

SANDIA-INSTRUMENTED Nitehawk rockets will carry Mylar high altitude samplers during forthcoming shots near Fairbanks, Alaska.



TESTS ARE BEING CONDUCTED at Sandia on Mylar panels with aluminum and platinum patches. Panels will be deployed at an altitude of 100 miles to gather particles in Arctic aurora. (L to r) Drs. Hugh Chivers of the University of California

at San Diego, Fritz Buehler of the University of Berne, Switzerland, and Project Scientist Ron Ewing (5235) are deciding on necessary adjustments in bulk and length.

Will Fire Research Rockets

Sandia to Help With Aurora Experiments

This spring a team of Sandia Laboratories scientists and engineers will collaborate with a group of university scientists to fire a pair of instrumented research rockets into the arctic aurora. The experiment is designed to learn whether particles in the aurora originate in the sun or the earth.

The energetic particles from the aurora are collected in metal foils that are swept through the aurora as part of a rocket payload. The foils are returned to the laboratory and the particle content analyzed. In addition, optical photometers and electrostatic particle analyzers will be an important part of the payload to determine auroral constituents.

The experiment is tentatively scheduled to begin March 15 at Poker Flats, 30 miles northeast of Fairbanks, Alaska.

The metal foil experiment was originally proposed by Dr. W. Ian Axford and Dr. Hugh J.A. Chivers of the University of California at San Diego, and Dr. Johannes Geiss of the University of Bern, Switzerland. Sandia was asked to collaborate in the experiment, to design and field the payload, and to handle launch and recovery operations because of the Labs' experience with the Mylar high altitude sampler. Ron Ewing (5235) is a project scientist; Ken Cordes (9224), vehicle project engineer; Ren Moore (9221), test director; Win Watson (9221), coordinator for all

systems; and Jim Davis (9224), diagnostic rockets.

The experiment is an extension of the "solar wind" experiments designed by Dr. Geiss and performed by the astronauts during manned lunar landings. In the solar wind experiment, sheets of thin aluminum foil are deployed by the astronauts at the beginning of their extra-vehicular activity, then collected immediately before their departure. In the laboratory, the embedded atoms from the solar wind are "baked out" of the aluminum in an oven and then identified with a mass spectrometer.

In the Sandia experiments, a Nike-Tomahawk (Nitehawk) rocket will carry a nine-foot payload to an altitude of 200 miles. At an altitude of 100 miles, the nosecone will be explosively separated and three pie-shaped Mylar plastic sheets covered with metal foils will unwind from a shaft to form a disc eight feet in diameter. The foils will be exposed to the aurora for five minutes, then the Mylar panels will be reeled back into a storage compartment, sealed for protection during re-entry, and a parachute (equipped with a radio beacon) will be deployed for return of the payload to earth.

The metal foils will be returned to the University of Bern for laboratory analysis. A measurement of the ratio of helium-4 to helium-3 is expected to identify the origin of

atoms in the aurora. In connection with the primary sampler experiment, each Nitehawk payload will include: a 16mm camera to monitor deployment of the sampler panels and a particle counter to detect the concentration of hydrogen encountered.

Several additional experiments designed by Sandia scientists will be included to provide background information for the solar wind experiment and also allow further investigation into the physics of the aurora. An optical filter wheel photometer will be used to scan a number of selected wavelengths in the optical spectrum emitted by the auroral display. The purpose is to determine the density of several of the excited states of atmospheric constituents as a function of altitude. The instrument was developed by Department 5230 specifically for auroral investigations. Adjacent to the photometer, particle measurements will be made by a "retarding potential analyzer." This instrument investigates electron energies and densities. Such information can be combined with the photometer data to gain new insight into important physical processes which take place in the aurora. Bob Woods (5235) and Gary Tisone (5233) are principal experimenters, and Trevor Looney (9226) is the instrument engineer in these investigations.



by BILL BRISTOL
Credit Union
Manager

Credit Union Reporter

A Tragedy In One Act

Scene: Showroom of the Whammy 8 SuperSports Widomaker (an automobile)

Players: The salesman and you and Mrs.

* * * *

Salesman: I've got to hand it to you, sir, you're a hard bargainer. Only \$4995 for this Whammy 8 and getting a six percent loan out of us—well you're something else!

You: (modestly) I know a thing or two about money matters. . .

Mrs.: I can't wait to show Verla Lou our new Whammy 8!!!

Finis

But then you get home and in an idle moment happen to read the contract, and somewhere buried in the text come across a number like, say, 11 percent and it's followed by the words "annual percentage rate." So what happened to the six percent? Well, you've just found out the hard way that what a salesman says and what actually appears in the contract may not be quite the same. In this case, the salesman employed a device known as the "add-on." In simplified form, here's how it works:

The lender offers a loan at a cost of \$6 per \$100, adding the interest charge right away to the principal—\$106—which is then repaid in 12 monthly installments. Does this sound like six percent interest? Actually it's about 11 percent. Because the loan is being paid off monthly, the average amount of the loan over the year is \$50. Yet you are paying a full \$6 interest on \$100.

Some Other Devices:

The discount: In this case the interest charge of \$6 per \$100 is deducted when the loan is made, so you get only \$94. You are being charged \$6 not on a full \$100 but only on \$94. Thus you pay even more for your money than a comparable add-on charge; about 11-1/2 percent true annual interest.

Monthly rates: Some lenders often quote rates of up to three percent per month. Such rates make borrowing sound very cheap but

multiplied by 12 (12 months) we find a true annual rate of 36 percent. Cheap? Department stores levy a service charge of, usually, 1.5 percent per month on "revolving credit" charge accounts. "Service charge" sounds more trifling than "interest rate" but you are really paying 18 percent annual interest for the convenience of charging.

"Loading" the contract: The credit charge may be inflated by extras—investigation fees, processing charges, service charges, high premiums for insurance. Many of these fees are merely disguised interest charges.

Perhaps about now you're wondering what happened to the Truth-in-Lending law you've heard about. It does exist and is highly effective, but one important point about the law is that it does not require salesmen or merchants to volunteer to you their true annual interest rate, only that this rate must appear in the written contract or disclosure form. This means that when you start talking turkey, insist on knowing the true annual interest rate and search through the contract for this required information before you sign.

Credit Costs Will Vary:

All lenders have expenses of doing business, and these expenses differ depending upon the type of lending institution. Charges of 12 percent or more may not be unreasonable, all things considered. But you, the consumer, have a right to know what the credit costs are.

Since July 1969, when the Truth-in-Lending law became effective, comparison shopping for "buying money" became possible without slide rule, calculator and a degree in math. The law ensures that borrowers and customers know what they are paying to "buy" money so that they can compare costs and avoid the uninformed use of credit.

The two most important parts of the law stipulate that the dollar finance charge and the annual rate of interest be stated in the contract. These numbers tell you at a glance how much you are paying for credit and its relative cost in percentage terms. Of these, the annual percentage rate stands out as the more reliable yardstick for comparing lending charges. And remember, when the salesman starts talking about interest rates tell him the only one you need to know is the true annual interest rate—the one that appears in the contract.

* * * *

Livermore Report

Plans to modernize the Livermore Credit Union facility were recently reviewed, and I am happy to report that two rooms and a lobby area in Bldg. 911 have been made available. The plans include decorations and furnishings similar to those in Albuquerque and a tentative opening date of June 1. To mark the occasion, your Board of Directors are discussing an open house with door prizes and the like. Board members will attend and will be available for discussion of the operation of the Credit Union. Complete details will be announced at a later date.

* * * *

Credit Union Statements

As part of its normal audit procedure, the Supervisory Committee recently mailed statements to members with account numbers from 3000 to 3999. If your account number is in this series and you have not received your statement, please notify Karl Waibel (4117), committee chairman.



Dick Meyer



Irv Auerbach

New Mexico Academy Of Science Honors Meyer, Auerbach

Two Sandians have been elected to Fellow memberships in the New Mexico Academy of Science and will be honored tonight at Popejoy Hall during the final session of the Symposium on Peacetime Uses of Atomic Energy.

The two men are Richard Meyer (5224) and Irving Auerbach (9328). The honor is in recognition of significant contributions to the Academy or to science in New Mexico.

Dick has served as chairman of the Academy's advisory panel for summer science training programs. His BS degree in chemistry is from the University of Wisconsin, and his PhD in physical chemistry is from the University of California at Berkeley.

Since coming to Sandia in late 1959, he has done research in gas phase chemical kinetics, high temperature vaporization of refractory materials (including work on zirconium-oxygen-nitrogen systems), and is currently studying carbon vaporization and chemical reaction of carbon atoms and molecules. He organized the Weapons Technology Colloquium and helped to organize the Research Colloquium in its present committee form.

Irv has participated in the Academy's visiting scientist program for many years and was president of the Academy in 1963. He also was program director of the National Science Seminars, held in conjunction with the National Science Fair in Albuquerque several years ago. Both his BS and PhD degrees in chemistry are from Ohio State University.

During his 14 years at Sandia, Irv has worked on effects of high energy radiation on polymers, was assigned to the Classification Division, and is presently concerned with research and development of reentry materials. He is also a Fellow of the American Association for the Advancement of Science and the American Institute of Chemists.

Today's symposium is directed at junior and senior high school science students and teachers. Speaker at the evening session (8 p.m.) will be Navy Admiral Hyman Rickover, who will discuss "What Are Schools For?"

Minicomputer Symposium Planned for Feb. 18

Product Data Systems Development organization 2400 will sponsor a Minicomputer Symposium Thursday, Feb. 18, featuring a dozen presentations by Sandians on usage and application.

The day-long program in Bldg. 632 auditorium will begin with remarks by Bob Henderson, Vice President, 2000. The other talks will deal with such topics as: general guidelines and problem-solving for tester applications; digital filtering; and specific applications, including data gathering and processing, data display, and process monitoring and control.

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Vista New Mexico

(Ed. Note—In this new LAB NEWS column there will appear articles about the people and history of the Southwest, chiefly prepared by authorities on the subject. Aim of this feature is to enhance the understanding and appreciation of New Mexicans for our distinctive culture.)

Fred Norwood, a mathematician in org. 1721, together with other members of UNM's Chicano Studies Center, prepared the following article when we inquired about the Center. When not a Sandia mathematician, Fred teaches at the Center.)

* * * *

UNM'S Chicano Studies Center

Did you know that it is easier to find out what life was like in a small English village in medieval times than it is to get the same information about a village in New Mexico around the year 1800? Because, in the former instance, graduate students and scholars by the score have swarmed over every item of evidence—artifacts, the literature of the period, letters, etc.—that could provide a basis for their documentation of what life was like then. But comparatively little has been done by scholars in what is a rich field—the history and culture of peoples of the Southwest. This is one of the reasons for the formation, 18 months ago, of the Chicano Studies Center at the University of New Mexico.

In addition social developments of the past few years have made apparent the need for more knowledge and understanding of the ethnic and cultural differences which exist in our midst. Lack of understanding has led to serious misconceptions by ourselves about each other—a circumstance that has sometimes hindered the proper functioning of our society.

Ethnic studies programs in our universities can help eliminate this problem and, in the past four years, we have seen the establishment of ethnic studies in many of the nation's universities, including the University of New Mexico. Course offerings in Chicano, Indian, and Black studies have been available at UNM for the last 18 months.

The Chicano Studies program at UNM embraces more activities than is normally found in a university division. Over and above strictly academic pursuits, Chicano Studies

deals with other aspects of student life and the community. To this end, the program sponsors a Student Services office, a Chicano Library, and a Community Relations group.

Development by the Chicano Studies staff of necessary class material has been difficult. Very few good source books have been written. For example, the book on barrio sociology deals only with a barrio located in Venezuela. For history, several good books have been published, but for other topics the most valuable sources of information are newspapers, magazines, and reports that have appeared since 1965.

In addition to University lectures, the Center sponsors conferences, workshops, and consulting services to public school systems to assist in the development of curricula that will include the Chicano contributions to society and a more balanced and realistic presentation of Mexican and Southwestern history.

In the area of student services, Chicano Studies offers college recruitment services, scholarship information, counseling and tutoring. The recruitment and scholarship information is directed to students who meet the entrance requirements but are not aware of the financial help provided by the University. The counseling service is provided as a supplement to that given by the University. Students are assisted in interpreting aptitude test scores, in learning about the University, and in many other areas.

The Chicano Studies librarian compiles contemporary Chicano works and periodicals, as well as historical documents which will help the student understand more fully the social makeup of New Mexico and the Southwest.

The Center's community relations program aims to provide a bridge between the University and the Chicano community. Among its activities are sponsorship of performances of the Teatro Campesino (a California theatre company), setting up workshops and seminars for high school pupils, and inviting community representatives to speak in Chicano Studies classes.

The Chicano Studies Center thus does not restrict its activities to matters that are only academic, but also deals actively with the community and with students and their problems.

26 Miles

The Huff 'N Puff Brigade

Anyone who would voluntarily run 26 miles is either a nut or a competitor in a marathon race. Four Sandians will be going the distance Feb. 27 when they compete in the AAU-sanctioned College of Artesia Marathon. The event has been held for the past four years and has attracted as many as 580 contestants.

Bob Jeffrey (9231) will be competing for the fifth time in the Artesia Marathon. His best time so far is four hours and six minutes. "I'm one year older each time," he says, "and I beat my previous record a little. This makes me feel pretty good."

Irv Hall (1643), who will be trying the marathon for the second time this year, says that a guy runs it for the same reason that someone climbs a mountain. "No logic," Irv says, "no good reasons. It's there and it's a challenge. Can I make it? Somehow I have to prove that I can."

Bob Lowrey (AEC) is going to make the run for the first time this year. His reasons are similar to those of Irv. "I want to find out if I can," he says.

Bob Gregory (2653) says it in a different way. He says, "I'm crazy."

Crazy or not, the foursome can be found any noon hour during the week jogging around Sandia Base with a determined look on their faces. All of them average about 50 miles a week of practice running.

Anyone can compete in the Artesia Marathon. A doctor's certificate is required. And anyone who finished in less than seven hours is awarded a Marathon T-shirt.

The race will start at 9 a.m. at a point five miles west of Hope, N.M. Finish line is in downtown Artesia, 26 long hard miles away. Good luck.

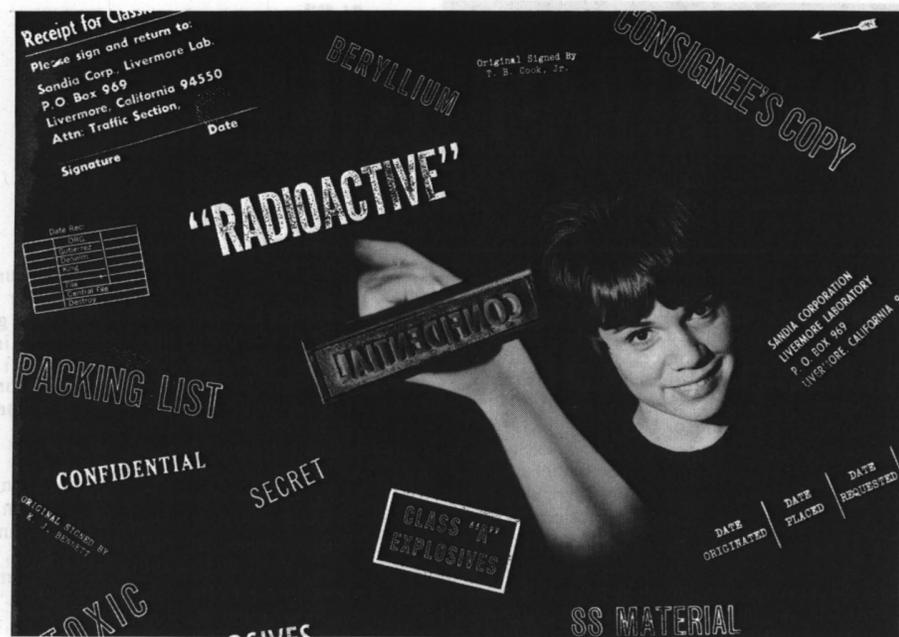


Bob Lowrey

Irv Hall

Bob Gregory

Bob Jeffrey



POISED FOR THE KERPLUNK, Karen Yung (8251) holds a frequently used tool at Sandia Laboratories—the rubber stamp. Organizations using the stamps find them practical and cite cost- or time-saving reasons for their purchase.

People Collect Rubber Stamps

Rubber-stamping documents has long been associated with an approval or endorsement of a matter without exercising judgment.

Such is not the case at Sandia. The stamps serve their purpose of conveying important information. And they are bought for cost- or time-saving reasons.

Who uses them?

Nearly every office has them to put security markings on classified correspondence. A Secret document takes a minimum of four. And that's not counting the frequently used "Rough Draft," the date stamp nor the "Original Signed By—"

In addition to stamps for classifying, there are stamps for routing, stamps for coding and stamps for instructing, to name a few.

Ordering special-design rubber stamps for Sandia Laboratories Livermore is one of Jim Martin's jobs in Material Control Section 8256-3.

"Most general purpose stamps," says Jim, "are available in the Stores catalog. But we find it necessary to buy nearly 160 other stamps a year. Some are replacements for worn-out stamps—most are new. We can always expect new stamp orders when there is a reorganization or a significant change in procedures."

Today's rubber stamps (95 percent filler, 5 percent rubber) are frequently stashed in desk drawers because they're aesthetically unattractive. That wasn't a factor in their earliest origins. The Chinese used hand-carved wood blocks and clay reliefs for printing religious symbols as early as the 7th Century A.D. Both Oriental and Occidental cultures used stamps where large numbers of exact copies of religious symbols or signatures were required to assure things like scriptural authenticity. Assyrians used them 3000 years ago to make book plates. The French used them (and the Mexicans still do) for decorative pottery designs. But it wasn't until Charles Goodyear discovered vulcanizing in 1839 that rubber stamps were produced in large quantities.

Wanting a stamp isn't assurance you'll get it. Orders for stamps crossing Jim's desk are reviewed by Systems personnel to assure that the requester has a reasonable business need. Checks are also made to determine how rubber stamping affects an administrative procedure. Is the procedure the best? Does it need changing? Is a printed form doing its job? Should it be redesigned?

Sounds like a lot of fuss over an item that costs 75 cents to \$5? Not when the stamp permits the salvaging of \$1000 in forms. Or saves that amount in man-hours.

"We find rubber stamps very useful in our work," says Ken Bennett, supervisor of the Order Analyst and Traffic Section 8264-1. "It's important that the people doing a job based on our paperwork know all the special requirements of that job. The rules for shipping one kind of material, for instance, differ from another, yet we use the same pieces of paper for all shipments. Stamping "HE," "SS" or "Radioactive" across the face of a piece of paper is an attention-getter. It tells the man packaging the material and the truck driver moving it that something's different about this shipment. Handle it accordingly."

Stamps also help Ken's section keep track of Purchase Orders—and experience has shown records need to be kept.

"Why buy special-printed log books for this purpose?" reasons Ken. "We just use commercially available logs and stamp the column headings to suit our purpose. Entries such as "date order placed," "case number" or "actual cost" save many hours in expediting and gathering cost figures for budget purposes. Then, too, purchasing forms are always changing and oftentimes a \$3 rubber stamp will allow us to modify and use all existing stock. This period of time also gives the forms people adequate time to redesign and order replacement stock."

"I remember one believer in rubber stamps," recalls Jim. "He wanted the letters four inches tall. He changed his mind, though, when we couldn't find a stamp pad big enough for the stamp."

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Brain Wave Measurement May Be Clue to Individual Creativity



Don Skinrood

Robert Louis Stevenson had the ability to dream publishable plots by commanding the "Brownies" of his mind to furnish him with a story. Kekule's theory of molecular constitution — termed the most brilliant

piece of prediction to be found in the whole range of organic chemistry — came to him through a series of deep reveries in which atoms "gambled" before his eyes. Other comparable experiences seem to indicate that creative persons appear to have the ability to visualize — almost hallucinate — in the area in which they create.

Researchers today are applying electronic instrumentation to define and measure brain waves in various stages of consciousness. It is their intent to draw a relationship between brain wave rhythms and imagery and reverie-imagery and creativity.

Although the subject matter is sometimes sensationally exploited, exploring certain outputs of the human organism with a view to the enhancement of function is a serious enterprise to a number of top-flight scientists. Most are members of the Bio-Feedback Research Society.

"I've always felt," says Don Skinrood (8323) "that there was some correlation between deep reflection and creativity. For several years I've been interested in the meditative processes as a means to enhance human functioning, or any other way to improve communications among people. Of particular interest to me was a recently published article in the JOURNAL OF TRANSPERSONAL PSYCHOLOGY by researchers Alyce and Elmer Green and Dale Walters. By interconnecting electrodes from the left occipital region of the head to electronic instruments, an individual hears (through headphones) the range of consciousness he's in. For some people, this feedback information enables them to recreate—at will—a very deep introspective state in which information stored in the brain becomes more accessible."

In research experiments, dream-like images have occurred during semiconscious reverie. And this state is measurable by the frequency bands of the brain waves. From 0-4 Hertz (cycles per second), a person is normally unconscious (asleep). This is known as the delta region. The theta region ranges from 4-8 Hertz, the semiconscious region where people are known to have images. In two other regions, a person is normally conscious—the non-drowsy alpha region from

8-13 Hertz and the wide-awake Beta region, 13-26 Hertz.

The production of theta and low frequency alpha waves appear to be associated with the imagery that is the indispensable factor of creativity for many outstanding people.

"From the engineering standpoint," claims Don, "making instruments to measure brain waves doesn't present a problem. Perhaps soon we'll find people using a portable, battery-operated instrument to help them attain a temporary childlike state of undifferentiated activity without loss of adult faculties. It's pretty exciting to think what creativeness could come to a person when he is able to control his brain waves to make new combinations and fresh recombinations from the material already in his brain."

Touring Northern California

Oakland's Lake Merritt, Lakeside Park, and Children's Fairyland are for the youngsters. But be careful—one trip and adults are hooked also!

First, there's the lake, dotted with sailboats and canoes that can be rented, or excursion vessels that can be boarded for a cruise to points of interest around the lake.

The lake itself is a tidal body of salt water in the center of the city, surrounded by parks, drives and handsome buildings. This winter, as in years past, thousands of wild ducks will take sanctuary at the government duck banding station, where daily at 3:30 p.m. the ducks are fed and a naturalist discusses the quackers.

Lakeside Park is popular for strolling or picnics, and for its concerts in the bandstand. The Japanese garden usually has flowers blooming throughout the year and the garden center has a greenhouse as well as a gardening library. Beyond the gardens is the wildlife refuge and the Rotary Natural Science Center. Here seasonal displays of flowers and a variety of bird, animal, and insect exhibits are featured.

To see nursery rhymes come to life, hop aboard the "Lakeside Lark" for a ride to Children's Fairyland. The Fairyland is a child-size attraction with small buildings depicting over 50 fairy tales. Some have live animals and children can look, play, and touch. They can slide through the mouth of a dragon, climb the rigging of a pirate ship or even feed a calf. Special events include fun and magic with Popo the Clown and free shows in the Puppet Theatre.



BTL Scientist Promoted to Head Metallurgy Division

JAMES SWISHER of Bell Telephone Laboratories, Murray Hill, N.J., has been transferred to Sandia Laboratories Livermore as supervisor of Metallurgy Division II, 8313, effective Feb. 1.

A Bell employee since 1967, Mr. Swisher has been a member of the technical staff in the Department of Metallurgy Engineering, engaged in research on gas metal reactions, diffusion processes, and properties of magnetic materials. He was the recipient of the Rossiter W. Raymond Award from the American Institute of Mining, Metallurgical, and Petroleum Engineers in 1969, and again in 1970. This award is given annually for the best paper published in an AIME journal by a young author.

Previously, he worked for three years at the NASA-Lewis Research Center in Cleveland, Ohio, on assignment as a U.S. Army officer, and for two years as a staff member of the Bain Laboratory for Fundamental Research, U.S. Steel Corporation, in Monroeville, Pa.

He received his BS, MS, and PhD degrees in metallurgy engineering from Carnegie-Mellon University in 1959, 1962, and 1963, respectively.



FIREWATER IN THE TECH AREA? Dale Birch (8139) could hardly believe her eyes. She thought firewater was as dead as the old western movie. Fortunately, or unfortunately, firewater in this case is part of the special firefighting system that provides high pressure water for hydrants and automatic sprinklers in buildings.

Sympathy

To Martha Leverenz (8275) for the death of her brother in Albuquerque, Dec. 26.

To Dick Myers (8124) for the death of his mother in Phoenix, Ariz., Dec. 27.

To John (8271) and Betty Barnhouse (8275) for the death of his father in Independence, Mo., Jan. 13.

To Bill (8139) and Pat Childers (8235) for the death of his father in Louisville, Ky., Jan. 13.

To Tom Cook (8000) for the death of his father in Bowling Green, Ky., Jan. 13.

To John Molitor (8271) for the death of his father in St. Cloud, Minn., Jan. 5.

To Bill Carter (8274) for the death of his father-in-law in Mansfield, Ohio, Jan. 20.

Take Note

Ken Marx of Analytical Division 8341 and John Killeen (LRL) were co-authors of a technical article published in a new book, "Methods in Computational Physics," Vol. 9, edited by B. Alder (LRL), S. Fernbach (LRL), and M. Rotenberg (UC/LaJolla). Title of the article is "The Solution of the Fokker-Planck Equation for a Mirror-Confined Plasma." The book is a compilation of 10 review articles by plasma physicists from laboratories and universities throughout the country, covering computational methods of treating various plasma physics problems.

Ken is also the author of an article titled, "Effects of Spatial Variations on Collisional Losses in a Mirror-Confined Plasma," which appeared in a recent issue of PHYSICS OF FLUIDS.

* * * *

Jack Dini of Metallurgy Division 8312 is serving as technical chairman for the third symposium sponsored by the American Electroplaters' Society on Plating in the Electronics Industry. The two-day session will be held in Palo Alto, Calif., Feb. 3 and 4. Topics to be discussed include electroless plating, printed circuits, electroplating, and magnetics.

* * * *

Ron Musket of Materials Division 8311 was the author of two articles published recently in technical journals: one entitled, "Auger Electron Spectroscopy Study of Electron-Impact Desorption," appeared in SURFACE SCIENCE; the other, "Room-Temperature Adsorption of Oxygen on Tungsten Surfaces: A Review," in the JOURNAL OF THE LESS-COMMON METALS.

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Hartmut Spetzler (8311) presented a technical paper at the American Geophysical Union Meeting held last month in San Francisco. Title of the paper was "The Equation of State of Polycrystalline Al₂O₃ to 8Kb and 800°K."

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Pat Caywood (8312) was the author of a technical article entitled, "Anisotropy of the Constant Energy Surfaces in n-Type Bi₂Te₂ and Bi₂Se₃ from Galvanomagnetic Coefficients," which appeared in the Oct. 15, 1970, issue of PHYSICAL REVIEW.

Congratulations

Mr. and Mrs. Mike Baskes (8312), a daughter, Michelle, Dec. 9.

Mr. and Mrs. Gary Beeler (8153), a son, Kevin Duane, Dec. 14.

Mr. and Mrs. Randy Gummus (8322), a son, Kenneth Lee, Dec. 22.

Mr. and Mrs. Bill Swansiger (8333), a son, James Andrew, Dec. 28.

Lee Shepherd (8217) and Ken Kirkman married in Livermore, Dec. 18.

Billie Titus (8120) and John Miller (8175) married in Livermore, Jan. 31.



UCF AWARDS were presented to 41 Sandia organizations last week by President Hornbeck. Brian Finley (3112), left, accepts award for the 3100 organization.

1970 Reserve Fund Allocation Made

President Hornbeck distributed 41 UCF awards to Sandia organizations last week with the comment that "you did a wonderful job." To qualify for the awards an organization had to have 90 percent of its employees participating in the Employees Contribution Plan at the equivalent of 75 percent of the fair share level. (A fair share is one hour's pay per month.)

President Hornbeck, president of the Albuquerque UCF during last year's campaign, told the organization representatives that Sandia employees' contributions helped mightily in reaching the UCF goal last year.

"I want to thank all Sandia contributors," he said, "as well as all Sandia campaign workers."

Organization 3100 led the list of awards as the only directorate with 100 percent participation. Three departments—3110, 3120 and 4380—qualified for awards with 100 percent participation at the fair share level.

Organizations with 100 percent participation were 100, 1650, 1740, 2440, 2450, 3000 staff, 3130, 3230, 3350, 3510, 4120, 4140, 7620 and 9150.

Department 3110 received the UCF award for the seventh consecutive year. Departments 2440, 2450, 3130, 4110 and 4120 received awards for the sixth year.

For the fifth year in a row Department 1510 qualified for the UCF award.

Fourth year winners were 1500, 1600 and 3350. Third year qualifiers were 1520, 1610, 1640, 1650, 1740, 2400, 3430, 3510, 4380 and 5510.

Second year awards were presented to 100, 2300, 2320, 2620, 3100, 3230, 4140, 7620, 9150 and 9520.

Receiving awards for the first time this year were 1210, 1530, 1710, 2310, 3000 staff, 3120, 5000 staff, 5130, 5320, 7280 and 7610.

Events Calendar

Feb. 12-14—"Man of La Mancha," Music Theater, 301 Menaul NE, tel. 255-8560.

Feb. 14—Windsor Trail by snowshoes or cross country skis. N.M. Mountain Club, leader Bob Babb, tel. 256-9016.

Feb. 15—Indian dances, San Juan Pueblo.

Feb. 16—Western Electric special "Where We Stand in Indochina." KGGM-TV, 8-9 p.m.

Feb. 16-17—"Zorba," UNM Popejoy Hall.

Feb. 24—Vienna Boys Choir, Popejoy Hall.

Feb. 24-28, March 3-7—"Dracula," Old Town Studio, tel. 242-4602.

Supervisory Appointments



DAVID NORTHROP to supervisor, Composites Materials Development Division 1, 5313, effective Feb. 1.

Since joining Sandia in September 1964, David has worked in Materials Research Division 5154, where he has been primarily concerned with investigation of vaporization phenomena.

David graduated from the University of Chicago with BS, MS and PhD degrees in chemistry. He is a member of the American Association for the Advancement of Science.

David and his wife Audrey have two children and reside at 7207 Harwood Ave., NE.

* * *



PAUL STOKES to supervisor, Systems Analysis Division 1711, effective Feb. 1.

Joining Sandia in July 1960, Paul was assigned to a reliability division and later worked with a command control group. One of his assignments in this area was to help develop protective hardware for Sandia's Unmanned Seismic Observatory. Later he joined a study group related to arms control and most recently has been in a systems design division.

Paul received his BS degree in electrical engineering from North Dakota State University and, under Sandia's Technical Development Program, earned an MS from the University of New Mexico. He is a member of the Institute of Electrical and Electronics Engineers.

Paul and his wife Laura live in Alameda. They have three daughters — a four-year-old and 20-month-old twins.

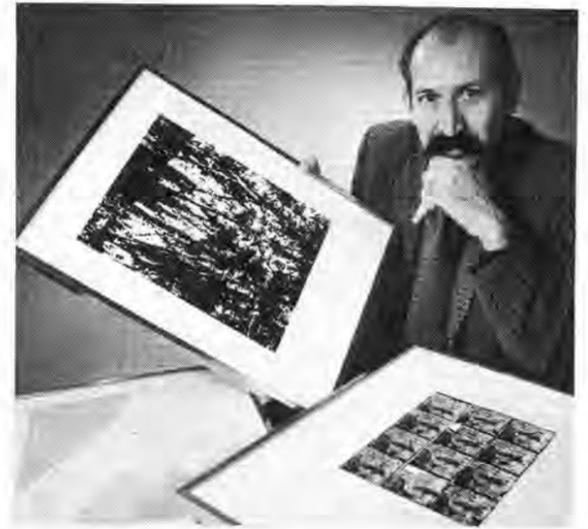
Fibers Strengthen Brittle Material In New Technique

Sometimes the novelty of a technique can be the basis of a patent. Such was the case with a disclosure submitted by Ed Beauchamp (5332) and James Morenz, now a graduate student at the University of Utah.

Their concern was with lead telluride, a thermoelectric material commonly used in the space isotope program. Although the material had the desired electrical properties, it lacked strength.

The men knew that ductile material could be strengthened by adding brittle fibers, but they had no real evidence that this would be true when the matrix was also brittle, but the technique worked. The two men mixed small diameter fibers of sapphire with a powdered version of lead telluride, then hot pressed the combination. The result was a material with a tensile failure strength of at least 6000 pounds per square inch, about 10 times the strength of the material without the addition of the fibers.

The inventors believe the recently-patented technique would also be applicable to the fabrication of other ceramics.



JOE LAVAL (3433) will exhibit a group of photo-serigraphs (made by silk screen from photographic negatives) at Jonson Gallery at the University of New Mexico Feb. 14 through Mar. 12. This will be the second time that Joe has had a showing there of his unique art.

Take Note

The Sandia Golf Association (Women) annual membership drive will start Tuesday with a general meeting of members and interested golfers at 12:05 p.m., in conference room 229 of bldg. 802.

Tournaments, league play, the handicap system, and the club's goals will be discussed. Sandia and AEC women are eligible for membership at \$2 per year.

The association customarily arranges for group lessons for both beginners and intermediate golfers at reduced rates.

* * * *

Gene Farnum (5154) will present "X-Ray Studies of Dislocations in Single Crystals" at the 5100 Staff Seminar Feb. 16. Wendland Beezhold (5112) will discuss "The Crystalline-to-Amorphous Transformation in Ion-Implanted Si" on Feb. 23.

The seminar meets on Tuesday mornings at 8:30 in rm. 201 of bldg. 806.

* * * *

Volunteers who can spend a few hours a week working in the office are needed by the Bernalillo County Unit of the American Cancer Society. Name lists and solicitation kits are now being prepared for the April Crusade and help is needed during the day, evenings, or on weekends, according to Ted Sherwin (3430), president of the unit. Retired employees are especially welcome, but anyone who can spare a few hours will be helping a worthy cause. Call 268-2909 to sign up for a specific time.



AFTERNOON IN NEW MEXICO by James Boren was chosen the best watercolor in the recent annual Cowboy Artists of America show. It is one of 21 paintings and bronzes depicting Western art on exhibit in the Bldg. 802 foyer until Feb. 22.

Service

Awards

25 years

Philip Dailey (9242), C.M. Abernathy (4338), Ira Hamilton (9133), and William Kraft (2440).

20 Years

Ramon Armijo (4232), Gilbert Atencio (4614), T.L. Barry (4233), Allan Beck (1731), Kyle Benton (4513), Irene Berger (7533), Wayne Bottoms (3520), Piffie Chavez (4623), Vences Chavez (4512), Harry Cherb (4211), Earl Coffee (2346), James Coleman (4131), James Coughlin (1612), George Davies (3520), T.J. Dawkins (4622), James Deakin (7373), Edward Domme (9414), Max Engle (2492), Dorothy Evans (4231), Charles Fletcher (7223), William Foy (7343), Eufemiano Garza (4212), Clayton Guynes (1000), Malcolm Hamm (3417), John Hobart (4213), James Holliday (4222), Alfred Holmes (7452), Orville Howard (9235), Jose Jojola (4253), Moses Loreto (4514), Gene Lucas (7532), Marshall Ludlam (3520), Murt McMullen (3520), Eugene Medina (7223), Candido Mieras (4514), Vernon Moore (3520), Norman Richardson (5224), Frank Sanchez (7532), Jose Sanchez (4614), Dalton Savage (9239), Robert Scharrer (7221), Paul Stickler (7424), Jack Sublett (7650), Donald Tyson (4622), Gilbert Weaver (4514), LaVern Wehby (4551), Wayne Welkenback (4233), Junior Woellhart (4511), Dan Yearout (2312), and George Zimmerman (1554).

15 Years

Roger Aden (7371), Billy Asher (4553), Gabriel Beatrice (7652), Darrell Breehl (2634), Bernice Cannon (3452), S.D. Carrillo (4152), Roland Cleveland (7613), Walter Dodd (3135), Roque Feliciano (7372), Hubert Filusch (9228), Arthur Finlayson (1611), Gertrude Finley (3417), George Hunt (9131), Muriel Iverson (7223), Andrew Landis (3433), James Leonard (9521), Herbert Loemker (9211), Jose Martinez (4514), Richard Moyer (7433), Billie Palmer (4222), Anna Pearce (3256), Walter Suiter (9225), Richard Wahlberg (2492).



NOW THIS may appear to be the fairly routine presentation by Gordo Miller of a 20-year service award to Don Fifield, both of Mobile and Remote Ranges Division 7252. But it ain't! Because Gordo has just debarked from a chopper into -48 degree F weather at the weather station of Alert, Canada, 82° 31' North — less than 400 miles from the North Pole. Gordo reports that Don proposed they celebrate occasion with night on the town.

10 Years

Margaret Houston (2625), Arthur Hassig (7654), Sy Mayer (8124), Bill Pritchard (8273), Daniel Miko (9228), Tadao Hisaoka (8273), Alec Willis (8351), Chester Claghorn (7284), Bill Emrick (1531), Charles Cockerleas (1531), Paul Miller (3455), Marjorie Rabel (4364), Frederick Gustke (7524), Len Dighton (8157), Jack Casey (8181), Bob Gaeddert (8210), Robert Gardner (3455), John Schamaun (1544), Bill Peila (8124), Dennis Mangan (2612), Robert Gall (3431), Robert Roth (4137), Lawrence Bennett (7524), Thomas Conlon (1644), James McIlmoyle (9125), Rosemary Padilla (4613), Duncan Tanner (8182).

Deaths

Carl Carlson, a member of the Systems Planning Staff 100, died Jan. 25. He was 44.

He had worked at Sandia 13 years.

Survivors include his widow and four daughters.



* * * *

Dana Wray, a service clerk in General Stores Division 4613, died Jan. 26 after a long illness. He was 57.

He had worked at Sandia for 14 years.

Survivors include his widow, a daughter and a son.



Sympathy

To Vivian Hedman (4152) for the death of her husband, Feb. 6.

To John Fackelman (4512) for the death of his mother Jan. 25 in Toledo, Ohio, and his father Jan. 29 in Detroit.

SHOPPING CENTER • SHOPPING CENTER •

CLASSIFIED ADVERTISING
Deadline: Friday noon prior to week of publication unless changed by holiday.
A maximum of 125 ads will be accepted for each issue.

RULES

1. Limit: 20 words
2. One ad per issue per person
3. Must be submitted in writing
4. Use home telephone numbers
5. For Sandia Laboratories and AEC employees only
6. No commercial ads, please
7. Include name and organization
8. Housing listed here for rent or sale is available for occupancy without regard to race, creed, color, or national origin.

MISCELLANEOUS

RCA consolette, 21", \$25. Goodman, 299-3652.

'69 YAMAHA 100cc trail bike, dual gear range for trail or street, lg. trail sprocket, elec. starter. Barton, 255-5491.

ONE-TON drop center trailer axel w/hubs, new bearings, new races, wheels, u-bolts, \$40. Campbell, 268-8445.

DBL. MATTRESS, box springs, \$25, w/expandable frame \$30. Fortman, 256-2105.

HUNTING DOG puppies, cross German Shorthair, Platt hound, permanent shots, tails docked, \$15. Sharp, Placitas, 867-2815.

YOUNG reg. Hereford bull. Causey, 299-0089.

SKIS, men & women's, 2 sleds, tobaggan, swing set, 2 sets twin mattresses & springs, king size and 2 dbl. bedspreads. Hunter, 268-7014.

DRESSER, double w/mirror, blond oak, \$20. Hurt, 282-3675.

10.5 CU. FT. refrig w/freezer. Stixrud, 298-0478.

CDR antenna rotator assembly, heavy duty, complete w/cable, poles & chimney bands, \$25. Merritt, 299-1482.

DRESSER, solid limed oak, 6 dwrs, 19 1/2 x 30 x 58" long w/ 1/4 beveled mirror 30 x 48". Fisher, 266-2266 between 4-6 p.m.

PRECISION E-200 & E-400 signal generators, BC-221 freq. meter, linear amp, microphones & bug. Bierly, 898-3851.

CAMPER SHELL, cab high Suncraft, new, for long, wide bed truck, \$275. Magee, 256-1358.

TEXTBOOKS: math, thermo & physics, numerical analysis, operations research, & computer science. Miller, 299-4350.

AKC reg. Old English sheepdog puppies; disassembled '50 MGTD; 7' dia. stocktank (good for kids pool). Cooper, 1-636-2198.

'70 DUCATI, 450cc, scr., 1800 miles, \$750. Munford, 296-4552.

STROLLER, \$7; wrought iron fireplace screen, 40x30", \$30. Magnani, 299-8693.

THREE TIRES, Uniroyal "Laredos" 8.25x14, most of tread gone, 50¢ ea. Leeman, 299-9149.

ATLAS BATTERY A-23 heavy duty, cost \$31.95, sell for \$22.50; new, still in box. Eaves, 299-7728.

MINI BIKE, \$115. Oberst, 299-1224.

'65 YAMAHA 250; '69 Yamaha 175; 5 7.00x14 tires VW bus. King, 282-3186.

REMINGTON 20 gauge pump shotgun, \$45. George, 299-9101.

ICE SKATES, women size 5, Hyde brand, cost \$52, sell for \$10; bullets, 7.7mm Jap (.314 dia.), 185 gr., full jacket, boat-tail, 275 available, 1¢ ea. Ristine, 298-8383.

GE STEREO phonograph, walnut cabinet, \$50. Rowe, 296-6295.

CHILD'S learning bike w/training wheels, \$7; child's tractor (to ride), \$5. Myers, 256-0642.

12-CU. FT. GE refrig., \$45. Berg, 266-2058.

ALUMINUM sun screens for 4-dr. stationwagon, set of 7 designed for Plymouth, may be adjustable to others, \$15. Joseph, 299-6989.

GERBILS: Scott hand mower; tape recorder; record changer. Spray, 299-0412.

ROYAL port. manual typewriter, never been used, \$50; J.C. Higgins 22 rifle, case & few boxes of shells, used 6 times, \$35. Smith, 299-7151.

COMBINATION hi-fi/AMFM console, French provincial, cherry fruitwood finish cabinet, \$45. Spencer, 298-5061.

'68 HONDA CL-77 305cc scrambler, recent overhaul (top end), dirt gears, \$250 or make offer. Kirchmeier, 255-1000.

LIGHT FIXTURES, incandescent w/glass: kitchen, \$3; bath, \$3; bedroom, \$2. Veneruso, 268-9283.

SNOW TIRES w/cleats, 650/600-13, \$15 or best offer. Wetzel, 898-3725 before 5:30, 255-5671 after 5:30.

TASCO 60x700 telescope w/Barlow lens, tripod & filters. Pappas, 265-3303 after 6:30.

HOT POINT electric range; brown sofa-bed; 2-pc. green sect. Chavez, 255-9006.

AKC reg. Samoyeds. Demaree, 296-1344.

'62 16' SHASTA travel trailer, \$700. Boling, 265-1336.

MILK GLASS decanter, \$3.50; four antique iridescent goblets, \$6.50 ea.; antique French Haviland sauciers, \$5 ea. Smitha, 299-1096.

GE WASHER, matching dryer, both for \$80. McClelland, 296-3661.

100 WATT guitar amplifier, new speaker, cover included, \$150. Mazzio, 298-2438 after 3 p.m.

REFRIGERATOR, 15 cu. ft., Frigidaire, separate freezer section, \$50. Van Deusen, 299-4328.

SOFA-BED & matching chair, \$70. Newton, 299-1283.

CARS & TRUCKS

'62 INTERNATIONAL Travelall V8, OD, R&H, \$450. Rigali, 298-6119.

'66 CORTINA (English Ford), 4-cyl., 2-dr., 41,000 miles, \$450. Proulx, 299-6066.

'62 CORVAIR Monza, 4-dr. sedan, AT, \$325; '65 Aristocrat travel trailer, 16', self-contained, sleeps 4, spare tire, extras. Hughes, 299-6674.

'62 MERCURY Monterey 4-dr. V8, AC, Gallagher, 268-1988.

'70 VW sedan, radio, other extras, \$1725. Keich, 299-1108.

'70 OLDS Cutlass, 4-dr., AT, PS, PB, snow tires, radio, driven 3500 miles, \$2800. Massick, 299-3086.

'70 DATSUN convert., 2000 series, tonneau cover, low mileage. Troy, 266-0672.

'60 FORD 1/2-ton V8, 4-spd., short wide box, custom, insulated, cab high shell, '71 tag, \$700. Yingst, 268-2896.

'56 FORD V8, std. shift, OD, \$175. Salberg, 298-9248.

'62 RAMBLER, 18-20 mpg., good mechanically, needs paint, upholstery, \$295 or best offer. Bickle, 298-4836.

'68 CHEVELLE Malibu V8, 327, AT, PS, AC, vinyl top, NADA \$2175, sell for \$2000. Jewell, 256-0414.

'61 INTERNATIONAL Metro step-van camper, water tank, pump, sink, refrig., sleeps four, ample cabinet space, Tate, 299-6813.

'69 3/4 CHEVY, 4-spd. V8, HD camper pkg., 9' Open Road camper, 8.75x16.5 & 10x16.5 tires, \$3600, or trade. Griega, 299-0627.

'56 CHEVY 1/2-ton pickup, 4-spd., side boards, overcab, stockracks; '62 Rambler 4-dr., OD, AC. Johnson, 247-8634.

'66 THUNDERBIRD, convert., 390 engine, all power, AC, \$1150 or trade on '70 3/4-ton pickup. Vigil, 296-3590.

JEEP UNIVERSAL, 4-wd, cab, hubs. Chavez, 243-2525.

'70 DODGE Super Bee, 4-on-floor, 383 eng., PS, disc brakes, 13,000 miles, \$2500. Sharpe, 1-636-2521.

FURNISHED apartment for two UNM female students, very reliable, very super as Dad will attest. Maak, 265-4754.

OLD used 4-wheel drive vehicle or tractor for use on ranch. Steuber, 299-2414.

OUTBOARD MOTOR, 10HP. Gallagher, 268-1988.

5-STRING BANJO. Wilson, 282-3225.

USED OXY-ACETYLENE and/or 200 amp arc welder. Berglund, 255-3988.

1 OR 2 BDR. apartment near bus route, under \$100 preferred. Olman, 298-5024.

TO RENT one-car garage; w/electricity, concrete slab floor & lockable doors, NE or SE city. Sutherland, 299-0820.

USED clothes washer, good condition, reasonably priced. Peterson, 298-1235.

LOST AND FOUND

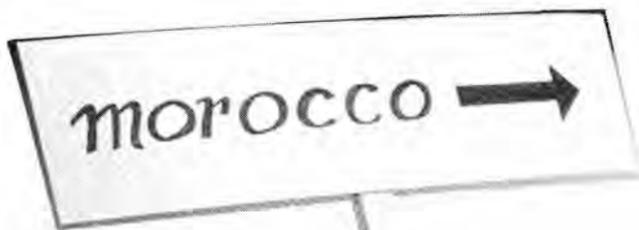
LOST — Rx bifocal safety glasses in case, check book, AFS pass book, Parker fountain pen, Rx safety bifocal glasses in black case, white scarf w/black border design, Canadian seal fur coin purse, Rx glasses w/brown frames in brown case, black driving gloves, keys in pistol holder shaped case, trifocal safety glasses w/brown & metal frames in case, retiree pin, man's black 3/4 length winter coat, heavy black leather ski glove, silver drop earring, beige cloth coat button, loop earring w/turquoise stones. LOST AND FOUND, tel. 264-2757, Bldg. 832.

WANTED

SKI RACK, prefer type which clamps on rain gutter & uses big rubber bands to hold skis. Baxter, 344-7601.

USED CUB SCOUT uniforms, any condition. Mora, 842-9736.

FOUND — Brown leather glove, Enco credit card, earring w/gold triangles & circles, dangling pearl & crystal earring, black vinyl & knit glove, Rx glasses w/black frames, set of keys on ring. LOST AND FOUND, tel. 264-2757, Bldg. 832.



Stage Show Movie Manana

Dorothy Lamour, of course, was a beautiful princess in a harem. Bob Hope and Bing Crosby were Bob Hope and Bing Crosby in that order. The film was "Road to Morocco" and it's worth seeing again because you can take the kids.

Combine the movie with a stage show featuring the Fiesta Singers and the Albuquerque Music Club singing tribute to American composers and you have quite an evening. Add one more touch: two chapters of the old Bela Lugosi movie serial "The Phantom Creeps" and you have something outasight. Because, in the first place, admission is free to members and families and, secondly, happy hour bar prices will be in effect all evening. Steak sandwiches and hamburgers will be available.

The event starts at 7 p.m. tomorrow night at the Coronado Club. For lack of a better name, it's called "Family Vaudeville and Classic Comedy Night with the Creeping Phantom and Happy Hour Prices."

* * * *

HAPPY HOURS at the Coronado Club are something else. Tonight, for instance, Wildman Bob Banks will be on the bandstand making happy music with the red Yamaha electronic organ. Smilin' Jim Noonan, Club



**Anna
Maria
Farina
(5240)**

manager, will wheel out his famous chuckwagon roast beef for the buffet. Yolanda (sometimes called Yo-Yo) Adent will entertain with a sing-along in the main lounge starting at 9 p.m.

Next Friday, Feb. 19, The Good Times will be on the bandstand while Italian food is the buffet feature.

On Feb. 26 Sol Chavez and the mighty Duke City Brass will return to the Club. Veal cutlets will be spread for the buffet.

* * * *

SOUL SESSION on Saturday, Feb. 27, will feature a new band—Freddie Williams and the Screaming Yellow Zonkers. Other than that, it's the same old successful Soul Session formula: free admission to members, happy hour prices from 8:30 to 12:30, and strobe lights to stop the action occasionally.

* * * *

TEENAGERS can go-go, frug, bugaloo, or whatever on Saturday, Feb. 20, when a group called simply "Cross" is wired into the bandstand. Member parents should pick up tickets (25 cents for their own youngsters, 50 cents for guests) before the bash. It starts at 7:30, ends at 10:30 p.m.

HOT PANTS and other spring fashions from Omar's Boutique will be modeled by a bevy of Sandia's loveliest during the noon hour next Tuesday, Feb. 16. Models will include Soila Candelaria (2314), Peggy Stevens (5310), Bertie Denman (4332), Claudia Garlick (5314), and Lynn Brosman (AEC).

* * * *

CORONADO SKI CLUB will meet at 7:30 p.m. Tuesday, Feb. 16.

* * * *

THE MAZATLAN TOUR is sold out, according to Chet Fornero (4337), Club travel director. He has called a meeting of the group on Tuesday, Feb. 23, at 7:30 p.m. at the Club. Details and arrangements for the trip will be discussed. Charlie Runyan (4620) will present a slide show of scenes from previous Coronado Club tours.

Congratulations

Mr. and Mrs. Gino Carli (7624), a son, Christopher, Feb. 1.

Mr. and Mrs. Joe Salas (4622-1), a daughter, Feb. 4.

Mr. and Mrs. Donald Tipton (9225), a son, David Gregory, Jan. 13.

Solenoid with Rotors Safe Actuation System

A safing device using a solenoid and two rotors is the basis for a patent issued recently to the AEC in the name of Charles Sandoval (2325).

In operation as part of an actuation system in a rocket, the solenoid and its rotors serve as a lock to keep inertial weight from closing a specific switch. The device is not affected by a rolling motion or shock.

When desired, a single electrical signal unlocks both rotors and permits the switch to close.



SOLENOID and double rotors (left) are the heart of the actuating device invented by Charles Sandoval (2325) and held in his other hand.

Unsafe Conditions Are Everywhere

