Monday marks the beginning of Sandia's annual Savings Bond Drive—a two-pronged drive aimed at both signing up new participants in the Payroll Savings Plan and encouraging those already enrolled to increase their investments. There will be a company-wide distribution of brochures, and solicitors will be out and about. As always, the drive will prompt questions. The key one is: "Why? Why buy bonds?"

We know that bonds are popular with Sandians because payroll deductions in FY '77 ran a little over $1.5 million. FY '78 deductions (projected through the end of the fiscal year) are running a hundred thousand or so ahead of that.

Why, in fact, do Sandians buy bonds?
First, we talked with Bill Martin (3430), Chairman of Sandia's campaign; with Glenn Fowler (VP 1000), who is chairman of the State drive and with Morgan Sparks, president of Sandia and chairman of Albuquerque's bond drive. To all we asked: Why buy bonds?

*Bill Martin took instant exception to our terminology: "We're not asking people to buy anything," he said. "We're encouraging them to save. Bonds aren't purchases, they're savings—savings that pay good interest."

*Glenn Fowler ticked off a couple of advantages: "The interest earned is subject only to Federal income tax—and then only [Continued on Page 7]
Shock Tube Tests Underway

In Sandia’s shock tube facility a Boeing KC-135A fuselage section—12 feet in diameter and 12 feet long—is undergoing simulated nuclear blast overpressures. The work is being performed for the Defense Nuclear Agency, the Boeing Company, and the Air Force Weapons Laboratory under a reimbursable arrangement. The blast tests are conducted with the fuselage mounted within the 19-foot diameter explosively driven blast tunnel.

In the test series, the tanker fuselage will be exposed to a number of shocks created by HE charges of various weights and detonated at the small end of the 700-foot-long shock tube.

Data from 100 channels of pressure and strain measurement are collected. The data show dynamic structural response and shock reflection factors as a function of shock strength, fuselage orientation to the blast, and fuselage internal pressure. These data will be compared to analytical prediction.

The work is centered in Division 9333 under Floyd Mathews. Project leader for blast testing is Manny Vigil. Tom Witherpoon and Donna McConnell are responsible for data instrumentation and recording. Gary Laabs is responsible for test setup and arming and firing. Ray Gonzales, Frank Garcia and Margo Greigo (all 9718) provide test setup support. Frank Hensley (9412) provides photometries recording. Gary Laabs is responsible for strain measurement. The data will be compared to analytical prediction.

Retiree Deaths

Ora Nairn (76) 1-18-78
Luis Garcia (83) 1-19-78
Marshall Servis (72) 1-20-78
Wilbur Schaffer (86) 2-22-78
Ralph Larsen (76) 3-1-78
Hugh McLaren (63) 3-2-78
Benjamin Fisher (59) 3-8-78
John Marquis (74) 3-27-78
Everett Johnson (76) 3-17-78
Al Banks (68) 3-27-78

Labor News

Published every other Friday
SANDIA LABORATORIES
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chuck cochelew & norma taylor write
bill laskar does picture work
joan russell smith

CAREER STIMULATION DAY is the occasion for Anne Turbett, a chemist in Chemical Metallurgy Division 5831, to explain to these young people what being a chemist is all about. Fifty students from city high schools toured Sandia work areas in which various technical disciplines are pursued. Anne is in her lab in Bldg. 892.

Afterthoughts

Don’t let it go to your head—In a Harris survey of 1520 adults concerning the perceived prestige of various occupations, some of us here at Sandia do pretty well and others of us—well, here are the stats.

<table>
<thead>
<tr>
<th>Perceived Prestige (%)</th>
<th>Considerable</th>
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<tbody>
<tr>
<td>Scientists</td>
<td>66</td>
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<tr>
<td>MD’s</td>
<td>61</td>
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<tr>
<td>Lawyers</td>
<td>36</td>
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<td>Engineers</td>
<td>34</td>
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<td>Athletes</td>
<td>26</td>
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<td>Journalists</td>
<td>17 (hmm)</td>
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<td>Bankers</td>
<td>17</td>
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<tr>
<td>Politicians</td>
<td>17</td>
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</tbody>
</table>

Don’t be sad if your fellow man regards you with something less than awe. You’re better off than salesmen, who scored only 6% in the “very great” prestige category, with 74% of respondents stating that the poor salesman has only “some” or “hardly any” of that wonderful stuff.

Dog days—We recently alienated non-smokers with criticism of their complaints about second-hand smoke, and now we’d like to take on dog owners (and we’ve been one for many, many years.) Our thesis is that most of them aren’t too bright when it comes to the care and treatment of their best friend. To wit:

--they permit their dogs to become fat.
--they lock the animals up, usually in the back yard and totally alone, and then wonder why the dogs become neurotic.
--finally, and worst of all, they impart no training whatever to their dogs, the result being an undisciplined animal that won’t come when called, jumps up on people, cadges food at the dining table, and generally is your canine equivalent of the genus slob.

We’d be sympathetic if these dog problems had some dimension of complexity. But these are simple problems with simple remedies:

--like a fat person, the fat dog has had too much food. Perhaps it’s difficult for the dog-owner to exert the self-discipline necessary to control his own waistline, but surely he doesn’t have to inflict his extended appetite upon his dog.
--a dog is a social creature, perhaps even more so than we. In the wild state, as everyone knows, the canine runs in packs. To lock one up in solitary, i.e. alone in the back yard, is a cruel and unnatural act and the dog responds accordingly—he becomes mean.
--if an owner doesn’t know how to train his dog, there are all manner of training courses offered by kennels and, for that matter, manuals are available that explain how-to. It’s really not difficult to bring bowser around, even for the obtuse breeds, and—contrary to axiom—you can teach an old dog a few new tricks.

Why bother? Consider: the dog is a truly major addition to your family, one that’s going to be around for a dozen or more years. But only you can make those years rewarding.

* * *
Indian Cycles

Increased gas and automobile costs mean little to Ron Wishart (8346), although he commutes some 70 miles daily between his Walnut Creek home and Sandia Livermore. Only if it’s raining does he take a car; otherwise he hops on one of his motorcycles, something he’s been doing since he was a teenager.

And he has plenty of cycles to choose from. The Wishart backyard resembles a museum, with several sheds that house 14 Indian motorcycles. Built from 1903 to 1953 and actually called “motorcycles,” Indians were some of the finest cycles ever produced, Ron claims.

Five of the Indians are restored to original condition and running; the other nine are in various states of restoration. “Because most were really rusty and incomplete when I got them, I’ve needed a lot of spare parts which are difficult to find,” Ron says. “Some parts are available, but I have to make a good many, especially fenders, in my own shop.”

Ron was a factory racer for the Indian company for seven years between 1933 and 1940 and still holds the flat track speed record at Springfield, Ill., where he averaged more than 95 miles an hour for 150 miles. That record can never be broken—“a shopping center has been built on top of the track!”

Ron also rode in motodromes—maneuvering his motorcycle on the vertical walls of wooden silos which were moved from fair to fair as an entertainment attraction. Whenever the circus came to town, he’d challenge the circus riders to an exhibition.

It wasn’t until five years ago, when he acquired a box of assorted Indian parts, that Ron began collecting seriously. Since then, he’s travelled as far as Kansas City to find,” Ron says. “It has an unusual history. After being sold in 1942 to go to China, it was crated and shipped to the dock in San Francisco, but never left. It drifted around until 1952 when a local resident bid on the unopened box at an auction. I bought it from him, still virtually unused, in 1973. Today, it has gone only 9000 miles and is absolutely original.”

Ron and his wife Ruth agree that not until you go by motorcycle do you realize how much you miss when you go by car. They once clogged over 1000 miles in a single vacation day. They also cover many miles enroute to various West Coast antique motorcycle events.

For motorcycle enthusiasts: Ron’s two prize-winning models will be on exhibit during the upcoming Antique Car Show (motorcycle class) at the Concord Pavilion on April 23. Acquisition, a 1951 Indian Warrior of which only 460 were ever made, he bought blind from a fellow in Albuquerque.

Last June, his 1940 Indian Four Cylinder, considered the American classic in motorcycles, and his 1941 Bonneville Sport Scout took first and second awards in the Fifth National Show of the Historical Vehicle Restoration Association in Berkeley. In October, he won first place in the National Antique Motorcycle Club show in Los Angeles, again for the ‘41 Sport Scout.

“Not only is this Sport Scout my favorite model,” comments Ron, “it is an unusual history. After being sold in 1942 to go to China, it was crated and shipped to the dock in San Francisco, but never left. It drifted around until 1952 when a local resident bid on the unopened box at an auction. I bought it from him, still virtually unused, in 1973. Today, it has gone only 9000 miles and is absolutely original.”

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### Speakers


### Sympathy

To Frank Murar (8345) on the death of his mother-in-law in Albuquerque, Feb. 22.


To Pat Clark (8433) on the death of her husband in Hayward, Feb. 26.

To Ernie Mikles (8433) on the death of her father in Charleston, Ark., March 15.

To Chuck Thomas (8348) on the death of his father in Palo Alto, March 7.

To Mike Stephenson (8366) on the death of his daughter in San Francisco, March 11.

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RON WISHART (8346) lines up Indians in his backyard. The award-winning ‘41 Sport Scout (in foreground), entirely original with only 9000 miles, is Ron's favorite.
Grid System for Buses Starts in May

Albuquerque's Mayor Rusk has said, "go" and, on May 1, the city bus service undertakes a new mode of service that promises to bring buses to some 80% of the population. The present system reaches only 60%.

Phase one of the service will place city bus routes in a grid pattern along all major east-west arterials between Montgomery and Gibson Blvds. and on major north-south streets between Coors and Juan Tabo Blvd. Service in the south valley and the west side will be similar to that existing.

For Sandians, the trippers will be no more as such, but five special peak hour buses will enter the Tech Area (see map). The bus passes sold by the Credit Union ($6 for 22 rides) will continue to be usable anywhere on the bus system (if you transfer, however, be sure to get a transfer slip). If you prefer, you may use tokens for $6) or pay the adult fare, 35 cents in any amount on the bus system (if you prefer, you may use tokens for $6) or pay the adult fare, 35 cents in any amount, but five special peak hour buses will enter the Tech Area (see map). The bus passes sold by the Credit Union ($6 for 22 rides) will continue to be usable anywhere on the bus system (if you transfer, however, be sure to get a transfer slip). If you prefer, you may use tokens for $6 or pay the adult fare, 35 cents in any amount, and other information as material becomes available.

Sandia employees will be kept informed of late-breaking news about the new bus system by means of the Sandia Bulletin.

Labs Scientist Honored

Joe Harris of Applied Physics Division 2353 was recently honored by election to membership in the Bohmische Physical Society. Members are chosen for the contributions to the field of particle-solid interactions by independent, original research.

Object of the Society is "to promote the advancement of knowledge of the interaction of particles with solids and to encourage exchange of information between scientists and engineers engaged in research or development in the field of particle-solid interactions."

Membership in the Bohmische Physical Society is international and includes scientific members in Japan, Sweden, Denmark, Germany, Italy, United States and other countries.

Events Calendar

Through April 23—"Lullaby," Barn Dinner Theater, 281-3538.

April 14, 15—New Mexico Symphony Orchestra and Chorus perform Verdi's "Requiem," Popejoy Hall, 8:15 p.m.

April 18—Sportsmen Concerned for New Mexico, monthly meeting, Desert Inn, 918 Central SW, 7:30 p.m.

April 19—"My Fair Lady," UNM Cultural Entertainment Series, Popejoy Hall, 277-3121.

April 19-22—"Rediscover New Mexico" travel show sponsored by the Albuquerque CofC, Winrock Center, W-F 12-9 p.m., Sat 10 a.m.-6 p.m.

April 22—Free concert by the Duke City Band, Civic Plaza, 1 p.m.
"Textiles New Mexico 1978" is the title of the latest exhibit at the Albuquerque Museum, running from April 16 to July 16. The exhibit is a joint presentation of the museum and Las Aranas Spinners and Weavers Guild, and it represents results of a juried competition of textiles and textile techniques produced by New Mexico craftspeople. All work is of original design.

Hal Pruett (2532) has sent us the agenda for the first meeting of the Sandia Microprocessors Users Group, to be held April 18 in Bldg. 815 from 8 a.m. to noon. It's a new endeavor, and Hal urges all interested Sandians to participate. Six presentations relating to microprocessors are planned and time is allocated for discussion.

Colloquium for next week features Peter Glazer of Arthur Little, Inc., who will talk on "Solar Cells in Space," which has to do with how energy might be beamed to earth from space. The talk is set for April 19 at 10:15 a.m. in Bldg. 815.

Attention pilots: next Thursday, April 20, the Albuquerque Technical Training Center (ARTC) Center are sponsoring a pilot/controller forum in the International Room of the airport terminal building, from 7 to 9 p.m. The agenda includes presentations on radar procedures and services available to the VFR pilot in the terminal area and en route, plus other topics relating to the pilot/controller exchange. There is no charge, and parking lot tickets will be validated.

The New Mexico Symphony Chamber Orchestra will present a concert on Sunday, April 23, at 4 p.m., in Woodward Hall at UNM. Admission is free. The Chamber Orchestra will play works composed especially for a musical group of that size, with selections by Haydn, Vivaldi and Bizet. Bassoonist Martha Beauchamp, a member of the NMSO since 1952, is featured soloist in the concert.

Also on Sunday, April 23, the Albuquerque Museum will be presenting a slide show/lecture, "The History of Albuquerque Art," at 2 p.m. in the Main Gallery of the Museum. Two speakers will share the program. Donald Cutter, professor of history at UNM and editor of the New Mexico Historical Review, will speak on Spanish and early American History. Calvin Horn, UNM Regent and local publisher, will discuss Albuquerque's recent history and development.

Stamp collectors, past, present, and future will enjoy ALPEX on April 21 to 23—the Albuquerque Philatelic Exhibitions to be held at the Hilton Inn. Exhibit co-chairman Jim Cocke (4514) reports that there will be some 50 frames of exhibits in three categories. Society president is Pete Kaestner (1223). ALPEX admission is free and the public is invited.

Retiree Clair Haut has an exhibit of her paintings on display this month at the First Unitarian Church, 3700 Carlisle NE. Hours are 8 to 5 Mondays through Fridays, Sunday afternoon from 1 to 4.

Louise Bland (3322) called to remind us again of one of Sandia's health education programs. "We've got an extensive video-tape library," she told us, "a library dealing with common health programs ranging from alcoholism to ulcers." The tapes are used by Sandia physicians to supplement patient care—and the tapes are available to employees who would like to increase their understanding of common medical problems. Tapes on other topics like First Aid, the Heimlich Maneuver, the Role of Exercise in Cardiovascular Fitness and Back Safety are also available. A complete list of tapes was published in the Lab News, March 17. Tapes can be viewed in Medical, room 117, from 12:30 to 4:45 p.m. Call Louise at 4-1205 to schedule a viewing time.

John Farner, a machinist in Division 9581, died April 10 in a fire at his home. He had rescued his family and then returned inside when he was overcome. He was 45. He had worked at the Labs for 27 years. Survivors include his widow, five daughters, and a son.
Raw Stock Warehouse

It's A Supermarket Of Sorts

If you suddenly develop a pressing need for, say, some two-inch-diameter aluminum stock, or maybe it's several Douglas fir 2 by 4's, or perhaps a door-sized sheet of copper, would you know where to go?

The answer is to the Metal Stock & Service Support Section 9658-4, which stocks some 900 items of all origins—ferrous and non-ferrous metals, plastics, and woods. The materials come in various forms—sheet, plate, tube, bar, and angle—and people in the group will saw, shear, flame cut or otherwise provide what you want in whatever dimensions you want. For that matter, if you already have the material and need it cut to size, they'll be happy to oblige.

Dick Gonzalez heads the group, and he reports that you can call in your request or, if you prefer, you can visit him in Bldg. 800 to place your order and even wait for it to be filled. These photos show some of their activities.

When the bonds are cashed, they can be extended until maturity, and they draw interest at the rate in effect on the date they're extended.

"Savings bonds subscribed through payroll deduction are a painless way to save. You set aside a specified amount weekly or monthly and receive bonds through the mail, when you've saved enough to buy them. Once you sign an authorization card, Sandia takes care of the rest."

Then we turned to the buyers, the individual Sandians who buy E Bonds as a significant part of their savings and investment plans. "Why," we asked, "do you buy bonds?"

Their responses dealt with three broad categories: education, retirement and investment diversification:

* Roger Hagemanber (331): "I'm 35 years old," Roger told us, "and I've got three children—two teenagers and an 8-year-old. Since college costs keep going up, I decided five years ago I was going to take some discipline (even some sacrifice) if my kids were going to have the same flexibility I had when it comes time to choose a college. I signed up for bonds and every month since then a percentage of my salary has gone to savings."

* Duane McCutchn (913): and Howard Lindell (931) have both been buying bonds since the 1950's. Duane started in 1956 when he was in the Marine Corps. Howard in 1957 when the Payroll Savings Plan began at Sandia. "I've never cashed a bond," Duane says, "though I have converted some to Series H bonds that pay me a dividend check every six months. I've got some AT&T stock, too, but Series E bonds are the mainstay of my retirement savings plan," Howard put it a little differently. "I've used bonds as a way of deferring income. My plan is to cash them as I need them after I retire. My income will be lower then and I'll pay a much lower tax rate on the earned income."

"Rosa Steele (2666) and Norb Molter (9051) both agree that saving bonds belong in a diversified investment program. "They're conservative," Rosa told us. "They're steady and sure and very secure—not like stocks, which can be quite volatile. Over the years, I've cashed some bonds to meet emergencies, or to take advantage of real estate opportunities. But I'm still holding most of them. For short term needs, I'd rather borrow than cash bonds. I'm saving them for retirement."

"The return on savings bonds," Norb says, "can be substantially more than most people realize. With stocks and bonds, the brokerage fees eat into the profits. So do taxes. Dividends on Certificates of Deposit are taxed as current income, too, which reduces their rate of return to the point where savings bonds are competitive—especially if you don't cash them until after you retire."

Maybe you need more facts. For starters, read the two brief brochures coming your way next week. Facts About Series E Savings Bonds and You Can Be One Third Richer. Past that, talk with your immediate supervisor or your organizational bond drive rep.
Dave Braudaway of Electrical Standards Division 2552 has developed a standard volt comparable in accuracy to that maintained by the National Bureau of Standards.

No small task, the accomplishment borders on the far edges of technology. In a congratulatory letter, Barry Taylor, chief of the electricity division of the National Bureau of Standards, said, "I simply had to write to congratulate you on the outstanding success of your Josephson voltage standard work. I am truly impressed by the fact that recent volt transfers between NBS and Sandia show our two Josephson volts to be in agreement within about 0.02 parts per million. You have every reason to be proud of this accomplishment inasmuch as Sandia has become the first non-national standards laboratory in the world to successfully construct a Josephson voltage standard!"

For years, since its development late last century, the world’s standard volt had been maintained by electro-chemical cells. It bothered standards people that the volt was not based—like other standards—on a natural physical constant. They were pleased when, in 1972, the "cold volt" was developed from the Bardeen-Cooper-Schrieffer theory of superconductivity and the theoretical analyses of Brian Josephson (all Nobel prize winners). As a result of that work, the standard volt is today based on microwave frequency. The frequency to voltage conversion depends only on the physical constant e (charge on the electron) and Planck’s constant. The U.S. legal volt is defined as 2e/h = 483.593420 TdVs/V.

Starting with the voltage (5 to 10 mV) produced by superconducting Josephson junctions supplied by NBS, Dave developed the apparatus to permit comparison with standard cells at about one volt. The goal was to be accurate within one part in 10 million. Result of the comparisons with NBS indicate that Dave’s apparatus was actually significantly better than the design goal.

Sandia operates a primary standards laboratory serving the weapons agencies of the DOE. Through transfer and certification of reference standards within the complex, precision instrumentation is calibrated so that highest quality of weapons is assured.

Sandia Develops New Volt Standard

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The Soldier-Farmer Experiment

In 1851, about 1000 Army troops were thinly spread at 11 tiny outposts in the Territory of New Mexico. Fort Union, some 30 miles north of present-day Las Vegas, and built in 1851 with Army labor, guarded the Santa Fe Trail. It became headquarters for the Ninth Military Department when Col. Sumner moved his command there from Santa Fe.

Col. Sumner had clashed with Governor Calhoun over arming civilians to provide a force to fight Indians, and was known to have little regard for non-soldiers. Justifying the move of his command to Fort Union, he called Santa Fe, “that sink of vice and extravagance.” He reported that “withdrawal is vital as regards discipline and economy,” and that he had found that “most of the troops have become a high degree demoralized due to vicious associations…” Also, the “evils were so great he did not expect to eradicate them entirely, but by moving away would be able to bring the troops together for discipline and instruction.”

The fort was to be both supply depot and a base for troop movement in the military district. About the time construction began, the Secretary of War ordered Army posts in the southwest to begin soldier-farming operations as an economy move. It was reasoned that these government farms, cultivated by soldiers, would make the Army of the West self-sustaining.

The troops at Fort Union were already cultivating a garden and were able to partially supply the post with vegetables. Ocate, 25 miles north of the fort, was chosen for the site of the experimental farm. The site had a “delicious spring” and “several ponds, one lake and a river six miles below.” These would provide water for the stock and for irrigation.

The land at Ocate was leased from a Manual Alvarez, who apparently had agreed to the lease, but later hired a lawyer to break it. Because of the dispute, no land was tilled during the first growing season, but Sgt. Pollock was cutting the wild hay for winter use. Residents at the fort worried, however, when late in the season the slow harvest yielded only 30 tons of hay. With 900 head of cattle and several hundred horses and mules, the Army would probably have to buy feed for the coming winter.

In the second year of his command, Col. Sumner reported to the Army’s Adjutant General that the farming operations were the one instance in which he had not had the “success I expected.” Nevertheless, he was still convinced the scheme was practicable.

The farm continued to plague the Fort Union commander. A civilian farmer had been hired, but problems still existed. Late in the second growing season, a report stated that even with the vegetables raised at the fort, plus the 50 acres of corn and 75 tons of hay from Ocate, the soldier-farming operation in New Mexico was $14,000 in debt. Further, an investigation disclosed that “the soldiers doing duty at the government farm had been paid extra pay!”

Col. Cooke took over from Col. Sumner in 1853. He, too, tried to discover why the farm was not successful. Sixty acres of corn had been planted that spring, and once again the harvest was slow. Col. Cooke dispatched two additional men to Ocate, “expecting that much better progress will be made in gathering the corn.” That didn’t help either.

Finally, Col. Cooke requested the Commander of the Military Department of New Mexico to relieve him of responsibility for the farm. He noted that each of the 10 soldiers assigned to Ocate post cost the government $217 per year, the farmer’s wages were $750, a laborer’s wages and rations amounted to $181, and the farm had produced only $170 worth of hay. He continued, “It will leave for the cost of corn $5.14 per bushel, about $12.85 fanega, which then has to be transported twenty miles. Corn can be bought in the territory, delivered, on the average for about $3 the fanega.” That did it. Shortly, farming operations ceased at military posts in New Mexico, and the concept of the soldier-farmer was put to rest. (A fanega, incidentally, is today defined as a Spanish unit of grain measure amounting to 1.6 bushels.)

JEROME MILES, Controller for the Department of Energy, was a visitor to Sandia this week. President Sparks is shown with him during the briefing session. Mr. Miles also toured Areas III and V and other Labs facilities.
**Authors**

R. C. Hughes (5814), "High Field Electronic Properties of SiO2," Vol. 21, No. 1, SOLID STATE ELECTRONICS.

P. J. Feibelman (9151), F. J. McGuire (9211) and K. C. Pandey, "Theory of Valence-Band Auger Spectra: GaAs(100)," Vol. 16, No. 2, PHYSICAL REVIEW B.

D. J. Jennison (9151), "Lithium Local-Orbital Energy Bands Using Kohl-Sham and Near-Hartree-Fock Exchange," Vol. 16, No. 12, PHYSICAL REVIEW B.

J. E. Adams, W. R. Dawes (both 2144) and T. J. Sanders, "Radiation Hardened Field Oxide," Vol. 24, No. 5, IEEE Transactions on NUCLEAR SCIENCE.

C. E. Barnes (9155), "Development of Efficient Radiation-Insensitive GaAs FETs," Vol. 24, No. 6, IEEE Transactions on NUCLEAR SCIENCE.

G. F. Derbenwich and H. H. Sander (both 2144), "CMOS Hardness Predictions for Low-Dose-Rate Environments," Vol. 24, No. 6, IEEE Transactions on NUCLEAR SCIENCE.

J. A. Halliday (9531) and M. W. Widner (both 5241), "Field-Enhanced REB Deposition and Bremsstrahlung Production," Vol. 24, No. 6, IEEE Transactions on NUCLEAR SCIENCE.


F. N. Coppage (9532) and R. W. Martin (4512), "Gamma-Induced Voltage Breakdown Anomaly in Schottky Diode; F. N. Coppage and D. C. Evans (9621), "Characteristics of Destructions from Latch-up in CMOS," Vol. 24, No. 6, IEEE Transactions on NUCLEAR SCIENCE.


D. J. Johnson (9144), et al., "Spatially Resolved FUV Emission from Focused REB Discharges Into Thin Targets," Vol. 49, No. 1, JOURNAL OF APPLIED PHYSICS.

J. B. Rundle (5161), "Gravity Changes and Palmdale Uplift," Vol. 5, No. 1, GEOPHYSICAL RESEARCH LETTERS.

M. M. Kowalski (9583), R. P. Clark (5253) and R. M. Biefeld (9157), "The Phase Diagram of the System Li3O3-H2O-CO2," Vol. 32, No. 1-2, JOURNAL OF SOLID STATE CHEMISTRY.

M. G. Thomas and B. Granoff (both 5751), "Coal-derived Product Effects on Viscoity," Vol. 57, No. 2, PULP JOURNAL.

D. Jensen (9511), "Auger Electron Spectroscopy as a Local Probe of Atomic Charge: Si L2,3VV, March 1979, PHYSICAL REVIEW LETTERS.

R. J. Reifer (5142) and M. T. Buttram (5246), "A Study of the Reactions p + 4.5 ^ n and p + 15.5 ^ k at 1.98 and 2.41 GeV/c, Vol. 16, No. 7, PHYSICAL REVIEW D.


J. S. Pearlman (5514) and G. H. Dahlbacka (LIL), "Emission of RF Radiation from Laser-Produced Plasmas," Ne. 49, No. 1, Communication, JOURNAL OF APPLIED PHYSICS.


W. R. Wampler and W. B. Gassner (both 5111), "Positron Annihilation Studies of Sputtered Aluminum," Vol. 8, No. 1, JOURNAL OF PHYSICS.


M. J. Landry (9412), "Exploiting PBS Film Q-Switch Laser," Vol. 17, No. 2, APPLIED OPTICS.


M. A. Sweeney, "Thermodynamic Inconsistency of the Modified SAHA Equation at High Pressures," Vol. 220, No. 1, PART 1, THE PHYSICAL ATOMIC JOURNAL.

**Congratulations**

Mr. and Mrs. David Bennett (5412), a son, Grant Daniel, April 1.

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**Fun & Games**

**Biking**—The 6th Annual Tour of the Rio Grande Valley is set for Sunday, April 25, starting from the UNM campus at Central and Cornell at 6:30 a.m. Riders may elect the 50 or the 100 mile tour and, based on the turnout of recent years, more than 300 are expected. Sag wagons follow the pack, so if you suffer a breakdown—mechanical or physical—you won't be stranded. Entry forms and other info: LAB NEWS, 4-1053.

We like the observations of Ralph Hirsch, executive director of something called the Bicycle & Pedestrian Transportation Research Center in Family Safety: "Running stop lights or making illegal turns puts the cyclist in an unfavorable psychological position, because the motorist regards him as an outlaw. The motorist thinks, 'The hell with him. He doesn't obey rules I would be ticketed for, so why should I treat him as an equal?'"

**Skating**—The Coronada Ski Club held its end-of-season election of officers late last month with these results: president, Frank Biggs (5231); VP, Dale Buchanan (4312); secretary, Rick Sneddon (DOE); treasurer, Al Thornton (2524); membership, Fred Schakade (128); trip chairman, Lyle Wente (9252); fast trip captain, Bob Butler (533); and area representative, Walt Westman (ret'd.).

Question: do you find skiing just a little expensive? We're referring to the price of lift tickets, from $7 locally up to $12 at other areas in New Mexico. Consider then the cost at ski areas near Salt Lake City, from which we've recently returned: Alta - $7; Solitude - $7; Brighton - $6; and Snowbird - $8. Like New Mexico ski areas, these are on national forest lands, leading one to wonder why the disparity should be so marked.

**Triathlon**—With the opening soon of the Olympic Pool, this event has been set for Sunday, May 14, and will be sponsored by the Coronado Club as part of its recreation program. Format remains the same as last year: a 10-mile bike ride, followed by a 5-mile run, followed by a 1/2 mile swim, all performed here on the Base. Last year's Triathlon—the first—had 35 entrants, and many more are expected this year. Entry forms and other info: LAB NEWS, 4-1053.

**Skateboarding**—Most of us are (take one or more) too old, too stuffy or too chicken (or too smart?) to ever have a go at skateboarding. But just in case you're seized by the impulse to try Junior's board just once, consider this quote from National Safety News: "A 30-fold increase in skateboard injuries, to a total of 106,000, as well as at least 28 deaths, was reported for the year ending June 1977... (A) year-long study revealed that lack of skill is a major factor... One third of the injuries occurred to persons who had been skating for less than one week and most of these were injured the first time they tried skateboarding."
To John Timmons (3711) on the death of his father in Rensselaer, Ind., April 3.

To Hank Neues (9152) on the death of his father in New Jersey, Feb. 5.

JUNK•GOODIES•TRASH•ANTICHES•KLUNKERS•CREEAM PUFS•HOUSES•HOLVES•LOST•FONDED•WANTED•THINGS

MISSCELLANEOUS

TRASH BAGS, MIRRORS, MODEL 680 Sioux OUTBOARD MOTOR, Sears 3½V. hp, PROPANE CHAISE. SEWING MACHINE, and test engineer Don g-forces up to 3.6. 0124. office, strung upholstery, $50. Dancy, upright, fier. $50. dinette set w/6 chairs and leaf. and jacks, room mirror, room mirror, 293-2517.

LIMIT original. available for occupancy without national sale. Moore, 296-1784.

3-hp lawn mover, 293-2596. 10,000 acres, 293-2596.

CATuguay Camp trailer, 14'/w/ 6-beds, batunie b ottles, post-potty, thermostat control heater, for big man, big horse, 1180. Bacter, 349-760.

DISK, double pedestal, 346x450. 175. Cutleng water softener; 130. boy's 20" bicycle; 520. bean bag chair, 320. Hill, 292-3532.

KITCHEN SINK, dbl. basin, porcelain on cast iron, w/faucet & strainers; 320. Anderson, 294-6461.

14" LARGESBERGSE boat, 4.5 HP Evinrude motor, 11' trailer, 6196. Hurry, 292-7747.

PHYSICIAN Desk Referemce, colored illustrations of medications, includes cautions and side effects, 48. Venengo, 292-3672.

TRUCK, pick-up, 15'/4-wd, bed 178-180, 16. LT, tube 16, books 16, 150. Mattex, 311-3949.

PIANO, console, 90, Jonas, 256-7306.

CURVED SOFA, $100. dbl. bed-size headboard, footboard and rails, 200. speaker heads, 90, 220, 292-6486.


BIKE, sidewalk, 16" and 20", w/training wheels, Isha Zme. 25 pair or 110. in stock, 297-9937.

PORTABLE TYPEWRITER, Olivetti, 375. 7½" x 14. old theater chairs, 40. schacht, 293-2603.

MICROPHONES, Shure Unidyne III & Sure Unidyne IV. Wilde, 290-5022.

RANGE HOOD, new, 30" white, 2" duct, 1060. sheet cabinet window, new, 31, 500. 12 lights, 560. Crawford, 688-1530.

BABY ITEMS, crib & mattress, 140; play pen, 10; GM car seat, 37; stroller, 57, back pack, 16, other items. Miersken, 298-8740.

FV BED, Koehler, green, 100; wool. penny playpen, 10; child's feeding table, 16; child's table and chairs, 16, Lieberman, 298-7789.

ELECTRIC HIDEA CLIPPERS, 15", double edges, 16, 26; 3-speed boy's bike, 820, Horton, 296-4448.

TRANSPORTATION


CHEY SCOTTSIDE 444, 6 ton, CHEVY 4PS, PB, AD, 1½16, tyres, white wheels, rear drum, dual tanks. Ecolly, 292-7727.

VEGA, AT, 42.000 miles, new battery, two new tires, 9000. Hays, 293-2386.

CAPRICE, 35 V-8, AT, AC, PS, PB, car, radio, carbon overs. 1446. McNichols, 294-9582.

FIAT, 123, low mileage, 10000. DeRouen, 292-0338.

HONDA CIVIC hatch back, radio, AC, extra set of mounted mud and snow tires, shop manual, April number NA5237, asking 1275. Ready, 3212-4767.

FLYING EIGHT clubs seek responsible individual to purchase existing items. 2000 C. 193-5621.

14'rick, 1½ ton, perfect condition, $50. for smaller items. 294-9507.

8½'X15' FORD pickup w/8 ft. bed, 1400. in stock, 298-8830.

HOLIDAY PARK, 3 br., FR/W, formal dining, liv. garden kitchen w/breakfast area, decorator acc., near access, landscaped. Cook, 292-2748.

5 YR. OLD HOME, 4 br., 1½ bath, 1600 sq. ft, carpeted den, carpeted, landscaped, Manzano High area, 453-540. Jeflerson. 296-2377.

FOR RENT

4 BDR., SE, 1½ bath, furnished or unfurnished, $150. for details, available about June 28. Gomez. 356-1584.

LAKE FRONT CABIN. Vallecito Lake near Durango, available day/week, fully furnished, modern, 2-bdr., with, vacation reservations. Croll, 881-7260.

2 BDR. APARTS. in new fourplex. 960 Cheyenne, unfurnished, 225, mo. plus utilities. Shear, 621-7804 after 4.

1 BDR., unfurnished, carpeted, den, LR, double garage, tri-level, kitchen b uildins, area, Monitor-Juan Tabo area. Boulle, 296-3134.

UNFURNISHED APT.-1 brd., 1½ b drs & utilites or $1100, no pets, off-street parking. Mantuya, 296-4357, 944 Charleston SE.

3 BDR. in NE, 1½ bath, den, FP, all appliances, $390 mo., 1st & last deposit, lease, available April 15. Fallasburg, 853-1146.

WANTED

TO TRADE for smaller rig, 19½ ft. snow blower, light tan upholstery, 296-4357.

TO BUY copies of Glucker Player Magazine New. 74, Feb. skr, Apr. 75. Jacklin, 296-3196 after 5. EXECURGE BIKE, Skoeber, 296-2177.

ODD JOBS for two teenagers. weekly lawn service, trash hauling, Nelson, 881-0146.

6 to "78 FORD Ranchero, auto trans. 294-9587.

TO RENT: Motor Home for 1 or 2 hours (depending on price) during summer, to sleep 6. Roth (Belts), 864-9298.


LOST AND FOUND

LOST—Silver bracelet w/magnate type torque stones; ladies sunglasses w/brown lens and frame; $75. sunglasses w/brown rims (made in France); man's bifocal sunglasses w/plastic gray frame. brown cop·

keyed case w/keys. FOUND—man's blue 3-speed "Huffy" Smiley bicycle. LOST AND FOUND, Bldg. 832, 264-9677.
**Coronado Club Activities**

**Fish Fry Tonight; Casino Operates Tomorrow at 7:30**

TONIGHT, Happy Hour features a fish fry buffet and the big trumpet sounds of the Mellotones on the Bandstand. Club retirees will party starting at 4:30 in the El Dorado Room. Mike Michnovicz and accordion will entertain.

TOMORROW Las Vegas comes to the Rio Grande when the Club's casino opens at 7:30 p.m. Trade your $1 ($2 guests) admission for a bundle of play money and try your hand at blackjack, craps, roulette and all those good things. Another good thing is a special performance by belly-dancer Leila Ashmahan. The show is scheduled for about 8 p.m. just before Elton Travis and his country western dudes start playing for dancing. Sandwiches will be available, and a good time will be had by all. There will be door prizes galore.

NEXT FRIDAY'S Happy Hour features a roast beef buffet, a fashion show and the Prisoners loose on the bandstand.

SINGLES will get organized at a meeting at the Club at 4:15 Wednesday, April 19. A program of activities will be planned. Plan to be there.

SWIM LESSON registration will be held from 9 until noon Saturday, April 22. Member parents must enroll their children.

TRAVEL DIRECTOR Ed Neidel (2166) will be in the Club lobby tonight from 6 to 7 with packages to Europe, Hawaii, Las Vegas and a raft trip down the Colorado River through the Grand Canyon.

CORONADO GRAND SQUARES square dance club is now organized, dances Monday nights at 8:30 at the Club, and is seeking new members. Call Mel Olman (1233), membership chairman, on 4-7701 if you would like to join. Vic (DOE) and Mary Berniklau are president-couple, Mike (9652) and Mary Lou Michnovicz are VP-couple and Nate (ret.) and Rita Wineberg are secretary/treasurer-couple.

UPCOMING EVENTS—Soul Session, April 29; Swim season opens May 27.

Sore Back? Here's One Answer...

More than 40 Sandians have already taken "The Y's Way to a Healthy Back," so says Wanda Cupp of Medical. "And most of them feel the course was beneficial—it helped with their back problems," Wanda reports.

With such good results, Medical will again offer the course sometime after April 18. Classes are held in Medical's building Tuesdays and Thursdays, start at 4:45 p.m., and are generally over by 6. A total of 12 classes is held.

Interested? Then send your name, organization, E-number and extension to Wanda Cupp—3322. She'll then contact you about the schedule.

NEW CONSTITUTION & LAWS for the Sandia Recreation Council are held by Don Padillo (1347), president of the Council. New provisions recognize recently assumed role of Coronado Club in Labs' recreation program. Max Newsom (1320), C-Club president; Bob Giersberg, C-Club recreation manager; Julian Lovato (3533), C-Club recreation committee director; and Eddy White (1739), secretary-treasurer for the Council, were present for the signing.

ANDY LIEBER (1310) presents a slide travelogue on Germany at the Club on Wednesday, April 19, at 7:30 p.m. Andy spent three years in Europe on assignment with the Department of Defense. Admission to the show is free; everyone is invited.

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**HEY! APRIL 15TH DEADLINE FOR COME IN COME TAXES!**