



**SURPLUS** locomotive, scheduled for a spectacular demise in Area III in January or February, is lifted onto a flatbed truck for transport. The unit, sans wheels (or trucks as they're called), weighs 125 tons. It will be propelled by rockets at 80 mph down Sandia's sled track to impact into a truck containing a shipping cask with simulated waste nuclear fuel. Test will measure the cask's integrity under "worst kind" of

transport accident. Truck and locomotive will also be subjected to a fuel fire during and after impact. At left are Dave Bickel and Bob Lucas (both 9335), responsible for conducting the test. Richard Yoshimura (5432) is project engineer. Harold Rarrick (9411) is test project manager.

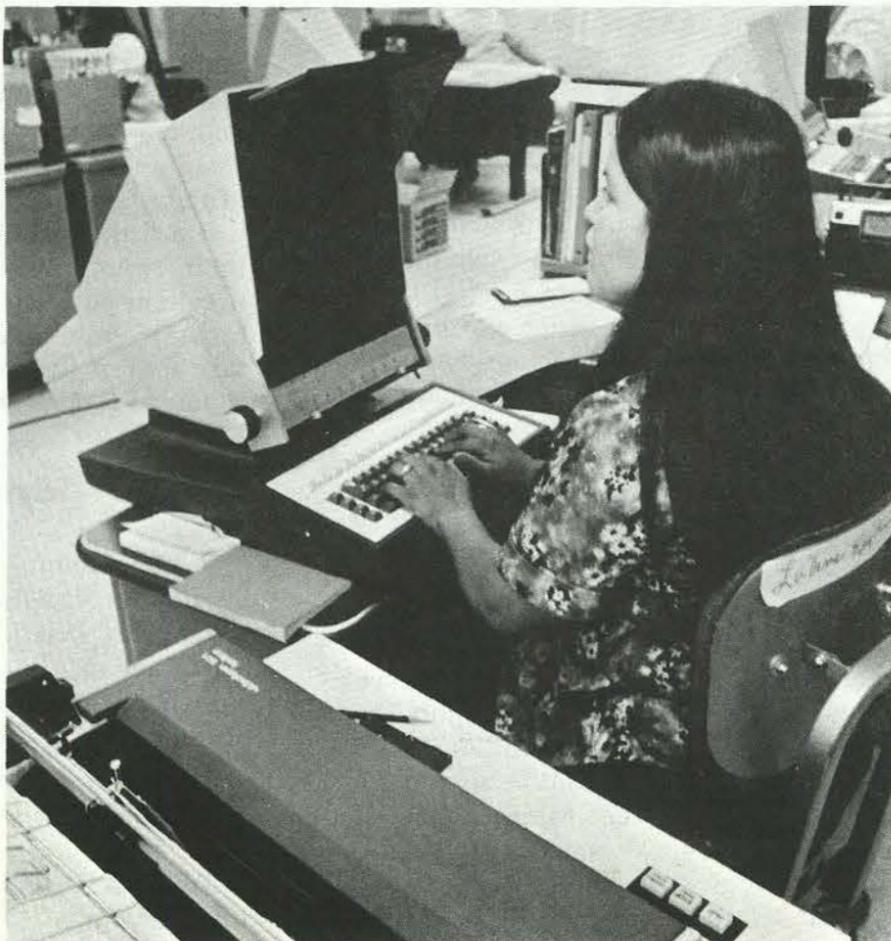
# LAB NEWS

VOL. 28, NO. 19

SEPTEMBER 17, 1976

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

**WORD PROCESSING**—La-Verne Keyonnie of Design Information Division 9631 watches screen of cathode ray tube as she types specifications. Text appears on screen and corrections are quickly made without need for erasure or opaueing. Printer is in foreground. Lexitron is manufacturer of this equipment. Wider use of word processing is planned for Labs.



## Word Processing Is Coming

Back around 1880, a Mr. Remington was promoting a singular contraption called a typewriter. Rendering a sort of printed word, the typewriter ultimately spelled the end of the charming-but-not-very-fast handwritten letter in the world of commerce. The next quantum improvement in this world was the electric typewriter, which came along in the mid-'30s. Copying machines have since appeared to relieve the secretary of the onerous job of making copies.

In truth, however, the actual process of producing typed copy has not been substantially altered for almost a century. It is a process that tends to be extravagant in terms of the typist's time because she (or he) may type the same sentence or paragraph over and over again as the document undergoes revision. For example, a scientific report at Sandia typically

(Continued on page four)

# Afterthoughts

And it's such a good place to get a tan too--"I personally think New England is the place where solar energy (heating and cooling) is going to go first. You're at the end of all the pipelines." Rhett Turnipseed, ERDA's Division of Solar Energy, in a speech before the New England Solar Energy Association.

\* \* \*

Oops--Mert Robertson (2541) called to chide us on a definition in our last issue State Fair nomenclature article. Seems we described the female hog after farrowing (giving birth) as a gilt; Mert says it's before, not after--afterwards the little lady is a sow. Mert, does a barrow ever get a gilt-complex?

\* \* \*

New Mexico, far out--Two items suggest the view of our state by the outside world. Jack Sivinski (5440) sent us an envelope addressed to him quite properly by ERDA which somehow ended up in Woomera, Australia. He notes that some good soul there put two Australian stamps on it to get the letter back here. Meanwhile, Alan Swain (1222) reports that some New Mexican friends travelling in Europe were given a hard time at the Swedish border: seems the authorities regard us as bubonic plague carriers. That's not as nice as, say, the Nobel Prize but it has to be one of this planet's more singular distinctions.

\* \* \*

From the New England Journal of Medicine in an article on public health: "It is generally assumed that people would rather be well than sick and that they would rather live longer than shorter lives. But many people really don't behave that way. It is a crime to commit suicide quickly. However, to kill oneself slowly by means of an unhealthy life style is readily condoned and even encouraged."

\*js

## Fun & Games

**Feeling pucky?**—Hockey is an activity in which an armed and armored opponent forcefully hurls a rock-hard projectile at your upper incisors. But fun, and ERDA's Bob Walston reports that Albuquerque's 30-30 Hockey League has started its new season. The group has openings for players 30 years of age and older. According to Bob, "30-30 hockey is played for fun and exercise under modified body contact rules." Call him on 296-0372 to sign up.

\* \* \*

**Running**—The 2nd Annual "M"

Mountain 9-miler at New Mexico Tech in Socorro is scheduled for Sunday, Oct. 3. All sorts of prizes are offered, including one to the runner who finishes closest to his or her estimated time. Also, the Governor's Cup Mini-Marathon (13 miles) is scheduled this Sunday, the 19th, starting from Montgomery Park in Albuquerque at 9 a.m. It, too, has myriad categories, and the Governor chugs over the course too. **LAB NEWS**, 4-1053, has entry blanks for both events.

\* \* \*

**Swimming**—Autumn and winter schedule for the indoor olympic pool is as follows: Monday, 11 to 1 lap swimming; Tuesday to Friday, 11 to 1 lap swimming; 4 to 9 open swimming; Saturday, 11 to 12 lap swimming; 12 to 5 open swimming; Sunday, 1 to 5 open swimming. The pool is located behind the Base Gym and is open to Sandia employees.

\* \* \*

**Sandia Bicycle Assn.**—Many cyclists feel their biggest problem is not automobiles or hostile dogs but rather rough and patchwork pavement. With 70 to 90-pound tire inflations, hitting even a small pavement crack can be jarring. We've learned of a number to call to report the more egregious street conditions—it's 766-7755, listed in the directory with something called Street Maintenance. If enough cyclists make a point of calling about a pavement problem, chances are remedial action will eventually be taken.

## ECP Campaign Shaping Up

The ECP campaign this year is scheduled for the first week in October. So reports Chairman Jim Kenagy (3640) who looks forward to a successful campaign.

George Samara (5130) of the Solicitation Subcommittee states that this year's goal has been raised 9% over last year. He is striving for greater percentage participation by Sandians; 73% are now enrolled.

Calla Ann Pepmueller (3140) heads the Allocation Subcommittee. This group recommends percentage allocations to the various agencies. These will be published in the next issue of **LAB NEWS**.

The remainder of the Executive Committee is made up of Art Clark (9330), past chairman; Ralph Bonner (3213), treasurer; and Joe Laval (3163), executive secretary.

The ECP Committee also includes representatives of each Vice Presidency and of each of the Unions. Directorate representatives have also been appointed and many are now touring United Way agencies so that they will be better informed on the actual services provided.

## Only Superjocks Need Apply

In the early 1900's a famous Arctic explorer, about to mount another expedition, advertised in the **London Times** for recruits. We don't have the exact words, but it ran along these lines: "Wanted—Men willing to undergo suffering and privation, extremes of cold, unending hours of hard labor, low pay . . . etc." The story goes that he was swamped with applicants. What's this got to do with Sandia? Well, John Budlong (1712) is concerned with the Safeguards program and he needs six good men & true for an assignment that promises to be physically grueling, hot and sweaty, and, maybe, just a little fun. Applicants should be in their twenties or early thirties, and in excellent physical shape (they'll be stress tested). John says the assignment will take four or five days. Call him on 4-2378 if you're feeling vigorous.

## Sympathy

To Dave Sample (9351) on the death of his mother in Albuquerque, Sept. 6.

To Fidel Perez (3646) on the death of his father in Albuquerque, Aug. 10.

To James Hall, Jr. (3422), on the death of his father in California, Sept. 9.

To Onesimo Martinez (3422) on the death of his brother in Albuquerque, Sept. 7.

To John Lowery (3422) on the death of his sister in Albuquerque, Sept. 10.

## LAB NEWS

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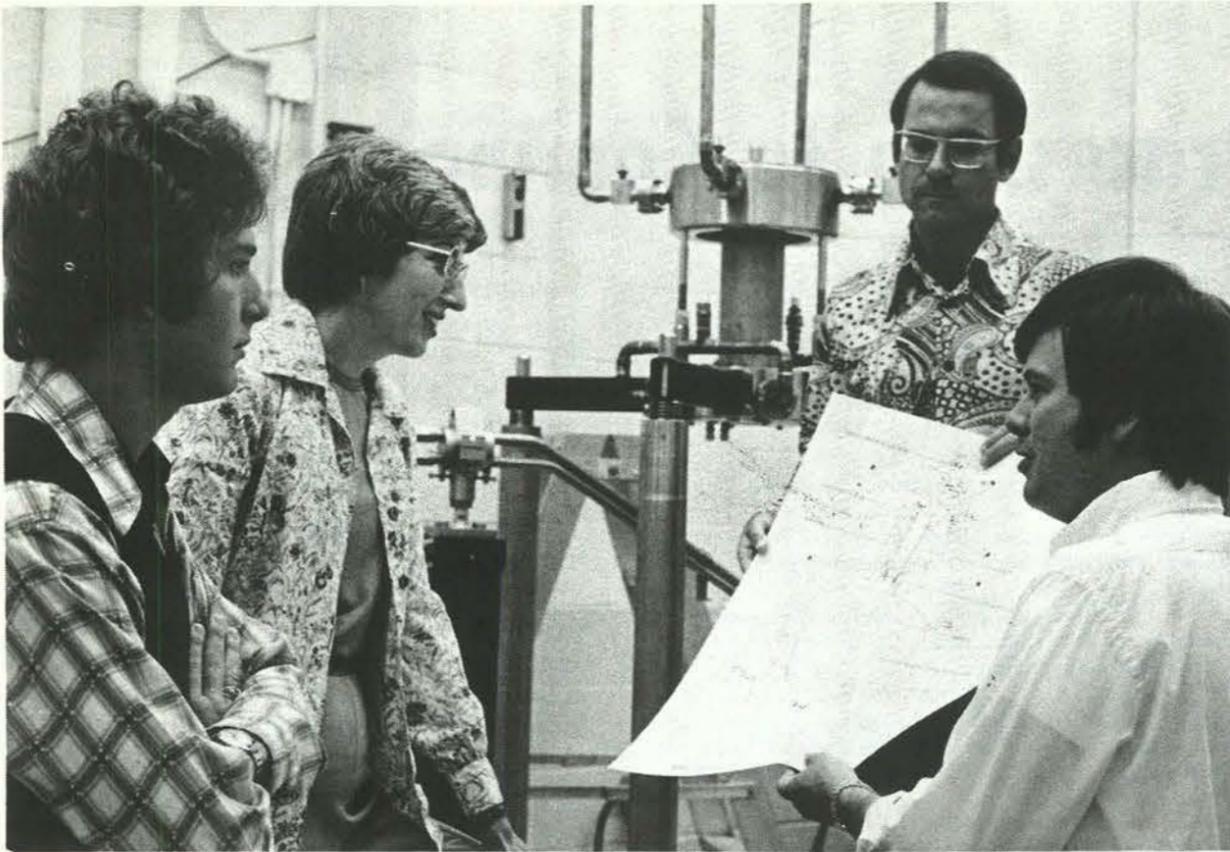
In Livermore Area 415 455-2111

john shunny is editor  
&

don graham ass't. editor

bruce hawkinson & norma taylor write  
bill laskar does picture work  
&

lorena schneider reports on livermore



**DURING SLL VISIT,** Mary Murphy (8184), standing, and Marty Abrams (8111) discuss solar central receiver with ERDA science award winner Mark Firmin and his high school teacher Dallene Perkins of Plaquemine, La.

## SLL Hosts ERDA Science Award Winner

Student Mark Firmin of Plaquemine, La., and his high school science teacher Dallene Perkins were visitors at Sandia Livermore after he won the ERDA Special Award at the International Science and Engineering Fair. Marty Murphy and other people in Solar Technology Division 8184 were hosts for the two visitors. The award was bestowed by a panel of ERDA judges.

Mark was recognized for a device he constructed for the efficient distillation of water using solar energy. Since his project and interests involve solar energy, he was attracted to SLL where the solar

central receiver concept is being developed.

A graduate of Plaquemine High School in June, Mark begins his freshman year at Louisiana State University where he plans a major in mechanical engineering.

A working model of his device is on display at the American Museum of Atomic Energy at Oak Ridge, Tenn.

## Sandian Receives Forest Products Research Award

Ray Ellis, who recently joined SLL's Applied Mechanics Division 8122 after completing PhD requirements, has been awarded the Annual Wood Award by the Forest Products Research Society.

Given annually for the best student research in the field of forest products, the award was presented to Ray in recognition of his paper, "Reduced Saw Vibration Through Feedback Control." The paper is based on a saw position control system he developed while working with Professor C.D. Mote.

The system uses electronic sensors to determine the lateral position of the saw and electromagnets to apply restoring forces should its position change during sawing. Use of the feedback control scheme could significantly improve sawing operations by reducing wobble in existing saws and enabling the use of thinner saws.

Ray received his BS degree from Cal Tech in 1969 and was a research assistant in the Forest Products Lab while attending UC/Berkeley.

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## Authors

Bob Setchell (8115) and Dan Aeschliman (5262), "Fluorescence Limitations to Combustion Studies Using Raman Spectroscopy," *APPLIED SPECTROSCOPY*, Vol 29, No. 5.

Dan Hartley and Don Hardesty (both 8115) and M. Lapp (GE), "Physics in Combustion Research," *PHYSICS TODAY*, Dec. 1975.

Jack Dini and Rudy Johnson (both 8312) and Carl Schoenfelder (8313), "Corrosion Behavior, Mechanical Properties and Long-Term Aging of Nickel Plated Uranium," *NUCLEAR TECHNOLOGY*, Vol. 28, p. 249.

Jack Dini (8312), Ben Benedetti (8113), and Rudy Johnson (8312), "Residual Stresses in Thick Electrodeposits of a Nickel-Cobalt Alloy," *EXPERIMENTAL MECHANICS*, Vol. 16, pp. 56-60.

Rand German (8312) and Z.A. Munir (UC/Davis), "A Kinetic Model for the Reduction in Surface Area During Initial Stage Sintering" and "The Identification of the Initial-Stage Sintering Mechanism: A New Approach," *SINTERING AND CATALYSIS*, Plenum Press, New York, pp. 249 and 259.

## Sympathy

To Marion (8433) and Charles McCain (8256) on the death of her grandfather in Oakland, Aug. 19.

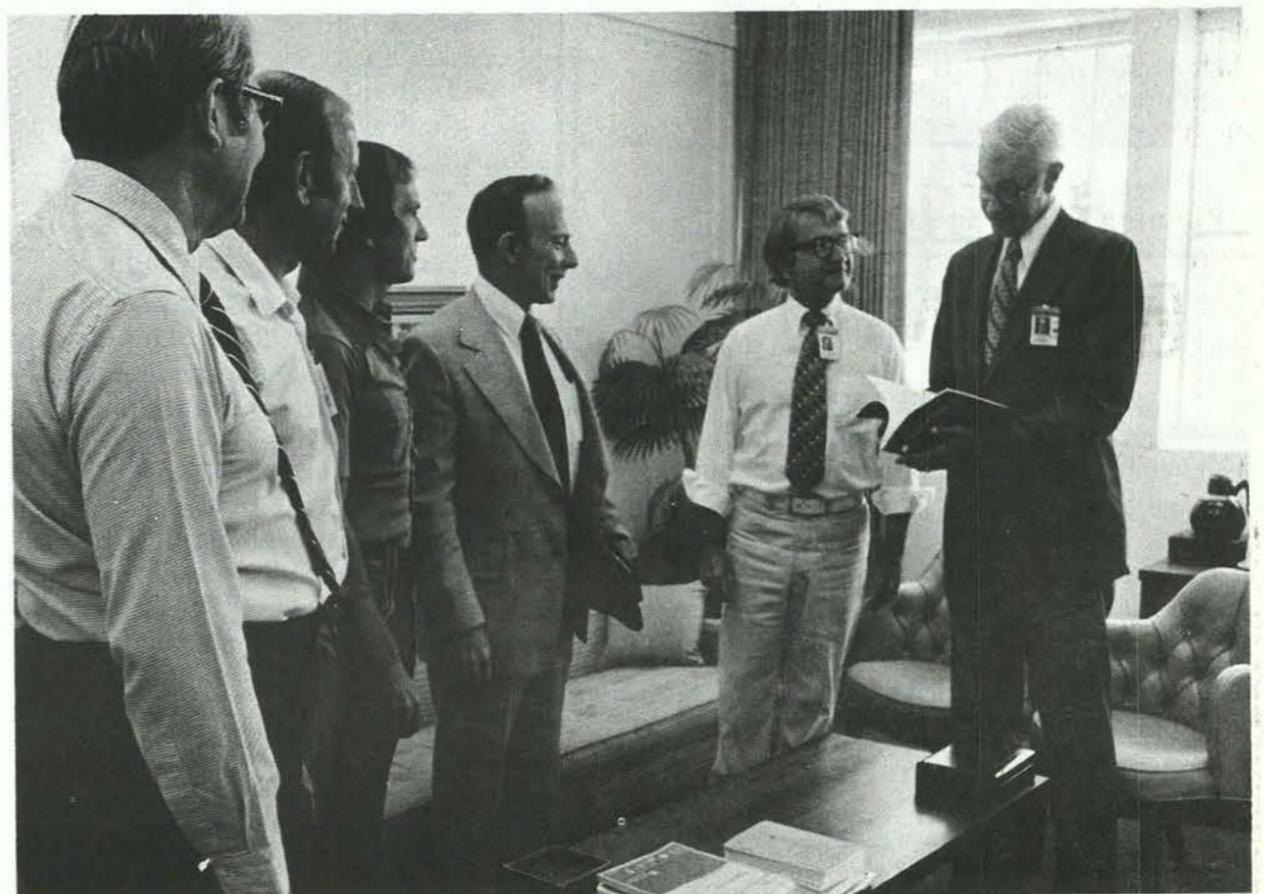
## Congratulations

Dave Ross (8256) and Bernadette Smith, married in Livermore, Aug. 7.

Mr. and Mrs. Cory Cornelius (8321), a son, Matthew Wiley, Aug. 23.

# LIVERMORE NEWS

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**ERDA OFFICIALS** at Sandia/Livermore recently for technical briefings included General Dodd Starbird, AA for National Security (right) and Major General Joseph Bratton, Director of DMA (third from right). With the visitors, VP Tom Cook (8000), Danny Hartley (8115), Walt Bauer (8334) and Byron Murphey (8300).

# Word Processing Is Coming

goes through several drafts, each requiring extensive retyping of much of its content.

This tedious process may now be radically altered. Using some tools of the '70s, a small revolution is occurring in the world of the office. Proponents of the revolution have a name for it: word processing. It works like this:

The secretary, about to type a rough draft from several pages of hand written material, sits before a standard keyboard which has a number of extra keys. There is no carriage nor, for that matter, a slot for paper. Instead, there is a small TV screen, and when she begins typing the words appear on the screen. The first item is a title that is to be centered, so she presses the "center" key—no calculations needed. She proceeds to type the text, misspells a word, backs up and spells it correctly and continues—no erasing or opaqueing. Having completed the text, which included a number of subscripts and superscripts, she withdraws from the console a plastic disk about the size of a phonograph record, contained within an envelope upon which she makes a few notations. Reinserting the disk into the console, she presses a few keys, whereupon a machine that looks like a typewriter without a keyboard proceeds to produce a three-page draft, double-spaced, in about three minutes. Job completed.

Or, rather, the first and principal step of the job is completed. A few days later, the draft is returned, somewhat altered. Words, sentences, whole paragraphs have been rewritten, deleted, added. One frequently used word, "proposal," has been changed throughout to "recommendation." Inserting the disk into the console, the secretary views on the TV screen the portions of the draft to be revised and simply types in the correc-

## Survey Results

As part of their study of word processing feasibility at Sandia, the Garner committee used questionnaires to survey office paperwork at Albuquerque locations. Highlights of the responses of secretaries and supervisors follow:

- Compared with other companies, the time devoted to typing activities at Sandia is relatively high. Organization 5000 ranks first in overall workload, although intensive typing activity occurs in many other offices.
- Most first-time typing originates from handwritten drafts. About 5% is from stenographic notes and only 1% from dictation equipment.
- The need for special character fonts and techniques varies from office to office. Generally, Organization 5000 secretaries made the most use of Greek characters, math formulas, superscripts, and subscripts.
- The average length of letters and memos is 2½ pages. Formal and informal reports average 15 pages.
- About 85% of all typing involves "standard" 8½ x 11" plain, letter, or memo heads.
- Most secretaries are happy with the availability and clarity of office paperwork instructions. However, many secretaries are unhappy with the availability and quality of copy machines.
- Secretaries were asked to identify "the two most pressing paperwork problems in completing your assignments." Typing problems, especially volume, deadlines, number of drafts, and illegible handwriting, ranked first. In second place were such administrative problems as frequent interruptions by phone, maintaining time cards and other records, and filing. Perhaps surprisingly, one of every five secretaries either stated she had no problems or did not respond to the question.
- Like secretaries, supervisors named typing as their number one paperwork problem. They emphasized turnaround time on reports and peak loads, as well as volume. Similarly, supervisors also rated administrative problems in second place, often stressing filing, record maintenance, and finding data.
- When supervisors were asked to predict near future paperwork workload trends, 45% felt it would remain "about the same." Another 45% believed it would be "somewhat increased," and 9% saw workload "greatly increased." Only 1% felt paperwork would be "somewhat reduced."

tions. She is unconcerned about the fact that certain corrections will alter line length and that, therefore, the terminal word on some lines may have to be hyphenated. She types the word "proposal" and then "recommendation," presses the key labeled "REPLC," and the substitution is made throughout.

With corrections made, she again presses a few keys and shortly has the newly typed revised draft in hand.

In the lexicon of word processing, the TV screen is the "CRT" (cathode ray tube). The disk is a magnetic memory storage device and, depending upon the system, can store from 75 to 4000 pages of text upon its surface. The typewriter sans keyboard is actually a printer. The standard printer runs along at 360 words per minute, while the supermagnum model zips by at 1400 WPM. To accept and carry out the myriad instructions, the system contains a small computer called a microprocessor.

A multitude of WP units (generally called "standalones") is available, but few can "talk" to each other and WP operator training differs for each. The seven "standalones" already on board at the Labs include four different models of WP equipment.

Bob Vokes and Marie Syme of the 4010 Management Staff are looking at word

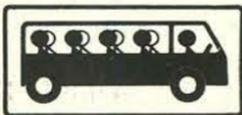
processing as it might be employed for administrative/secretarial word processing. Given the cost of a WP unit (\$10 to 20 k), it is uneconomical to assign such a unit to, say, a single division. This suggests a sort of cluster operation, where one or more word processors would be centrally available to service the typing needs of several nearby organizations. Bob and Marie are studying this application, aiming to learn the trade-offs, constraints, and human elements of word processing. By early next year he hopes to have recommendations ready for review by higher management.

At Sandia today, a second application of word processing is also being investigated: Text Processing. Text Processing Development Division 2633 under Don Emrick was created in May, 1974, to insure the orderly introduction of Text Processing into the Labs at Albuquerque. The project represents more than two years of careful research and study by Art Ahr, Cliff Fisk, and Jim Fisher of this division.

Sometime in 1977 a Text Processing Center will be set up in Bldg. 894 for the exclusive use of three organizations: the technical report groups of Tech Information Dept. 3150, the Weapons Manuals Division 1212, and the specifications group of Design Information Development Division 9633. The output of these organizations is the printed word—usually lengthy texts subject to revision both before and after issuance. Mathematical formulas, Greek letters, sub- and superscripts, headlines of different sizes abound. The work is ideally suited to automated Text Processing (as distinguished from use of "standalones" in administrative/secretarial word processing).

It's too early to predict how word processing will affect Sandia, but this much is clear: It's not a matter of "whether", it's a matter of "when." •js

## Bus Notes



Riders of City Sandia Specials: The fare is 35 cents cash or one punch on a Sandia Special pass from the Credit Union. No tokens, no "commuter passes," no anything else.

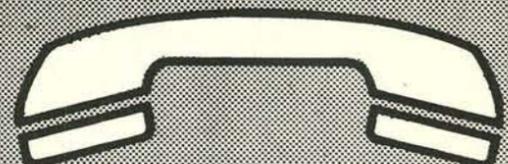
\* \* \*

Sorry but City Sandia Special riders will probably be riding old buses during the Fair. If you want to ride a new one, see below.

\* \* \*

Remember that there are several locations in town from which you can catch one of the new buses to the Fair. No parking hassle. 35 cents exact change. 25 cents discount on your Fair admission. More info. from 766-7830 or 4-RIDE.

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commuting  
information  
DIAL 4-RIDE





IT TAKES five years of work on the job and in the classroom to graduate from Sandia's apprenticeship program. These men completed the requirements and receive congratulations from Bob Hopper, director of Plant Engineering. From left, Fede

Molina, Tim George, Jesus Romero, Frank Padilla, Levi Anaya, Adenago Perea, George Paul, and John Hill (not shown, Louis Mora).

## Medical Update

# All About Swine Flu Immunization

By Judy Ewing  
Sandia Staff Physician

Swine flu may be here by winter, or might possibly never show up. But the Center for Disease Control (CDC) in Georgia recommends that if you are not allergic to eggs, you should probably take the shot. The rationale is based on the past behavior of new flu strains discovered in the past 20 years. Almost invariably, their appearance has been followed by an epidemic because most of the population has little or no cross immunity to the strain.

Swine flu became notorious as a result of the pandemic of 1918-1919, which killed over 500,000 Americans. It ceased to be a real problem in the 1920's and, until 1976, was found only occasionally in persons occupationally associated with pigs. The outbreak at Fort Dix in January 1976 showed evidence of person-to-person spread within the military base, but no spread to the surrounding community. This is a marked change from the pattern of spread shown in 1918, suggesting the present virus might not be as communicable. Thus, there has been some controversy over the potential threat of another swine flu pandemic.

Odds against a serious reaction to the flu shot are extremely good. In a review of both English and American literature from 1945-1976, with several hundreds of millions of doses given, there have been three deaths related to all types of flu vaccines. The early flu vaccines were not nearly as purified as recent vaccines. Thus, many people have unpleasant memories of reactions that have been eliminated in recent vaccines. The reactions to flu vaccines can be grouped as follows:

**Local reactions**—i.e., local redness, mild swelling, pain at the site of inoculation—20-30% of recipients.

**Febrile reactions**—i.e., low-grade fever in the first 24-48 hours after inoculation—2% of recipients.

**Allergic reactions**—extremely rare in modern vaccines because of high degree of purification (far less egg protein).

The majority (some 70 to 80%) have no significant reaction.

The swine flu immunization program will be divided into two phases. The first phase will immunize "high-risk" people using a vaccine that contains both swine flu and A-victoria flu vaccine. High-risk persons are the following groups:

Elderly—persons over 65

Heart disease—heart disease of any etiology

Pulmonary disease—chronic lung disease, including asthma, emphysema, chronic bronchitis, tuberculosis, cystic fibrosis

Diabetes and other metabolic disorders

Chronic renal disease

Cancer patients

Other chronic disease

Persons not falling into these high-risk groups will be given the swine flu vaccine during the second phase of the immunization program.

What about egg allergic persons? The flu vaccine is prepared by growing the virus in chicken eggs. Modern zonal ultracentrifugation has decreased the egg protein content of vaccines to minute levels. Thus, the risk of an allergic reaction is quite small, but does still exist. If you can eat eggs, you can take flu vaccine. If eating eggs causes any symptoms presumed to be due to hypersensitivity to eggs, further screening is indicated. These individuals will not be vaccinated in the public clinics.

Sandia Labs Medical Department will provide, on a voluntary basis, swine flu immunizations to all Laboratories employees when the vaccine becomes available.

## Events Calendar

- Sept.**—Barn Dinner Theatre, "Love on a Rooftop," Tues.-Sun. thru Sept., 281-3338.
- Sept. 16-25**—New Mexico State Fair, parade on Saturday the 18th.
- Sept. 17-18**—Classics Theatre, "Arsenic and Old Lace," 277-3121.
- Sept. 18, 19, 21**—Albuquerque Little Theatre, "Busybody," 242-4750.
- Sept. 20**—The Aman folk group, Popejoy, 277-3132.
- Sept. 24-25**—Albuquerque Symphony Orchestra Concert, Popejoy, 265-3689.
- Sept. 25**—KHFM Radio 96.3 FM, "Porgy and Bess," 6:40 p.m.
- Sept. 26**—N.M. Mt. Club, quiet stroll along the North Crest Trail, Western Skies, 9 a.m., 298-3630.
- Sept. 28**—Foreign film, Shakespeare's "The Merry Wives of Windsor," Popejoy, 7:30 p.m.
- Sept. 29**—National Indian Education Association-sponsored Indian dance, 6:30-9 p.m.; pow wow, 9:30-11 p.m., Civic Plaza.
- Sept. 30**—Travel adventure film, "The New Norway," Popejoy, 7:30 p.m.
- Oct. 1-3**—Grecian Festival '76: food, pastry, music, dancing, 308 High SE, 11 a.m.-10 p.m.
- Oct. 1**—Audubon Wildlife Film, "Coastline California," Popejoy, 7:30 p.m.

## Authors

A.E. Hodapp (1331), "Effects of Unsymmetrical Stability Derivative Characteristics on Reentry Vehicle Transient Angular Motion," February 1976 issue, JOURNAL OF SPACECRAFT AND ROCKETS.

A.G. Beattie (9352), "Energy Analysis in Acoustic Emission," April 1976 issue, MATERIALS EVALUATION.

J.J. Ramirez (5245) and L.W. Kruse (5242), "A Gated Scintillator Photomultiplier Neutron Detector for Time-of-Flight Measurements in the Presence of a Strong X-Ray Background," Vol. 47, No. 7, THE REVIEW OF SCIENTIFIC INSTRUMENTS.

M.E. Riley (5211), "Effects of the Pauli Principle on Electron Scattering by Open-Shell Targets," Vol. 65, No. 2, THE JOURNAL OF CHEMICAL PHYSICS.

P.J. Slater (5121), "R-Domination in Graphs," Vol. 23, No. 3, JOURNAL OF THE ASSOCIATION FOR COMPUTING MACHINERY.

## New Electron Beam Diode Invented

ERDA was awarded a patent recently for a cylindrical electron beam diode which has made possible a more efficient and uniform gas laser. Studies indicate that it may be a promising scheme to excite large-volume, high-pressure, gas lasers. A possible important application is the excitation of lasers for laser-fusion research. The inventor is Paul Bolduc of Beam Source Application Division 5232.



PAUL BOLDUC (5232) displays his cylindrical electron beam diode device recently patented by ERDA.

"When a beam of high energy electrons is injected into certain gases," Paul says, "the relative densities of energy states of the gas molecules are perturbed. The molecules find themselves in a non-equilibrium energy condition and make a rapid attempt to normalize conditions by radiating a photon of a given energy and frequency. In some instances, an inversion of energy-level densities will occur resulting in an intense, coherent beam of photons—the laser.

"Optical properties of the lasing gas are greatly affected by the way the electron beam is injected into the gas. Ideally, one would like a spatially uniform distribution of inverted molecular energy states throughout the gas volume. This is difficult to achieve because of the non-uniform aspects of the electron beam used to initiate the process.

"Basically, there are two ways of injecting an electron beam into a long, closed cylinder filled with gas—axially through one flat end cap of the cylinder, or radially through its curved surface. Axial injection requires a large external magnetic field along the length of the cylinder to control the electron beam in the region where it is being generated (the diode) and to guide and transport it through the gas volume. Other magnetic fields are needed to deflect these high energy electrons before they strike the mirrors at the ends of the laser cavity. One unfortunate aspect of this approach is that a non-uniform electron beam is carried through the gas, creating a non-uniform excitation density. The laser light produced is then radially non-uniform in intensity and in phase.

"One way to get around this problem is to inject the electron beam through the sides of the gas-filled cylinder. This is the main feature of the cylindrical laser diode.

"A pulse of several million volts is applied across an open-ended cylindrical cathode, concentric with the cylindrical anode. An imploding cloud of high energy electrons leaves the inside cathode surface and passes through the thin wall of the gas-filled anode cylinder. A radially uniform laser medium is produced. Since the electron beam is at right angles to the laser beam, mirrors in the laser activity are not bombarded with electrons. No external magnetic fields are

needed to control and guide the electron beam."

Further studies of generation of radially converging electron beams and their use in energizing large-volume, high-pressure gas lasers is underway in Pulsed Power Applications and Operation Division 5246 under Ken Prestwich. An accelerator called REBLE (Radial Electron Beam Laser Exciter) was developed specifically to supply energy to a cylindrical diode for experiments to study energy deposition of the high current radially converging electron beams in high pressure gases.

Paul joined Sandia in 1969 after spending two years at Penn State as a research associate while earning a PhD in plasma physics. Prior to Penn State, he spent 18 months as a guest researcher at the Max-Planck Institute for Plasma Physics near Garching, West Germany.

### Congratulations

Mr. and Mrs. Kazuo Oishi (9482), a daughter, Mitsuko Karen, July 30.

Mr. and Mrs. Mark Bunting (1312), a daughter, Liza Danielle, Aug. 18.

Mr. and Mrs. Mark McAllaster (5832), a daughter, Amy Kristine, Sept. 5.

## Committee of Six Speaks for Secretaries

How to prepare vu-graphs is the subject of a course to be offered next month to secretaries and other interested persons. The three-day, six-hour course is in-hours and will be conducted by Sandra Barber, Mary Campbell (both 4231), and Bobbi Voelker (4200).

The new course is one of several projects of the Committee of Secretaries. The Committee was established two years ago by Bob Edelman, Director of Personnel, to advise him on matters concerning non-represented secretaries. The six-member group, headed this year by Jan Robertson (9400), has an impressive record. Through committee recommendation, Education and Training Division 4231 now offers three out-of-hours courses for secretaries—English grammar, budgeting, and computing services. Enrollment in these courses has been high, and fall classes are now underway. An in-hours Document Control Refresher Course was also conducted.

More than 250 secretaries attended the Committee-recommended workshops conducted by the Training Division. "Plans are underway," Jan says, "for a one-day Saturday seminar early in January. Our theme is 'communication,' and invitations will be issued to supervisors as well as secretaries."

"One of the most effective functions of this committee," Bob Edelman says, "is that they act as a sounding board for me as well as for the non-represented secretary. When I meet with this group I know that the proposals or suggestions they make have been refined and evaluated and reflect the needs of the secretaries. And I like to try out ideas on them; their actions are helpful. They've opened up a line of communication that allows some positive action."

Members of the Committee of Secretaries are Esther Perea (1700), Jo Ann Oswalt (2150), Alice Hodyke (3750), June Rugh (4213), Helen Walsh (5800), and Jan Robertson (9400). Sandra Barber (4231) works with the committee on secretarial training.



BOB EDELMAN (4200) and the Committee of Secretaries: (l to r), Alice Hodyke (3750), Jo Ann Oswalt (2150), Helen Walsh (5800), Esther Perea (1700), Jan Robertson (9400) and June Rugh (4213).

# New Uses Developed for Composite Materials

One of the many unique features of the B77 design is that it makes extensive use of structural composite materials. Structural composites consist of high strength filaments, such as boron, graphite or Kevlar, embedded in either a resin or metal matrix.

Their primary advantage, according to Frank Gerstle, supervisor of Composite Materials Development Division 5844, is that they couple high strength and stiffness with light weight. Efficient use of these materials requires that the structure be analyzed in some depth before fabrication is begun. Tommy Guess (5844) has performed structural analyses on the B77 composite parts.

Fins on the current B77 are being made of titanium. During Phase 2, Arnie Rivenes (8158) requested a composite feasibility study which resulted in the development of boron-aluminum fins. Each will weigh about 0.9 kg (just over 2 lbs.) rather than the 1.5 kg (3 1/3 lbs.) of a titanium fin. Says Bill Hoover (5844), "The fin is a composite—filaments of boron surrounded by a matrix of aluminum. Together they give the strength and stiffness of steel with the weight of aluminum." In addition to these advantages, each boron-aluminum fin is hot-pressed, a quicker and cheaper process than machining. Composite fin cost in production should be competitive and these fins are now being evaluated as a replacement for the titanium.

Ron Allred, working in conjunction with Division 8157, is responsible for prototype fabrication of four parts of the weapon: the aft cover, the parachute liner, the programmer bracket, and the radar support. Each part is load-bearing and therefore has to be strong. And, because of the high temperature the weapon is expected to see—up to 150°C (300°F)—the parts also need to be thermal insulators. The first three are made of Kevlar-epoxy laminates, the radar support a combination or hybrid of boron-epoxy and Kevlar-epoxy.

Kevlar is a duPont trade name for a polyaramid filament. "Think of it as super-nylon," says Ron. "Its fibers are 40 times stiffer than nylon but, like nylon, it can be woven into a cloth." Epoxy binds the layers together and holds the part rigid. Tests thus far show the composite will surpass both load-bearing and thermal insulation design requirements, and it is lighter in weight than most common weapon materials. So Kevlar-epoxy is a good choice for these applications. The radar support must have higher flex resistance. Therefore, boron filaments (which are much stiffer than Kevlar) are added to provide the extra rigidity required. Tests will continue; Division 5844 is carrying out extensive studies on Kevlar-epoxy as well as on several new hybrid composites such as the one containing both Kevlar and boron.

Woven Kevlar yarn (in contrast to the rigid composites described above) has



**MATERIALLY DIFFERENT.** That's what these B77 parts are. Left to right, Bill Hoover holds a boron-aluminum fin; Ron Allred clutches the weapon's aft cover and leans on the parachute liner (both are Kevlar-epoxy laminates); and Dick Ericksen demonstrates the difference in thickness between a nylon chute webbing strap (his right hand) and (in his left) a Kevlar strap of the same strength.

been chosen for the parachute suspension line webbing and skirt band, again because of the phenomenal strength-to-weight of the material. "The object here is to reduce both weight and volume of conventional nylon parachutes," says Dick Ericksen (5844), who is working with Parachute Design Division 1332. "We're still investigating more efficient weaving methods and joint designs." At this point the use of Kevlar suspension lines in B77 parachutes has resulted in a 33% saving in weight and volume.

Sandia has played a leading role in the development and application of these high performance materials. David Schuster (5840) and Hap Stoller (5730), recognizing the potential of composites several years ago, laid the groundwork for our current capabilities.

Gary Beeler is supervisor of Structural Design Division 8157, which is responsible for the B77 mechanical design. Says Gary, "We have been able to utilize the thermomechanical properties of composite materials to good advantage in the B77 design. Such materials have a promising future in weapon and other applications."

## Speakers

M.E. Kipp (5162), "Single Particle Hypervelocity Impact Damage Analysis"; L.J. Vortman (1111), "Craters from Surface Explosions and Energy Dependence"; A.J. Chabai (5166), "Influence of Gravitational Fields and Atmospheric Pressures on Scaling of Explosion Craters," Symposium on Planetary Cratering Mechanics, Sept. 13-17, Flagstaff, Ariz.

W.D. Hardwood and C.W. Carter (both 9515), "Influence of Sheath Defects on MDF Performance"; J.W. Reed and H.W. Church (both 5443), "Guidelines for Environmental Impact Statements on Noise (Airblast)," Department of Defense Explosive Safety Board Seminar, Sept. 14, Denver, Colo.

C.L. Olson (5241), "Collective Ion Acceleration with the Ionization Front Accelerator," 1976 Proton Linear Accelerator Conference, Sept. 14-17, Chalk River, Ontario, Canada.

M.L. Lieberman (5731), "Materials Requirements for Coal Conversion and Utilization Technologies," N.M. Chapter of SAMPE, Sept. 15, Albuquerque.

J.R. Craig (2515), "Development of a Miniature Pyrotechnic Torch"; A.C. Strasburg (2514), "A Calculator-Controlled Data System for Explosive Component Testing," Ninth Symposium on Explosives and Pyrotechnics, Sept. 15-16, Philadelphia, Pa.

G.F. Derbenwick (2141) and F.L. Gregory (2140), "Effects of Silicon Surface Damage on MOS Radiation Hardness," F1-Committee Workshop on Methods of Delineating Defects in Semiconductors, etc., Sept. 16, San Diego, Calif.

A.W. Cronenberg (UNM) and R.L. Coats (5422), "A Comparison of Solidification Phenomena for UO<sub>2</sub>, UC, and UN, Relative to Quenching in Sodium Coolant," American Nuclear Society Meeting, Sept. 17-21, San Francisco.

R.W. Rohde (5832) and J.C. Swearingen (5847), "Analysis of Elevated-Temperature Cyclic Deformation with Hold Periods in Austenitic Stainless Steels in Terms of Mechanical Equation of State"; D.S. Drumheller (5167), "The Calculation of Hydrodynamic-Structural Interactions in the Subcooled Blowdown of a Pressurized Water Reactor," 4th International Conference on Structural Mechanics in Reactor Technology, Aug. 15-19, San Francisco.

R.E. Cuthrell (5834), "The Case for the Low Power Test in Contact Loop Resistance Measurements," Aug. 31, BKC.



# Potash Drilling Program Begins in SE New Mexico

Sandia Laboratories, in conjunction with the U.S. Geological Survey (USGS), has begun a drilling program to evaluate potash resources in an area some 30 miles southeast of Carlsbad. The site is under consideration as a location for an underground disposal pilot plant for nuclear waste.

Sandia is in charge of field engineering aspects of the potash assessment program and is heading the overall ERDA program to design and develop the facility, called the Waste Isolation Pilot Plant.

Pennsylvania Drilling Company and Boyles Brothers Drilling Company have been selected to drill a series of holes to evaluate the mineral resources of an 8000-acre portion of Bureau of Land Management land in the Los Medanos area.

Eleven holes will be drilled initially, and findings will be evaluated by standard laboratory assays, chemical analyses and x-ray defraction. Additional holes may be drilled at a later date. Maximum drill depth will be about 55 metres.

The holes will stop well above the planned disposal level and will be carefully plugged after the tests so that the integrity of the subsurface is not compromised should the area be chosen for the plant site.

Sandia has been conducting extensive investigations of this area since early last year, and further studies are planned through the fall. The program is an extension of earlier studies begun in 1972 by the Oak Ridge National Laboratory for AEC.

The area appears to satisfy site selection criteria better than other areas that have been examined. Investigations to date show that the salt beds in the area are favorable for isolating nuclear wastes generated at government facilities during the past 30 years.

The waste would be placed in special containers and stored in excavated rooms 60 to 80 metres below the surface. In the pilot plant phase, all materials would be stored so that they could be retrieved should the need arise.

Work at the test site has included extensive geophysical investigations, exploratory core drilling and hydrological testing. The exploratory drill holes have penetrated into salt formations about 85 metres below the surface.

"Core samples have been evaluated and in all respects indicate favorable geology," says Wendell Weart, manager of Waste Management Systems Department 1140. "There are extensive salt beds at depths between 30 and 120 metres beneath the semi-arid surface.

"These salt formations are 200 to 250 million years old and are geologically stable. Their very existence is evidence of no significant intrusions of water, which would have dissolved the salt."

Sandia work this past summer also has included study of data from two "hydro holes" drilled to evaluate the hydrological environment of the area and to determine the direction and rate of water flow. Those holes also stop well above the level where any waste would be buried.

"Plans call for an additional hydrological hole to provide further information," says Weart. "Present results do not indicate any water problems. Quantities of water inflow from these upper aquifers are very small."

Much of the nuclear waste at the pilot plant will come from facilities associated with weapons production and will include such articles as scrap tools, wipe rags, coveralls and glove boxes contaminated by contact with plutonium.

This waste—which will be in a solid form—emits small amounts of alpha radiation. Alpha particles are not very penetrating, and are stopped by a few sheets of paper or several inches of air.

"Probably the most significant characteristic of such transuranic waste is its long half-life," Weart says. "This period for plutonium is 24,900 years."

Although solid higher-level wastes from nuclear reactors will not be included in the pilot plan operation, experimental work will be performed with them. In on-site experiments, the phenomena that occur when highly radioactive, heat-producing waste is buried in bedded salt will be studied.

While the Los Medanos location appears to meet all established site selection criteria, the recommendation for selection of a storage site will not be made until all geological studies and resource evaluations are made.

No construction or land withdrawal will occur until an Environmental Impact Statement has been published and public hearings have been held. In the meantime, ERDA is considering other possible pilot plant locations elsewhere in the U.S.

## 5800 Open House Directory

Friday afternoon, Sept. 24

Bldg.	Room	Subject	Division	
805	111	Chemical Technology	5824	
	119	Elastomers	5811	
	119	Coatings and Films, High Temperature and Special Dielectrics	5811	
	122	Mechanical Properties of Materials	5847	
	124	Scanning Electron Microscopy	5822	
	124	Transmission Electron Microscopy	5822	
	201	Foams	5813	
	203	Oil Shale	5825	
	203	SYNTHOIL	5825	
	203	Surface Analysis	5825	
	204	Adhesives	5813	
	208	Encapsulants	5813	
	209-1	Environmental Testing	5811	
	223-225	Stress Corrosion Cracking	5831	
	301	Absorption Spectrophotometry	5821	
	301	Gas Chromatography/Mass Spectrometry	5821	
	302	Atomic Absorption	5821	
	302	Classical Chemistry	5821	
	302	Specific Ion Electrodes	5821	
	302	Microcombustion	5821	
306	Gas Analysis	5821		
308	Emission Spectroscopy	5821		
312	Electron Microprobe & X Ray Fluorescence Spectroscopy	5822		
314	X Ray Diffraction	5822		
321	Metallography	5833		
322	Surface-to-Surface Contacting	5834		
324	Thin Films & Coating Research & Development	5834		
806	227	Thick Film Resistor Processing	5832	
	259	Cleaning & Contamination Control	5821	
	340	Gas Metal Reactions	5831	
	344	Optical Properties of Materials	5842	
	348	Aging Response in Uranium Alloys	5832	
	348	Nitinol for Fire-Safing Devices	5832	
	352	Melting and Solidification	5833	
	353	Composite Structures in Energy Systems	5844	
	807	1030	Physics of Organic Solids Capabilities	5814
	2098		Composite Materials in Weapons	5844
2111		Plasma Spraying	5842	
2113		Thermophysical Properties of Materials	5842	
2113		Small Particle Sampling	5842	
808	11E	Calorimetry	5842	
828	13	Microwelding	5833	
892	137	High Temperature Chemical Reactions	5831	
138		Support for Design to Prevent Fracture	5832	
138		Fracture Testing for B77	5832	
894	133-1A	Glass Ceramics	5846	
	135-1	Ceramic-to-Metal Bonding	5846	
	137-2B	Powder Processing	5846	

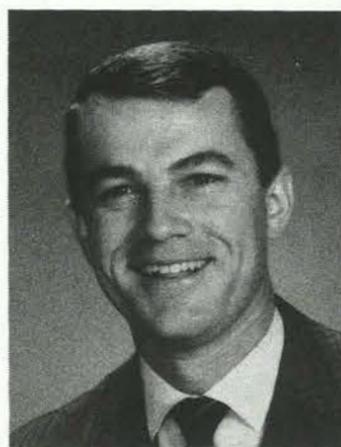


**OPEN HOUSE 5800**—Richard Blöse of Physical Metallurgy Division 5832 shows what he does best: fracturing test materials. His exhibit on the subject is one of many set up in the Directorate of Materials & Processes 5800 for show on Friday afternoon, Sept. 24. Complete directory is given at left. All Sandians are urged to drop by exhibits of interest. Purpose of open house is to acquaint Sandians with services and facilities provided by the 5800 organization.

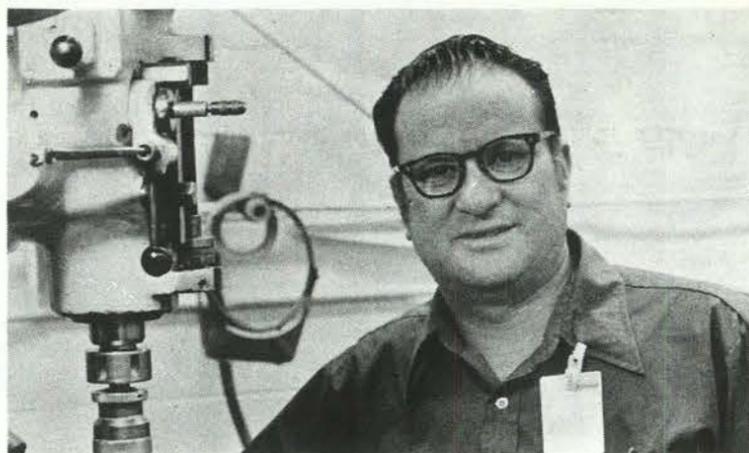
# MILEPOSTS

## LAB NEWS

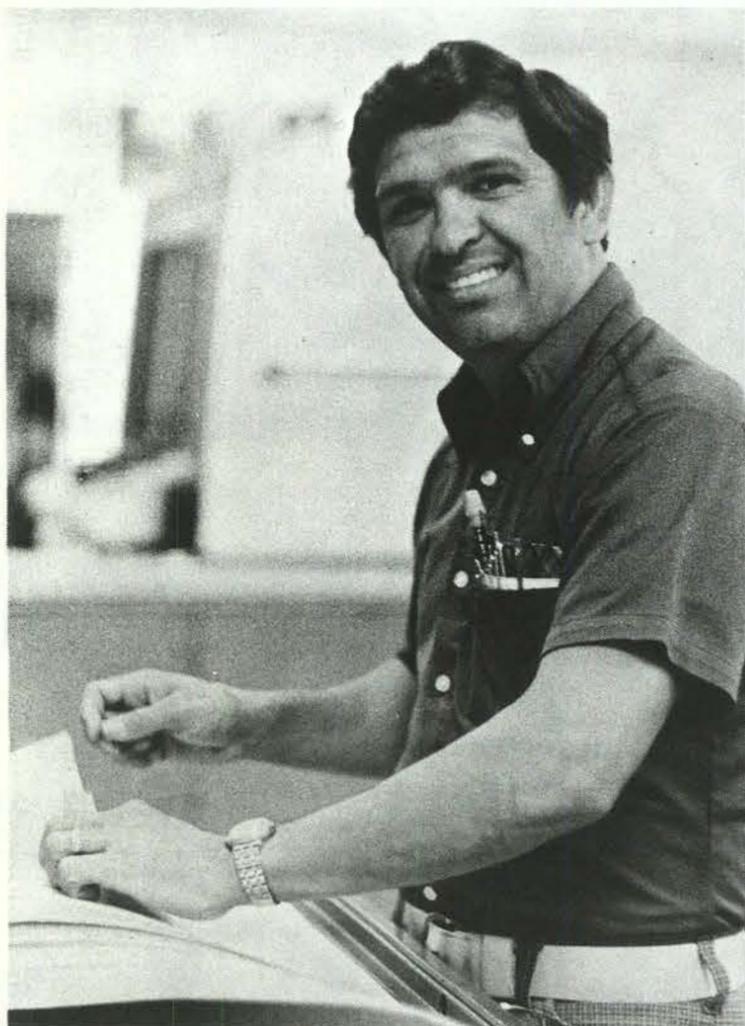
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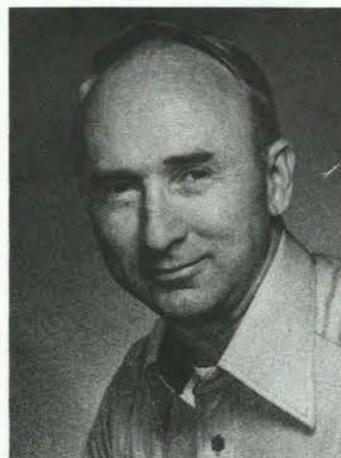
Glen Otey - 8362 10



Ernest Cordova - 3644 25



Eloy Giron - 9752 10



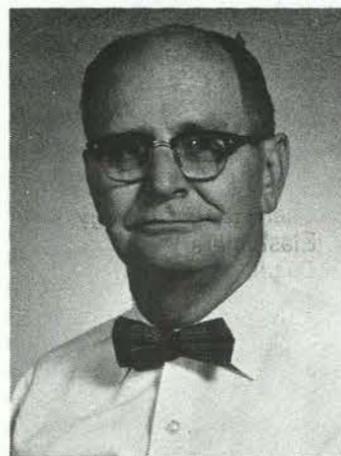
Joseph Newton - 2352 20



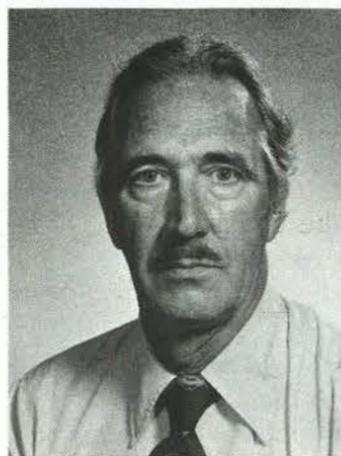
Robert White - 9511 20



William Leuenberger - 2325 10



Stephen Neff - 3624 20



Bill Drake - 3647 25



Glenn Burger - 4325 15



Dwight Soria - 8257 10



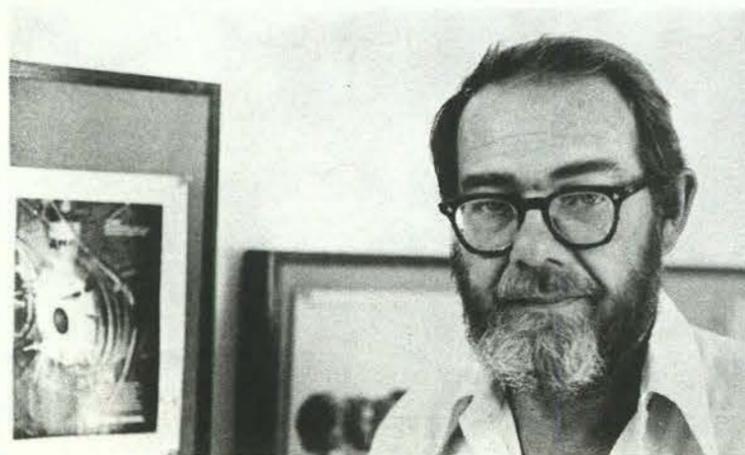
Earl Johnson - 9751 25



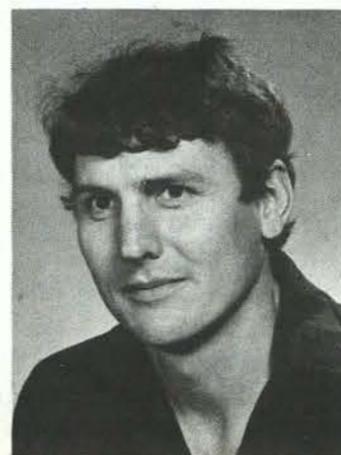
Brenda McAtee - 3254 15



Hazel Schuler - 9422 10



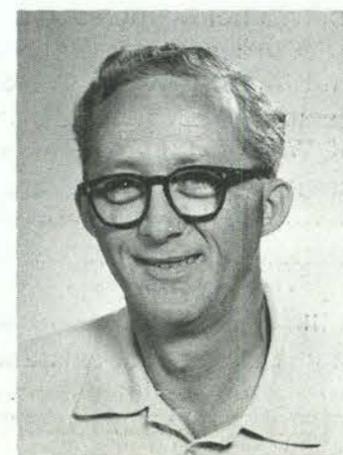
Jack Suttman - 3155 30



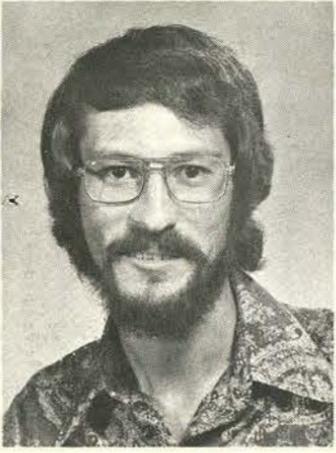
Keith Mote - 3646 10



John Souza - 4335 25



William Lewis - 9414 15



Ernest Sandoval - 3646 10



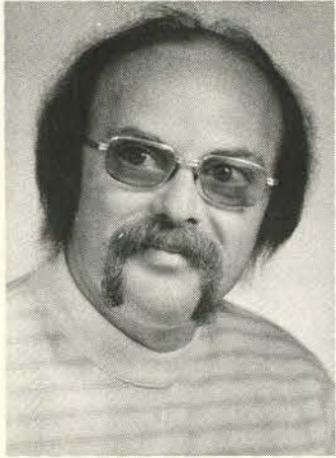
Martin Serna - 3644 25



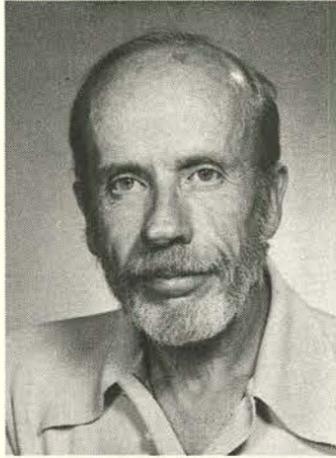
Peggy Poulsen - 3141 15



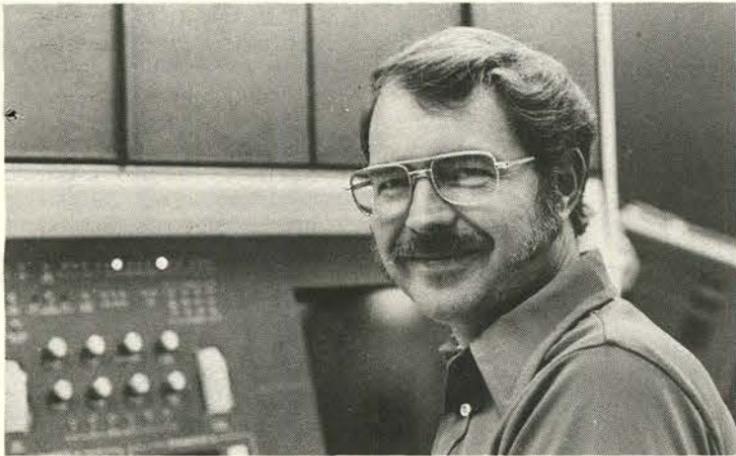
John Ingram - 3617 20



Jon Pallitto - 8256 10



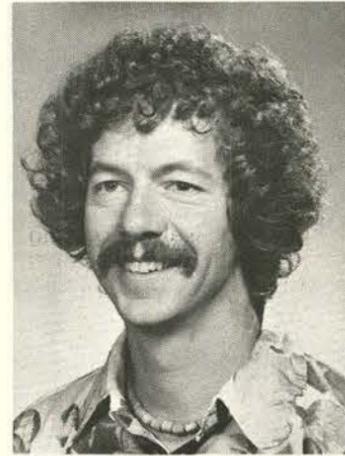
George Arnold - 5112 15



Warren Miller - 9422 20



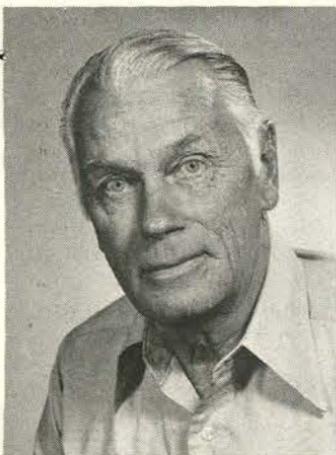
Meredith Gower - 3646 10



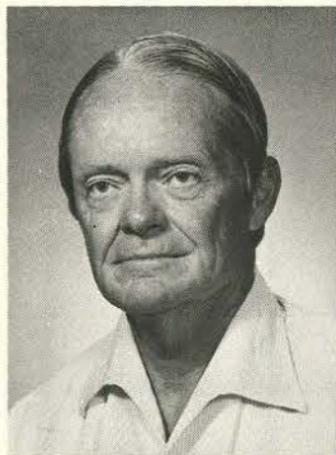
Gary Carlson - 5423 10



Jack Bolen - 8157 20



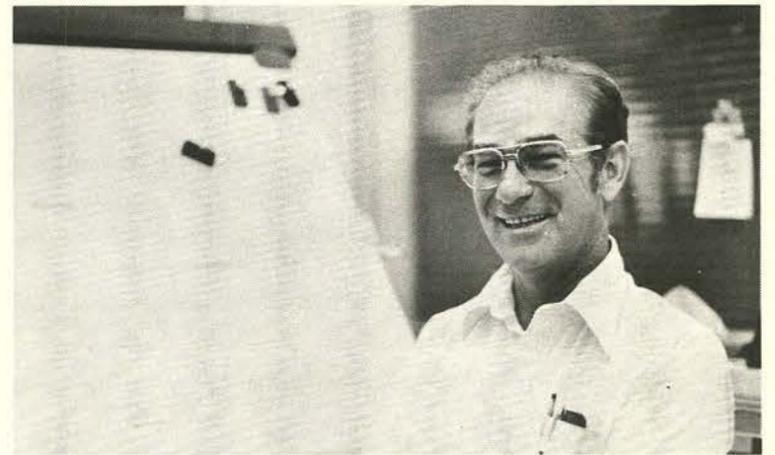
Allen Hobbs - 3311 20



William Price - 1326 20



Clifford Witten - 5167 10



Charles Duvall - 9622 15



James Grier - 3411 25



Lawrence Dyer - 9411 20



Leonard Nelson - 3613 25



Harold Houts - 4314 25



# HIRE THE RETIRED

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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**

DRUM SET, 4 piece with extra snare drum and accessories. Johnson, 298-4046.

KITCHEN TABLE, formica topped, one extension, and 4 chairs, \$20; tire chains, fits 165-15 tires (Volvo), \$5. Barnard, 256-7772.

TRUCK WHEELS, 16.5", eight bolt, \$15 each; high chair, maple, no gouges but needs refinishing, \$7. Mendel, 265-3840.

MOTORCYCLE DIRT BOOTS, size 8 thru 10, weekdays after 5 or any time weekends. Seidner, 883-8421.

MANX CAT, young, spayed, free. Cockerleas, 256-7570.

CORNER BEDS, two single size, corner table, storage area, blue plaid covers, two bolster pillows, \$120. Boyer, 298-3893, after 5.

WASHER AND DRYER, electric, Westinghouse Deluxe, \$100. C DeBaca, 344-3369, after 6.

BICYCLE, Schwinn Stingray, erector set; hot wheels, cars and track; G.I. Joe; electric football; Tinker Toys; etc. Amos, 298-1095.

EVETTE B-FLAT CLARINET, music rack, \$130. McKay, 256-3911.

270 REMINGTON PUMP model 760 Gamemaster, 4X Lyman All American scope; sling, recoil pad, case, some shells. Shinn, 299-6238.

FREE PUPPIES, Labrador X Doberman X?, six weeks old. Cooper, 869-2198.

CAR CASSETTE DECK, Muntz, \$30; RV 15 gal. water tank, fittings, \$10; Shakespeare 35 lb. laminated bow, \$27. Whitham, 836-1216.

JACKMAN WHEELS, 4 ea., 16.5x9.75 eight bolt, eight spoke; Schriilo power steering for F-250 4x4; 3 motorcycle helmets. Campbell, 268-5750.

BENCH SEATS for Carryall vehicle, one 56" long, one 40", red vinyl up-

holstery, universal mounting, both \$35. Su-ber, 296-7923.

GOLF CLUBS, Walter Hagen American Lady, 1-3-5 woods w/covers, 7 irons, wedge, putter, cost \$230, sell \$75. Klecotka, 821-1466.

CD IGNITION SYSTEM, Delta Mark 10, \$25; Aluminum luggage rack for station wagon, \$20. Martin, 869-2049.

RAW HONEY; Mercruiser I/O props 23 cupped and 20 cupped; 1500 watt generator, \$50. Westman, 881-0471.

SHIP MODEL, Sp. galleon, needs restoration but complete, wood and brass parts, stand, original plans, \$100. Devaney, 281-3961.

SEWING MACHINE, Singer, walnut desk, and chair, 3 yr. old, \$225. Hawbaker, 881-7046.

TRAVEL TRAILER, 24' Holiday Rambler, 8TR, wall to wall carpeting, sleeps 4, self contained, \$2900. Peirce, 299-1946 or 881-7588.

STEEL WINDOW, 37"x 51", with 2 swing windows, \$6. Moulds, 247-8433.

BUNDY CLARINET, case, music stand, \$75. Green-woll, 298-0959, after 5.

NAUGAHYDE COUCH, \$85; McGregor golf clubs, irons and woods, \$35; dog travel case, \$5; portable stereo system, \$25. Goen, 268-7521.

GAS VENT PIPE, double wall type B, 16', 5" dia., wind/rain cover, \$15. Murphy, 881-1520.

QUEEN SIZED BED, 3 yr. old, Mediterranean head board and night stands, corner unit with two single beds. Clarkson, 296-8740.

HOTPOINT REFRIGERA-TOR, 1 yr. old, harvest gold, 11.9 cu. ft., \$200. Cowham, days 265-1028, evenings 881-7193.

PROFESSIONAL MOVING BOXES; 20 book, several medium, 1 wardrobe; large tire for sandbox, free. Link, 294-0338.

TWIN BED, bookcase head-board, mattress, box springs, \$35; bathroom sink, \$5; German Shep-herd cross puppies, free. Hurt, 281-3675.

COFFEE TABLE, octagonal, 42" across flats, 16" high, pecan, wrought iron base of 1/2"x1 1/2" bar-stock in scroll loops, \$50. Champion, 299-0163 after 5.

SINGLE BED MATTRESS, \$20; gold double bed quilt, \$15; grocery store

adding machine, \$20. Pope, 255-6702.

BEGINNER'S CLARINET, \$150; music stand, case, \$7; guitar, \$30. Carter, 296-8709.

GAS RANGE, Tappan, golden harvest, 4 burner, big Oven. Ortiz, 831-0274 after 5.

POLAROID LAND CAM-era model 125; music center for stereo component systems; four 14" tire rims. Kiro, 266-7605.

SHAG RUG, 8x8, black, \$25; 20" girl's Spider Bike, \$20; kettle grill, \$8; child's record player, \$5; camper toilet, \$5; Hoppity Balls, \$2. Keltner, 298-7888.

MINIATURE TWIN-LENS Rolleiflex, \$100; Bolex 8 mm movie camera, \$65; 8 track stereo AM/FM portable radio, \$60. Las-kar, 299-1024.

'76 ENCYCLOPEDIA BRI-TANNICA III, leather bound, gold page edg-ings, bookcase, 30 vol. set, \$750. McConnell, 256-7321.

.32 COLT AUTO, \$65; Nor-dica size 8 ski boots, \$50. Ingram, 264-8803.

FLUTE, \$125; child's car seat, \$8; Pinto locking gas cap, \$4; portable vacuum cleaner, \$5. Singleton, 299-1613.

TWO FAMILY PATIO SALE, furniture, type-writers, binoculars, misc., 9-4, Sept. 18, 19. Nunez, 608 Madeira NE.

ELECTRIC FIREPLACE, 20,000 btu, \$200; hollow core door 28"x6'8", w/ knob assembly, \$5. Penn-ington, 256-9506.

MOBILE HOME, Marlette, 12x65, 2 bdr., 1 1/4 bath, range, refrigerator, W/D utilities, carpet, drapes, covered patio, lawn, trees, set up. England, 898-2045, 299-7849.

**TRANSPORTATION**

'69 DATSUN stn. wgn., AT, \$995. Sandlin, 299-8786.

BICYCLE, men's 3-spd., Sears, \$45; girl's stand-ard AMF 24" bicycle w/ basket, \$40. Jones, 299-6542.

'67 FIREBIRD, 400, 4-spd., new engine, gages, 8-trac, posi-trac, headers & more, all offers consid-ered. Schalles, 281-3035 after 6.

'69 FORD Fairlane, AT, AC, PS, PB, \$750. Brown, 299-3384.

SINGLE HORSE TRAILER, new floor, covered, lock-able tack compartment, spare mounted tire. Houghton, 299-3386.

'69 DATSUN 1600 converti-

ble, \$1200 or make offer; pr. of bucket seats, \$10. Long, 296-2590.

'68 FAIRLANE, 289 CID, 3-spd. Jefferson, 299-1125.

SCHWINN 3-spd. bike, man's model, 26", \$45. Cockerleas, 256-7570.

'69 BUICK LeSabre, PS, PB, AT, AC, 4-dr., 350 V8, 69,000 miles. Gunck-el, 299-3543.

'65 PONTIAC Gran Prix, PB, PS, AC, \$200. Bahr, 256-7452.

GIRL'S BIKE, \$15; little red wagon, \$7.50. Loch-tefeld, 296-1326.

'73 FORD 1/2-ton pickup, AT, PS, PB, AM radio-tape deck, 2 gas tanks, \$2500, price negotiable. Cherino, 865-9588.

'74 VEGA Kammback, AC, new tires, 4-spd., custom interior, red w/black in-terior. Hurt, 299-8857.

14' BOAT, 50 HP outboard, tilt trailer, \$995. Falacy, 881-1802.

BICYCLE, Sears, 26" girl's one-spd., \$20. Moss, 298-2643.

SCHWINN Paramount P-13 24" bicycle frame, \$120; some components for sale. Downs, 293-9320.

'64 CHEVELLE Malibu, 4-dr., AC, AT, radio, V8, new shocks, \$400. Cas-ter, 299-1239 after 5.

'69 TOYOTA Corona, 4-dr., AT, new tires; men's 10-spd. bicycle. Clarkson, 296-8740.

'70 DUCATI 450 Desmo, \$500 or trade for street 2-stroke, truck or mach-ine tools. Good, 898-7963.

125CC PUCH 6-spd., 110 hours, \$375; motorcycle trailer, 3 rail, 15" wheels, \$150. Lassiter, 298-2461.

'75 HONDA CB200, wind-shield, bags. Shane, 296-4430.

'73 MINI CYCLE, 80cc, 16" wheels, street legal, /76 plates, 60 miles. Click-ner, 294-6983.

'70 CHEV Suburban 4-spd., 4-wh, built-in bed, new rubber, \$1700. Mat-tox, 296-4149.

'70 FORD Galaxie-500, 351 cu. in., 2-dr., AC, PS, PB, new radials & valves, \$1100. Lowrey, 298-4288.

**REAL ESTATE**

ONE ACRE lot in Bosque Farms, all utilities, paved road, \$9000, easy terms. Cooper, 869-2198.

MOSSMAN BRICK, 2100 sq. ft., 3-bdr., lg. den, western landscape, north of Sandia HS, \$57,000. Downing, 299-6945.

MOUNTAIN HOME (year

'round), 2-bdr. on 5 wooded acres, 30 mins. from city, sell all or half interest for \$8050. Gallo, 296-0112.

LOT at Deer Lake Estates, approx. 3/4 acre, view accessible year round. Wilson, 299-1721.

MOUNTAIN LAND: 13.4 acres, gently rolling, ad-jacent to Sandia Knolls, 20 mi. from Sandia. Al-bright, 821-9462.

**FOR RENT**

HOUSE, 2 bdr., unfurnish-ed, garage, drapes, stove, refrigerator, avail-able Oct. 1, first and last months rent, \$185/mo., \$100 deposit. Bozone, 294-1127.

CONDOMINIUM, Purga-tory ski basin, discounted early reservations, ski to lifts and your door, sleeps 6, linens, fireplace, kit-chen. Smatana, 299-6278.

CABIN, Vallecito Lake, Colorado, 3 bdr., furnish-ed, FP, sleeps 8, fishing, boating, hiking, horse-back riding, \$30/night, \$180/week. Croll, 881-7235.

**WANTED**

LAWNMOWER in good condition; three or four knee high stools. Rob-erts, 294-3648.

ONE BDR. APARTMENT in NE Heights, preferab-ly in vicinity of UNM, must have small yard for small dog. Sanchez, 293-4751, after 4.

RIDER/DRIVER from Menaul and Chelwood area, Gate 4 parking. Ford, 4-1457 or 294-6133.

BRICKLAYER to build two 2'x1 1/2'x5' brick pillars for church sign, price negotiable. Woodworth, 294-4477.

'66 FORD Pick-up owner's manual. Nelson, 881-0148.

CHEST, 4 or 5 drawer. Santana, 294-0536.

PIANO, excellent condition only, prefer console pi-ano. Arenholz, 298-1724.

**LOST AND FOUND**

LOST—Pocket calculator 3x2; earring with three round silver pendants; Rx Photo-Grey bifocal glasses with silver frames; ring with four pieces of turquoise; Rx smoke-colored safety glasses.

FOUND—Aluminum key inscribed "Eastlake, Oh-io M-1"; two-bladed pocket knife 2 1/2" long with pearl handle. LOST AND FOUND, Bldg. 832, 4-1675.

**•JUG BAND•C-CLUB•STEAK•HOLY LAND•BROWN TROUT•FIFTH QUARTER•**

FRIDAY	SATURDAY
17—HAPPY HOUR ROAST BEEF BUFFET Adults \$3.25 Under 12 1.92 Watermelon Mountain Jug Band MIDNIGHT SPECIAL	18—SHRIMP PEEL Cocktails at 6:30 Dinner at 7 NIGHTLIFERS 8:30-12:30
24—HAPPY HOUR STEAK BUFFET New York \$3.75 Chopped Sirloin \$2.25 VIKINGS Al McCahon in Lounge	25—TEEN DANCE 7:30-10:30 DIAMOND Members 50 cents Guests \$1

I—am **delighted** to inform you that the Watermelon Mountain Jug Band will indeed be at the Club for Happy Hour tonight. So call your spouse and/or loved one (loving one?) and arrange to get to the Club early enough to get a seat. (Last time we had to bring in the picnic tables, remember?). As if the Jug Band (at 6:30) weren't enough, we'll throw in a roast beef **au jus**, baked potato, etc. buffet and the **Midnight Special** at 8:30. Freebie football tickets too—see below.

**LIVE**—a little, travel a lot. That's easy, fun, and not all that expensive, thanks to the Club's package deals. Ask Ed Neidel tonight at Happy Hour (between 6 and 7) about the newest trip, the one to the Holy Land for Christmas. You're on holiday anyway—and what more appropriate place to be for the most memorable Christmas of all?

A—last minute reminder in regard to tomorrow night's shrimp peel: remember your tickets, toothpicks, nail files, and something to wipe that salty smile off your face with.

**LIFE**—of Riley: that's what I was leading. Then Riley came home! So I'll be at Happy Hour next Friday for steaks to reduce the swelling. You may want to eat yours. Corn-on-the-cob too. Dance to **The Vikings**. Then catch Al McCahon in the Lounge.

**OF**—all the local fish varieties, the brown trout has to be the most challenging. Meet that challenge by enrolling in Bob Lake's Brown Trout Fishing School. It begins on the 22nd, it meets for five Wednesdays thereafter, and it costs \$22 (\$24 for non-Club members). Sign up soon.

**INDULGENT**—parents are the ones who get their teens tickets for the dance on the 25th. Else their little tear-streaked faces with noses flattened against the windows will ruin Teen Dance for all the others.

**EXCESS**—energy of Lobo rooters can be dissipated during the Fifth Quarter. That's when Wolfpackers and like-minded friends gather at the Club after the game to calm down and/or cheer up with a Wolfpack Special. No game tickets? Never fear. Win one of a handful of freebie game tickets in Julian Lovato's raffle during Happy Hour on the 17th. Lobo bus departs at 6:45 on the 25th.

**BUT**—not much longer. That's this year's swim season. Pools and snack bar

are open weekends through the 26th.

**ALWAYS**—fun to meet a movie star. Come to the Ski Club's meeting on the 21st, and meet Pepi Stiegler of Jackson Hole, star of "Stiegler and the Style of a Champion." (Underwhelming modesty that.) John Ades of K-2 Ski Company will, I'm told, bring some comedies—rejects from the assembly line perhaps. Should be a good meeting.

**IN**—the patio. Wednesday nights. Through September. Enjoy the finals of the picnicking competition. Winners go on to the Regionals. Losers get their baskets ceremoniously smashed—like, correction, by John Foster, father of the Picnic Night tradition.

**STRICTEST**—discipline and training are necessary to produce a truly talented mime artist. And one of the finest will be at the Club for Variety Night on the 2nd. She's Havre von Lambach, and she excels at the art of telling a story without words. In addition, a movie that brings back the young stars of **Oliver**. It's called **Melody**. And two (2) color cartoons, including an Elmer Fudd.

**MODERATION**—in your movie expenditures in order? In order to reduce them, buy a batch of Commonwealth tickets at 75 cents off the going price. Good through Dec. 15.

**MORE INFO—265-6791**

**•DIAMOND•MIDNIGHT SPECIAL•ROAST BEEF•**

# Take Note

**LAB NEWS** had a call the other day from an employee who, in the interests of conservation and economy, was thinking about making his own storm windows—the glass (not plastic) variety. But he has several questions: what's the optimal distance between the storm and regular window? Is the seal between the seal window and the window frame critical? Or are small cracks "for breathing" ok? What's a good design for a do-it-yourself storm window? He figured someone out there would have answers. If you know about storm windows, let us (**LAB NEWS**) know and maybe we can publish something of general interest on the subject.

\* \* \*

The Heart Association called to report an interesting service they'll be offering at the State Fair. For free to all comers they'll do lipid screening and make blood pressure checks. Lipids are found in the blood stream and include triglycerides and cholesterol. If you wish to participate, show up at their booth in the Agriculture Bldg. between 10 am and 1 pm; don't eat breakfast. The blood pressure checks are offered all day. (A check of a medical text had this to say about lipids: ". . . lipids

are synthesized by the agranular portion of the endoplasmic reticulum." That should clear up any misconceptions you may have had about the little rascals.)

\* \* \*

According to the prospectus, the Career Counseling Workshop offered by the Labs ". . . will help you learn to set your own goals, assist you in developing a basic career plan, and help you realize your own strengths, limitations, desires, and needs." The workshop meets for ten weekly two-hour sessions after work. Enrollment is limited by number but not by rank. If you're interested, call your Personnel Representative, or Al Artiaga (200) on 4-9481. Tentative starting date is Oct. 4.

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Missouri Research Laboratories, located in Albuquerque and dealing in electronic fabrication, printed circuit manufacturing, instrument repair and calibration services, have a large quantity of surplus instruments for sale. In some cases, the items are free. The instruments are available on a first-come, first-served basis; for more information or to arrange inspection of the instruments contact Dave Ortiz, 243-6772.

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