-sp., 20"19", hub brake, \$700 OBO. Gintley, 296-0005.

TWO BOATS: 16' Skeeter bass, 40-hp Evinrude, w/trailer, \$1800; 14' Glas-tron, 75-hp Mercury, radio, built-in gas tank, w/trailer, \$700. Goodwin, 281-5943.

'70 MUSTANG CONVERTIBLE, AC, disc brakes, runs, but needs front suspension work, \$2000 as is. Olsen, 294-2333.

'72 FORD TRUCK, AT, 302 engine, needs body work, \$1000. Gutierrez, 881-4841.

'76 FIAT X19, new clutch and tires, green. Roseth, 296-8842.

'77 GMC STEP-SIDE PICKUP, w/camper shell, V-8, PS, AT, AM/FM cassette, chrome rims, \$2700 OBO. Marshall, 298-4206.

'67 FORD TRUCK, 3/4-ton, w/10' camper, best reasonable offer. Stixrud, 298-0478.

MAN'S 10-SPD. BICYCLE, \$30. Nielson, 294-2643.

BOY'S 10-SPD. BIKE, 24", Performer, \$55. Sanchez, 831-4707.

'79 DATSUN 280ZX, 62K miles, AC, AM/FM, \$4000. Loudermilk, 299-4621.

'87 FORD BRONCO XLT+, 14K miles, loaded, 5.8 litre, trailer towing and handling package. Smith, 298-4100.

'85 SUBARU XT TURBO SPORTS COUPE, silver, 5-sp., GL-10, 31K miles, \$7900. Ewing, 268-6920.

'76 TOYOTA CORONA, AC, AT, one owner, \$950. Marrs, 281-9889.

'82 SUBARU GL WAGON, 4-WD, bur-

gundy, AM/FM cassette, original owner, \$2500. Maish, 898-8027.

'84 FORD BRONCO II XLT, 4x4, 44K miles, AC, PS, PB, cruise, tilt, \$7000. Stinnett, 298-8613.

'84 CHEV. K-5 BLAZER, 305 V-8, brown, AC, 45K miles, \$10,500, trade considered. Todd, 344-9015.

'82 HOBIECAT, 16', Highlander trailer, Carumba sails, \$2200. Pregent, 281-1414.

'84 NISSAN MAXIMA, AT, 6-cyl., light gray over silver, sunroof, cloth seats, 38K miles. Gendreau, 268-3436.

'81 SUBARU DL, one owner, AM/FM cassette, 5-sp., blue metallic, 64K miles. Spilka, 888-9573.

'84 CELEBRITY, 4-dr., V-6, FWD, AC, PW, PL, 31K miles, more, \$5800. Graham, 293-7302.

'80 DIESEL RABBIT, 86K miles, \$1100; '80 Suzuki GS450, 11K miles, \$700. Koenig, 294-2264.

'84 FORD TEMPO, 4-dr., AC, 5-sp., 42K miles, \$3750. Martinez, 299-8204.

'75 YAMAHA RD350 STREET BIKE, 2-stroke, 2-cyl.. Shapnek, 281-5913.

REAL ESTATE

GLENWOOD HILLS CORNER LOT, views, \$69,500 or SE commercial trade. Richter, 265-2347.

3-BDR. HOME, on .28 acre, South Valley, new kitchen and bath, skylights, detached garage (24' x 24'), sprinklers, fenced, \$61,900. Klaus, 843-6439.

DOUBLE-WIDE MOBILE HOME, on 1-2/3 acres west of Edgewood, 19 miles from Sandia. Morrow, 281-9607.

POCONOS (PA) TIMESHARE, Week 38, sleeps 10, lake, horses, tennis, \$3000. Frames, 344-6451.

3-BDR. HOME, Bosque Farms, 1-3/4 baths, country kitchen, pitched roof, 2-car garage, horse barn, 1 acre. Mitchell, 869-6816.

3-BDR. HOME, Rio Rancho, 2 baths, 1414 sq. ft., sprinkler system, \$2500 down, assume 7.8%, \$418/mo. Gerry, 891-0423.

CENTURION MOBILE HOME, 1977 model, 12' x 68', 1-1/2 baths, \$3500. Edwards, 281-2743 after 6.

2-BDR. MOBILE HOME, 1977 Melody, 14' x 60', 1 bath, custom drapes, \$10,500. Gutierrez, 292-1834 or 881-4841.

3-BDR. HOME, SE, den, 1-3/4 baths, single-car garage, new kitchen, 1500 sq. ft. Gendreau, 268-3436.

CHALET-STYLE HOUSE, detached double garage, guesthouse, 2 acres, N-14 frontage, garden area, \$107,000. Carson, 281-5115.

3-OR 4-BDR. HOME, 1300 sq. ft., 1-3/4 baths, LR, kitchen, garage. James, 296-3597.

3-BDR. CUSTOM HOME, professionally landscaped, \$118,000. Herrmann, 255-7327.

WANTED

LIVE-IN COMPANION or housekeeper for widower (67), male or female, west of Base, no smoking. Coulter, 255-6436.

DRAFTING MACHINE. Ruvolo, 898-2180.

HEXEL SUNDANCE SKIS, 185-205cm. Blake, 881-1663.

TRACTOR TIRE, 12 x 38. Bentz, 299-3448.

OLD WASHING MACHINE CABINET, any make or model. Stone, 298-4641.

WORK WANTED

PAINTING, by college student, interior and exterior, in NE/SE Heights, large and small jobs, experienced, reasonable rates. Perrine, 293-1429.

Turn Back the Clock a Day: Celebrate Cinco de Mayo Tonight

YOUR CALENDAR may tell you it's May 6. Don't worry, though — it doesn't mean a thing. Through a little time-warp magic, you can celebrate Cinco de Mayo tonight without missing a cha-cha beat. Start the festivities with a great two-for-one special dinner (filet mignon or fried shrimp), while you're listening to the Roberto Sandoval Mariachi Group unleash its specialties (7-8 p.m. in the ballroom, 8-9 in the main lounge). Then it's south-of-the-border dance time, as the Bourguet Brothers provide Latin music from 8 p.m. to midnight. Call 265-6791 para comida reservations.

YOU'LL BE GRINNING just like that well-known cat at Family Night tomorrow (May 7), starting at 5 p.m. with a low-cost buffet featuring all sorts of good stuff (hot dogs, pizza, etc.). Cartoons provide the dinner entertainment while everybody gets ready for the Disney feature at 6: "Alice in Wonderland," starring Alice, of course, and her strange coterie of friends — the White Rabbit, Queen of Hearts, Mad Hatter, the cat from Cheshire, and others. Free movie admission, balloons, and popcorn for kids and adults.

M IS FOR THE MANY THINGS — and you can let Mom know how you feel by treating her to Mother's Day brunch this Sunday (May 8) anytime between 10 a.m. and 2 p.m. The scrumptious buffet includes Virginia baked ham, carved turkey/giblet gravy, baron of beef, vegetable quiche, tossed salad, fresh fruit, green chile (salsa and stew), bagels and cream cheese, omelets, sausage, and much more. Piano music from 11:30 to 1:30, carnations (for the guests of honor), and a complimentary glass of champagne for each diner add up to a very special occasion. Prices: adults, \$10.95; children ages 5-12, \$5.95; toddlers 4 and under, free. Reservations required.

T-BIRD CARD PLAYERS WING IT again this month at back-to-back sessions on May 12 and 19, starting at 10 a.m. Join them for gaming, good conversation, and free refreshments/door prizes.

BY POPULAR DEMAND, those good old Poor Boys from Isleta return next Friday night (May 13) to play favorite shuffle tunes from 8 p.m. to midnight. Two-for-one chow entrees that evening are prime rib or snow crab. The trail food gets better all the time! Don't forget to reserve your dinner space.

RALLYING THE RVs is the favorite sport of

those on-the-go T-Bird Roadrunners. This month, they head for Elephant Butte (May 15-21) for a week-long party. And — get this — other T-Birds are invited to "crash" the festivities May 17-18! If you're a potential crasher, give Pat Ligouri a call (256-3613) for more info.

The T-Bird monthly meeting on May 9 (1 p.m., south end of ballroom) is a planning session for the Elephant Butte bash. This is where the action is, folks.

Retiring in Paradise

Retirement planning is the topic when Fred Lancaster of New York Life Insurance Co. discusses his ideas on "Retiring in Paradise" and "Resting in Peace" at a session on May 10 from 5 to 6:30 p.m. in the Eldorado room. Phone your RSVP to Fred on 883-5757.

WESTERN NIGHT on May 19 features free country/western dance lessons from 6 to 7 p.m., followed by more stompin' from 7 to 10. Trio Grande, the band that has every foot in the place jumping in no time flat, provides the music. Free munchies and special drink prices all evening.

I CAN'T BEGIN TO TELL YOU how much you'll enjoy those outstanding odysseys sponsored by the C-Club. I can, however, give you some of the details:

River-Running (Aug. 8-17) — Join leader John Shunny (ret.) on a one-of-a-kind adventure as you travel the mighty Colorado River through the Grand Canyon (Lee's Ferry to Lake Mead). The tab of \$895 includes all meals on the river trip and bus transportation back to Lee's Ferry after you've conquered the rapids. Reservations deadline is very close — tomorrow (May 7) — so hop to it. Give John a call on 265-1620 for more info or to reserve your space.

Rocky Mountain High (Aug. 27-Sept. 4) — It's one breathtaking scene after another as you tour the rugged Canadian Rockies on this not-to-be-missed trip. Explore Banff, Jasper, Lake Louise, the Columbia Ice Fields, Shuswap Lake (stern-wheeler boat cruise), Maligne Lake (another boat cruise), and several of Canada's most scenic national parks. The \$876 price/person (double) covers RT air fare to Calgary, motor coach transportation through the Rockies, eight nights' lodging, several meals (including a departure dinner in Calgary), and much more. Price breaks for triple or quad occupancy. Sign up with a \$300/person deposit; final payment's not due until July 27.

Silent Sufferers



Driving a car or waiting anxiously for a train are far more likely to give a cardiac patient a minor heart attack than physical exercise. An important and worrying new finding about heart patients is that they may have twice as many incidents of painless angina as painful, recognizable attacks.

New Scientist



Fun & Games

Bowling — SANDOE Bowling Assn. March Bowlers-of-the-Month are: Scratch — Gary Cochrell (9115), 648; and Patty Jojola (3731), 575; Handicap — Ron Husa (2314), 638 and 722; and Lin Ohrt, 531 and 687.

Winners of the Scotch Doubles tournament held at Iceland Bowl April 9-10 were Frances and Silviano (7212) Candelaria, with a combined 1248 handicap series. Second went to Nita Wilson (155) and Bob Heck (guest), with a 1223 combined handicap series. This was the last tournament of the 1987/1988 season.

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Golf — Sandia Golf Assn. (SGA) members were winners at the Rusty Swing golf tournament at Ladera Golf Course April 9. Format was a two-man Stableford team. Winners were: A Flight — Mark Calvin (3532) and Gary Rivord (2621); B Flight — Frank Arellano (6422) and Tony Lopez (ret.); and C Flight — Michael Allen and Daniel Lucero (both 6422). Longest-Drive winners for each flight were: A Flight — Terry Hutchinson (7485), B Flight — Charles Salazar (7485), and C Flight — Danny Drummond (9241).

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More Golf — Sandia Women's Golf Assn. (SWGGA) members celebrated spring at the Tanoan Ladies Day spring tournament on April 25. Winners were: Flight A — First Low Net, Debbie Tricoglou (7485); Second Low Net, Shirley Kendall; Best Front 9, Carrie Neugebauer (2854); Best Back 9, Barbara Ford (5151); and Low Putts, Jennie Mirabel. Flight B — First Low Net, Teresa Mills (3723); Second Low Net, Ginny Moore (3545); Best Front 9, Peggy Burrell (3543); Best Back 9, Phyl White (5122); and Low Putts, Pat Neiswander (2523). Flight C — First Low Net, Liza Herrington; Second Low Net, Betty Worley (4000); Best Front 9, Tess Reis (ret.); Best Back 9, Nina Coe (3718); and Low Putts, Margaret Hawk (6000). If you're interested in joining SWGA, call Marijo Hinrichs (3544) on 6-0464.

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Still More Golf — The Third Annual Sunwest Bank/Charley Pride Senior Golf Classic is scheduled for May 23-29 at the Four Hills Country Club. Proceeds from the event will benefit local hospitals. Discount ticket order forms for the pro rounds (May 27, 28, 29) are available in the LAB NEWS office (Bldg. 814); \$8/gallery (grounds only), and \$20/clubhouse (grounds & clubhouse); save \$4 and \$5, respectively. Deadline for ticket orders is May 16. For more information on the tournament, call Debra Hutchins on 765-3175.

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Tennis — The Sandia Tennis Assn. (STA) and the Coronado Tennis Club (CTC) are sponsoring a tournament on May 21-22. Events include Men's and Women's Singles and Mixed Doubles. For more information, call Mark Tucker (5246) on 4-2346 or Pat Fleming (9243) on 4-2386.

Welcome

Albuquerque

- Delfino Aragon (3426)
- Yong Chu Cheney (2632)
- Kathryn Eyster (3743)
- Robert Goodloe (3426)
- Gale Martinez (6418)
- Stephen Parker (3311)
- Frank Villareal (121)
- Linda Wilson (3726)

Sympathy

To Darlene Moore (1144) on the deaths of her father Nov. 12 and her mother April 9 in Downer's Grove, Ill.

To Michael Brandon (5142) on the death of his grandfather in Akron, Ohio, April 14.

To Barbara Bays (7541) on the death of her father in Farmington, April 15.

To Pat Rosario (2610) on the death of her mother and Linda Rosario (3735) on the death of her grandmother in Albuquerque, April 19.

THIRTY STUDENTS and ten teachers from nine Albuquerque high schools visited Sandia during the annual Edison Day observance on April 21. Each student worked, one-on-one, with a member of the Labs' technical staff during the half-day session. Here, George Kamin (1274) shows Eldorado High School senior Teresa Gonzales the fractal pattern produced when a lucite target gets zapped by an electron beam at the EPOCH (Electron-beam Propagation On Channels) facility. Bob Austin (3163) coordinated Edison Day.