

## Sandia Does Quality Assurance for SNAP 19 Units

For a handful of Sandians in Quality Assurance activities, the flyby of Jupiter this week by the Pioneer 11 spacecraft is more than a major scientific achievement—it represents a personal accomplishment.

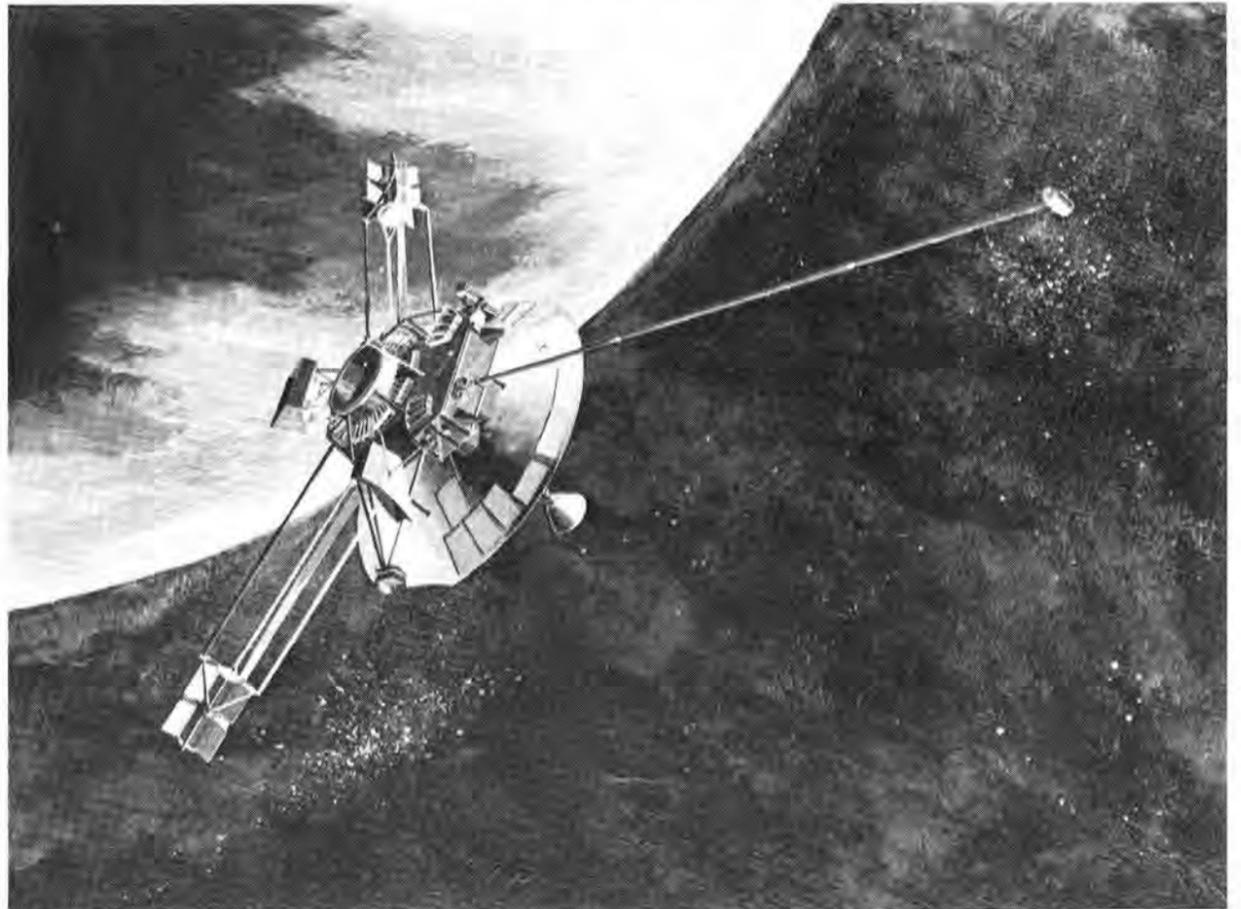
Sandians of Reimbursable and Special Project Division 9512 performed a "customer" function for Pioneer 11—making sure that the hardware for the four SNAP 19's which power Pioneer 11 met specifications.

The QA job included evaluation of the contractor's quality control operations, evaluation of the product, evaluation of the reliability program and product acceptance. Sandia has provided this service for all SNAP units since December 1967. From an annual reimbursable contract of \$50,000 with the AEC's Division of Space Nuclear Systems, the work has grown to more than a \$400,000 annual job.

Early last week Pioneer 11 had provided unprecedented photo coverage of Jupiter's three planet-size satellites and was relaying invaluable information about the giant planet's intense radiation belt and atmosphere. After the flyby of Jupiter, Pioneer 11 will orbit, gathering centrifugal force for additional speed, and then shoot on toward Saturn.

Currently, the Sandia QA group is working on SNAP 19 units to be used aboard the Viking Mars Lander scheduled for launch next year. In addition, work is starting on the Multi-Hundred Watt radioisotopic thermoelectric generator for use in the Mariner Jupiter-Saturn space craft scheduled for a '77 launch.

Bob Harnar (9512) is project leader for the reimbursable QA work. Quality engineer for the SNAP 19 program is Dale Pipher (9512), Myron Pilat (9516) is the field representative. Quality engineer for the MHW project is Bob Hannigan (9512). Field reps of Section 9516-1 under Jack Wimpling working on the program are Gary Reif, Gene Jeys and Hank Neues. Division 1641 provides reliability support to the group.



PIONEER 11 passes Jupiter. On board are four SNAP 19 generators which power the spacecraft. Quality Assurance for the SNAP 19 program is the responsibility of Sandia Laboratories.

# LAB NEWS

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DECEMBER 6, 1974

SANDIA LABORATORIES • ALBUQUERQUE NEW MEXICO • LIVERMORE CALIFORNIA • TONOPAH NEVADA

## The Stratosphere—A New Focus for Sandia

Sandia has been high into the atmosphere many times in several ways for several purposes, and the Labs has developed an expertise there that makes Sandia a candidate to pursue further stratospheric exploration. Reason: energy and stratospheric effects thereon.

In this first of two articles, we examine what is known about the stratosphere.

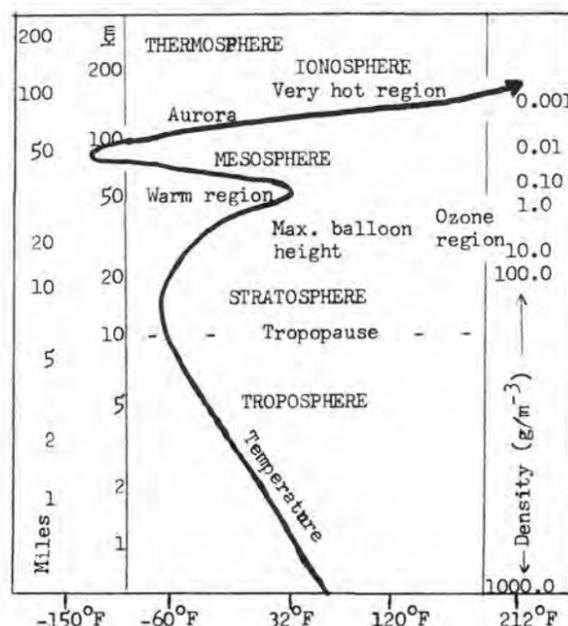
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It is probably the least understood layer of our atmosphere. But we do know that without stratospheric filtering we'd be at the mercy of the sun: present life on earth would not exist. Also known: it's the layer above the troposphere (where we live); it begins about 10 km (six miles) above sea level and continues up to about the 50 km (31 mile) level. Its precise thickness varies with season, location and solar activity.

The demarcation line between troposphere and stratosphere (the tropopause) is determined by temperature. It's true that temperature drops as higher elevations are reached, but only in the

troposphere, not the stratosphere. If you climbed a 100 km ladder straight up, you'd be cooled thoroughly at the tropopause — it's

Table 1



about 215 K, or -75°F. But if you persisted in climbing through the stratosphere, you'd note a constant temperature for a few kilometers, then a gradual rise. At the top, or stratopause, you're in 270 to 285 K (30° to 60°F) weather.

It's thin up there too. Atmospheric density at sea level is about 1000 g/m³; in Albuquerque it's 600 g/m³; in the stratosphere it gets down to 1 or 2 g/m³. Note Table 1.

But it's not a total vacuum. Gases, mostly nitrogen and oxygen (see Table 2), are found throughout, though rather sparsely at the top where it's a long way between molecules. Nitrogen, under unperturbed conditions, is chemically inactive and relatively unimportant in tropospheric and stratospheric processes. In the stratosphere oxygen is nearly transparent to solar radiation. It does, however, absorb some ultraviolet radiation which splits its two-atom molecule. A single oxygen atom may then combine with an unsplit O<sub>2</sub> molecule to form ozone (O<sub>3</sub>).

Ozone is thinly distributed, with a  
(Continued on Page Two)

# Afterthoughts

For collectors of turkey lore--Glenn Case (2114) sends this fascinating tidbit: "While turkeys are perhaps the dumbest birds alive (most commercial turkeys are bred by artificial insemination and there is some question whether the domestic turkey even knows how to make love), they are one of the most efficient protein converters alive. Their average feed conversion efficiency is about 2 to 1, compared to 5 to 1 for beef cattle." Makes one wonder what our feed conversion efficiency is--

\* \* \*

Whatever happened to the terse military declaration? "Damn the torpedoes," "Nuts!" "Sighted sub, sank same," and the like. Consider this, from the KAFB Bulletin: "Comptroller General of the U.S. Decision B-179850 dated 18 March 1974, reference (A) Paragraph M8000-2, Volume I, JTR; (B) Paragraph C1100, Volume 2, JTR; (C) Paragraph 1-1, note AFM 75-4. Subject CG decision affirms its position of 52CG 479 (1973) that a snowmobile is not defined as an item of household goods." Maybe there's a law at work here--the number of words is inversely proportional to the significance of the subject?

\* \* \*

The cafe coronary--is a term used to describe, inaccurately, what happens to a person who chokes to death while eating because food is lodged in his windpipe. Now comes a simple technique, called the "Heimlich maneuver" (after its originator, a Cincinnati surgeon), to cope with choking. Stand behind the victim and place your arms around his upper abdomen, just below the rib cage. Have him lean forward from the waist, with head, arms, and upper torso hanging down. Then, grasping your right wrist with your left hand, exert a sudden, strong pressure against the abdomen. The vigorous bear hug will force the diaphragm upward, compress the lungs and the chunk of food will be expelled.

\* \* \*

The new male mystique--"Sometimes men should be shown as quiet and passive, or fearful and indecisive, or illogical and immature. Similarly, women should sometimes be shown as tough, aggressive, and insensitive." Guidelines for Equal Treatment of the Sexes in McGraw-Hill Book Company Publications. \*js

Continued from Page One

## New Focus For Sandia

maximum of one part ozone to 100,000 parts of air. Even so, ozone is one of the most important yet least understood gases.

Its importance lies primarily in its filtering capability. It absorbs radiation in three different parts of the spectrum; two of these -- yellow-green and infra-red -- apparently play a role in absorbing incoming and outbound heat and therefore influence the

Table 2

Gas	Parts per million	Relative thickness*
Nitrogen	781,000	6.25 km
Oxygen	209,000	1.68 km
Argon	9,000	74 m
Carbon Dioxide	333	2.6 m
Neon	18	0.15 m
Helium	5	0.04 m
Methane	2	16 mm
Krypton-Zenon	1	8 mm
Hydrogen	1/2	4 mm
Nitrous oxide	1/2	4 mm

\*If all the air in the atmosphere were contained in a uniform layer of density equal to normal sea level density, and each gas had its own separate sub-layer.

warming of the upper atmosphere.

The most important absorption area is that in the ultra-violet region (2200 to 3300 A.) If this filtering did not occur, U-V radiation from the sun would be lethal in its intensity.

Ozone is formed, as mentioned, when molecules of oxygen (O<sub>2</sub>) absorb radiation and split into individual atoms. If one of these free atoms encounters a molecule of O<sub>2</sub>, it may combine to form ozone (O<sub>3</sub>). It is thought that almost all the ozone in the atmosphere is so formed -- the amount produced by the high-voltage discharge of an electrical storm is negligible.

Ozone is itself destroyed in the upper atmosphere: in the process of absorbing solar radiation of wavelengths around 2500 Å, it is

## Luminarias by Bus

The traditional luminaria tour on Christmas Eve is much more fun when someone else worries about the traffic. Like a bus driver.

And tickets for the Suntran's (né Albuquerque Transit's) bus tour are now available at Sandia, thanks to the Credit Union.

Each ticket costs a buck and guarantees you a seat on the hour-and-a-quarter tour through the Country Club, Old Town, and Los Altos areas. Buses leave the Civic Auditorium every 15 minutes from 6:15 through 8:15 on Dec. 24; be there 15 minutes early. And expect to see Santa.

(Good way for some Sandians to show the kids how they ride to work.)

## Events Calendar

- Dec. 7 -- N.M. Mt. Club, Painted Cave above Cochiti Lake, 8-10 miles, Gulf Mart, 8 a.m.
- Dec. 7 -- Albuquerque Symphony Orchestra, Seraphin Trio, 8:15 p.m., Popejoy Hall.
- Dec. 8 -- Audubon Wildlife Film Series, "Florida's Cyprus Sanctuary," 8:15 p.m., Popejoy Hall.
- Dec. 9 -- Basketball, UNM vs. Stetson University, 7:30 p.m., UNM Arena.
- Dec. 12 -- Matachines Feast of St. Guadalupe, Jemez Pueblo.
- Dec. 13, 14 -- Alb. Symphony Orch., 13th at 8:15 pm, 14th at 1:30 & 3:30 pm, Popejoy Hall.
- Dec. 14 -- Film, "Smiles of a Summer Night," Bergman, 10 am & 12 noon, Guild Theater, 265-0220.
- Dec. 15 -- N.M. Mt. Club, Cabezon Climb, Gulf Mart, 8 am.
- Dec. 14 -- Optimist's Christmas Show for Children, Convention Center, 265-3271.
- Dec. 18 -- Basketball, UNM vs. Abilene Christian College, 7:30 p.m., UNM Arena.
- Dec. 19 -- Audubon Society Lectures, 7:30 p.m., Astronomy Bldg. UNM.

converted into a molecule of oxygen and an atom of oxygen. If that free atom happens into a molecule of ozone, two molecules of oxygen result -- no more ozone.

The ozone creation-destruction cycle has been going on for milleniums, and the amount of ozone in the atmosphere has remained more-or-less constant.

Today, however, the cycle needs careful examination. Several authorities suspect that the ozone level is threatened by man-made agents, such as radioactive fallout from atmospheric nuclear tests; the chlorine emitted from aerosol cans; the nitric oxide and water vapor left behind by supersonic aircraft flying through the stratosphere; and various pollutants from fossil-fuel power plants. Each of these may be eroding the delicately balanced supply of ozone.

(Next, Ken Touryan, manager of Aerosciences Research Department 5640, discusses what Sandia can do in the stratosphere.)

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lorena schneider reports on livermore



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# LIVERMORE NEWS

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## Dave Bray Awarded Master's Degree

Dave Bray (8182) has been awarded an MS in EE from the University of California at Davis. Course work was completed under the Lab's Educational Aids Program.



The second employee to receive a master's degree through Sandia/Livermore's educational television center, Dave is enthusiastic about TV as an educational medium. "You can't make continuing education any easier," he comments. "Main advantage is you're just a few steps from your office. In addition, classes are taped for replay if you should miss one. A campus even a block away wouldn't offer that feature."

Dave joined Sandia in 1960 after graduating from Oregon State University. He's worked mostly in the design and development of telemetry for ground station and airborne applications.



GEORGE RAFAL, (8257) looks over the *Electricians Handbook and Certificate* presented to him by Hilt DeSelm (8200). George has just completed a 10,000-hour, 5-year apprenticeship course leading to his present status as an electrical plant technician. Smiling their approval are from left: DeSelm, John Pearce (8250) and George Mincks (8257).

## Take Note

Jim Swisher, supervisor of Exploratory Materials Division 8313, has been appointed to an Ad Hoc Committee on Certification for the Metallurgical Society of the American Institute of Mining, Metallurgical, and Petroleum Engineers. The committee will determine ground rules for certification of members.

\* \* \* \* \*

Rodger Page (8157) has been installed as Senior Grand Steward of the Grand Lodge, Free and Accepted Masons of California and Hawaii, the first time a member of Livermore's Mosaic Lodge has been so honored. The appointment, made annually, is based on contributions to and interest in Masonry. In his new capacity, Rodger will represent the Grand Lodge, the organization's governing body, at official functions throughout the state.

\* \* \* \* \*

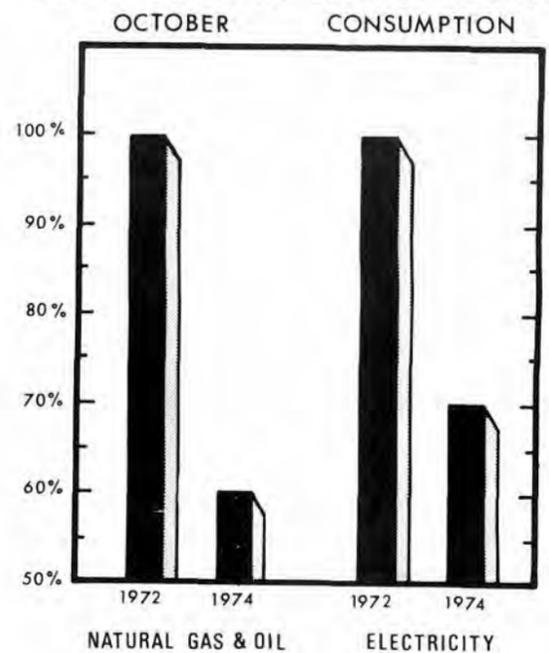
Ollie Rohrback (8431) took first place in this year's Clifford O. Erickson Memorial Golf Tournament established as an annual event by the Livermore drafting organization. Ollie shot a net score of 55 in the "blind bogey" tournament. Sandia retiree Bill Carter placed second with a net score of 57.

\* \* \* \* \*

The 1973 Livermore Employees' Assistance Plan (LEAP) Committee has

unanimously agreed to contribute its remaining one percent reserve fund to the American Red Cross for disaster relief in Honduras. Arnie Rivenes (8158), 1973 LEAP chairman, says the \$372 reserve fund is earmarked for medical supplies.

## THE LIVERMORE ENERGY PICTURE



SANDIA'S CHRISTMAS BAZAAR was a first venture success for the organizers, Pam Gibson (8168), left, and Annette Hicks (8346), here admiring a handmade afghan donated by Mary Sparger, (8261). The Bazaar netted \$800 for the mentally retarded. All items were donated by employees or family members.

# Making PLZT Is Gourmet Cooking

PLZT is remarkable stuff — a transparent ceramic with optical qualities that can be changed electrically. It can hold a photographic image, "remember" signals as in a computer memory, and achieve switching from transparent to opaque within 50 microseconds. A number of devices are under development using the material, including a flashblindness protection window for aircraft.

The PLZT materials development program is the responsibility of Gary Snow, Bob Dungan and Jim Armijo of Active Ceramic Materials Division 2521.

Producing PLZT is a time-consuming, laborious and complex task.

It goes like this:

Zirconium butoxide, titanium butoxide, and lead oxide are mixed with lanthanum acetate, butyl alcohol and water in a blender for about 10 minutes and poured into a pan and baked for 16 hours at 110°C. This removes the volatile organics. Then the batch is heated to 200°C for another hour. This ignites the non-volatile organics and the material actually glows as the organic material burns.

The batch is now placed in a ball mill with acetone and milled for eight hours to homogenize the material. Then it goes back into the oven for baking another six hours at 110°C to remove the acetone. Temperature of the batch is next increased to 500°C for 16 hours. After this phase, the material can now be called PLZT — it is atomically mixed but has to be reduced to a fine, uniform powder. This is done in the ball mill again for 16 hours in a solution of acetone. The acetone is removed by pan drying for six more hours at 110°C, then the temperature is increased to 500°C for another 16 hours to remove the residual organics and to promote homogeneity.

The task is just beginning.

Now the material is pressed into a disk shape using a steel die and a cold press at 3000 psi. The resulting slug is placed in a silicon carbide mold and transferred to a hot press. The chamber is evacuated and backfilled with oxygen. During the next 18 hours the material is brought to 900°C as pressure is slowly applied up to 3000 psi. The slug is held at 900°C for two more hours under pressure, then the temperature is increased to 1240°C and held for another 18 hours. The controlled cooling process and pressure removal takes another 65 hours.

"Then we break it out of the mold and it may or may not be any good," Gary Snow says. "A lot of things can go wrong. Any impurity (the batch is mixed in a clean room) can cause a flaw in the optical quality, improper mixing can result in cloudiness of the material, or heating or cooling too rapidly or too slowly can cause cracking and affect electrical characteristics."

Slicing and polishing complete the production of PLZT. Large slugs (5¼" in diameter, 1" thick with about the same density as steel) are produced by the Ceramic Shop, organization 3622-1, Joe Smith is keyman in this operation. Smaller slugs are produced in the Division 2521 lab in Bldg.



NEWLY POLISHED plate of PLZT transparent ceramic is examined by Jim Armijo, Bob Dungan and Gary Snow of Active Ceramic Materials Division 2521. Fabrication takes 120 hours and a number of complex steps.

807. The two slugs are produced from the same mixing batch and compared when completed.

"The development effort is aimed at simplifying the production process," Gary says. "We have achieved the electro-optical

qualities desired but before any large scale production of the material can start we have to make the process economically attractive. Since any deviation from the many steps now used causes a resulting change in characteristics, we obviously have more work to do."

## Speakers

G.C. McDonald (9623), "The Impact of the Metric System on Plant Supervisors' Problems," Annual Meeting, Southwest Physical Plant Supervisors, Oct. 11, Albuquerque.

H.H. Patterson (1730), "Mexico and the Sea of Cortez," Adult Fellowship Group, First Presbyterian Church, Oct. 15, Albuquerque.

H.G. Jeblick (9541), "Public Awareness," Oct. 16, Belen Rotary Club.

J.T. Williams (4275), "Trends in Data Processing," Albuquerque Skills Center, In-House Workshop, Oct. 17.

H.C. Monteith (9344), "Science — How Is It Important?," Science class, Ocate Elementary School, Oct. 22.

L.D. Tyler (1111), "An Oil Shale Fracture Experiment (Alka Selzer Engineering)," NMSU Engineering Faculty Seminar, Oct. 31, Las Cruces.

G.L. Cano, P.J. Brannon, J.E. Powell, J. Cuderman, M.A. Palmer (all 5243) "Laser Plasma Studies with the Sandia Four-Beam System," N.M. Academy of Science Annual meeting, Oct. 11-12, Highlands Univ., Las Vegas. G.L. Cano (5242), "The Energy Crises and New Mexico's Role," Humanities Lecture Series, U of A, Nov. 10; "The New Mexico Judicial System," Albuquerque Breakfast Civitan Club, Nov. 12.

J.R. Asay (5167) and R.A. Graham (5131), "Temperature Dependence of Longitudinal Second-, Third-, and Fourth-Order Elastic Constants of Vitreous Silica"; I.J. Fritz (5132), Invited Paper, "Ultrasonic Investigation of the High Pressure Structural Phase Transition in Paratellurite (TeO<sub>2</sub>)"; R.A. Graham (5131), "Strain Dependence of the Piezoelectric Polarization of Y-Cut and 36 Degree Rotated Y-Cut

Lithium Niobate," Ultrasonics Symposium, Nov. 11-13, Milwaukee.

M.K. Gordon (2642) and L.F. Shampine (5121), "Interpolating Numerical Solutions of Ordinary Differential Equations"; D.C. Williams (5843), "The Efficient, Scale-Invariant Determination of Starting Step Sizes for High-Order Integrators," ACM '74 Conference, Nov. 11-13, San Diego.

M.E. Kipp (5162) and G.C. Sih (Lehigh Univ.), "Brittle Fracture Considerations of Two External Notches Under Combined Loading"; L.W. Davison (5131) and A.L. Stevens (5167), "Modeling of Fracture Produced by Short-Duration Loadings"; J.W. Nunziato (5131) and E.K. Walsh (U. of Fla.), "One-Dimensional Wave Propagation in Elastic Bodies with Spatial Interaction"; F.P. Gerstle (5844), "Filamentary Composite Spherical Pressure Vessels"; R.H. Ericksen (5844), "Creep of Kevlar-49 Epoxy Composites," 11th Annual Meeting Society of Engineering Science, Inc., Nov. 11-13, Duke Univ., Durham, NC.

J.E. Powell, G.L. Cano et al (5243), "Laser-Plasma Studies of Solid Pellets Irradiated with the Sandia 4-Beam Laser," 5th Conference on Plasma Physics and Controlled Nuclear Fusion Research, Nov. 11-15, Tokyo, Japan.

L.S. Nelson, J.M. Freese, N.L. Richardson (all 5824), H.N. Planner and K. Keil (both UNM), "Correlation Between Explosion Times and Initial Molar Content for Metal Droplets Buring in Air"; L.S. Nelson and C.J. Northrup (both 5824), "The Zirconium-Oxygen Photoflash Reaction at Elevated Oxygen Pressures," Fall Tech. Meeting, Eastern Section, The Combustion Institute, Nov. 12-13, Johns Hopkins Univ., Silver Spring, Md.

# feed it iback

*Q. No-fault auto insurance has been successfully blocked by the attorneys in our state legislature, and insurance companies have held the line against reducing insurance premiums despite the significant decrease in deaths and other claims experience since the 55 mph speed limit was imposed. As a consequence, all of us are paying too much for auto insurance. We employees of Sandia Labs could save a substantial amount if we had a group plan, like our health insurance plans, through which we could pay premiums by payroll deduction.*

*Question: If a representative committee of employees worked out an arrangement for group coverage by a responsible insurance company, would the Labs permit the payroll deductions and handle the other administrative arrangements?*

A. It would be possible to offer group auto insurance to employees on Payroll deduction; however, it would result in some expense to the Laboratories and cause additional work in the administration of such a plan.

If automobile insurance were an area in which Sandia properly had an interest, such as life insurance and health insurance, additional expense might be justified, and the responsibility for the administration and adjudication might well be worth accepting. At the present time, however, we feel that automobile insurance does not fall in a similar area of interest.

R. J. Edelman - 4200

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*Q. Electronic pocket calculators are made available to many people whose jobs require one. To get one, you must accept financial responsibility for the calculator. If you wish to take the calculator home for business or personal use, a property pass must be obtained.*

*If I can't take the calculator home with less paperwork, why should I accept financial responsibility for Govt. property used for Govt. business?*

A. The electronic pocket calculator assigned to you may now be removed through the security gates, when needed for business purposes, by use of a "Limited Material Pass." When approved by your Director, this pass covers a period of one year, and may be renewed annually thereafter. If your Division Secretary does not have this form, you may obtain one from Division 4811.

Pocket calculators are a highly desirable item with a high value. As such, they are susceptible to theft and misuse to a much greater extent than most items used by an employee. For these reasons, it is sound business practice to exercise positive control by requiring individual users to sign a receipt for the property and accept financial responsibility in cases of negligence or abuse.

C. R. Barncord - 4100



MAILMEN MOVING MAIL into the sorting slots, one for each organization, then into the wagons. Front to back, Joe Holcomb, Robert Romero, Danny Baca, and Danny Sanchez (8all 3171).

## 'A Hustling Place'

# They Move the Mail

It's 7:20 a.m. A truck backs up to Bldg. 824. Half a dozen people start unloading bulging canvas bags. They pile them on a large table inside the building.

It's 7:30. One man opens a bag and dumps its contents into a bin at the apex of a V-shaped shelf. Two men stand inside the V and begin moving individual envelopes from the big bin to smaller numbered bins that make up the arms of the V.

Another day begins at the Mail Room.

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On a Monday or a Friday, as many as 40 sacks of incoming mail are received, sorted, and delivered to Sandians at their work locations.

The sorter is the key to both speed and accuracy: he picks up an item, reads only the organization number, and dumps it into the appropriate (one of nine) bins. It's all one motion — he knows the route for every Sandia organization.

Each of the route men (we've had route women, but none currently) makes a final sort, then loads up his cart. By 8 a.m. he's off, making deliveries and picking up the outgoing mail. "Sandians expect punctuality," says Ralph Campbell, who has been 3171-1 section supervisor for almost five years. "If we're early or late it seems to suggest that we're careless about the mail. To Sandians, that's bad: mail is pretty sacred stuff."

Joe Hernandez is senior clerk in the Internal Mail part of the section. "I guess our motto here is 'Move it out.' That's the way it should be — we don't want it. Problems? The most common is organization number errors. That's what we sort on — and if John Doe used to be in 3535 but isn't anymore, 3535 will still get any stuff that doesn't have his new org on it.

"Hey, tell people to put that kind back in the mail with the right org number — or at least write 'Org?' on it so we can look up the right one. It could bounce back and forth between 3535 and the Mail Room forever otherwise."

The route men carry more than the mail. New phone books for instance. Each route

man keeps a count of how many people at each mail stop. He uses it to get the right number of LAB NEWS's, Sandia Bulletins, Safety Bulletins — and phone books — to the right place.

Before we regained consciousness inside a mail sack on the way to Pantex, we remember asking Joe how he liked sweeping reorganizations...

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Much of the stuff that comes in off the routes goes to the External Mail group. They perform something of the same kind of sort — a box for Livermore, AEC, LASL, LLL, KAFB, Bendix, etc., plus a first class outgoing. Tony Lopez is senior clerk. "We ran \$132,000 worth of mail through the postage meter last year. Of course, much of that amount was classified mail and therefore registered — at 95¢ an item. But it's still a lot of mail, some 6000 pieces a week."

Except for local AEC and KAFB mail, the boxes and the loose mail in sacks, canceled and sorted by destination, go directly to the Base Post Office and from there to the Airport. (Almost all first class mail going any distance goes air mail regardless of postage.) "We're almost certainly the Albuquerque Post Office's biggest customer," says Ralph, "but they seldom see us downtown except for an occasional bulk mailing."

Chet Fornero is Photo and Mail Services (3171) division supervisor. "I'm new in this job and I'm impressed. We handle maybe a million pieces each year — it's a hustling place." • bh

## Sympathy

To Bill Elskes (9711) on the death of his mother-in-law in Albuquerque on Nov. 13.

To Salomon Moya (9713) on the death of his brother on Nov. 8.

To Pablo Garcia (9718) on the death of his sister in Albuquerque, Nov. 21.

To Michael Valerio (3646) on the death of his sister in Albuquerque, Nov. 21.



## A Scenario

# Robin Hood & William Tell, Meet Howard Tessler

**Characters:** Robin Hood of Sherwood Forest  
William Tell of Switzerland  
Howard Tessler of Sandia (9324)

**Time:** The Present

**Scene:** An archery range in Tijeras Canyon. Tessler is working with an arrowhead and an oil stone. At his feet is a leather case.

*(Tell and Hood enter, carrying longbows and arguing)*

**Hood:** Well, shooting an apple balanced on the head of your son bordered on the foolhardy. Couldn't you have used a pumpkin? Poor boy.

**Tell:** You don't understand. Gessler the Tyrant set the rules. I had no choice . . . *(to Tessler)* Oh, hello there. I'm William Tell — don't believe we've met.

**Tess:** Hi. I'm Howard Tessler. And you must be Mr. Hood. Glad you could make it over.

**Hood:** My pleasure. Pray tell, what are you doing with that arrow and those little steel strips?

**Tess:** The strips are called injector razor blades. The arrowhead is designed to hold four blades just behind the point, like this. But they're for bowhunting, not for target work. *(Hood reaches finger)* Careful, Mr. Hood, they're sharp.

**Hood:** Ouch! too late, I fear.

**Tell:** I trust your cut finger won't interfere with our competition.

**Hood:** Goodness no. You see, I'm ambidextrous — what you call, I believe, a switchhitter. I can shoot my longbow as well with my left hand as my right.

**Tess:** Yew, I suppose.

**Hood:** Yes, it *is* me, isn't it? That's just what the bowyer who made it said. It's made of lemonwood.

**Tell:** That's a strange bow hanging on the bow rack there.

**Tess:** That's a recurved bow. Until recently, it was about the only major improvement in bows since your longbows. There are still some around. That extra curve above and below the handgrip means it doesn't have to be as long as yours, but it still delivers the same power. Would you gentlemen care to shoot a few warm-up shots while I get my new bow ready? *(opens case)*

**Hood:** Oh, I'm always warmed up . . . You see, I could never tell when that loutish Sheriff of Nottingham would be lurking in ambush.

**Tell:** If you're not going to warm up, I won't either. Besides, I want to see what Mr. Tessler has in that case.

**Tess:** Come and look. This is the grip. It's made of magnesium for strength and light weight. See how well my hand fits it?

**Tell:** But where's your bow?

**Tess:** This is it. It's a take-down, or, more precisely, a take-apart. You carry it in the case, then put it together when you're ready to shoot.

**Hood:** Your Sheriff must not lurk much.

**Tess:** True, true. These limbs lock into the grip to make up the bow itself. Then I string it like this. The whole bow weights only 4½ pounds.

**Hood:** Pray tell, why the pulleys on each end?

**Tess:** The bowstring hooks on each end to

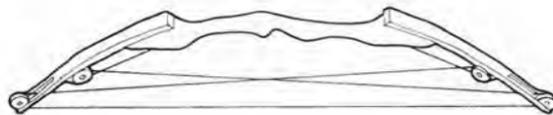


ARCHER Howard Tessler reenacts bowdom's climactic moment.

steel cables which go through the system of pulleys.

**Tell:** But the pulleys on the ends of the bow aren't centered; their axles aren't in the middle. Is workmanship so bad today?

**Tess:** Probably. But these pulleys are deliberately offset. That's the secret of a compound bow. With yours, you see, it takes a steadily increasing force to pull the bowstring back. And then you've got to aim while exerting a steady 50 pounds or so of pull. With my compound, the offset pulleys gradually get pulled around the ends



of the bow and back down on the other side. I'm pulling 50 pounds only when the pulleys are way out at the ends. As I pull to full draw, the pulleys allow me to aim while holding only, say, 35 pounds draw-weight.

**Tell:** Oh, I see. You can aim more accurately because you don't have to pull so hard, but you still get 50 pounds of force to the arrow. Amazing. *(Muttering)* Why couldn't our watchmakers think of that?

**Hood:** Whatever are those strange things sticking out near the handle?

**Tess:** They're just stabilizers. They help to steady the bow during the split second when the string is released.

**Tell:** What's this on the grip?

**Tess:** An arrow rest . . . it minimizes friction as the arrow leaves the bow, and it's a better platform for an arrow than my thumb.

**Tell:** And this little button with the hole in it that's woven into the string?

**Tess:** That's one kind of sight. I look through it along the top of the arrow toward the target. Some archers use telescopic sights, but I don't.

**Hood:** And this one without a hole in it and a little lower than the sight?

**Tess:** That's the "kisser" button. When I'm at full draw, the button is right against my lips. It helps me hold the bow in exactly the same way every time I shoot.

**Tell:** With a rig like that, I suppose you can hit that target 80 yards out almost every time.

**Tess:** Oh, yes. But that's not so great. Really good shooters hit the bullseye consistently. In fact, many of them can regularly hit the little aiming spot in the middle of the bullseye. You guys ready to shoot?

**Hood:** Well, I really must get back. You guys go ahead.

**Tell:** No, I probably better get back too. Glad I met you, Tessler. *(they stroll off)* You know, Robin, with a bow like his, you could have robbed a lot more from the rich, given just as much to the poor, invested the difference at 9.5%, and had yourself a tidy retirement income.

**Hood:** Very true — and you could have split a pea on your son's head. You know, I wonder how you could rob all these rich people going through Tijeras Canyon.

**Tell:** You open a gas station, see, with a little wrecker business on the side . . . *(they exit)*

CURTAIN

## New Operator for Rocky Flats

The AEC's Rocky Flats Plant near Golden, Colorado will no longer be operated by Dow Chemical after June of next year. According to the AEC release, Rockwell International-Atomics International Division will take over at that time for a five year period. Dow, which had operated the plant for 22 years, decided not to compete for the new contract. Most of the 2900 employees at Rocky Flats are expected to remain. The plant is a production facility in the weapons complex and is part of the Albuquerque Operations organization of AEC.

# A Collection

# of Skills



AMONG THOSE making significant contributions to the Sandia Vertical Axis Wind Turbine project were 1. Ray Perry (3644) 2. Manny Lucero (9713) 3. Nabor Rael (3622) 4. Sam Tabet (9713) 5. Tony Saavedra (3644) 6. Don Mitchell (3644) 7. Joe Langdon (3622) 8. Jim Bedeaux (3613) 9. Teddy Chavez (3622) 10. Ernie Cordova (3644) 11. John Cronin (3622) 12. Bob Knight (3622) 13. Ken Shinn (3733) 14. Charley Bates (3623) 15. Bob Vermillion (3623) 16. Lou Baudoin (9655) 17. Bob Stewart (3622) and 18. Blythe Wemple (3622).

Sandia's newest landmark — the vertical axis wind turbine on the roof of Bldg. 802 — was the scene recently of a reunion of sorts. Lou Feltz (5623), system designer, called a meeting of all the people from the Process and Fabrication labs and others who had contributed to the project to congratulate them.

"The wind turbine is meeting preliminary design specifications," Lou announced. "We have a high performance system. Although testing is only beginning, we can say that the wind turbine's performance is remarkable."

It was gusting when the group gathered, and wind speed was averaging about 30 mph. The whirl of the moving air-foil shaped blades was impressive. As they drove into the wind, the velocity of blade tips exceeded 250 mph.

"That's energy," Lou said. "That is first-class, economical energy."

Intent of the Sandia wind turbine program is to demonstrate that such a self-contained system — designed for use in isolated communities or other power-need situations — could be built economically and compete with other more conventional power generating systems.

"That's why the cooperation of the shops in this project was so important," Lou says. "We wanted all the help and suggestions we could get on economical ways to build the wind turbine. And we received help all down the line."

The wind turbine project was initiated last October by Randy Maydew, manager of Aerodynamics Projects Department 5620. Randy, Ben Blackwell (5628), project leader, and Lou met with Jim Kenagy (3640) and

other shop experts to outline the program and discuss in-house fabrication.

"We welcome the opportunity to discuss a project in its early stages," Jim says. "If we know the program goals and some of the design problems, then we can suggest ways to save time and money. Our people take pride in their skills and are eager to make a contribution."

The wind turbine project leaders also met with Plant Engineering and Safety representatives about the 802 installation. "Here again," Lou says, "we received excellent suggestions and cooperation."

"Early in the planning," Lou continues, "we realized that we needed something to help us explain the device — a model that would show the vertical axis wind turbine and demonstrate the positive driving thrust of the thin air foil blades. Tony Saavedra (3644) did this job for us and he worked from very rough sketches."

Lou Baudoin of Project Design Definition Division IV 9655, designer/draftsman for the wind turbine project, worked closely with Lou Feltz throughout the project. He also worked with B.C. Brown (3623), supervisor of the Sheet Metal Shop, in devising a way to break form portions of the turbine blades from stock sheet metal. And Baudoin, a classic car fan, donated a 1936 Dodge handbrake lever to the cause. It went on the turbine braking system.

Key man for the project during fabrication in the Shops was Don Mitchell (3644). He prepared materials lists, wrote sub orders, and kept up-to-the-minute files on the status of every part as the work progressed.

Jim Bedeaux (3613), alignment and measurements specialist, contributed his skill before the two halves of the center shaft were welded, and again as work progressed on the turbine blades.

Blythe Wemple (3622) and the men in the Plastic Shops constructed the blades. Blythe worked out a process to fabricate the fiberglass blades around a thin steel shaft. Bob Stewart and Bob Knight (both 3622) built the prototype blades. A high gloss polyurethane paint was applied to the blades by Joe Langdon (3622) and other painters of the paint shop. The blades were actually balanced by the paint coatings.

Charley Bates and Richard Lopez, (both 3623) of the Welding Shops fabricated the large center shaft and the supporting tower structure. The tower was lifted onto the roof by crane. Millwrights under Jim Winter (9713) assembled the turbine on the roof. (The term "millwright" was originally applied to artisans who worked on English windmills in the 16th century.)

Procurement of special materials was a problem throughout the project, and Division 3613 under Cliff Taylor searched the market for suitable materials. Ken Shinn (3733) handled the buying of the commercial parts used in the turbine.

"Machinists, welders, painters, plastics craftsmen, millwrights and a lot of other specialists made significant contributions to the project," Lou says. "As those blades whirl around up there, we can all feel satisfaction from the job." • dg

# MILEPOSTS

## LAB NEWS

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Phil Nicovich - 9655

25



George Wladika - 9651

20



Margerite Miller - 3152

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Josephine Gibbons - 1522

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Roy Dell - 9626

20



Cecil Russell - 5821

25



Arthur Barth - 2514

25



Pablo Maes - 2113

20



Don Stoner - 8183

15



Charles Bates - 2331

20



Howard Lindell - 1514

25



Cecil Fitzgerald - 3617

10



Ramona Anderson - 8214

10



Edward Neidel - 2316

25



Cliff Taylor - 3613

25



Allie Whitmore - 4812

20



Gil Esquibel - 8183

15



Roland Millican - 9421 25



Alfred Bouton - 9481 15



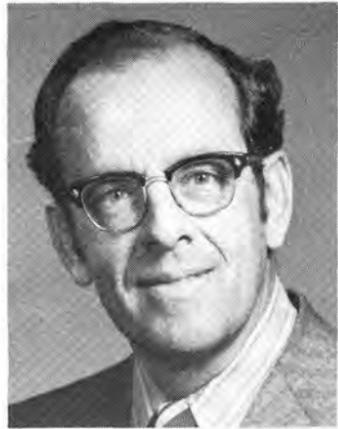
Bertha Frick - 8433 15



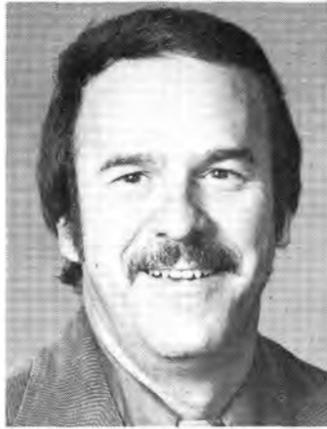
Wayne Ebaugh - 5243 15



Richard Rogers - 4151 10



Dick Vivian - 1611 20



John Boyes - 3723 25



Chuck Wells - 9718 25



Jack Cyrus - 5712 15



Fred Eichert - 9610 25



Emery Postenrieder - 4252 15



Barcus Keller - 9711 25



Ron Wishart - 8252 15



Terry Demaree - 9332 10



Rocky Arroyo - 9751 15



Bernadine Ross - 3141 15



Cecil Page - 9484 25



Wanda Cupp - 3321 15



Al Kaping - 3732 20

## Take Note

Ralph Griffin (5725) isn't one to abuse a benefit. He joined Sandia as a modelmaker in February 1952 and retires this month from his favorite job; he's a Staff Assistant doing everything there is to do with reentry vehicles. And during that almost 23 years he has not once used any sick leave. Here's to your health, Ralph!

\* \* \* \*

Election of officers is the main agenda item at the Dec. 12 meeting of Chicano Unidos. Members will meet in the Hospitality Room of the Public Service Bldg., downtown at 5th and Silver SW, 7:30 p.m.

\* \* \* \*

The public is invited to a performance, a very "Casual Concert," by the Albuquerque Lesser Symphony Orchestra on Dec. 9, 7:30 p.m., on Stage II of the Univ. of Albuquerque's Fine Arts Learning Center. There is no admission charge. John Gaston, ALSO's conductor, will lead the orchestra in six selections. Compositions by Rossini, Purcell, Mozart, and Beethoven are planned. Gary Derbenwick (2113) will be heard as the violin soloist in "Danse Macabre" by Saint-Saens. The final work on the program will be "Christmas Music for Orchestra," arranged by John Cacavas.

\* \* \* \*

Sandians interested in the proposed land swap between the U.S. Forest Service and the Sandia Peak Tram Co. are invited to read the Draft Environmental Statement prepared by the Forest Service, now available in the Tech Library. The Tram Co. is offering two tracts of land, a 160-acre parcel in Embudo Canyon (east of Indian School Road) and a 160-acre parcel adjoining the Carson National Forest northwest of Tres Piedras, in exchange for 160 acres near La Cueva Picnic Area and the Sandia Heights development. In addition to the Statement, response forms give you a chance to attack or defend the proposed swap. Check out the Statement, for use in the Library, at the Circulation Counter.

\* \* \* \*

The 5100 Seminar Tuesday, Dec. 10, will feature Bernie Hulme (5122). He will discuss "STFODE COLODE: Subroutines to Solve Stiff Ordinary Differential Equations by Collocation." The Seminar meets Tuesday mornings at 8:30 in room 201, Bldg. 806.

\* \* \* \*

*Southern Avenue users* — An item in the KAFB Bulletin of Nov. 26 states that the city will barricade Southern Avenue between Eubank and Juan Tabo because traffic is raising too much dust. The date of the closing is a little vague—"... within the next couple of weeks."

## Congratulations

To Floyd Braaten (3623) on the birth of a son, Floyd III, Nov. 26.

NEW SUPERVISORS — Dirk Dahlgren (1723), Bob Gregory (2140) and Danny Seager (3144).



## Supervisory Appointments

DANIELLE SEAGER to supervisor of Technical Library Systems, Reference and Periodicals Division 3144, effective Nov. 1.

Danny joined Sandia in January 1970 after teaching seventh grade science classes at Princeton, N.J., for three years.

She holds a BA in physics from Mount Holyoke College, earned in 1965, and will finish her Masters' work in computing science at UNM this month.

Except for seven months spent in systems analysis in Division 4734, Danny has worked in Sandia's Technical Library. She is a member of the American Physical Society.

Danny and her husband Carleton, a staff member in Electrical Transport Division 5155, reside at 8521 Northridge NE.

\* \* \*

BOB GREGORY to manager of Integrated Circuit Process Department 2140, effective Dec. 1.

Bob joined Sandia in October 1963 after earning a PhD in Electrical Engineering at Carnegie Tech, Pittsburgh. He received his BS there in 1960 and MS in 1961.

Supervisor of Device Design and Processing Division 2113 since Oct. 1969, Bob's new responsibilities will include bringing the microelectronics and integrated circuit laboratories now under construction in Bldg. 870 into operation.

Before transferring to the integrated circuits area, Bob was involved in studies of radiation effects upon materials and devices. He is a member of IEEE.

The outdoors is Bob's primary recreation interest — he's just returned from a successful deer hunt — and he enjoys long-distance running. In the summer he works a large garden. Cold weather sees him inside listening to opera and stringing trade beads.

Bob and his wife Maggie live at 1614 Bayita Lane NW with their three daughters — Gwen, 9; Ginger, 7; and Lee, 4.

\* \* \*

DIRK DAHLGREN to supervisor of Reactor Safety Studies Division 1723, effective Dec. 1.

Dirk joined Sandia in June 1964 after earning an MS in Mathematics at the University of Wisconsin. He worked in weapons effects studies until September 1968 when he was one of the first Sandians chosen for the Doctoral Studies Program. He earned his PhD in Mathematics from UNM in July 1969 and has been involved in systems analysis and reactor safety studies since. He is a member of the American Nuclear Society and the Institute of Mathematical Statistics.

Dirk divides his leisure time between the intellectual game of Go ("I'm really intense about Go," he says) and playing basketball in local leagues.

Before joining Sandia Dirk spent two years with the Army. He was stationed in Virginia and performed numerical analysis for the Transportation Research Command.

Dirk and his wife Pat live at 1508 Cedar Ridge NE with their four children — Eric, 4; Stephanie, 9; Mike, 11; and Lisa, 13.



SECRETARIAL WORKSHOP, one of a series for Sandia secretaries, is here shown at the 4-Seasons where the group listens to Bob Edelman, Director of Personnel 4200. The one-day workshops are set up by Education and Training Division 3131.

# FUN & GAMES

**Bowling** — Nearly 100 members of the Sandia Labs Bowling Association competed in the 11th Annual Handicap Tournament last month. Coming up next, on Dec. 14 and 15, is the SLBA Mixed Doubles and Singles Tournament, to be held at Fiesta Lanes. Two classes will compete — Class A, those averaging 150 or more, and Class B, for 149 or less. The handicap is 70% for men and 80% for women. Joe Stiegler, ext. 1400, and Carl Smith, ext. 4450, have additional details.

## Retiring



Frank Mistretta (2325)



**NEW CREDIT UNION** addition, 2400 sq. ft. of working space, opened last week with this group on hand for the occasion. From left are Red Turner, CU assistant manager; Joe Miller (4154), secretary; Earl Simonson (4152), president; and Clarence Sandy (9533), vice president. Some 1400 new safe deposit boxes are now available to members. Plans are underway for a 1900 sq. ft. Credit Union building to be constructed at Livermore.

### JUNK • GOODIES • TRASH • ANTIQUES • KLUNKERS • CREAM PUFFS • HOUSES • HOVELS • LOST • FOUND • WANTED • & THINGS

**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

4 DATSUN used tires, 6.00x12, \$2 ea., still have 1/8 or more tread. Gorney, 898-2667.  
 CYCLISTS: 1 pair of 27" Mavic alloy rims for tubular (sew-up) tires, \$10 pr., spokes for same also. Stuart, 265-7315.  
 CALIF. RABBITS (5) 3 mos. old, \$3 ea.; (7) 6 wks. old, \$2 ea. Schallert, 298-8942.  
 SKIS for beginner or intermediate, Kastle CPM-70, 195cm, \$40. Fienning, 268-6597 after 5.  
 LIGHTING plant, 5-kw Kohler 660, generator good condition, engine needs work. \$400. Barnaby, 265-4353.  
 14" CAR wheels from '65 Mustang, \$4 ea. or 4 for \$15; rocking chair, dining room table & chairs, king-size bed cover. Chandler, 296-3323.  
 PUREBRED German Shepherd, no papers, 6 mos., male, all shots, \$7. Mehl, 345-1076.  
 SKIS & ski boots, \$60. Oberst, 299-1224.  
 ZENITH TV, 23", b&w, '64 table model M2717, roller stand included. Swayze, 268-5222.  
 CATALINA solid state stereo receiver, AM/FM, 70 watts, 2 cabinet speakers, MGA 8-track tape deck, BSR 4-spd. auto turntable, \$175. Daut, 255-2529.  
 DOUBLE BED, extra firm, used 6 months, no headboard. Hartwigen, 298-1071.  
 PHOTOGRAPHIC enlarger & related equipment & materials. Swain, 265-0098 or 255-7003.

ONE white Samoyed male puppy, \$50; three black & white Samoyed cross puppies, \$5 ea., for Xmas. Daniel, 821-8689.

ENGLISH Springer Spaniel puppy, AKC registered, liver & white, male, family companion & hunter. Barth, 345-0172.

EUROPEAN health spa membership, take over payments, \$8.73/mo. Adent, 293-3715.

DOBERMAN puppies, AKC registered, bred for gentle temperament. Bower, 299-5765.

ACCORDION "La Melodiosa" 120 bass, black w/case, \$200. Chavez, 881-2711.

SEARS stereo radio combination, needs repair; Kenmore washing machine, needs repair; violin, has been appraised, best offer. Huston 842-1831 after 7.

SOLID-OX torch, \$20; room divider, \$5; 3 outdoor Christmas choir angels, \$15; blonde step table, coffee tables, \$2.50 & \$15. Carter, 296-8709.

BOYS 20" Schwinn Junior Sting-Ray, new tires, new seat w/carrier, flag & fenders, lists for \$72.95, price \$35. Crompton, 299-5569.

OLIVETTI 12 digit calculator; Remington 15" chain saw. Bashaw, 266-1614.

BUMPER pool table, slate bed, levelers, complete w/ball & cues, \$70. Wilkins, 299-4926 weekends & after 5.

AKC German Shepherd puppies, 6 wks. old Dec. 12, calm & intelligent, hips guaranteed. Shay, 299-2634.

PING PONG table, folding w/wheels, equipment included, needs some repairs, \$10. Miller, 255-6838.

POOL table, 54"x28", ball return, 2 cues, rack & new set of 1 1/4" balls, \$50. Asselin, 299-9270.

SKI BOOTS, Nordica Pro, fits shoe size 9, used 1 yr., new \$135, sell \$35. Horton, 298-4449.

DINING room set, limed oak, 2

piece china cabinet, 6 chairs, rectangular table with 2 leaves, \$150. Adams, 881-4351.

PIGS, Hampshires, 4 mos. old, \$20 to \$25 ea. Butler, 873-2867.

HOUSEBOAT, 17 x 7' (12x7' cabin), foam-filled wood pontoons, ice box, sink, water tank, 25 hp. outboard motor, needs some maintenance, \$350. McCampbell, 292-2762 after 5 p.m.

CHECK writer; 8-track auto tape player; AM/FM push button radio, 12v for VW, works but needs work. Tessler, 296-1025.

FLYING Club Membership: Cessna 172, \$10/hr. wet. Oliver, 299-5512.

AKC Black Lab puppies, 8 wks. old, \$40. Nelson, 294-5352.

6 SQUARE dance dresses, 3 petticoats, pantaloons, 4 Fiesta dresses, sizes 8-12, reasonable offers accepted. Shead, 292-2420.

SEARS Kenmore 21G-2AG sewing machine w/cabinet, recently serviced & tensions adjusted, \$80. Kaiser, 296-5215.

FRESH frozen Texas Gulf shrimp, all sizes, wholesale prices. Newsom, 299-2074 after 3.

GETZEN trumpet, silver, w/case, Doc Severinsen model, \$250. Whelchel, 299-1134.

BROWN tweed stuffed rocking chair, \$25; lots of indoor Christmas lights, balls & creche, \$10. Duvall, 255-3326.

B & W television, 19", in maple cabinet, \$50. Denton, 298-0566.

H & R Huntsman .45 cal. muzzleloading rifle, \$60; bullet mold, \$7. Stephenson, 299-3914.

MEMBERSHIP in Flying 8 Club, '65 C-150 (club also has C-182) \$500 membership, \$17/mo. dues, \$7.50/hr. wet. Ford, 294-6133.

NYLON tires & heavy duty wheels for Chev. van, 4 hiway on 14" x 6" rims, \$5 ea., 2 mud & snow on 14" x 7" rims, \$7.50 ea. Baxter, 344-7601.

HOLLYWOOD bed frame, \$4; girls 20" Schwinn bicycle w/banana seat, \$20. Peterson, 256-7514.

#### TRANSPORTATION

BICYCLE, men's, English lightweight, 3-spd., caliper brakes, kickstand, odometer, thorn resistant tubes, \$35. Joseph, 299-6989.

SCHWINN, Fair Lady, 3-spd., \$50 firm. Finlayson, 296-4538.

'63 U-Haul Van, 1 1/2 ton, 16' alum. box, \$2195. Browne, 344-0560 or 881-3772 after 6.

'72 OLDS Custom Cruiser station wagon, 2-seat, cruise control, HD cooling system, 36,000 mi., \$2900. DeWerff, 298-1029.

'59 PORSCHE, \$300. Mason, 296-7267.

'73 HONDA SL70, \$275. Barnes, 898-2375.

'73 CHEVY pickup, V8, long wide box, dual exhaust, stereo tape deck, \$2645. Johnston, 247-1448.

'73 GRAN PRIX, 13,000 miles, all options, \$6600 list, sell for \$4600. Lutheran, 293-8364.

'74 HONDA Elsinore 125, all eqpt, dirt and street, 76 miles/1.7 gal; AMF 10-speed. Alger, 294-6259.

'73 GRAN TORINO, dark green, \$3150. McMurtrey, 881-0390.

'72 CHEV. Vega GT, 4-spd., hatchback, \$1525. Baczek, 255-3429.

YAMAHA, Mini Enduro, Hooker expansion chamber, high compression head. Warren, 256-1334.

'71 CHEV. Impala, 2-dr., PS, PB, AT, AC, vinyl top, 350 V8, new tires, 51,000 mi., \$1950 or best offer. Trudo, 299-6449.

'68 FIAT 850 Spider, new clutch. Olsen, 881-2761.

'64 FORD station wagon, Galaxie 289 eng., AT, \$275; '60 Ford pickup, SWB, 6-cyl., 4-spd., \$300. Wilken, 299-7515.

#### WANTED

TELESCOPE, reflecting. Moss, 298-2643.

CYLINDER parts for Kawasaki, Model W1 or W2, 650cc motorcycle; will consider complete MC for parts. Mortley, 299-7840.

APARTMENT Mgr., apt. plus salary for retiree, minor maintenance. Mhoon, 294-5071.

RETIRED Sandians/AEC for weekend house-, pet-, and/or baby-sitting. Call 264-7841 for Job Reference Service Form.

HOUSE SITTING by responsible mature woman, Mrs. Johnson, 293-5902 or 299-0855.

'67 VW BUG. Kepler, 298-5652.

#### FOR RENT

3-BDR house, 1 3/4 baths, large yard, NE Heights, \$200/mo. plus \$125 damage & cleaning deposit required to move in. Bartlett, 299-4861.

3-BDR house, available Dec. 20th, appliances included, water pd., \$200/mo., lease required, first & last month rent & \$75 damage deposit. Richards, 266-9673.

FOR LEASE: 3-Bdr., large den w/fireplace, carpeted, with or without furniture, near Constitution & Eubank, \$200/mo. Adent, 293-3715 or 345-9393.

#### REAL ESTATE

4-BDR. home, 2400 square feet, Valle Encantada Addition, near El Dorado High, \$45,000, terms negotiable. Fimple, 296-2925.

#### LOST AND FOUND

LOST—Maroon & blue ski jacket; brown key case; brown fur hat; women's dark glasses; turquoise earring; Singer calculator; clip-on sunglasses; brown pipe; clip-on Polaroid sunglasses; man's Coultre gold watch w/leather band.

FOUND—Tooled leather eyeglass case; brown wire rim sunglasses; ladies RX wire rim glasses. LOST & FOUND Bldg. 832, Tel. 264-3441.

**PRISONERS • C-CLUB • PUPPETS • NEW YEAR'S EVE • RUIZ & VILLA • CHEWIWIE**

FRIDAY	SATURDAY
6 — SUPERHAPPY HOUR Adults \$2.75 Under 12 1.75 <i>Ruiz &amp; Villa On Stage</i> PRISONERS	7 — SANADO CHRISTMAS DANCE Cocktails 6:30 Dinner 7:30 Dancing 9:00 KEN ANDERSON
13 — HAPPY HOUR <i>Barbara in Lounge</i> No Buffet	14 — KIDS CHRISTMAS PARTY 10 a.m. Members Only

**CHRISTMAS** — means good fellowship with good fellows — and good gals too — talking skiing and dancing to Sol Chavez and not worrying about moguls or sitzmarks and seeing and hearing a slide-sound show and generally having a fine time, snow or no snow. It's not quite too late for reservations — call Gerry Barr at 4-3836 *now* — for the Ski Club Party on the 17th.

**IS** — there a bigger buffet bargain in town? Doubtful. It's the Superhappy Hour tonight, with shrimp and lobster thermidor, hand-carved round of roast beef, stuffed chicken breasts, hand-carved ham, and more. Only \$2.75. Call your spouse and meet him/her there. Music for listening, eating, visiting, and dancing to too.

**COMING** — kids? Tell your Mommy and Daddy that all you want for Christmas is a puppet show, cartoons, and Santa Claus. The Club's Kids' Christmas Party is the 14th at 10 a.m.

**THE** — Club will be closed Christmas Day.

**GOOSE** — and duck and chick (and all the rest of you) better scurry, or else you'll have a New Year's Eve worry — like where to find the most exciting New Year's Eve Party in town. Hats, noisemakers, confetti, dancing



**DAZE YOUR KIDS** at the Day's puppet show, featuring Albert and Zelda and their friends. Ron and Mary Kay and their entourage (plus Santa in person) at the Kids' Christmas at 10 on the 14th.

(to Frank Chewiwie and Bob Banks taking turns), buffet breakfast (including champagne) all for \$9 per member couple, \$12.50 guest couple. But scurry — tickets must be picked up *by Dec. 21*.

**IS** — Mr. FreeBee still roaming Happy Hours? You bet your bottle!

**GETTING** — to be time for organization

parties. That means Happy Hours are in the Lounge only on the 13th and the 20th.

**SCARED** — you've missed Sanado's Christmas Gala this year? You haven't — if your reservations were in on time. Don't forget tomorrow night.

**MORE INFO** — 265-6791.

**SOL CHAVEZ • LOBSTER • BANKS • BARBARA • CONFETTI • HAM • CHAMPAGNE**



**ANDY BLAIN** (in hat) of Redistribution and Marketing Division 4822 explains to staff at the Rehabilitation Center how broken pallets should be repaired. Jeff Gammon from Purchasing (behind Andy) has contracted with the Rehab Center for pallet work, which will be done by people with handicaps. Andy states that the Labs has a continuing supply of broken pallets.