

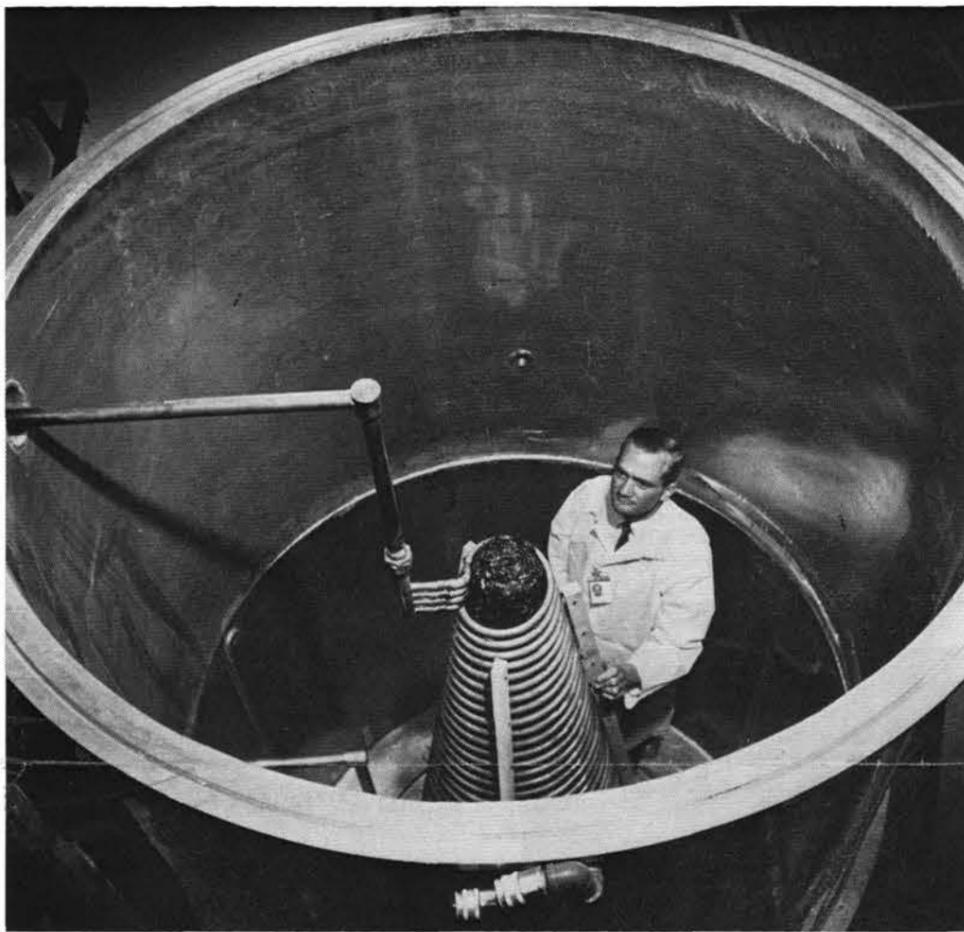
# LAB NEWS

VOL 22, NO. 11

MAY 22, 1970

SANDIA LABORATORIES - ALBUQUERQUE NEW MEXICO & LIVERMORE CALIFORNIA

## Charcoal to Carbon-Carbon . . . You've Come a Long Way, Baby



CHUCK THACKER (5312) inspects a carbon/carbon cone prior to chemical vapor deposition process inside a huge furnace in Bldg. 845. The piece is subjected to temperatures up to 2000°F in a methane-argon atmosphere.

Everyone knows that carbon is that black stuff people burn hamburgers with in the form of charcoal. And graphite is the "lead" in a pencil. And a diamond—another form of carbon—is a girl's best friend.

It seems a long way from these familiar materials to a new kind of Sandia-developed rocket nose cone, a cone that functions as a heat shield for instrumentation during reentry, but there are some things they have in common.

Carbon and Graphite Processing Division 5312 under Gene Frye has developed processes for producing carbon/carbon (short for carbon filament reinforced carbon) hardware which has unique properties lying somewhere between the softness of charcoal and the hardness of a diamond.

The technology is based on utilization of carbon in filament form. Other researchers in the field have succeeded in producing fine strands of pure carbon which have higher strength than most steels. These strands are already being used to reinforce plastic resins similar to the fiberglass process. Sandia's material differs in that the matrix, or binder, is not a plastic resin, but is itself a pure carbon.

As a heat shield, carbon/carbon becomes stronger with higher temperatures. In reentry, for instance, it will become white hot (in excess of 5500°F) but will actually be structurally stronger than at normal room temperatures. It will oxidize with the atmosphere during reentry but at a lesser rate than other ablative materials.

"Sandia's interest in the material is primarily for heat shields," Gene says. "However there are other possible uses for it."

With its high strength at high temperatures, carbon/carbon can be used for rocket nozzles or as aircraft brake shoes. Sandia  
(Continued on Page Two)



RALLY 'ROUND THE FLAG is the message conveyed by Dorene Yepa (3256) to Savings Bonds buyers at Sandia. May is Savings Bonds month, and the big 5 is the increased interest rate on Series E Bonds. Sign up for Bonds through payroll deduction.

### New Mexico Section Of ASME Elects Sandians to Office

A number of Sandians were recently-elected officers of the New Mexico Section of the American Society of Mechanical Engineers. They include: David Schafer (7250B), chairman; John LeRoy (2322), vice chairman; Patrick Walter (7511), secretary; Leroy Stradford (1517), treasurer; Ralph Wilson (4220) and Eugene Emerson (7625), directors.

The New Mexico Section has more than 400 members both in this state and in El Paso.

## Trash, Trash -- We've Got More Than Anyone

Piles of junked cars grow along the outskirts of any town across the country. Empty drink cans continue to be an eyesore along the highways. Garbage collection costs and a shortage of land for its disposal pose a problem for many large cities.

What is being done to solve the problem of solid waste disposal? For getting rid of trash has become a grave national problem with economic implications that are hair-raising. Many things actually, but there are so many facets to any solution—and such a high price tag—that progress will be slow.

This three-part series will discuss some of the difficulties.

About 350-million tons of solid waste accumulate in the United States annually. If that sounds like a lot, stop and figure how many trash cans are filled by your family each week. In addition to garbage there are other waste products, for example, grass cuttings, leaves, branches and other debris from yards; sewerage; paper products which still may be burned in some communities; and discarded items such as clothing, toys, furniture, appliances, etc. The estimate for all disposables is 9.7 pounds per person per day.

The development of the kitchen garbage disposal has helped to some extent, but this improvement may be offset by new packaging methods which have gained widespread use in industry. Time was when many small items such as nails, thread, etc., were available in bulk and one paper bag did the job. Now the buyer is more likely to find a small quantity of the same item hygienically sealed in its own plastic bubble, which, in turn, is mounted on a cardboard of greatly larger size and—at the cashier's stand—this is encased in yet another paper bag.



A GREAT PLACE TO VISIT BUT . . . this edifying scene is really sort of a controlled mess. It's the South Eubank dump where, among others, Sandia dumps its unclassified trash. Article discusses growing problem, local and national, of what to do with unwanted stuff.

Grocery items, such as laundry soap and cereal, become available in ever-larger cardboard containers—presumably to meet consumer demand—yet no apparent attempt is made to package these items in containers that can be collapsed by degrees as the commodity is used. Sugar and flour are sold in space-saving containers, easily folded flat when empty—why not detergents and some of the less-fragile cereals? Every housewife knows that the volume of trash is more of a problem than its weight.



THE CRUNCHER, or whatever this machine is called, weighs some 35 tons and is used to break down and compact trash, after which a dozer pushes trash plus earth into the big hole previously excavated by the dozer. When hole is filled after 2-3 months, operation moves on to new site.

Just how serious is the situation locally? What is being done nationally? Are there alternate ways of dealing with solid waste?

In Albuquerque waste disposal is influenced by two factors: 1) enough nearby vacant land to make the sanitary land fill method practical; 2) low humidity and low precipitation which slows the decomposition of some metals and other materials. (Hikers maintain that they have found intact vienna sausage cans left by pioneer cowboys.)

About 14-15,000 tons of refuse are collected monthly in the city and dumped either in an 80-acre sanitary landfill on South Eubank or a 900-acre landfill on South Broadway. The trash is covered with earth and compacted daily so that, eventually, the land can be reused, as is the case with a 40-acre landfill near the Sunport. Sandia Base disposes of waste at the South Eubank dump through a joint use contract with the city.

(Continued on Page Two)



SANDIA TRASH is handled by Dempster Dumpster system. Max Lopez (4514), right, drives his dumpster truck to the eighty dumpster cans around the Tech Area, then proceeds to S. Eubank dump. Volume, not weight of trash, is principal constraint in most collection systems.



Continued from Page One

## Trash, Trash

But a "reduction" system of this type (about a two-to-one reduction through compaction) can barely keep up with the steadily increasing accumulation of waste. Furthermore, how long will vacant land be available? Attempts to dispose of paper products through open burning run headlong into the problem of air pollution. Even so, the larger communities in New Mexico have better systems of disposal than the smaller ones, many of which have no refuse collection service whatever—accounting for the unsightly piles of rubbish in many arroyos throughout the state. But New Mexico is not unique here, and about 80 percent of all waste disposal in the country consists of open dumping.

Authorities estimate that of the 350 million tons of solid waste (in 1966), 52 million tons were packaging material and only 10 percent of this was reused or recycled. In addition, the experts estimate that per capita use of packaging materials will increase from 525 pounds in 1966 to at least 661 pounds in 1976.

To further complicate the problem, a packager wants containers of materials that won't burn, break, crush, degrade, or dissolve in water, while the waste processor wants a package easy to reduce by burning, breaking, compaction, or degradation.

At present the cost of collection and disposal averages about \$9 per ton, but in some areas of the country (New York City) the cost is as much as \$30 per ton. Considering the number of individual items of trash that go to make up a ton, even the top price may be a bargain.

The disposal problem was aggravated by the advent of cheap plastics and of no-return metal cans. Returnable glass containers (milk, soft drinks, beer) were reused an average of 19 times, but housewives found them heavy to carry and, of course, breakable. In the period 1966-70, the use of nonreturnable containers is expected to more than double.

There are several bright spots. Aluminum cans are being salvaged and recycled, but collection and separation of aluminum cans from "tin cans" is dependent upon Boy Scouts, civic groups, and others. Even so, some two-and-one-half million of the light weight containers were collected and resold to a brewer over a six-week period.

Company officials expect to re-purchase 50 million cans by year's end. With ordinary "tin cans" (actually tin and steel), the tin coating and the lead solder are contaminants that make the steel unsuitable for recycling. Attempts are underway to make all-steel cans.

Of course, be they tin or aluminum cans, to the guy who heaves them out his car window they're all the same. Maybe he's the real problem.

Next: What do we do with 8 million junk autos per year?

Continued from Page One

## Carbon-Carbon

has received a number of inquiries concerning these applications of carbon technology.

In Sandia's new Carbon Process Laboratory, Division 5312 can produce a wide range of carbon/carbon devices in almost any configuration. The most common method used is winding thread-like carbon filament around a mandrel and then treating the resulting piece in a high temperature furnace containing a methane-argon atmosphere. At about 2000°F, the methane decomposes, or cracks, on the surface of the hot filaments, breaking down into hydrogen and carbon. The hydrogen is released as a gas and the carbon deposits on the filaments. As the process (called chemical vapor deposition) continues, the pores of the filament structure fill with deposited carbon, eventually forming a dense interlocking binder or matrix. The material can be further heat treated to convert to a layered graphite structure. In this form the material acquires the familiar slick feel of a graphite lubricant.

Other methods are also used to produce carbon/carbon hardware. Rayon felt can be shaped into the desired configuration and then baked to produce a carbon felt. This material can then be subjected to the chemical vapor deposition process. (Hugh Pierson and John Smatana, 5314, are advancing this area.) Or, the felt or the carbon filament can be combined with a polymer resin and baked into a carbon/carbon material as Hal Mackay and Ron Allred, 5314, are doing. Combinations of these processes can also be used.

"This is the job of the Carbon Process Laboratory," Gene says. "We determine the variables in a process to produce material to desired specifications. We are learning process control so that we may repeat the process and produce prototype hardware. We then conclude by generating complete process specifications and eventually pass the technology on to production agencies."

Scale model carbon/carbon heat shields have performed successfully in a number of laboratory tests simulating reentry. A field test of a carbon/carbon heat shield is scheduled during early summer from Barking Sands Launch Facility in Kauai in the Hawaiian Islands. The test is one of a series undertaken by Exploratory Systems Department 1220 and Upper Atmosphere Projects Department 9220.

"After these tests," Gene says, "we will have data and guidance for further development of carbon/carbon."

## Bob Scharrer Finds More to Roses Than Meets the Nose or Eyes

Give a man two rose bushes and you might spark a hidden desire to be a flower exhibitor or even a rose judge.

That's all it took to get Bob Scharrer (7262) started. The Scharrers now have 80 or more rose bushes (many of the blooms have won blue ribbons). Bob is finishing requirements to become a certified judge in the American Rose Society, and he is treasurer for the Albuquerque Rose Society which will sponsor its 21st annual rose show at the State Fair Floriculture Bldg. this weekend.

Roses grow well in Albuquerque. Bob prefers planting from bare root stock and often will order directly from the grower if he wants a specific patented rose which is not available at local nurseries. He feeds his bushes more often than normally recommended because with irrigation the plant food easily leaches out of most New Mexico soil. Rose bushes do poorly if the ground around them gets too warm, so Bob mulches his plants with grass clippings.

In mid-March Bob starts pruning the bushes on the south side of his house. With his large number of bushes, the job normally takes several weekends; in addition, the bushes also receive a light pruning every time blooms are cut. "When we have a late freeze, like this spring, it's sometimes necessary to go back and prune to a healthy side bud. The frozen end of the stem may have a rosette of small leaves, but no flower bud will be formed," Bob explains.

A year and a half ago, he attended the district judge's school for prospective judges. The two-day school included instruction in anatomy of roses, identification of different types, points to be considered in judging, etc., and concluded with a lengthy written examination. Successful candidates



then must serve as an apprentice in five flower shows within the next three years, and receive a recommendation from a certified American Rose Society judge at each of the shows.

Bob just finished this apprenticeship at a show in Phoenix, but he plans to continue exhibiting his flowers when he's not judging. "I feel you lose your objectivity if you don't submit entries to the various shows," he explains.

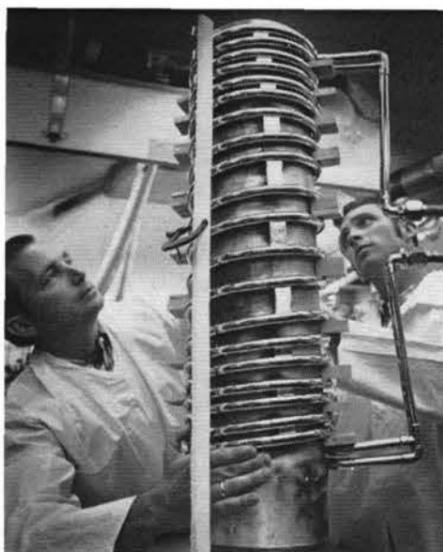
He adds that everyone is eligible to exhibit roses at the forthcoming show. There are even special novice classes for persons who have never won a blue ribbon for roses exhibited in a show.



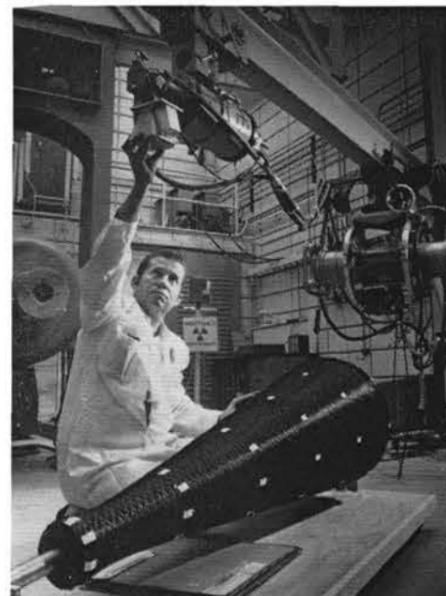
DAVE THEIS (5312) displays a variety of filament-wound carbon/carbon shapes produced in Sandia's Carbon Process Laboratory. The material will undergo extensive laboratory testing.



RON GOLDING (5312) operates a small filament-winding machine. Pure carbon filament is being wound around a mandrel while Ron sprays the piece with a thin adhesive.



INDUCTION HEATING COIL is readied by Dick Curlee, left, and Don Cook of the Carbon Processing Laboratory 5312 before installation in a furnace.



CARBON/CARBON nose cone, filament-wound, is x-rayed in the Nondestructive Testing Laboratory 7361 by Pete Peterson. The piece is checked for internal flaws before undergoing chemical vapor deposition in a furnace. Treatment at temperatures up to 2000°F may take as long as a week.

## LAB NEWS

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### SANDIA LABORATORIES

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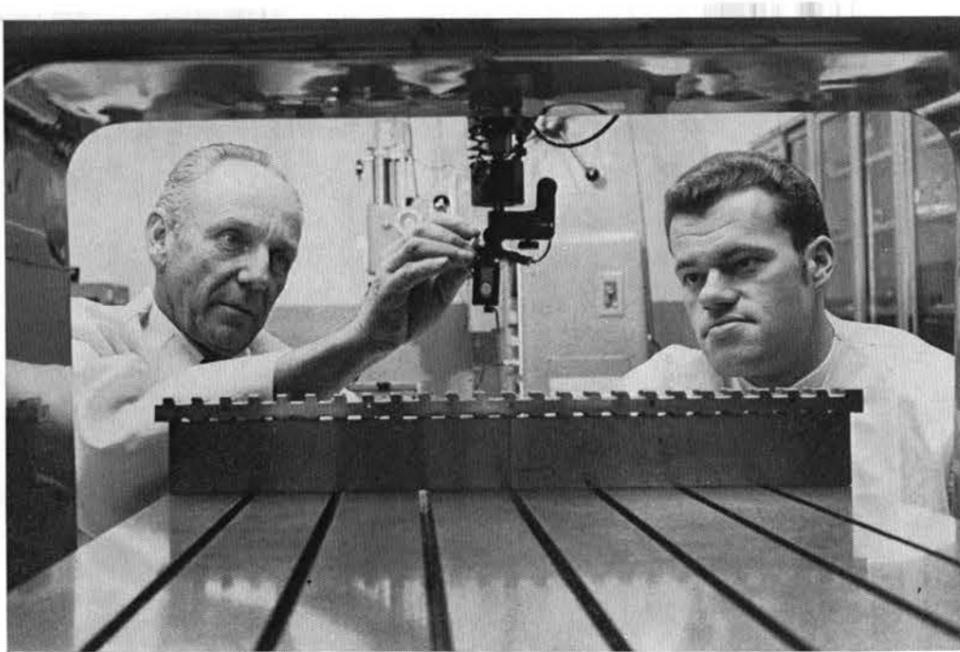
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Matt Connors & Lorena Schneider

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Bill Laskar is Photographer

Norma Taylor/All The Rest



APPRENTICE ON THE JOB—Chuck Shinneman (8129), left, explains the operation of the two-coordinate measuring machine in Sandia/Livermore's Metrology Laboratory to apprentice Jim Nickerson. On-the-job training is part of a new mechanical measurement technician apprenticeship program, one of several technician apprenticeship programs established recently at Livermore.

## New Technician Apprenticeship Programs Underway at Livermore

With recent certification by the State of California, new apprenticeship programs for mechanical measurement technicians and mechanical, electrical, and structural plant technicians are underway at Sandia Laboratories Livermore.

These four technician programs are in addition to the electronic fabrication technician program certified by the State last summer.

Employees selected for the first classes under the new programs are Jim Nickerson (8129), Mechanical Measurement Technician; Dwight Soria and Wayne Townes (both 8222), Plant Technicians (Mechanical); Herman Armijo and George Rafal (both 8222), Plant Technicians (Electrical); and Tim Marino and Clarence Rogers (both 8222), Plant Technicians (Structural). Everitt Davis and Jim Reitz (both 8223) are continuing their Electronic Fabrication Technician apprenticeships.

The programs provide training for persons who wish to become journeymen technicians. Administration of the programs is handled by an apprenticeship committee recently formed at Sandia/Livermore.

Members of the committee include chairman Jack Wilson, supervisor of Standards and Calibration Section 8129-2; John Bryson, supervisor of Model Shop, Manufacturing and Shop Liaison Division 8223; George Mincks, supervisor of Plant Maintenance Division 8222; Rus Richards, supervisor of Electronic Fabrication Section 8223-3; and secretary Barney Goncher of Training and Benefits Division 8214.

A member of the California State Division of Apprenticeship Standards works with the committee in a consultant capacity and a representative from the local school district also serves.

"We developed apprenticeship programs at Sandia/Livermore because the need for technicians in these trade areas is becoming critical," says Jack. "Trades selected are those not emphasized in the past because there were not many jobs using these skills. But this does not reduce Sandia's need and that of industry in general for adequately trained people to fill those jobs that do exist."

Two of the technician programs—mechanical measurement and electronic fabrication—cover a four-year period of on-the-job training (8000 hours) while the remaining three plant technician programs cover a five-year period (10,000 hours). Additional instruction is given at nearby community colleges in job-related courses.

Jack notes that the programs are not easy. "An apprentice gives up at least two evenings a week during the school term for the four or five years in order to attend classes, and puts in the additional time necessary to complete homework assignments."

The novice technician in mechanical measurements is trained in the care and handling of instruments, the preparation of parts for measurement, and making measurements of increasing complexity. In addition, he studies theory of measures and a wide range of measurement systems.

Depending on their discipline, whether mechanical, electrical, or structural, the plant technician apprentice masters skills involved in refrigeration, heating and air conditioning, mechanical and/or electrical control systems, steam generation, plumbing, pipe fitting, and structural systems.

The electronic fabrication technician apprentice receives training in all phases of electronic fabrication from soldering tech-

niques through assembly, with about 200 hours spent on such special assignments as etched circuits, electrical inspection, coil winding, and metal and machine operations peculiar to electronics.

A machinist apprenticeship program has been underway at Sandia/Livermore since July 1966. Presently serving as apprentices under this program are Joe Marques and Jim Spoonmore (both 8223).

## Death



Keith Banko, a staff member in Systems Research Division II, 8325, died suddenly Thursday, May 7. He was 31.

Keith joined Sandia Laboratories Livermore after receiving his MS degree in electrical engineering from Oregon State University in June 1961. He worked in preliminary design where he was involved in feasibility, systems, and safety studies, in a project group, and most recently in systems research.

Survivors include his father and mother and a sister who reside in Portland, Ore.

## Sympathy

To Jerry Maloney (8129) for the death of his father in Walnut Creek, April 30.

To Chuck Pignolet (8162) for the death of his brother in Milwaukee, April 24.

To Betty Zembik (8322) for the death of her brother in Hayward, April 27.



CERTIFICATE OF APPRECIATION—Hilt DeSelm (right), Director of Staff Services 8200, accepts a certificate of appreciation on behalf of Sandia Laboratories Livermore for its support of the observance of the Centennial Anniversary of the City of Livermore last year, including Sandia's participation in the industrial display. Paul Heppner (8162), Chairman of the Livermore Centennial Committee, presents the certificate.

# LIVERMORE NEWS

VOL 22, NO. 11

SANDIA LABORATORIES

MAY 22, 1970

## Institute of Printed Circuits Honors Sandian

Arnie Andrade (8312) was presented the Institute of Printed Circuits "President's Award" at its 12th annual meeting held in Miami Beach, Fla., recently.

His award reads: "In recognition of your outstanding contributions to the programs of the Institute, thus contributing to the advancement of the printed circuit technology and the electronics industry."

The IPC award is made once every two years at the conclusion of the president's term in office to those members who have made outstanding contributions to the programs of the Institute.

Arnie has been serving as a member of the IPC Technical Activities Executive Committee and also serves as general chairman of the IPC Acceptability and Repairability Committees. In these latter capacities, he helped update two technical manuals — "IPC Acceptability of Printed Wiring Boards" and "Repair of Printed Wiring Boards."

Currently a staff assistant in Metallurgy Division 8312, Arnie has engineering responsibility for printed wiring boards and associated soldering problems at Sandia/Livermore.

After joining Sandia in 1959 as an electrical inspector, he later became involved in the printed circuit laboratory where he worked on the processing of printed wiring boards. From 1966 until transferring to his



ARNIE ANDRADE (8312), left, accepts "President's Award" from Institute of Printed Circuits president, Wallace Moon, at the 12th annual meeting of the Institute.

present assignment in 1968, he worked with the manufacturing liaison group.

## Take Note

Lee Radosevich (8324) and Wendell Williams of the University of Illinois were co-authors of two articles published recently—one entitled "Thermal Conductivity of Transition Metal Carbides" which appeared in the JOURNAL OF THE AMERICAN CERAMIC SOCIETY, the other "Lattice Thermal Conductivity Superconducting Niobium Carbide" in the PHYSICAL REVIEW.

Several Sandians took top honors recently in the first sailing regatta to be held at the Del Valle Reservoir in the Livermore Valley. Thirty registered boats competed.

In the Open Handicap Fleet race, Terry Mattson (8133) and his wife Cindy in a Snipe outdistanced Jerry Weber (8172) and Bill Guyton (8162) in another Snipe to take first place. Walt Bauer (8331) and

Ted Dellin (8341) and wife Arlene in a Rhodes' 19 were third.

In the Flying Dutchman Junior Fleet race, Hank Lucas (8311) and wife Eleanor took the third spot in a Lido 14.

In the Junior El Toro race, Howie Marion (son of John Marion, 8133) placed first, with Jim Brandvold (son of Glen Brandvold, 8170) finishing second.

The newly formed Del Valle Sailing Club hosted the regatta. Meetings of the club are held the third Monday of every month at 7:30 p.m. at the Livermore Recreation Center. Anyone interested in sailing is welcome. Members need not be residents of Livermore.

Mel Callabresi of Experimental Mechanics Division 8122 recently presented a paper entitled, "Nonlinear Stress Analysis of Solids" at the Third Annual Solid Mechanics Symposium. Sponsored by the Society for Experimental Stress Analysis, the symposium sessions were concerned with "Finite Element Methods in Solid Mechanics," and were held at the United States Air Force Academy in Colorado Springs, Colo.

Bill Robinson (8352) presented a technical paper at the American Society of Civil Engineering (ASCE) meeting held in Portland, Ore., April 6-10. The paper was entitled "Dispersion during Wave Propagation in a Regularly Layered Material."

Jesse Floyd (8222) shot a low net score of 70 to win the first place trophy in the Sandia Employees Golf Club tournament played at Manteca Golf Course May 9. He also took the "fewest putts" award in the tournament. In the "best ball, two-man team" feature, Pat O'Brien and Moe Houk (both 8161) placed first with a low net score of 62. Dick Isler (8322) was closest to the pin in the hole-in-one contest.

## Congratulations

Mr. and Mrs. Ron Hagen (8182) a son, David Mark, April 3.

Mr. and Mrs. Ronald Musket (8311), a son, Daren Ronald, April 5.

Mr. and Mrs. Fred Scholl (8252), a daughter, Brenda Leigh, April 28.

Mr. and Mrs. Leon Seibel (8175), a daughter, Stacey Renae, May 3.

Mr. and Mrs. Jerry Rohwein (8343), a son, Mark Alan, May 3.

# Ole! Puerto Vallarta



VIVA MEXICO! John Dean, the last man off the plane, cheers upon arrival.



HONEYMOONERS Jan and Phil Anderson (1224) enjoy a swim and a coco-loco.

*Puerto Vallarta, Mexico, hangs on the sides of several steep hills on the Pacific coast about halfway between Mazatlan and Acapulco. The population is about 8,000. The population increased by 210 recently when the town was invaded by two tours of Coronado Club members on vacation.*

*Headquartered in the lush Posada Vallarta resort hotel, the Sandians explored the town, the beach and the coastline, not to mention the shops, galleries and the intricacies of a "coco-loco." The weather was warm and humid and the swimming was fine. So was the seafood.*

*Frontier flew first class and getting there was half the fun. Someone loosed a live iguana on the plane coming back and that was just one more exciting incident on top*

*of scuba diving, parachute rides, catching bonito, and playing polo on stubborn burros.*

*Most of the troops felt that Montezuma exacted his revenge in cases ranging from mild to "omigod." Everyone did survive.*

*Randy Parsons (7284) and Charlie Clendenin (9415) won the free trips.*

*Tour directors Bob Banks (5100) and Chet Fornero (4335) called both tours "complete successes" and report that the Coronado Club will sponsor other travel packages in the future—probably to Jamaica in December.*

*So save your money—they say the four-day Caribbean tour will cost about \$200 for the works.*



PARACHUTE RIDE, pulled by a speedboat along the surf, was an attraction.



POLO played on the beach with brooms and burros was more a matter of getting the donkey to move than hitting the ball. Ask Arky Henderson (3251), far left.



BOB SCHARRER (7262) unhooks a bonito, one of 13 caught on the way to Yelapa.



LUNCH on the swimming pool patio is enjoyed by the group including Helen and Ted Sherwin (3430) and Jim Rhodes (9423), lower right, and wife, Sammy, (left).



THE SURF at Yelapa was just right, the water warm, and the turtle steak great.



PUERTO VALLARTA and church with a filagree crown is viewed by Nancy Sanchez (3462) from small boat in the bay.

## Service Awards

### 20 Years



Emilio Chavez  
4623

George Felzman  
4361

Ward Hunnicutt  
4550



Donald Knott  
4542

Candido Montoya  
4623

### 15 Years



Bill Chapin  
8168

Frank Gordon  
2492

Amy Kahoiwai  
7631



Robert Moll  
2346

James Park  
2312

Robert Parks  
4112



William Riggan  
2611

Gordon Ross  
8212

George Steck  
1723

### 10 Years

Delores Molina 4153, James Nickerson 8129, Evelyn Bachman 8231, and Diane Holdridge 1711.

## Regional Toastmistress Conference This Weekend

When Toastmistresses hold a regional conference, they do just what you'd expect—they talk.

Albuquerque members will host the Four-Corners Regional Conference May 22-24 with meetings and festivities held at Holiday Inn Midtown. Theme of the meeting is "Educate a Woman and You Educate the World." Highlights of the conference will be a creative accomplishment panel, and a seminar conducted by Cavett Robert, a winner of Toastmasters International award for his talks in the field of human engineering and motivation.

Sandia members who have been active in making arrangements for the regional meeting include Marcelia Samuelson (4623), Laurene Dubuque (9322), Ann McIntyre (9323), and Bertha Grant (3511).

## Authors

R. L. Kruse (on leave of absence), "Enumerating Finite Rings," Vol. 2, Part 1, JOURNAL OF THE LONDON MATHEMATICAL SOCIETY; "On the Classification of Nilpotent Rings," Vol. 113, No. 3, MATHEMATISCHE ZEITSCHRIFT.

A. R. DuCharme (5331), "Applications of Optimized Model Potential Theory to Stacking-Faults in hcp Metals," Vol. 31, No. 1, PHYSICS LETTERS A.

E. H. Farnum (5154), "Characteristic Volume Expansion of Point Defects in KBr," Vol. 187, No. 3, PHYSICAL REVIEW.

R. C. Wayne (8331) and L. R. Edwards (5132), "Effect of Pressure on the Curie Temperature of  $ZrZn_{13}$ ," Vol. 188, No. 2, PHYSICAL REVIEW.

B. L. Gregory (5112), "Minority Carrier Trapping by Defect Clusters," Vol. 16, No. 2, APPLIED PHYSICS LETTERS.

M. J. Clauser (5114), "Mossbauer-Effect Study of Ferroelectric Potassium Ferricyanide Trihydrate," Vol. 1, page 357, PHYSICAL REVIEW B.

P. B. Tollefsrud (1222), " $^{18}F$  States with Large Isospin Impurities," Vol. 1, No. 2, PHYSICAL REVIEW B.

P. H. Adams (7323), "Motion Measurement Transducers," June issue, RESEARCH/DEVELOPMENT.

D. B. Longcope (1222), "Motion of a Rigid Cylinder within a Shell-Core Structure," May issue, AIAA JOURNAL.

T. P. Wright (5231), "A Non-Maxwellian Equilibrium Distribution for the Free Electrons in a Plasma," April issue, THE PHYSICS OF FLUIDS.

Roy Dell (7653), "Positional Limit Dimensioning," April 13, issue, DESIGN NEWS.

Bruce Hawkinson (on leave of absence), "A Computer-Controlled Microfilm System," Vol. 16, No. 3, DATAMATION.

## Retiring



EMILY CLASS  
Technical Information 3112



INA ALEXANDER  
Design Information Processing 7631



EFRAN APODACA  
Plant Maintenance 4512



HELEN HUTTON  
Technical Art 3417

FRED DRUMMOND  
Electronics 4231



JOE CHAVEZ  
Motor Pool 4573

HELEN KENT  
Communications 9415

## Department of Definitions That Tell Us More Than We Really Want To Know About the Subject

"The poiseuille is the dynamic viscosity of a fluid of which the rectilinear uniform motion, in its plane, over the plane surface of a solid of infinite extent gives rise to a retarding force of 1 newton per square metre of the surface contact with the fluid, when the rate of flow has become steady and when the gradient of speed in the fluid at the surface of the solid and per metre of normal separation from the aforesaid surface is 1 metre per second."

## 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.

### FOR SALE

#### MISCELLANEOUS

TWO IRON NAVY COYS w/springs & mattresses, \$20. Peterson, 256-7514.

WESTINGHOUSE combination refrigerator & freezer, copprtone. Meeins, 298-6681.

18" REEL-TYPE power mower, 2 HP Briggs & Stratton motor, grass catcher, \$25. Lochtiefeld, 296-1326.

PLASTIC POOL, 12' diameter x 4' deep w/filter & sweeper, \$60; '66 Honda 90 trail bike w/under 800 miles, \$175. Jackson, 299-5107.

AMPEX 1250 stereo tape deck, cost \$450 new, asking \$125. Kjeldgaard, 296-2212.

GOLF SHOES. Penny's, 8 1/2 B, \$15, worn once; Lazybones 6B, worn twice, \$15, both black & white Corfam. Freshman, 299-9263.

COMPLETE MG engine w/starter & clutch, \$45. Martin, 282-3794.

FREEZER, 17 cu. ft., chest type, Coldspot, \$100. Duimstra, 299-9278.

GOOD NATURED 9 mos. Beagle + Collie dog, has all puppy shots, \$15. Hatcher, 296-7589.

TRUMPET, Olds recording model, \$175; Reynolds flute, \$100; Mosrite electric guitar, \$180 w/hardshell case. Bernard, 296-1385.

5-FORD TRUCK WHEELS, 8 hole, 8:00x16.5 size, \$5 ea.; 3 tires, same size, \$10 ea. Cranfill, 298-3194.

FEMALE German Shepherd puppies, exceptional pedigree, 8 wks. old w/permanent shots, Kramm, 268-5078.

PORTABLE dishwasher, late model RCA Whirlpool, \$135. Ritterbush, 298-4010.

PAIR maple finish bunkbeds, \$20 both; fireplace screen & tools, \$10; h/nd masonry tools; misc. furniture. Boyd, 296-7565.

KITTEN, grey, cute, medium long hair, free to good home. Petty, 298-0856.

SOFA BED, old rose upholstery, 81" long, \$35. Williams, 268-0045.

DUNCAN PHYFE drop-leaf table, solid dark mahogany, 54"x38" opened. Aronson, 268-7109.

PICKUP WHEELS, 8-hole for 3/4-ton Ford or Chev., 8:00x17.5 tubeless tires, \$5 each. Souder, 282-3121.

FREE 6-wk.-old puppies, part poodle, part?; new 1970 set Britannica Jr. encyclopedia. Peterson, 299-4714.

ZENITH color TV, '67 model, \$200. Hill, 255-6538.

BOAT, 15' fiberglass, w/conv. top, 50 hp electric start motor, drive on trailer, 4-yr. old, one owner. Dow, 344-8619.

TOY POODLES, silver, 6 wks. old, very small, excellent pedigree. Shipley, 298-2433.

TENT TRAILER; short bed pickup shell. Navalesi, 344-0598.

REG. GREAT DANE, 6-mos.-old female puppy, honey fawn color, presently in obedience school, has all shots, loveable & gentle family dog. Phillips, 268-6446 after 5:30.

FREEZER, chest type, 4.2 cu. ft., Ward's, \$50; approx. 35 bales dusty alfalfa, suitable for cows, free. Bassett, 898-1840.

10 USED CHAIN SAWS, \$45 to \$65; new high std. revolver, sells new for \$65, want \$52. Ernst, 898-4772.

GUITAR, solid body, electric, single pickup w/35 watt amplifier, \$55. Gallagher, 268-1988.

MOTOR HOME-CAMPER, professional conversion of International bus, sleeps 4, plus fully equipped & functional, \$3995. Laval, 898-0518.

WOOD garage door complete w/2 types of hanging hardware, door covered w/thin aluminum sheeting, make offer. Marchi, 299-8516.

POODLES, 9 wks. old, one male, two females, pedigree, AKC registered. Sanchez, 298-3130.

FRENCH Provincial double bed, five months old, cost \$210, will take \$150. Roybal, 299-0938.

DROP-LEAF dining room table, antique bronze/olive, 4 chairs, seats covered w/crushed velvet, \$50 complete. Jordan, 255-4832.

1969 YAMAHA-250, \$575; 6500 cfm 2-speed cooler, \$85; 40 gal. gas water heater, \$20; 100,000 btu Carrier gas furnace w/thermostat, \$100. Gelder, 298-8960.

PAIR OF gerbils, 5 months old, 10 gal. aquarium cage w/top, exercise wheel, all for \$4. Barton, 255-5491.

SOFA, Early American, brown tweed upholstery. \$20. Kubiak, 265-6525.

REM. 513 target rifle, Redfield sights, \$65; I.N.A. revolver .38 special, \$45. Svensson, 344-7700.

2-WHEEL shopping-laundry cart; boy's and girl's clothing, sizes infant to four years. Detry, 299-3117.

BEIGE cotton carpet and pad, 15' x 18'; blue cotton brocade formal, Vogue size 12, moccasin boots, size 8. Luikens, 256-0437.

**CARS AND TRUCKS**

'64 DODGE Polara, 2-dr. HT, 6-cyl., PS, R&H, \$150 over NADA wholesale; '62 Chev. Bel Air station wagon, 327 V8, 6-pass., PS, AT, AC, new brakes & front shocks, \$480. Faro, 344-3818.

'60 ENGLISH FORD, \$125. Adent, 299-1905.

'59 RAMBLER, 6-cyl., OD, rebuilt motor, overhauled trans., new tires. Grass, 282-3889.

'62 SCOUT, 2-wheel drive, new brakes-clutch & battery, \$450. Gilbert, 299-9141.

'61 MERCURY wagon, 4-dr., std. trans., new belted wsw tires, R&H, carpeting, \$295 or best offer. O'Bryant, 268-9049.

F-85 OLDS, 4-dr., V6, std. trans., AC, \$595. Curzi, 295-5386.

'68 MUSTANG, 302, R&H, stick, new glass wsw, luggage rack, \$1875. Arrington, 299-7297.

'64 COMET 2-dr. sedan, 6-cyl., lt. tan, \$250. Lee, 268-7172.

'68 FORD Country Squire station wagon, 390 engine, PS, PB, AC, heavy duty suspension, rear seats, luggage rack, 32,000 miles, \$2800. Pope, 299-2276.

'59 ALFA GIULIETTA spider Veloce, approx. 70,000 miles, recently replaced clutch & rebuilt engine, \$900. Eagle, 265-7128.

'68 DODGE Polara, 4-dr., AC, AT, new glass belted tires, new brakes-shocks, must sell below whole. Clark, 298-8254 late evenings.

'63 FORD pickup, F100 long-wide-bed, V8, 4-spd., R&H, custom cab, suburban cab height camper, both for \$950. Abeyta, 636-2524 after 5, P.O. Box 182, Peralta N.M. 87042.

'64 PLYMOUTH 4-dr. V8, \$400. Morrisett, 298-2884.

'69 TRIUMPH Spitfire, yellow w/white convert. top & tonneau cover, extra trim, 2 new tires, 22,000 miles. Olsen, 265-3308.

'61 PLYMOUTH 9-pass. wagon, PS, PB, AC, R&H, AT, \$345. Loemker, 344-0278.

'36 CHEV. 3-window sport coupe, rumble seat, original restoration, \$995. Brewer, 344-4619.

'63 PONTIAC Catalina 4-dr., PS, PB, AT, R&H, AC, one owner, \$475. Snidow, 298-6163.

'69 CORVETTE coupe, white 390 hp, 427 cid, air conditioning, AM-FM radio, 4-speed, Positraction, tilt steering wheel. Bennett, 298-6163.

**REAL ESTATE**

4-BDR. ADOBE on 3.4 acres, lg. rooms, corral & stall, will take 7.5% REC. Patterson, 877-3158.

MOSSMAN 3-bdr., den, 1 3/4 baths, near schools-shopping, min. \$6000 cash, assume 5/4% FHA loan. Lamb, 256-7343.

HOUSE, 4-bdr., 1 3/4 baths, SW landscaping, 1700 ft., near schools, NE Heights, new roof, \$17,900, 4 1/2% loan. Shummy, 265-1620.

3-BDR., 1 3/4 baths, den, fp, large kitchen, built-in range, extra cabinets, carpeted, landscaped, 1520 sq. ft., assume 5 3/4% mortgage. Daniel, 296-3676.

**WANTED**

2 ea. USED SLEEPING BAGS. Stevens, 296-6326.

TRADE 2 commercial C-3 lots for clear late model pickup and camper. Chavez, 298-5091.

COMPLETE 3 1/2 HP minibike or one without an engine. Lewis, 256-3171.

BASINETTE for new-born, nothing fancy. Simpson, 299-4080 after 6.

USED CAMPING PACK & aluminum pack frame. Baxter, 298-1567.

JOB baby sitting, daytime, evenings or weekends. Graham, 265-1363.

LADY in Holiday Park area to care for elementary school children. Taylor, 299-5559 after 5:30.

PIANO, console size. Nogle, 299-3863.

2-MAN TENT. Westman, 255-6048.

FACTORY MANUAL or military TM and assorted parts for Harley 45, WWII or earlier. Mortley, 299-7840.

RIDE from Eastridge area or Juan Tabo & Constitution to Area 1. Widenhofer, 298-2510.

5 or 6 HP ENGINE, have 2 ea. 3 hp and/or cash. Weber, 298-1564.

WOMEN interested in a 3-day-weekend jaunt to Las Vegas, Nev. (cost \$55 transportation & lodging), contact Stark, 296-8084 after 6.

**FOR RENT**

2-BDR. furnished house, near bases, schools & shopping in SE Heights, available June 1. Hodges, 268-5097 after 5:30.

SITTER for summer, any age, own transportation, two children 8 & 10. Hours 8-5, Holiday Park. Fergesen, 299-1501.

SMALL, used air conditioner (window type) for small apartment. Phillips, 299-7074.

**LOST AND FOUND**

LOST—stainless steel watch w/stainless steel band; pearl tie tac; Rx safety glasses; gold perfume ring w/green stone; Motorola Pageboy radio, one-way; 8 pages from Mercedes Benz shop manual; Polaroid sunglasses; gold nugget tie tac; savings account book. LOST AND FOUND, Bldg. 832, 264-2757.

FOUND—long drop earring, white and turquoise rock; gold drop earring w/green stones. LOST AND FOUND, Bldg. 832, 264-2757.

**NEXT DEADLINE FOR SHOPPING CENTER ADS 12 NOON MAY 28**

*Soul session*



it swings!

**TOMORROW NIGHT 8:30-12:30  
CORONADO CLUB  
HAPPY HOUR PRICES**

#### Coronado Club Activities

## Soul Session Repeats Tomorrow

Tomorrow night the Coronado Club repeats the successful formula that has been packing them in once a month since last November. Take one Saturday night, free admission for members, happy hour prices and mix well with the big modern sound of Rod King and the Soul Knights and you have a Soul Session. Pizza is available from the kitchen. The troops do the boogaloo, frug, and even the sagebrush shuffle while the miniskirts are something else. You just don't hardly buy this kind of entertainment at these prices any more.

#### Social Hours

Tonight Tommy Kelly will make the happy music while Mexican food buffet is spread. Social hours start right after work on Friday evenings and continue with special prices until 9 p.m. The band plays for dancing from 6 to 9 p.m. while the buffet is spread from 6 to 8 p.m. Then the group moves to the main lounge where Pat Reich and piano entertain with a sing-along until midnight.

Friday, May 29, will be a holiday so social hour will be held in the main lounge only from 5 to 9 p.m. on Thursday, May 28.

On Friday, June 5, the regular Friday night schedule is back in effect with Sol Chavez and the mighty Duke City Brass on the bandstand. The seafood buffet will be the menu feature.

In the meantime, the mid-week social hours continue on Tuesday evenings from 5 to 8 p.m.

#### Teen Go Go

Teenagers will have their night Saturday, May 30, with something called "The Sight" wired into the bandstand. Member parents should pick up tickets (25 cents for members, 50 cents for guests) at the Club office.

#### Bridge

Ladies bridge meets Thursday, June 4, at 1 p.m. Call 299-1055 or 298-1370 for additional information. Newcomers are welcome.

Duplicate bridge meets Tuesdays at 7 p.m.



YOLANDA ADENT

#### Song Stylist

Starting Friday, June 5, Yolanda Adent (7250) will take over the Friday night sing-along sessions at the Coronado Club. Yolanda, a song stylist of considerable talent, replaces Pat Reich who is leaving Albuquerque. Tonight is Pat's last night in the Club's main lounge. It should be some farewell party.

Yolanda is no stranger to the Club. She has filled the Friday night sing-along spot a number of times and met with enthusiastic response. Yolanda passes out her collection of song lyrics and keeps urging the troops to sing. With the words in hand, it's easy.

She plays the standards, songs that people like to sing, and answers requests. She tosses out some novelty tunes and can make a production number out of a Spanish melody.

Yolanda started playing piano when she was a child of eight, took only four years of lessons, but continued to work on her own—with music and by ear. She also plays clarinet and saxophone.

At Sandia, she's secretary to Test Project Management Department 7250.

## Todos Amigos Family Day On Sunday, May 24

AEC/ALO's recreation association, Todos Amigos, has scheduled its Family Day for Sunday, May 24, from 2 to 5 p.m. at the Brunswick Iceland Bowl, 5110 Copper NE. Families will be able to bowl, ice skate or play billiards and there will be a short meeting of members to approve by-laws and elect officers. For more information call Cornelio Kabeza De Baca on ext. 7182 or Loren Klar on ext. 7873.

#### Sympathy

To Ellis Roper (7433) for the death of his wife, April 27.  
To Bill Benedick (5131) for the death of his father, May 6.

## Gala Party Opens Swim Season May 29

Swim season at the Coronado club twin pools opens Friday, May 29, with recreational swimming starting at 11 a.m. A gala patio party is scheduled from 1 to 4:30 p.m. with Mike Michnovicz (7632) and accordion providing entertainment.

Opening day of swim season is free to members. Seasons tickets are on sale, however, at \$5 for a continuous member family ticket. (A continuous member is defined as one who has been a member since last September.) Otherwise, family season swim tickets cost \$28. The swimming pool office has additional information on costs of single memberships, children, out-of-town guests, etc.

The Coronado Aquatic Club will host an invitational swim meet on June 12-13. The pools will be closed for recreational swimming on Saturday, June 13, for this event.

Independence Day will be celebrated, as last year, in grand style on the Club's patio. Games for the kids, special prices on hot dogs and beer and outdoor entertainment is scheduled.

The Club's annual Water Carnival will be held Aug. 22 and, of course, the end of the season on Sept. 7 will be reason enough for another patio party.



DIXIE FAMBROUGH (9427) reminds you that swim season starts Friday, May 29, at the Coronado Club twin pools. A gala opening party is free to members.

The twin pools are available for private party rentals weekdays after 8 p.m. and on Saturdays after 6:30 p.m. See the Club office for price schedules.

## Take Note

New Mexico Chapter of Pearl Harbor Survivors Association is seeking new members. Persons eligible may have been in any branch of the military and present on the island of Oahu, or within three miles of the island during the attack on Dec. 7, 1941. Local contact is George Demming, 255-1858. The Chapter now has 16 members.

Work by artist-craftsman Claire Haut (3412) was accepted recently for two national shows. A drawing, "Weed Bouquet," will be on display until May 24 in the 14th National Exhibition, Fall River, Mass., and a sterling silver pin and a forged necklace were in the Penwomen Biennial show in Salt Lake City, April 25-30.

In the past year Claire has won nine prizes in graphics and crafts, including second prize in abstract drawing at the New Mexico State Fair, second in jewelry at the Penwomen regional conference in California, and two honorable mentions in graphics at the Mall Opening Festival in Albuquerque.

One of her montages and a drawing were exhibited in the last Museum of New Mexico Southwestern Biennial, and her jewelry is shown at the Southwest Crafts Center in San Antonio and at Artisan's Center in Denver.

George Kinoshita (1221) has been named a "National" in the National Ski Patrol System. The honor is awarded to veteran Ski Patrolmen who have performed exceptional service for the Ski Patrol. George has been in charge of testing and training of Patrols in the Southern Rocky Mountain Division, which includes New Mexico and Colorado.

## Events Calendar

- May 22-24—Ringling Bros., Barnum & Bailey Circus, Tingley Coliseum.
- May 23—Hike to Canyoncito Spring on the east side of the Sandias. N.M. Mountain Club, leader Dorothy Clark, tel. 247-9741.
- May 23-24—Albuquerque Rose Show, State Fair Floriculture Bldg.
- May 28—Del Norte High School band concert with Tonight Show's Clark Terry, soloist, UNM Student Union ballroom.
- May 29-31—Backpack to Black Range Primitive Area. N.M. Mountain Club, leader Milo Conrad, tel. 298-2989.
- June 5—June Music Festival concert. Albuquerque Little Theatre.
- June 5-7—Corrales Adobe Theater presents Jean Anouilh's "Waltz of the Toreadors."

## LAB NEWS

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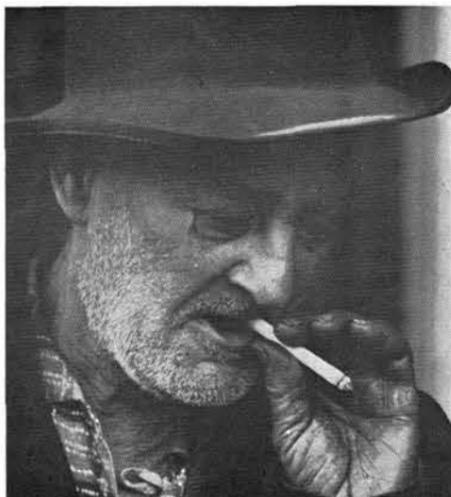
## Eaton Draper Award Given at ASME Meet

The Eaton Draper award will be presented for the first time at a dinner meeting of the New Mexico Section, American Society of Mechanical Engineers, on May 27 at the Sandia Base Officers Club.

The award will be given for an outstanding mechanical engineering design by a sophomore at the University of New Mexico. The student's name will be engraved on the plaque which will be on permanent display at Farris Engineering Building.

The award honors the memory of Eaton Draper, Sandia vice president who died in 1966. He was vice president of ASME's Region VIII.

During the meeting, six members of ASME will be elected directors for the new Medical Aids Research Foundation. This group is made up of volunteers (from both medical and engineering professions) who are interested in designing devices to aid physically handicapped people—for example, a wheelchair able to cope with a curb.



**SMOKING IS VERY SOPHISTICATED**

AMERICAN CANCER SOCIETY