

Senators Visit Sandia

VIP's visited Sandia last week. Left, Adelico Cordova and Dolores Aragon of Photofabrication Section 3623-1 explain their work to Senator Pete Domenici who is decked out in clean room clothing. New Mexico's newest Senator, Jack Schmitt, and President Sparks are shown during the Senator-elect's Labs briefing.

LAB NEWS

VOL. 28, NO. 25

DECEMBER 10, 1976

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

FIVE YEAR PLAN

Diversity Marks Energy Effort Through FY82

[This final article in a series based on the Sandia Laboratories Long Range Plan covers projected Labs activities through FY82 in areas relating chiefly to energy and reimbursables.]

Nuclear energy, solar energy, wind turbines, drilling technology, coal liquefaction, enhanced natural gas recovery, in situ exploitation of coal and oil shale, and combustion research are major elements of the Labs' commitment to energy development. The mix reflects a match of Sandia's research and development capabilities to ERDA's broad charter.

Sandia solar projects during the 5-year period will become highly visible. The collector fields east of Bldg. 832 will be augmented with industrial developmental designs, and under the Solar Total Energy Systems Program, several large experimental facilities with a capacity of 5 MW_e/25 MW_t will be operational around the country by 1983. (Ed. Note: MW_e stands for megawatts electrical and denotes the electrical output of a power facility; MW_t, megawatts thermal, denotes the thermal energy output of a solar system.)

The "power tower" south of Area III should offer a 1 MW_t test capability by next spring and is scheduled to be expanded to a 5 MW_t capability by the end of the calendar year. Sandia Livermore will continue to manage the solar central receiver power plant project for ERDA, with planned operation of a 10 MW_e pilot plant in 1980. The site for this plant has not yet been selected. Photovoltaics (direct

conversion of sunlight to electricity) will be the basis of a 10kW_e experimental power system, scheduled for completion in 1978, while a nationwide total of 100 kW_e in photovoltaic power systems is planned to be operational by 1980.

The vertical axis wind turbine that sat atop Bldg. 802 last year will be succeeded by two larger models: a 60 kW_e system in 1977 and a 200 kW_e system in 1978.

The Labs will continue its investigations into drilling technology throughout the five years.

Sandians will assist in the Laramie Energy Research Center's work on exploitation of the country's fossil fuel resources. The in situ conversion to gas is the principal coal project. For in situ exploitation of oil shale, the Labs will devote a major effort to the fielding and development of instrumentation and rock mechanics research. We will also continue work on diagnostic techniques to support massive hydraulic fracturing efforts by industry for enhanced natural gas recovery.

The combustion research program at Sandia Livermore is the Labs' major initiative in conservation. Using advanced diagnostics and computer modeling, studies of combustion in automobile engines and in other combustion chambers (including furnaces) may point the way to enhanced efficiencies.

Several hundred Sandians work on reimbursables. Reimbursable programs are those funded by non-ERDA agencies such as the Department of Defense (DOD)

and the Nuclear Regulatory Commission (NRC).

Nuclear energy projects, many funded by NRC, include feasibility studies of radioactive waste management and installation of a pilot plant in the salt beds of southeastern New Mexico; the development of casks for use in transporting hazardous nuclear material; experiments and investigations relating to the safety assessment and licensing requirements of the liquid metal fast breeder reactor (LMFBR) and the commercial light water reactor plants; and development of methods to evaluate both physical protection systems and nuclear waste disposal facilities.

The Labs plans to continue its substantial reimbursable effort for DOD on a variety of projects. Some examples:

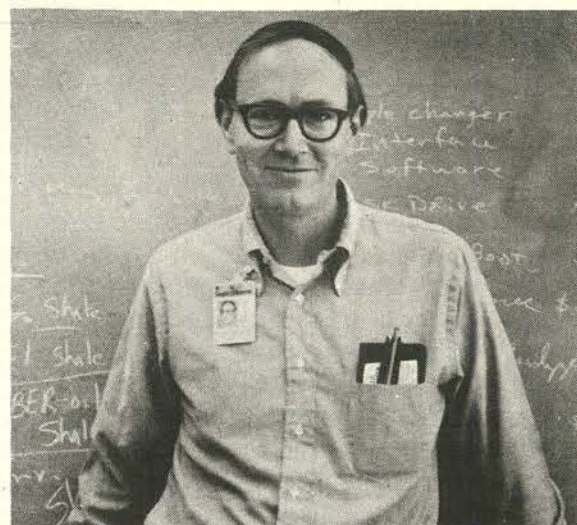
- R&D in the Mk 4 arming and fuzing system for the Navy. Completion of the main effort is expected in FY 77.
- Intrusion sensors and data handling. Over 100 Sandians work on this Air Force project, and the effort is projected to remain at a high level during the forecast period.
- Satellite systems. This long term program involves development of radiation and optical sensors for Air Force satellites. Over 100 Sandians are also currently assigned, and our level of effort through FY 82 is expected to remain constant.

Afterthoughts

Reading, writing--Two items. The first is that the Association of American Publishers has found the reading proficiency of college freshmen today to be equal to that formerly expected of high school freshmen. Second, a statement by Brown's English department chairman, A. D. Van Nostrand: "Writing is thinking. The alarming thing about the decline in students' ability to write is not that their grammar is weak or that they don't know how to construct a decent sentence. It is, rather, that they cannot string sentences together to form a coherent paragraph that completes a process of thought. The degeneration is in the quality of an idea and in the ability to convey it in writing. The affliction... is characterized by rambling, lack of focus, writer confusion over what he is trying to say, and problems in organization."

Unrailed--A young woman named Cissy Recklau made minor history recently when, confronted with a job transfer from San Diego to Washington, D.C., she decided that driving there would be a drag and, following negotiation, took her auto along on the American Airlines DC-10 flight that flew her to the East. It was a first for a passenger airline. Significantly, Miss Recklau had earlier tried to have the car shipped by rail, only to be informed that railroads no longer ship cars for individuals. One sometimes get the impression that our troubled railroads' notion of progress is to find new ways to discourage business.

Perspective--"Every man takes the limits of his own field of vision for the limits of the world." Arthur Schopenhauer *js



DICK LYNCH (5440)

Supervisory Appointment

DICK LYNCH to manager of Waste Management and Environmental Program Department 5440, effective Dec. 1. Dick earned a BS degree from the University of California at Berkeley, and his MS and PhD — all in chemical engineering — from the University of Illinois. He joined the Labs in March 1966 and worked with a chemical physics research group. Following a two-year military leave-of-absence, serving in the Army Signal Corps, Dick returned to Sandia, and in June 1971 was promoted to supervisor of Applied Material Science Division. With this group, which later became Chemical Technology Division 5824, Dick was concerned with problems associated with light water reactor safety, high temperature gases, magma tap, and municipal solid waste conversion. For the past two years the focus of Dick's work has been the solidification of nuclear reactor waste, the beneficial use of isotopes recovered from nuclear waste, and research relating to the synthetic oil program.

Dick is a member of the American Association for the Advancement of Science, the American Physical Society, and the American Institute of Chemical Engineers. He enjoys hunting, fishing and yardwork, and he and his family are avid skiers. He and his wife Myra have three children and live at 7500 Osuna Road NE.

Deaths

John Postlewaite of Stockpile Systems Division II (4325) died Nov. 24 after a long illness. He was 52.

He had worked at Sandia since September 1955.

Survivors include his widow and three daughters.

Daniel Elmore of Test Data Programming Division 9424 died Nov. 28 in an automobile accident. He was 28.

He had worked at the Labs for almost a year.

Survivors include his mother, step-father, three brothers and a sister.



Events Calendar

- Dec. 11, 15, 17 — Chaparrals home games, 255-7581.
- Dec. 11 — "La Fiesta de la Posada," a Christmas Cantata, New Mexico Symphony Orchestra, 2 & 8:15 p.m., Popejoy Hall, 277-3121.
- Dec. 15 & 16 — All Beethoven programming on KHFM radio, 96.3 FM, in honor of Ludwig's birthday.
- Dec. 18 — New Mexico Symphony Orchestra Ensemble concert, Albuquerque Public Library Auditorium, 2 & 3:30.
- Dec. 18 — KHFM radio 96.3 FM, "Candida," 6:40 p.m.
- Continuing — "TV or Not TV," Barn Dinner Theatre, 281-3338.

Retiring



Marie Dillon (3152)



George Dingman (3430)

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COMPUTERIZED

War Games Help Define Labs Work

Not so many years ago professional soldiers hovered over outsized sand boxes moving miniature military units and equipment about with all the intensity of schoolboys playing with toy soldiers. It was a game, but not a game in the usual sense. Called wargaming, the sand box exercise brought a graphic element to complex battlefield problems — the big picture was there before you and, manipulating the various units, the professional soldier gained insights into combat. He refined his craft.

At Sandia Livermore today, a group of scientists watches a film screen intently. Almost cartoon-like, groups of small squares and rectangles sway back and forth across the screen. One line retreats, another advances. The film is stopped, and the scientists talk about corps, divisions, nukes, coordinates, target arrays, target acquisition. This is the language of wargaming.

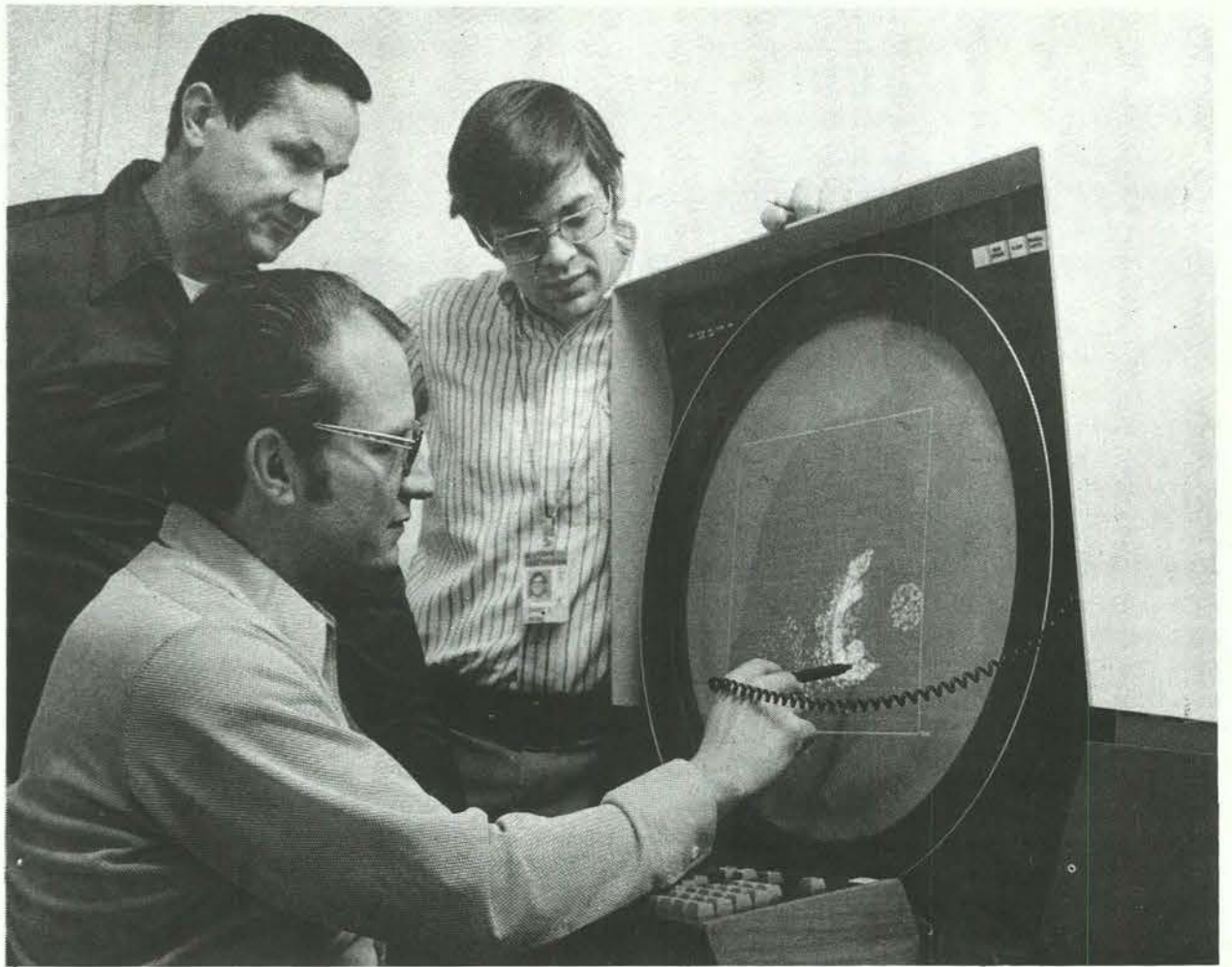
The activity is centered in Garry Brown's Systems Studies Division 8324. Why are we doing it? "To help make sure that Sandia works on the right things," says Garry. "We're trying to make assessments of what a future conflict might be like. Wargaming is a tool for investigating how a tactical conflict may unfold. Wargaming can't predict who will win the war, but it can indicate relative performance. It can illustrate battlefield situations that call for special measures — for example, the employment of nuclear weapons to neutralize heavy armor yet not destroy the countryside in the process.

"At Sandia, wargaming helps us evaluate different warhead options and delivery systems during Phase 1 and Phase 2 studies. We hope wargaming will help identify fruitful exploratory development projects for the laboratory."

Wargaming has undergone dramatic changes in recent years. The sand box is replaced by the computer, which has the unique capability to ingest the infinite numbers of "what ifs" that arise from what has been aptly termed the fog of battle: What if the enemy shifts his tank force northward? What if we use a nuclear weapon against a concentration of artillery? What if he wipes out our petroleum reserves? And so on.

One of the computer wargaming models employed in Garry's group is called DIVWAG (Division War Game) and was originally developed by the Army at its Command & General Staff College in Fort Leavenworth. Exercises with DIVWAG there are carried out by teams of 20-30 people.

"By applying computer capabilities, particularly graphics, to the problem," says Garry, "we are able to use the model with as few as two to three people. Furthermore, computer graphics enable us to gain a more complete understanding of the battle, the flow of information, and the performance of each portion of the model.



WARFARE is antiseptic on a computer graphics screen, here viewed by (standing) Norm Breazeal and Garry Brown (both 8324) and Dick Basinger (8322). The device is used by the three in wargaming studies in Garry's division.

LIVERMORE NEWS

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Authors

Bill Swansiger (8334), Jim Swisher (BTL), Joe Darginis (8212) and Carl Schoenfelder (8313), "Hydrogen Permeation in Palladium-Chromium Alloys," JOURNAL OF PHYSICAL CHEMISTRY, Vol. 80, p. 308.

Ron Musket and Walt Bauer (both 8334), "Determinations of Oxide Thicknesses on Tritiated Erbium Films Using Beta-Induced X-ray Fluorescence," JOURNAL OF APPLIED PHYSICS, Vol. 47, p. 353.

Ron Musket (8334), "Effects of Contamination on the Interaction of Hydrogen Gas with Palladium: A Review," JOURNAL OF LESS COMMON METALS, Vol. 45, p. 173.

Rudy Johnson and Jack Dini (both 8312), "Etching and Plating of Uranium Alloys," METAL FINISHING, Vol. 74, p. 37.

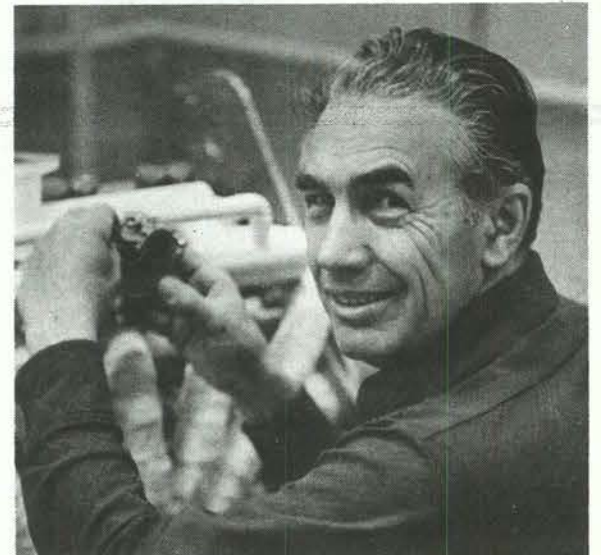
We can also examine many more scenarios or excursions."

Army planners are now frequent visitors and work closely with the Sandia staff on wargaming exercises. Joint Army-Sandia DIVWAG exercises are planned.

Garry notes the group's preoccupation with defensive scenarios. "By most measures of conventional combat strength, the Warsaw Pact forces have an advantage over the NATO forces. By building a tactical nuclear weapon inventory that can be employed without devastating Western Europe, we hope to deter aggression."

That's scary talk. After thinking about it, though, we conclude our best interests are well served by people willing to think about the unthinkable.

Retiring



Harvey Pouliot (8116)

Sympathy

To Carl (8423) and Jerry Wackerly (8213) on the death of their father in Berkeley, Calif., Nov. 15.

To Ken Henry (8344) on the death of his mother in Laclede, Mo., Nov. 6.

To Charlie DeCarli (8346) on the death of his father-in-law in West Columbia, Texas, Nov. 7.

To Sandy Huston (8122) on the death of her father in Tracy, Calif., Nov. 23.

To Fred Eickert (8432) on the death of his mother in Pleasanton, Nov. 1.

To Dick Ballard (8212) on the death of his father-in-law in Albuquerque, Nov. 12.

'Thanksgiving — A State of Mind'

Carol (1260) and Jack Kaemper planned to eat their Thanksgiving dinner on Sunday following Thanksgiving Day. Their two children — 11-year-old Michael and 15-year-old Amy — would be returning late Sunday afternoon from a four-day trip to Rainbow Bridge National Monument in southern Utah. Highlight of the church-sponsored trip was the 12-mile backpack to Rainbow Bridge.

Carol spent Sunday cooking the dinner and laying a festive table; the kids would be arriving about 5:30 p.m. Carol and Jack and parents of the others in the party gathered at the church. They all felt concern because of the severe storm that struck Albuquerque early Saturday morning. At 7 p.m. they received a call from Tuba City, Ariz., saying the bus had just left and the weather was not too bad. At 1:30 a.m., the call came in from Gallup: -27°, terrible roads, cold bus. The group arrived in Albuquerque at 4:30 a.m.

"When we got home, Michael saw the table and told me how hungry he was," Carol says. "In fact, all of us were starved, so at 6 a.m. Monday, we sat down to eat our Thanksgiving dinner. We had the whole bit — china and silver included. I know now that Thanksgiving is not a special day — it's a state of mind."

Power Supply Awarded Patent

ERDA was recently awarded a patent for a unique power supply designed for use in an extreme emergency situation. Inventors are Jack Marron (2314), Ed Hart (2314), Jim Leeman (2315), Hugh MacDougall (2316) and Calvin Smith (Omega Electronics, Amarillo).

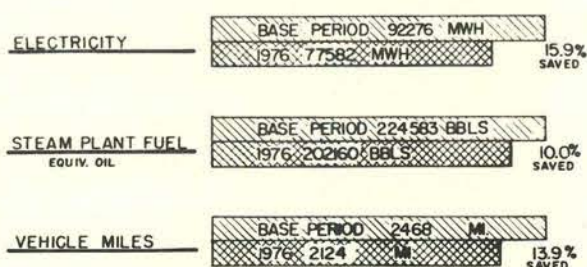
Part of the emergency disablement system, the power supply provides detonating power to small shaped charges strapped on nuclear weapons in storage. The charges enable destruction of the weapons to prevent capture by terrorists or enemy forces, yet are so designed as to minimize the scatter of radioactive material.

The power supply incorporates explosive initiators, ferroelectric current generators and a compressed magnetic field current generator. Coaxial cables connect the power supply to the charges.

"Prime requirements of the system were low cost, high reliability and safety," Jack Marron says. "The first units were available for field trials about a year after the project started."

ENERGY SAVINGS

COMPARED WITH USAGE IN BASE PERIOD — JULY 1972 THRU JUNE 1973
CURRENT REPORTING PERIOD ENDING OCT. '76



DUANE ARLOWE demonstrates method of placing a canister, which holds up to 2½ kilograms of SNM, in a carousel. Carousels and canisters are part of an advanced storage vault and protection system being developed by Sandia for ERDA's Division of Safeguards and Security.



SAFEGUARDS WORK — Construction of a nuclear material protection system to house special nuclear material (SNM) is continuing at the Laboratories. Duane Arlowe, left, and Stan Howard, both of Special Projects Division 9425, examine a prototype canister in which SNM will be stored. Model canister has top cut away, exposing the electronics package which allows for constant monitoring of canister integrity and contents.

Pu & U Vault Has Unique Features

A nuclear material protection system that includes a storage vault with built-in safeguards against unauthorized entry and theft is in the final stages of development at Sandia.

The new vault will be used to store special nuclear material (SNM), such as plutonium and highly enriched uranium. It is one part of the broad safeguards program sponsored by ERDA's Division of Safeguards and Security.

The heart of the Sandia system is a succession of checks that must be satisfied before the vault can be entered and nuclear material removed.

The unique vault and its multiple entry operation procedures will:

- Reduce vulnerability to forcible attack.
- Restrict authorized access to specific canisters of materials.
- Provide continuous monitoring of stored materials.
- Reduce radiation exposure.

Before persons may enter the vault to remove materials, their authorization must be validated in three separate offices — a security operations center, a material operations center and a materials accountability center.

In an actual removal procedure a work order will be drawn up specifying the person or persons authorized to enter the vault, the time materials will be moved, and what materials will be moved.

A system which matches photographs, fingerprints or signatures, or combinations of these, will be used for identification. Computer techniques for automatic comparison of fingerprints and signatures with stored data are now being investigated and developed. Sensors at the vault entrance will detect contraband such as explosives, tools and weapons.

The security operations center will

communicate automatically to the material operations center that persons have been identified and cleared for passage into a "holding area" near the vault. The material operations center will then check the time. (If an authorized person arrives at the vault, but at an unauthorized time, it will be noted at this stage.)

Inside the vault will be special eight-foot-tall carousels, each containing 35 canisters filled with up to 2½ kilograms of SNM. The steel carousels have geometrically spaced openings which operate in conjunction with doors and feature remotely controlled locks.

Computer controlled from the material operations and materials accountability centers, the carousels will turn to a pre-determined position, making the prescribed canister available through the door which unlocks at the appropriate time. Because of the carousel design, only one canister will be accessible at a time.

The status of the canisters can be determined immediately by computer-controlled remote monitoring. A small, sophisticated electronics package in the top of each canister will constantly monitor the nuclear material inside and the integrity of the container. Signals from the package to the computer will provide a quick, efficient inventory, and eliminate the hazards of radiation exposure and the errors inherent in manual accounting methods.

After authorized removal of the canisters, the contents of the vault will be automatically inventoried again, and any discrepancies will be reported to the control centers. If no discrepancies are detected, the people may leave the vault.

Engineering tests on the vault will be conducted at Sandia through 1976. Operational evaluation at an existing storage facility is expected to begin in early 1977.

Sun's Rays Raise Water — And Hopes

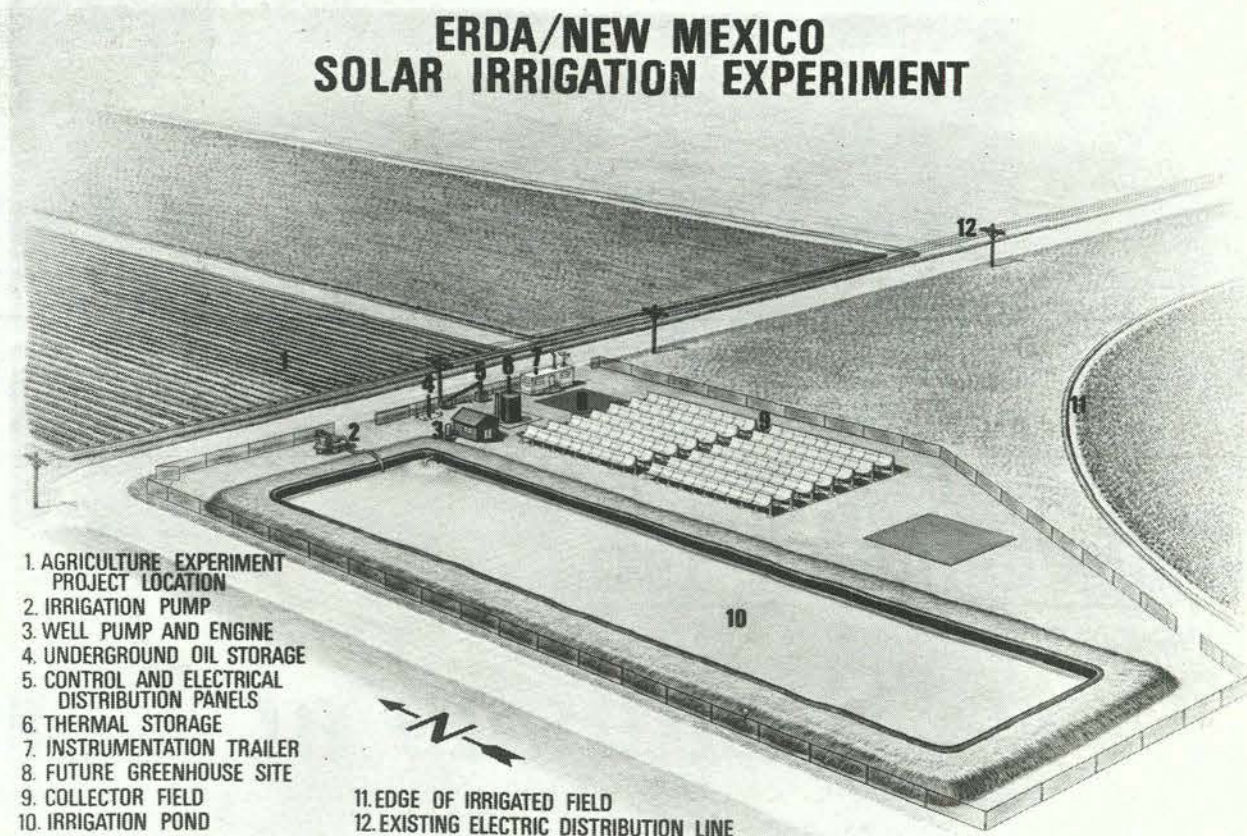
The sunlight necessary to grow crops can now be used to water them. That's the premise of an experiment in solar-powered irrigation now underway in the semi-arid Estancia Valley south of Willard, New Mexico. The experimental system, the first in the nation, is a joint effort of ERDA, New Mexico State University, and the State of New Mexico. System engineering is directed by Advanced Energy Projects Division 5715 with Bob Alvis as project engineer, while systems analysis is directed by Systems Analysis Division 5742 with Sharla Vandevender as project leader.

NMSU is responsible for the agriculture experiments and portions of the systems design. The experiment will be located on the Torrance County Land and Livestock Company Farm operated by Ted Schrimsher.

When completed, the system will pump enough water to irrigate 100 acres of mixed crops. Potentially, enough energy may be available to support off-season operations such as a greenhouse or fish farm.

Over 160,000 irrigation wells in the Southwest are powered by natural gas. With gas rate increases and potential shortages, many of these wells may become unprofitable to operate. Solar-powered irrigation may offer a clean alternate source of energy in the future for the nation's food production industry.

In operation, a heat transfer fluid (an oil-like fluid which remains stable at high temperatures) is pumped into the collector field. Solar energy from the 605 square metres (6720 square feet) of sun-tracking



parabolic collectors heats the field to 215°C (420°F). A thermal control valve then opens to allow the hot fluid to flow either to a thermal storage tank or to the boiler/heat exchanger of a heat engine.

In the boiler/heat exchanger the heat transfer fluid heats liquid freon to a gaseous state. The heated, high-pressure freon gas drives a turbine, whose output of 19 kW (25 hp) drives a conventional irrigation pump.

"Data is what we're after," says Bob. "We are incorporating a number of

temperature sensors and flow indicators into the system. We'll also have a small weather station to monitor environmental conditions. These data will be the basis for our analysis of the system's performance."

"We should note," says Dick Braasch, 5715 supervisor, "that this New Mexico project is only one part of a larger program. Another solar-irrigation project is to be constructed in Arizona; within the next few years, ERDA plans to design and test an energy system for a full-scale farm operation."

Speakers

R.L. Schwoebel (5820), "Materials Problems in Nuclear Waste Management," LLL and Cornell University, Oct. 18 and 25.

E.P. EerNisse (5133), "Photovoltaic Concentrator Systems," invited talks at IEEE Power Engineering Society Meeting, Indianapolis, Oct. 20; Purdue University EE Department undergraduate and graduate seminars, Oct. 21.

G.W. Barr (5243), "Particle Beam Fusion Program," Energy Projects in the Southwest, American Society of Civil Engineers, Arizona Section, Oct. 22, Casa Grande, Ariz.

K.W. Schuler (5163), "Observation and Analysis of Shock Wave Propagation in Carbonate Rock," Fall 1976 ME seminar series, Oct. 29, University of Maryland.

G.B. Krefft (5112), "Radiation Effects in Ion-bombarded Polycrystalline Alumina"; J.K. Johnstone (5846), "Consolidation of Nuclear Wastes in Titanate Ceramics"; R.H. Marion and C.H. Karnes (both 5847), "High Temperature Mechanical Properties of Graphite Matrix Reactor Fuels," 1976 Joint Fall Meeting of the American Ceramic Society, Oct. 31-Nov. 3, San Francisco.

D.M. Mattox (5834), "Thin Film Adhesion and Adhesive Failure - A Perspective," Symposium on Adhesion Measurement of Thin Films, Thick Films and Bulk Coatings, Nov. 2-4, Philadelphia; invited paper, "Ion Plating - Concepts and Applications," 25th Symposium of the Mechanical Failures Prevention Group, National Bureau of Standards, Nov. 3-5, Gaithersburg, Md.

R. Harrigan (5711), "Photochemical Energy Conversion - Can It Compete?"; D.M. Mattox (5834), "Chemical Aspects of Solar Energy Utilization," American Chemical Society Pacific Conference, Nov. 7-10, Phoenix.

M. Scott (2642), "Computational Solution of Nonlinear Boundary-Value Problems via Quasilinearization and Orthonormalization," MIT and University of Toronto, Nov. 8-9, Boston and Toronto.

P.J. Modreski (5831) and E.J. Graeber (5822), "Fumarolic Gases from Kilauea Volcano, Hawaii," Geological Society of America annual meeting, Nov. 8-11, Denver.

D.M. Mattox and R.R. Sowell (both 5834), "Properties and Composition of Electroplated Black Chrome," Coatings for Solar Collectors Symposium, Nov. 9-10, Atlanta.

P.E. Bolduc (5232), "Generation of 100 kA Megavolt Electron Beams in Cylindrical Geometry," 1975 Annual Meeting of the Division of Plasma Physics of the APS, Nov. 10-14, St. Petersburg, Fla.

J.E. Schirber (5150) and H.T. Weaver (2354), "Pressure Studies of Rare Earth Singlet Ground State Systems," International Conference on Valence Instabilities and Related Narrow Band Phenomena, Nov. 11-13, University of Rochester, N.Y.

E.L. Burgess (5133), "Silicon Solar Cell Testing in Concentrated Sunlight and Simulated Sunlight"; E.C. Boes (5719) and I.J. Hall (1223), "The Effects of Spectral Variations on Silicon Cell Output," ERDA/NASA Terrestrial Photovoltaic Workshop, Nov. 10-12, Baton Rouge, La.

J.M. Heuter (4231), "Creativity," UNM Civil Engineering Club, Oct. 12.

G.C. McDonald (9623), "Wilderness Areas in New Mexico," Highland HS science classes, Oct. 14; and Downtown Optimist Club, Oct. 29.

R.M. Jefferson (5430), "Our Powerless Society," Society of American Military Engineers, Oct. 21; and Manzano HS world problems class, Oct. 27.

D.A. Reynolds (1757), "Self-Checking Design Using Complete Sets of Alternating Primitives," 14th Annual Allerton Conference on Circuits and Systems, Sept. 28-30, Monticello, Ill.

R.M. Jefferson (5430), "Neutron Threat to Simulation Fluence Calculations for Semiconductor Device Parameter Degradation," "Proposed 14 MeV Neutron Transient Annealing Experiment," and "Neutron Spectra Unfolding From Foil Activation Data," Fast Burst Reactor Dosimetry Conference, Oct. 18-19, University of Arkansas.

J.R. Freeman (5241), "Particle Beam Fusion," Second U.S.-Japan Seminar on Laser Interaction with Matter, Nov. 2-5, Rochester, N.Y.

Save Energy At Home

Ben Blackwell (1333) wants to organize an informal discussion group to exchange ideas on energy conservation techniques applicable to residential buildings. The group would probably meet during lunch or after work. Ben feels that the most fruitful discussions would take place with six or fewer participants, but if many people are interested it may be possible to form several working groups. If you're interested, fill out this form and mail it to Ben — please don't call.

TO: BEN BLACKWELL - 1333

Name _____ Org. _____

Phone _____ New Construction _____ Retrofit _____

Education/Training _____

Sympathy

To Demus Jojola (9582) on the death of his sister and brother in Albuquerque in early November.

To Ralph Wilson (9570) on the death of his father in Albuquerque, Nov. 14.



The U.S.S. Hull, Johnny Stuckey's wartime home



Pearl Harbor vets Johnny Stuckey (9633) and Howard Phillips (3644) today.

DECEMBER 7, 1941

Sandians at Pearl Harbor

Bob Nelson (2154) was dumped out of his bunk by another crewman when he didn't respond to the general quarters alarm. Howard Phillips (9581-1) left his breakfast and got shot at. Frank Bell (6001) ran to the deck wearing his underwear and a .45 semi-automatic pistol. Johnny Stuckey (9633) looked out of the radio shack, saw an unfamiliar plane drop a torpedo, and shouted "This is it!" It was.

These four Sandians were there 35 years ago this week. In talking with them, we found that all had been in the Navy aboard destroyers moored in the same area of the harbor, that Bob and Frank had been aboard the same ship (though neither has ever met the other), and that none was wounded during the attack.

* * *

Bob Nelson — "I was a Radioman Third Class aboard the *Phelps*, a squadron leader of four other destroyers. That Sunday morning between 7:30 and 8 the GQ alarm went off. Well, we'd gotten pretty casual about GQ's by then so I just rolled over and went back to sleep. Then a friend dumped me out of my bunk. I was furious, but he was excited enough that I ran up on the fantail for a look: enemy planes over Ford Island Air Station, smoke from behind the Island — later I found out it was the battleship *Arizona*. I went then to my quarters on the bridge. My job was to operate the submarine detecting gear, so I didn't have much to do as long as we were in the harbor. The bridge was a good place to watch the battle from though.

"We got orders to get steam up and head for open sea. It wasn't easy. For one thing, we were moored to two other destroyers whose boilers were cold. For another, we were short-handed — much of the crew was on liberty ashore. In fact, the only officers aboard were the engineering officer and an ensign — I understand that was Frank Bell.

"We got underway in an hour or so and headed out the channel to sea. I watched the *Utah* get torpedoed and capsize. I saw a disabled Japanese plane crash-dive the *Curtiss*. It sometimes seemed like the whole

sky was full of planes, torpedoes everywhere, lots of strafing. But they were after bigger targets like battleships and cruisers so we weren't attacked. We spent the next 40 hours on the open sea looking for subs — no luck."

* * *

Frank Bell — "I was indeed the ensign on the *Phelps*. When the GQ went off, somebody rolled me out of my bunk; he said he needed the keys to the ammo lockers. At the time I thought I was the only officer aboard, so I reacted somewhat hastily. Once I was on deck (in less than prescribed uniform) I saw the planes, found the ammo locker keys, and headed for the bridge. Here I got the famous 'This is no drill!' message. Luckily, a regular Navy officer, Lt. Bruce Trippensee, was on board so he became the Commanding Officer as we cut ourselves loose from the destroyer nest, got the steam up, left our anchor — inadvertently — on the bottom of the harbor, and headed for sea.

During the sub search, Lt. Trippensee had to sleep eventually. He gave me an accelerated lesson in taking a bearing, handed me a pair of binoculars, and sacked out. I was standing the first deck watch of my life. But we survived, and I no longer felt like a Reserve Officer.

* * *

John Stuckey — I was radio operator on the *Hull*, one of those destroyers with dead boilers next to the *Phelps*. I was waiting to go ashore on the 8 o'clock liberty boat, but I never made it — the attack came at 7:55. I heard some explosions and saw a torpedo drop from a strange plane. That's when I said, "This is it!" I took the message to head for sea and tried to find an officer to give it to — our skipper was ashore. It took us till noon to get steam up and head out. I remember seeing the *Arizona* get hit in her magazine and explode and the *Raleigh* get hit and begin listing. *Oklahoma* was bottom-up when we passed her. The *Nevada* was beached in the channel. We were manning our guns as well as we could without power. We had to aim and point manually and we had to get ammo out from below deck without a lift, but we got

credit for 1½ planes downed — they made a great target as they banked to leave the harbor after dropping their fish. We also captured one of the two-man subs that had slipped into the harbor. Our ship wasn't



Johnny Stuckey during a Pearl Harbor liberty

strafed but we did pick up some shrapnel on the fantail.

"It was pretty chaotic out there — the harbor was full of smoke, and the planes just kept coming. It seemed like there were lots of planes downed, but apparently we didn't get very many. One of our officers got so furious, or felt so frustrated maybe, that he stood on the bridge emptying his .45 autoloader at any plane in sight."

* * *

Howard Phillips — "I was coxswain on the *Trever*, another of the destroyers with dead boilers that day. We were moored only 500 feet or so from the *Arizona*. I was wearing some brand-new whites and a pair of shoes I'd been polishing for six months but had never worn. By the end of the day, the uniform was in tatters and the shoes were scuffed beyond salvation. It started when I heard explosions and ran up onto the galley deckhouse to see what was happening. Then's when I saw the Ford Island Air Station get hit. I was staring over there when I realized that a plane was

Take Note



Howard Phillips, U.S. Navy

heading right at me — and that those were bullets whizzing by me. Then they started hitting the deck about two inches from my shoes. I took cover then — in a less than ideal place: under an ammo box.

"Well, we manned the machine guns while we tried to get some steam up. The guns were water-cooled, and I remember watching a hose get cut by a strafing bullet just as clean as if it'd been cut with a knife.

"I think the battle was hardest on the guys who didn't have any duties assigned — I remember feeling sorry for someone who was in the crow's nest with a shotgun.

"I had a crew trying to get the whaleboat aboard. But everytime we'd just about get it up to the deck, we'd get strafed again and have to drop it. Finally, when we got some steam, we cut it loose and got underway. Smoke and disabled ships all over. I remember seeing a crew in a whaleboat getting a ride. They had roped the periscope of one of those two-man subs and were getting dragged all over the harbor. Don't know what happened to them."

* * *

All four Sandians served in the Navy throughout the war. Howard helped train commandos, then was on a ship torpedoed and sunk near Casablanca. He was rescued and served as an aircraft machinist's mate on the Gallapagos Islands. By the end of the war he was stationed in the States.

Johnny spent four years on the *Hull* and took part in 18 battles, including Guadalcanal, Attu, Kiska, Wake, Kwajalein, New Guinea, Truk, the Marianas, and Guam. Then he cut the cards with the other senior radioman to see which one would stay aboard the *Hull* and probably make chief petty officer and which one would attend radio technician school at Treasure Island, San Francisco. Johnny went to school. His friend did make chief, then was the only survivor from the 14-man radio crew when the ship was lost in a hurricane late in the war.

Bob saw action aboard the *Phelps* at Midway, Guadalcanal, and the Coral Sea. The Navy sent him to school in late 1943 at UNM, then to the University of Colorado. By the time he earned his EE in 1946, the war was over.

Bob came to Sandia in October 1948, Johnny in November 1951, Frank in August 1953, Howard in October 1959.

Doug Drumheller (5167) will present "Thermomechanical Mixture Theories vs Reality" at the 5100 seminar Tuesday, Dec. 14. The seminar meets in Bldg. 806, Rm. 201 at 3:15 p.m.

* * *

The Sandia Laboratory Credit Union will be closed Dec. 27 through 31, according to Bill Bristol, manager.

* * *

Reminder: When you get your new Albuquerque telephone book, don't throw the old one away. Take it to your building's paper recycling bin.

* * *

"The Ugly Duckling," a children's musical written and directed by Gary Shepherd (2634), will be presented tonight and tomorrow at 8 p.m. at the Neighborhood Center, 1020 Edith SE. Youngsters in the cast are members of the Neighborhood Drama Project which Gary has directed for the past five years. Admission is free but donations are accepted.

* * *

Larry Conterno, director of Purchasing and Materials Management (3700), is chairman of the New Mexico Minority Purchasing Council and recently accepted an award in behalf of the 35 private business firms who are members of the Council. The award was made during last month's minority business owner's conference and trade fair, and it was presented to the Council for progress it has made in the program since being chartered in January of this year.

* * *

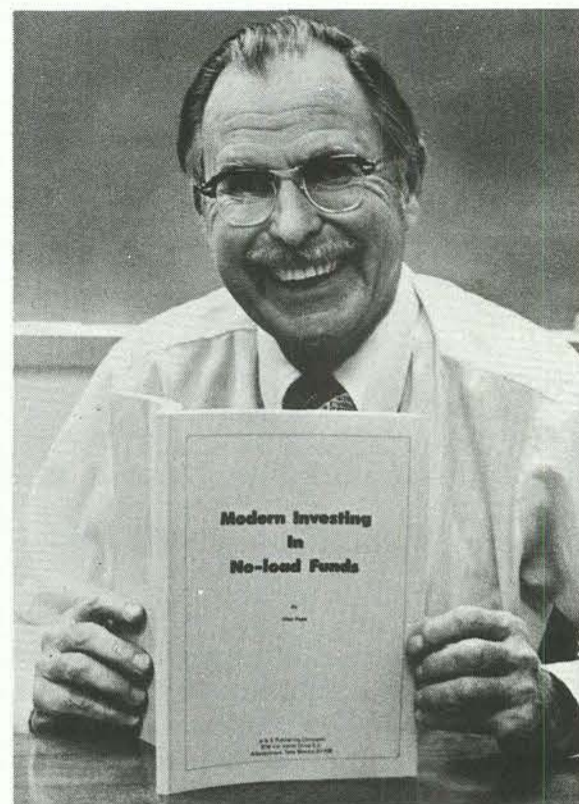
Alan Pope (1400) reports that the American Institute of Aeronautics and Astronautics will start publishing a new archival "Journal of Energy" in the spring of 1977. The Journal will be devoted to energy — its production, transformation, and conservation, and will include but not be limited to laser power transmission; gas turbine power generation; wind, ocean and geothermal energy recovery; MHD generators; hydrogen storage and distribution; solar energy transformation in space; improving combustion efficiency; and fuel cells. Potential authors for the Journal should call Alan on 4-7812. Alan is a Regional Director of AIAA.

* * *

Bob Reed (9526) sends us an interesting clipping from the Idaho State Univ. alumni publication which details a "portable solar powered water heater" that might be just the thing for our many campers. Take one car or truck inner tube, cut the spigot out of a plastic water jug and, using washers inside and out, attach the spigot at the site of the valve (which you've already removed). Place in sun, fill with water, and the author claims you'll be in hot water in no time.

* * *

Sun-Tran is again offering luminaria tours by bus on Christmas Eve. The 1½-hour tour includes the Old Town, Country Club and Los Altos areas. Tickets (\$1.50) are available at Sandia's Credit Union, Felicity Flowers in Winrock,



ALAN POPE (1400) is the author of a newly-published book — his tenth — entitled *Modern Investing in No-load Funds*. In addition to college textbooks on aerodynamics, Alan has also written *Financial Success for Salaried People* which resulted in a feature article in *Fortune* magazine. The new book discusses mutual funds sold only by mail on which no sales commission is paid. Alan has pursued writing as a hobby since 1934 when he sold his first article (for \$5) to the *Atlanta Journal*.

Rhodes Travel Service in Coronado, the Chamber of Commerce Office at the Convention Center, and at Sun-Tran at 619 Yale SE. Tours depart from the Civic Auditorium about every 15 minutes beginning at 6 p.m. on Dec. 24.

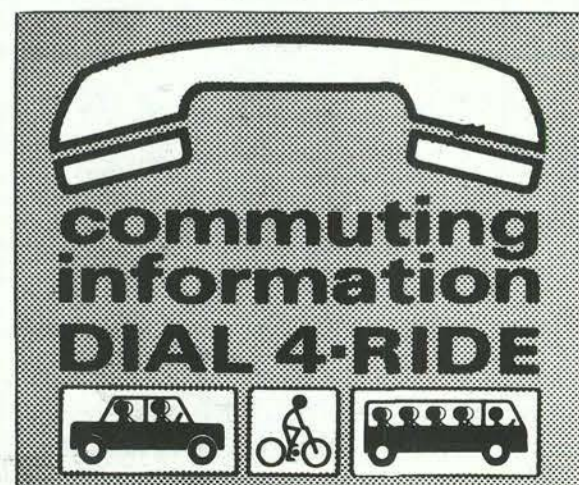
* * *

As a Christmas project, youngsters of Boy Scout Troop 165 and Cub Pack 165 are selling luminarias. The price is \$1.50 per dozen when you pick them up at St. Paul's Methodist Church or \$1.75 per dozen (minimum 3 dozen) delivered. Call Scout leader Fred York (2135), 299-4906, to place an order or stop by the church on Dec. 11 or 18. Address is 9500 Constitution NE.

* * *

Smoking is no longer allowed in the ERDA cafeteria between 11 a.m. and 1 p.m.

* * *



Congratulations

To Ray Foster (1131) on his marriage on Nov. 12 to Virginia Sloan in Las Vegas, Nevada.

Improved Controller Developed

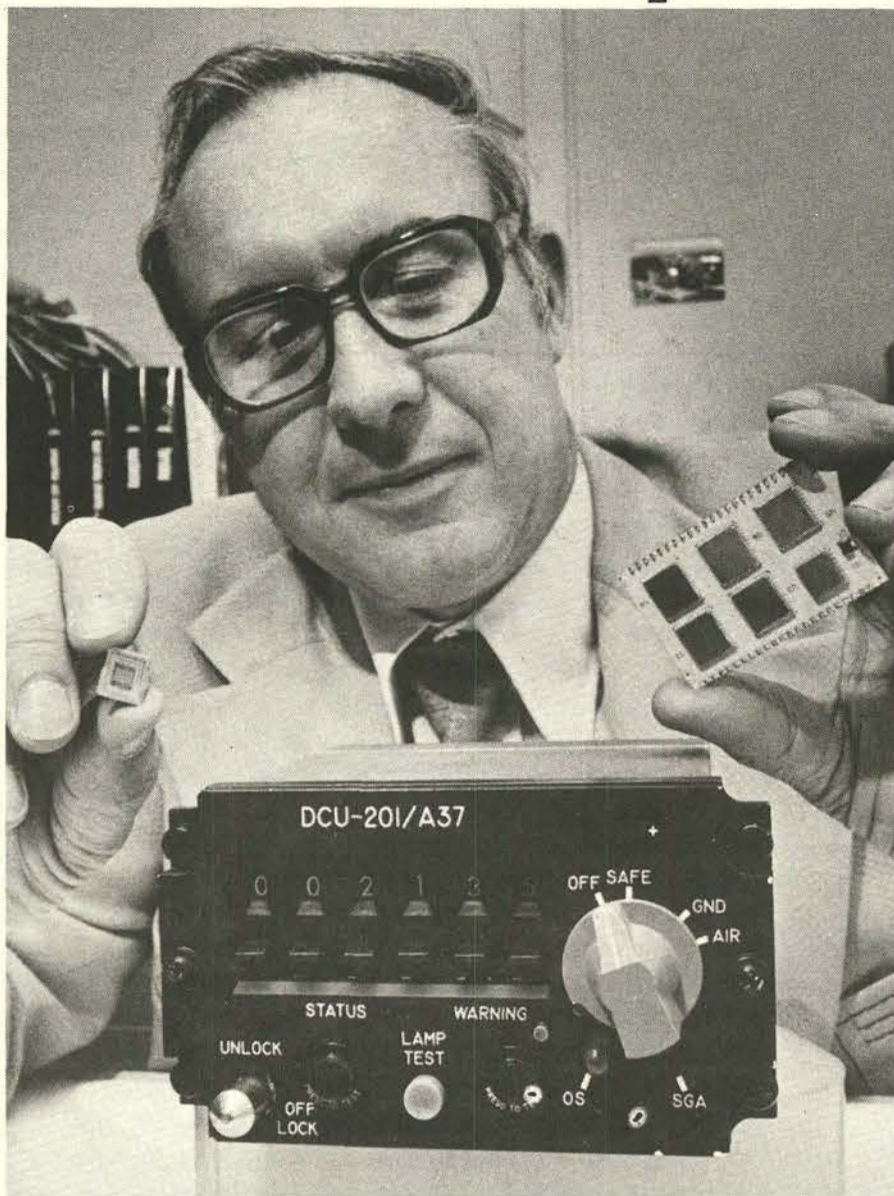
Sandia has completed development of a new and improved PAL/AMAC controller for the Air Force. The DCU 201, like earlier PAL/AMAC (Permissive Action Link/Aircraft Monitor and Control) controllers, is mounted in the cockpit of an aircraft carrying nuclear weapons. It allows the pilot to lock or unlock the bomb, safe or pre-arm the bomb, and monitor the status of certain bomb options. And it allows these functions to be performed with even greater safety than before.

The PAL system keeps unauthorized people from unlocking the weapon. It consists of a coded switch, which is a kind of electronic combination lock in the bomb, and an external PAL controller in the cockpit. The pilot must insert the proper PAL code and then command the bomb to unlock. Electronic circuits in the DCU 201 convert the code from the switch settings to two sets of voltage pulses which are transmitted to the coded switch in the bomb. Only if the code in that signal is the same as the one stored in the coded switch will the pilot's unlock command be obeyed.

One of the two sets of coded voltage pulses unlocks weapons containing an older coded switch; the second set is for newer coded switches. By generating both sets of codes, the controller works without regard to the vintage of the bomb. A light on the controller panel tells the pilot whether or not the bomb is unlocked.

The second function of the DCU 201 is to safe or pre-arm the weapon. A weapon is always kept in a safed condition rather than in a pre-armed state until ready for use, thus eliminating the risk of a detonation during an accident. A switch and a light on the controller ensures that the weapon is in fact set to SAFE. The same switch allows the pilot to select a weapon use option (such as air or ground burst) and to pre-arm the weapon just before release. If the pilot does not use the weapon, he returns it to SAFE with the same switch.

The DCU 201 was developed in Division 2135, then headed by Tom Workman. Says Bill Clement (2135), who heads the project team for the unit, "Nuclear safety has always been a major concern in weapon and controller design. We paid particular attention to isolating the output circuits and the input circuits. This



BILL CLEMENT and the DCU 201 controller. In Bill's right hand is a custom CMOS Large Scale Integrated circuit. In his left is an LSI assembly — six of the LSI units mounted on thick film interconnect board. The DCU 201 is the first to employ these advanced components.

isolation gives us a system that is safe in a fire or other accident."

One of the advanced features of the DCU 201 is that it is the first controller to provide a unique coded pulse input to a hard link pre-arm switch in the weapon (older weapons used a DC signal to pre-arm). The unit's USG (Unique Signal Generator) switch was designed by Jim Boespflug (deceased) and Ted Reed (2323). It contains a complex logic array which the pilot must insert into the circuit electrically by two distinct counter-rotating motions in order to generate the required unique pre-arming code.

The DCU 201 is also the first controller to use custom designed CMOS Large Scale Integrated (LSI) circuits — seven of them, each containing approximately 1250 transistors. The circuits are encased in leadless hermetic packages and mounted on a thick film multilayer ceramic interconnect

board, another first for Sandia. Divisions 2116 and 2152 helped to design and develop both the custom LSI circuits and the thick film circuit.

The controller is the first one designed for removal from one aircraft and installation in another (after being converted for use in the newer aircraft). Bill Hoagland and Dick Tullar (both 4323) coordinated the necessary requirements with the Air Force.

"This controller," says Bill Clement, "has more functions for the amount of panel space than any previous controller, yet it requires far less power. We designed, developed, and evaluated the DCU 201 in about 18 months — that's quite a task for a component with the number of advanced features this one has. The people and groups mentioned and the other members of the project team deserve a good deal of credit."

Fun & Games

Sandia Runners — For visitors to Sandia Livermore, a pleasant open-country run consists of running north from the Holiday Inn on Bluebell to Hartford, then east to N. Livermore Ave., south under the freeway to Las Positas, and lastly west along Las Positas back to the motel. Distance: about 7 miles.

Henry Dodd (5742) has sent us a price list from The Jog Shop in Brownsville, Texas that offers SRAers a pretty good discount: Tiger Montreal, \$19.95; New Balance 305, \$18.95; Nick Waffle Trainer, \$22.95; and others. Postage costs \$1.50/pair plus 50¢ for each additional pair. Call 4-1053 for a copy of the price list.

* * *

Triathlon — Organizers of the 1st Annual Triathlon of Albuquerque say it will probably go if a few more people sign up. It's 10 miles by bike, 5 miles of running, and .25 miles of swimming (8 lengths of an olympic pool), consecutively and without pause. Call LAB NEWS, 4-1053, if you're interested.

* * *

Sandia Bicycle Ass'n. — Safety reports that at a recent meeting of the Base Safety Committee one of the participants expressed great unhappiness about bikers and the intersection of Wyoming and Club Road (near the Wyoming gate), claiming several near misses. Stop signs do give

vehicular traffic the right of way here, and SBAers are well advised (1) to proceed cautiously and (2) not to irritate The Man (in this case a colonel).

* * *

Bowlers — Entries should be submitted for the annual Singles & Mixed Doubles tournament to be held at Holiday Lanes, Dec. 18 and 19. Delores Schumpert, 4-8059, or Curt Schumpert, 4-7133, have further details. Monthly high score winners for October were: scratch, Millie Smith (3254) 530 and Jim Powell (5433) 644; handicap, Pam Morenus (2516) 644 and Bill Lawrence (ERDA) 678. For entry blanks call Mary Ward on 4-6120.

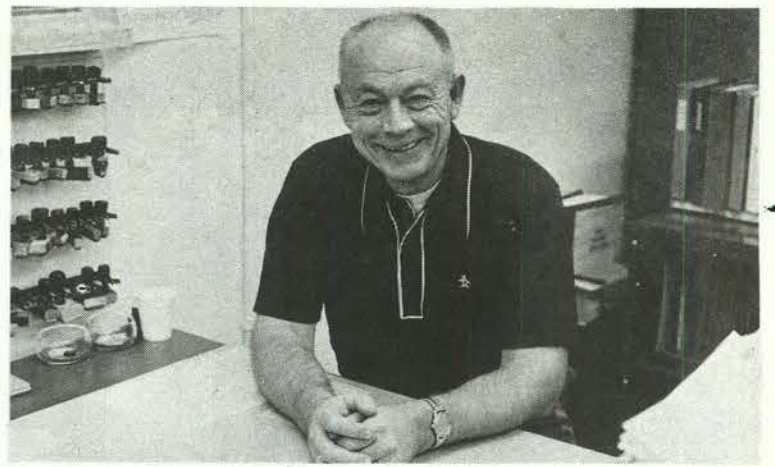
MILEPOSTS

LAB NEWS

DECEMBER 1976



Dorothy Schroeffer - 8254 10



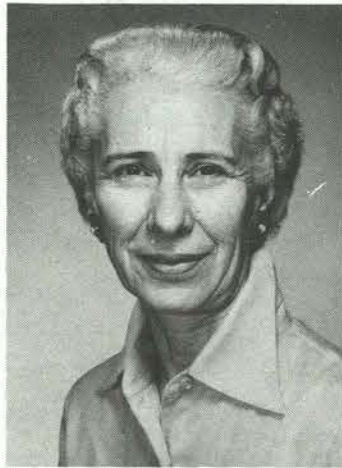
L.T. McKenzie - 3432

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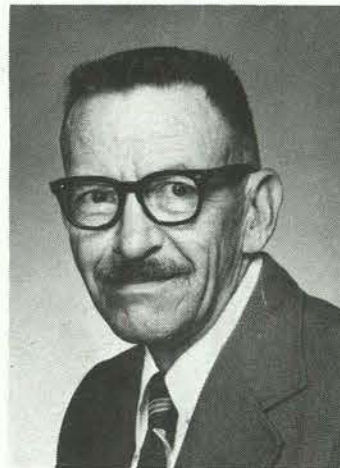
Ciss Kelly - 4212

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Lillian Kraus - 3431

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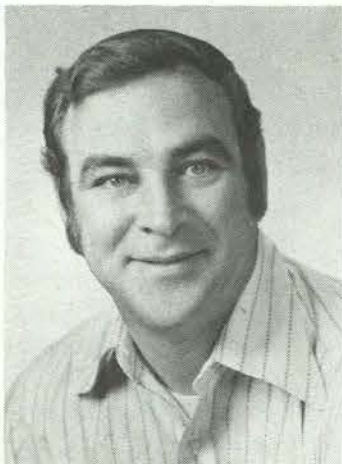
Loren Watkins - 2531

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Ike Davis - 8423

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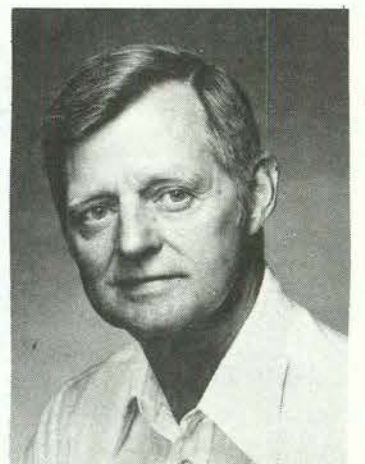
Dennis Sparger - 8116

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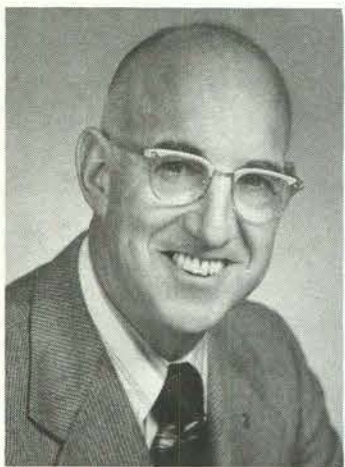
Maurice Richards - 5400

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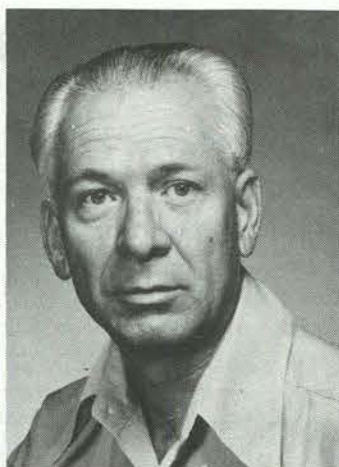
Robert Grover - 5715

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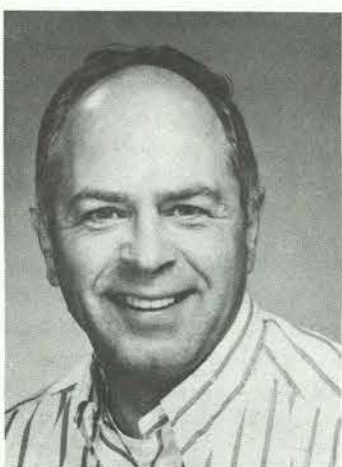
Dan Held - 8213

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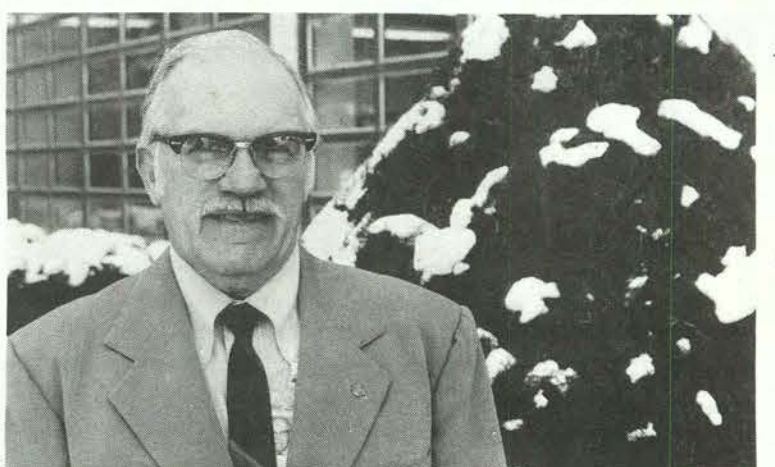
Thaddus King - 2325

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Donald MacKenzie - 1334

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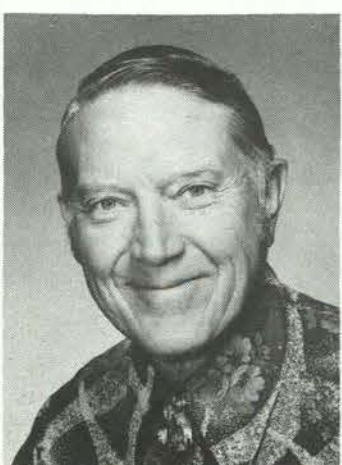
Leo Reynolds - 1212

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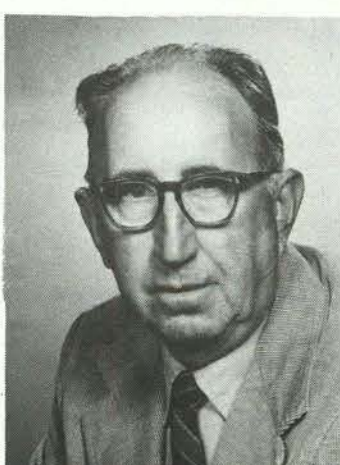
Louis Sanchez - 2131

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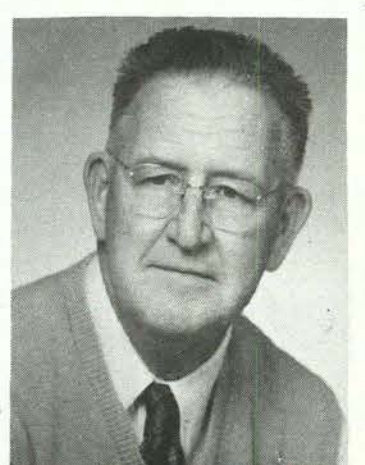
James Stueber - 9485

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Arnold Strasburg - 2514

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Bob Hauff - 8431

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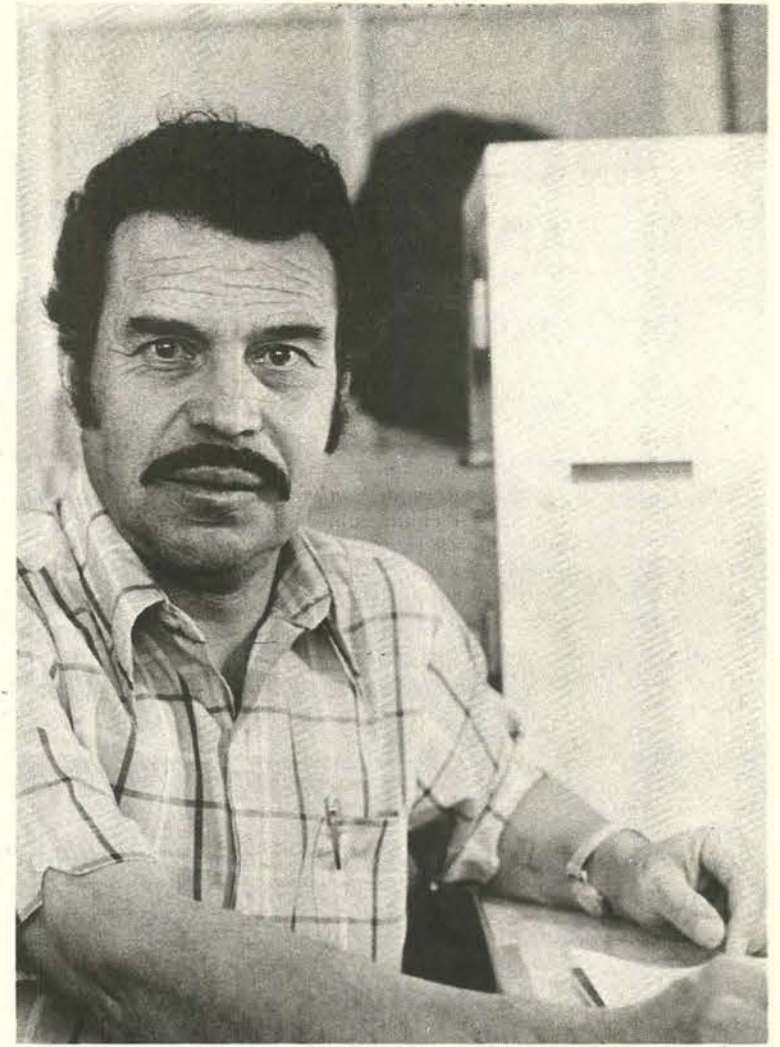
Aquiles Trujillo - 2152 20



Lyle Porter - 1731 25



Robert Knight - 9572 20



Vic Lopez - 3614 25



Will Gauster - 5111 10



Carl Zickert - 1221 25



Horace Poteet - 1314 25



Mary Valenzuela - 9653 10



Ernesto Griego - 3614 20



John Stuckey - 9633 25



Don Emrick - 2635 25



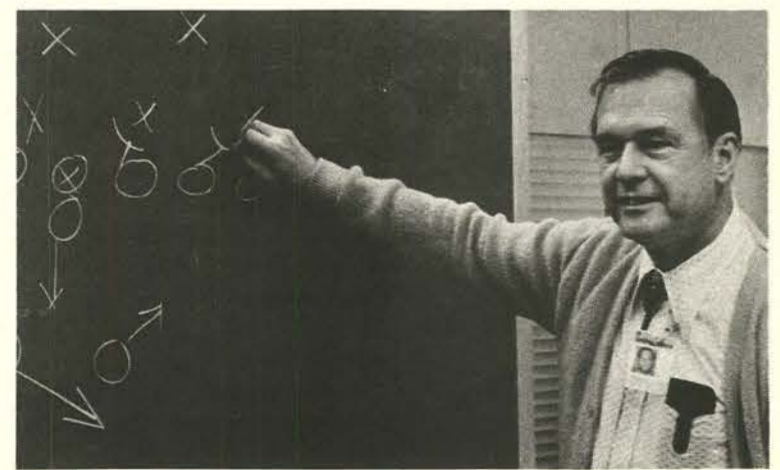
Jay Hughes - 3731 25



Daniel Vallejos - 3421 25



Billy Caskey - 1712 20



Ed Haut - 4322 20



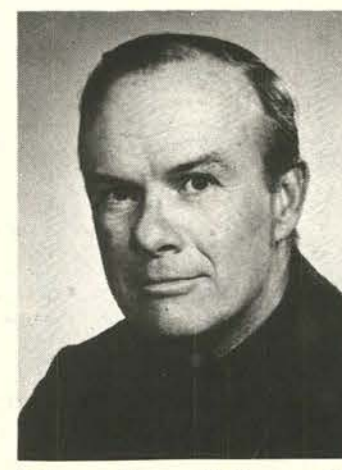
Bob Hofford - 8432 20



George Dawson - 8423 20



Bob Schmedeman - 9343 25



Johnson Hays - 1126 20



Frank Leyba - 9572 25

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F.W. Bingham, A.W. Johnson and J.K. Rice (all 5216), "Rate Coefficient for Deactivation of O(2S) by H₂O," Vol. 65, No. 5, THE JOURNAL OF CHEMICAL PHYSICS.

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C.W. Mendel (5242), "Minimum Background Plasma Density for Plasma-Grounded E-Beam Targets," Vol. 47, No. 10, JOURNAL OF APPLIED PHYSICS.

New Apprentice Class



STRUCTURAL APPRENTICES — Steve Rudick, Willie Wedemeyer, Dave Saxton, Richard Toledo, Danny Baca and Pat Lynn (all 9710) are Labs' newest class. Their five year course of study and work leads to journeyman status as millwrights, carpenters, or sheet metal men.

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

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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

- EASY CHAIRS**, matching pair, beige, upholstered, modern design, nearly new, \$40 each or \$70 pair. Cova, 266-3345.
- USED HOT WHEELS** set, 28 cars, lots of track & accessories, \$17; Jr. golf clubs, 3,5,7 irons, 1-3 wood. Gasser, 255-4562.
- DRUM**, 14" diameter, Gretsch, needs new skins, \$10. Holmes, 292-0898.
- BLACK WALNUT** tree trunk & limbs, estimate 100 bd. ft. yield plus lots of 3" limbs for turning, \$50. Meikle, 299-4640.
- HERITAGE** dining room table & 6 chairs, 48"x72" plus 3 extensions; side pieces available separately. Hale, 821-8850.
- BASKETBALL** goal w/regulation hoop & hardware for mounting on roof, \$15. Sirwinski, 881-2032.
- 2 TWIN BEDS**, mattresses, box springs & non-matching headboards, \$90 or \$35 & \$65 separately. Pierce, 268-6057.
- TWO TIRES**, E-78x14, whitewalls, used only one weekend. Guest, 821-8622.
- SKI PANTS**, navy blue, size 30" waist, \$5. Noel, 298-2142.
- POTTER'S** kick wheel; men's brown Root shoes, size 10. Carlson, 242-4493.
- RUGER** .44 magnum carbine, 5-shot, semi-auto., \$100. Lewis, 298-6239.
- STEREO**, port. AM-FM w/8-track; 3-spd. bike; Bolex 8mm camera; miniature twin lens Rolleiflex. Laskar, 299-1024.
- FOUR BAR STOOLS**, white fiberglass swivel seats, chrome legs, \$25. Schubeck, 294-5666.
- CARPETS**: 10½x11½ blue/green foam backed shag, \$30; 10x14 gold sculptured plus pad, \$55. Fletcher, 293-4204 after 5.
- YOUTH SKI EQUIP**: Head skis, 150cm, \$20; Henke size 10½ boots, \$15; Cubco bindings, \$7. Andes, 268-8951.
- FLIGHT PANTS**, 36", \$25; leather M.C. zipper jacket, 44R, \$25; B&W TV, 22" console, \$25; dark room equip., \$100; Sportster shocks, \$40 ea. Anthes, 877-7805.

- HANDCRAFTED Noah's Arks**: hand-painted, 14-pairs animals, \$65; natural wood, 11-pairs, \$50; remote control Zenith TV, 19", b&w, \$35. Dalphin, 265-4029.
- NEW, woman's safety shoes**, size 7½ D, black leather. Orear, 256-1941.
- 4-TRACK Sony** stereocorder 464CS, reel-to-reel, owners instruction & service manuals, 2 speakers, 2 mikes, stereo pwr. amp., \$80. Hernandez, 268-5000.
- SKI BOOTS**, maroon Henke, 6½ or 7, \$12.50; black Kasting, 7 or 7½, \$7.50; Vega parts, engine, \$45. Bassett, 898-1840.
- INFANT** backpack carrier, \$7; infant car seat, \$15; walker, \$5; movie screen, \$25; Safari fluorescent lantern, \$10. Falacy, 881-1802.
- APOLLO** drum set, 5-piece, 2 tom toms, floor tom, base drum, 2 cymbals, high hat, cases, half price. Hillman, 299-8438.
- CONTAX III A f/2.0** Carl Zeiss (Jena) lens, meter; made in 1947 (approx.), make offer. Karnes, 299-9033.
- REFRIGERATOR**, \$35; stove, \$25; washer, \$40; bdr. suite (dbl. bed, dresser, chest-of-drawers, nite stand), \$50; couch & chair, \$25. Fenimore, 298-8052.
- SNOW TIRES**, G78-15, w/w, w/rims; two 670-15 w/w; tire chains, new. Nuttall, 821-2895.
- CAMPER**, cab-over, stove, sink, ice box, gas & elec. lights, for compact trucks (Courier, etc.), sleeps 4. Martin, 299-6768.
- SKI BOOTS**, Nordica Astral Slalom, men's 6M, \$90. Kepler, 298-5652.
- REGULATOR**, oxygen — for medical oxygen therapy, Hudson Model 2010, new, \$35. Rentzsch, 281-5017.
- GRANDFATHER CLOCK**, new, hand finished oak, 74" tall, Westminster chimes, moving moon dial, raised arabic numerals. Blackwell, 265-4242.
- TURNTABLE**, Garrard 4H-F w/Fairchild cartridge, \$25; Federal enlarger, 219, w/adjustable masking easel, \$20. Denton, 298-0566.
- AKC REG.** Phantom Toy Poodle female puppy; Min Such rabbits; reg. breeding stock. Stanfill, 255-6652.
- CRAFTSMAN** shop vacuum w/accessories, \$40; Singer carpet shampooer & floor buffer, \$20; Sears upright carpet vacuum, \$40. Davis, 881-7068.
- INDIAN RUGS & Kachinas** from Chinle, Ariz.; rifle scope, Weaver 2.5x7, \$40; .45 cal. black powder rifle, \$100. Reed, 292-0473.
- ELECTRIC FIREPLACE**, 220, 20,000 BTU, artificial rotating log gives fire effect, \$200. Pennington, 256-9506.
- E-70 NEW TIRES** mounted on wide chrome wheels, four, \$225; Fender Mustang elec. guitar w/case, extras, \$140. Stephenson, 299-3914.

SKI BOOTS, women's 5½-6, buckle, Henke, \$5. Hawkinson, 281-5239.

'63 71PPT cherry wood Orga-sonic electric organ, one owner, below book at \$579. Rex, 299-6264.

NEW weight lifting set, \$20. Dale-sandro, 881-4741 or 294-5767.

ALL METAL 3-bike motorcycle trailer, mag wheels plus spare, \$200. Kerby, 266-6133.

LADIES ruby & diamond cocktail ring, have appraisal, \$275 or best offer; 3-tier lazy Susan from Philippines, \$35. Bogdan, 265-6195.

FIREPLACE grate heat-circulator, 6 tubes heavy gage steel, 22½" tall, 23½" wide, 20½" deep, \$25. Martin, 869-2049.

WILSON staff golf clubs in deluxe bag, No. 1-5 woods, 2-9 irons, P.W. and putter, \$90. Allen, 299-9075.

DYNACO stereo PAS-3x preamplifier & stereo, 70-power amplifier, \$100 for both. Barnard, 256-7772.

MINIATURE Dachshund puppies, 7 weeks old. Shock, 299-7936.

AMF pool table, \$175; Sears ping-pong table, \$25; Tasco telescope, \$75. Clem, 296-5204.

ELECTRIC floor polisher & scrubber; steam iron & ironing board; 40x40 projection screen; toaster; Underwood port. typewriter. Auerbach, 296-1489.

PULSER, \$15; pulse width 0.5-40 microseconds, risetime 0.5 microseconds, output approx. 150 volts, positive pulse 60-100,000 pps. Slesinger, 299-4626.

ELEC. guitar, Fender Mustang, case & amplifier, \$172. Priddy, 298-8912.

BUNDY clarinet w/case & music stand, \$65. Greenwool, 298-0959 after 5.

AIR HOCKEY, full size - 3x7, \$45; ski boots, ladies size 5, \$5. Rosborough, 298-3645.

FIREPLACE screen, fits 31"x23" opening, black & brass w/mesh pull-curtain, \$15. Dippold, 821-5750.

ONE H-78-15 T/C tire, new; one G78-15 used mud & snow tire. Raybon, 299-2135 after 5:30.

TYPING table, heavy duty office model; Remington adding machine; slide rule, dec trig log log; Chevy van door mirrors, small style, fits most lt. trucks. Bagley, 294-4706.

FREE B/W TV, 19", GE, not working. You pick up. Laval, 898-0518.

TRANSPORTATION

'72 **MUSTANG**, 302 V8, 3-spd.-flr., low mileage, original owner, below NADA. Konnick, 266-7113.

'74 **HONDA** 750, 7500 miles, sissy bar, luggage rack, \$1500. Daut, 255-2529.

'74 **KAWASAKI** 100 Enduro, low mileage, \$375. Ellingson, 299-4056.

'68 **FORD**, 4-dr. Galaxie 500, 302 V8, AT, PS, radials, new battery, orig. owner, \$650. Ferraro, 881-2295 or 299-0169.

GIRLS 20" Schwinn bike, thorn proof tubes, single spd., \$35. Toepfer, 296-6758.

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

'71 **SUZUKI** T-500, all orig., 5000 miles, blue w/blue helmet included. Fay, 881-2733.

'67 **CHEVY** Impala, 327 CID, 4-dr., AC, AT, PS, Positraction, single owner, complete maintenance records available. Gear, 281-3166.

'67 **CADILLAC** Eldorado, black, red leather, PS, PB, PW, AM-FM stereo, tape deck, new radials, \$1500 firm. Malin, 344-6981.

SCHWINN, girls 20" bikes, both thorn-proof tires, new pedals, single spd., hi-rise handle bars, \$25 & \$20. Atkins, 298-5762.

'70 **TORINO**, V8, 2-dr., AC, AT, new paint, almost new steel radials, \$1000. Kelly, 867-2718.

'71 **BUICK** Riviera, all the extras, tan/tan vinyl roof, \$2200. McCampbell, 281-3054.

'72 **VOLVO** 145E stn. wgn., AC, fuel injection, luggage rack, new disc brakes, below book. Hurley, 296-2890.

'71 **CHEVY** Blazer, 2-wd, AT, PB, 350, R., new tires, air shocks, under book, \$2200. Brown, 296-9009.

'72 **PLYMOUTH** Duster, 318 AT, PS, PB, AC, almost new tires, chrome rims in rear, \$1200. Marquez, 344-4771.

'64 **PLYMOUTH**, 318 V8, AT, 4 new tires, \$695. Martin, 299-6768.

'67 **PEUGEOT** 404, 4-dr. sedan w/sun roof, good condition except will soon need clutch, best offer over \$300 by 12/17 takes. Hansen, 898-3173.

'74 **VEGA** Hatchback, 4-spd., GT-pack, custom interior, AM-FM, Positraction, low mileage, priced below NADA at \$1750. Hart, 265-2221.

'70 **CHRYSLER** Town & Country stn. wgn., \$950, AT, PS, PB, PW & seats. Sebrell, 821-4227.

BICYCLE, Schwinn sting-ray, 3-spd., \$40. Smith, 294-7358.

'72 **FORD** Courier, 43,000 miles, steel radial tires, HD bumper, racing stripe, \$1795. Lackey, 898-6638.

CLASSIC MERCEDES, white 1956 convert. w/HT. Zipprich, 299-2173.

'75 **MAVERICK**, 2 dr. sedan, blue. Klemm, 821-0769.

REAL ESTATE

3-BDR. HOUSE in Mountainair, 4 yrs. old, 1350 sq. ft., fully carpeted, custom cabinets, dbl. garage, Tabet,

294-3344.
2-BDR. HOUSE, 313 Gen. Chenault NE, garage, lg. yard, available immediately, \$25,000. Fenimore, 298-8052.

FOR RENT

SINGLE-occupancy efficiency apt., \$95 includes utilities, near Louisiana/Zuni, references, new & clean. Rush, 265-5374.

4 SINGLES, rent Dec. '76 - Dec. '77, no pets, furnished except for bdrs., near base, contract, cleaning/damage deposit. Herrera, 247-9094.

CONDOMINIUM, Purgatory Ski Basin, sleeps 6, linens, fully equipped kitchen, fireplace, reservations. Smatana, 299-6278.

WANTED

SOMEONE w/a meter & soldering iron to check out (and fix?) my home component stereo system. Busby, 299-6450.

TWO PAIR children's skis, prefer 1 pr. 100 cm, 1 pr. 140 cm. Hymer, 298-2232.

SMOOTH HAIR, miniature dachshund, preferably male up to 2 yrs., need not be registered. Benischek, 256-7869.

WINDSHIELD or cowling for medium size motorcycle. Rose, 298-4849.

WATER main shut-off tool. Shunny, 265-1620.

MINIBIKE in good condition. MacCallum, 842-6414.

USED DRUM SET for beginner. Barnaby, 265-4353.

\$5000 for 2nd title deed on commercial building & land, will pay 15%. Smith, 292-1967.

WIRE DRESS FORM. Kepler, 298-5652.
TWO 16" Chevrolet drop center wheels for ½-ton pickup, to mount 7.00x16 tires. Causey, 881-7534.

LOST & FOUND

LOST — Two color photos & negatives; book: *Spiritual Man*; ladies' gold Elgin watch; Ford key; tear drop needlepoint earring (turquoise stones); man's white-gold watch w/silver & turquoise band; oval shaped, greenish-blue turquoise rock (lost from bracelet); men's lt. beige knit gloves w/leather palm; brown suede glove; turquoise drop earring; grey La Franz sunglasses.

FOUND — Black tobacco pouch w/tobacco "Gazelda GBA Portugal"; lt. brown clasp-type glass case "Mary O'Rourke"; grey bi-focal glasses; stainless steel thermos. **LOST & FOUND**, Bldg. 832, 4-1657.

FRIDAY	SATURDAY
10—HAPPY HOUR NO BUFFET	11—CHRISTMAS SUPER BUFFET 6:30-8:30 SOL CHAVEZ 8:30-11:30
17—HAPPY HOUR NO BUFFET	18—KIDS' CHRISTMAS PARTY 10-12 Lobo Bus - 6:55 Fifth Quarter

ANYTHING — can happen at a C-Club New Year's Eve Gala (and probably will). (Last year John Foster promised everyone the most exciting night of their lives; all they had to do was to throw their keys into a pile in the middle of the dancefloor and pick up someone else's. Sounded great — then they found out he was talking about keys to safety deposit boxes.) Anyway, it's the Gala you won't want to miss: search high and low for the bands and you'll find them both places (*The Vikings* and *Charley B*); a nimity of noisemakers and party paraphernalia, rivulets of champagne, slatherings of scrambled eggs and sausage. Order, pay for, and pick up tickets by the 18th!

WORTH — a buck a head? Easy. The band (*Up Country*) alone is worth that; they play a wide variety of stuff for everybody from slopkickers to waltzers. And the door prizes! A weekend for two at Tamarron (helpful here if the two are compatible because they're likely to put both winners in the same room). Several lift tickets ideal for all of us who need a lift from time to time. Private ski lessons ideal for those of us who have private skis. But *today* is the very last day indubitably to get in on the gaiety by contacting good old Luke Stravasnik.



DOING — anything Super Special tomorrow night? You are if you already have tickets to the Christmas Super Special Buffet and Party featuring *Sol Chavez*.

IS — a Lobo basketball game your idea of fun? If your answer is NO, proceed to the next item. If YES, read on. Is fighting the traffic around the Arena before and after the game one of your favorite activities? If YES, head for your psychiatrist's emergency entrance. If NO, buy tickets (50¢ per member, \$1 per guest) for the Lobo buses. Remember, even warm standing in a bus is better than cold sitting in your car. In addition, the Fifth Quarter offers drink specials to make the evening even more memorable; L'Internationale on the 18th, the Aggie Anguish on the 22nd.

WORTH — a whole lot more than it will cost you. It's the "April in Rio" trip, and it's even better than April in Paris (after all, what Gaul those Parisiennes have!). RT jet fare, seven nights at the beautiful new Rio Othon Palace right on the Copacabana Beach, breakfasts, tips, taxes, transfers, and more. Optional excursions if you get tired of beach-bask-

ing. The package is just \$669 (\$758 single), and sign-ups are now being signed up.

DOING — it up right for the little ones. That's the Club's Annual Kids' Christmas Party: the Fiesta Singers with Christmas carols and other December ditties, Ron and Mary Kay Day with a new Christmas puppet show, cartoons, and the Gentlemen of the Hour — Santa himself. No charge, but members under 12 and their parents only please. 10-12 on the 18th.

OFTEN — old what's-his-name that does the Club bulletin and calendar errs. (To err is human; to really foul things up requires a computer.) Contrary to the calendar, the duplicate bridge group meets Dec. 13 and 20 but not the 27th. They've added another table or two, says Virge Bailey, and that probably means people to play on it/them — and *that* means even better competition than before. Come on out and challenge the November charity game winners (Larry Bertholf-Dick Schmidt or Mary Lou Arnot-Bertha Finch) or the Nov. 30 top dogs (Larry Kent-Ken Varga).

MORE INFO — 265-6791

• TAMARRON FOR TWO • SUPER BUFFET • KEYS • APRIL IN RIO • SANTA •

feed n'iback

To get a response to your comments and questions about Sandia Labs, complete a Feedback form [available near bulletin boards] and return it to the Feedback administrator. The substance of questions and responses of wide interest is published in LAB NEWS.

Q. I find that the new TV guard booth is now in use at gate 10 during the day. This may be a "Good Thing," but I fail to see the logic of a guard sitting in the guard shack while half a dozen people stand in line to get through.

A. These booths are designed to enhance the Security mission at SLA, to initiate cost savings, and to provide a convenience for SLA employees 24 hours a day, 7 days a week. When the Mardix booth is first used, it takes a short time to debug the equipment and accustom new users to the procedure. I apologize for the inconvenience that you experienced, but I feel that in the future you will find the Mardix booths to be beneficial.

All transactions through the Mardix booths are video taped and, when a new booth is placed in service, these tapes are analyzed to determine problems encountered such as your concern, the number of booth users, hours of heavy booth usage, and whether it is more expeditious to open the adjoining gate during rush hours.

The Security Inspector whom you mentioned had the responsibility for controlling vehicle traffic through Gate 10. We are reluctant, for safety reasons, to permit pedestrians and vehicles to use the same gate, although, as necessary, we do

permit SLA employees with uncleared visitors or employees carrying property to check through the vehicular gate.

The Mardix booths will be closed and all pedestrian gates opened during inclement weather.

D.S. Tarbox - 3400

Q. From whom should I get permission to take a box of "recycled" computer paper to my daughter's preschool? As you probably know, the schools like to use the backs of the tab-runs for drawing paper.

A. A recent review of the practice of providing recyclable paper to schools and agencies was conducted. It was determined that it is not practical to screen the paper delivered to the salvage yard to preclude the possibility of inadvertently disseminating sensitive information. The only authorized channel for disposing of recyclable paper generated by the Laboratories is through a contractor. It is the responsibility of the contractor, per our instructions, to bale or shred the paper and not sell it to the public in the form received. The contract covers all unclassified tabulating cards, tabulating paper, white print shop paper, mixed paper and corrugated cardboard.

D.S. Tarbox - 3400