Labs Proposes New Way To Drill Oil Wells

Finding new sources of oil is the greatest short term need of the nation in the current energy crisis.

Sandia has proposed a new kind of deep drilling device that could greatly reduce the cost of drilling below the 5000-foot level, where the volume of sedimentary oil and of gas is great – a domestic resource relatively untapped because of the tremendous cost of conventional drilling methods.

Often, a 15,000-foot well costs up to $2 million to drill and the last five per cent of the depth has accounted for half of the cost in some wells.

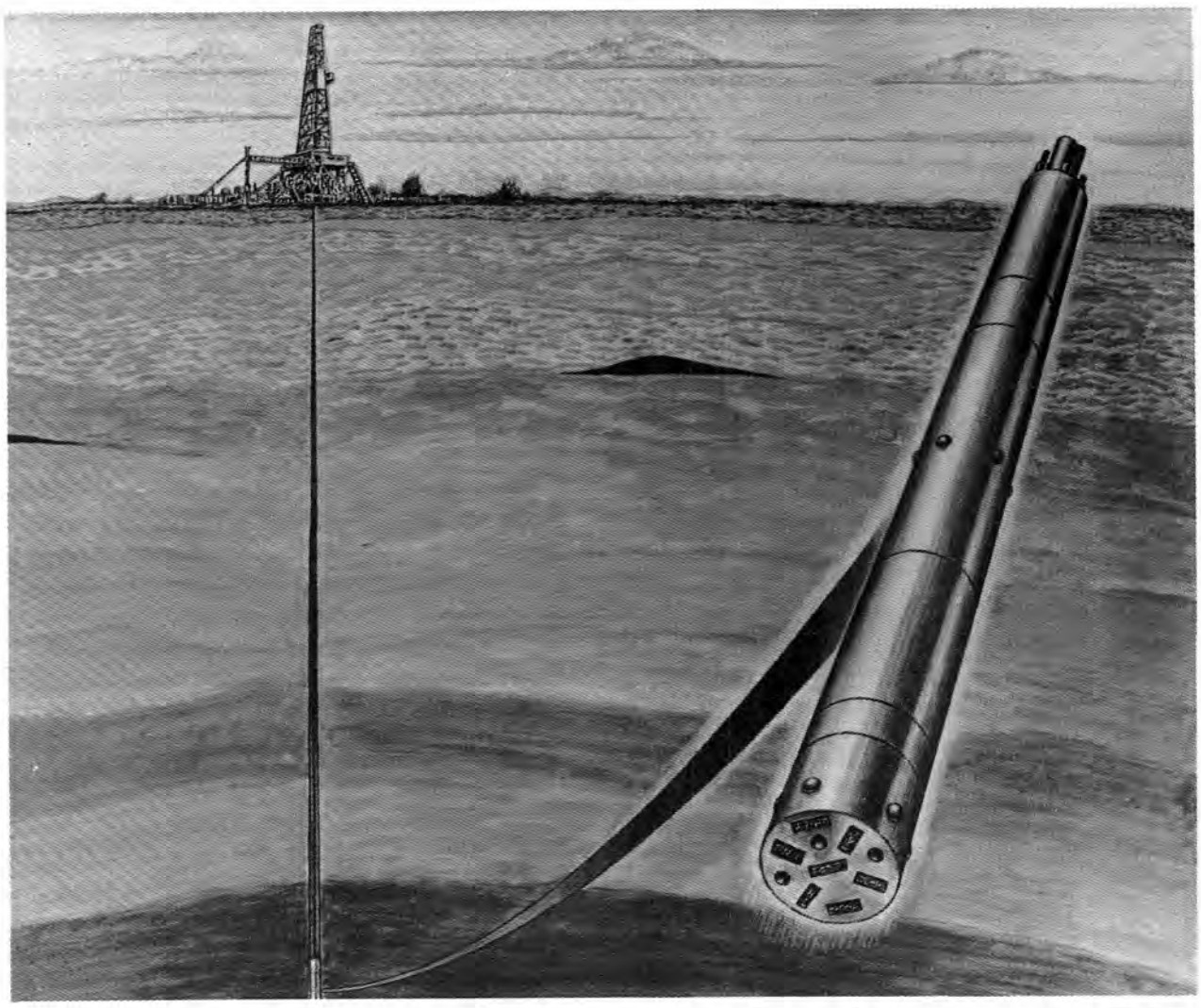
The problem is the conventional rotary drill bit, a tool perfectly capable of drilling through the hardest rock, but it has to be changed frequently. This requires pulling the entire drill stem (sections of pipe) out of the hole to change the bit — a process which takes days in deep wells and a lot of high priced labor and equipment.

Sandia proposes deep drilling with shocks generated by electrical detonations and the cavitation incident to the detonations. The "drill bit" would be a down-hole pulse generator that would deliver high-energy short duration electrical pulses across a spark gap.

"A number of advantages result," says Max Newsom, supervisor of Exploratory Systems Division IV, 5724, where work on the proposal is centered under Bob Alvis, project engineer. "The system has long life," Max says, "it would not have to be withdrawn from the hole. It offers one of the fastest drilling rates of all methods investigated. And it would use minimum energy, creating shock waves under controlled conditions to produce a cavitation (or bubble) effect that would take advantage of the high formation pressure of the rock at these depths to bring about the spalling and fracturing of the rock."

Lab experiments reveal that cavitation results when there is electrical discharge in a fluid. Conventional oil wells use a fluid system – called drilling mud — to maintain pressure in the hole and as a medium for carrying away debris. Cavitation would occur in the drilling mud as a consequence of the

(Continued on Page Five)



ARTIST'S SKETCH shows the proposed Sandia shock generator at the end of an oil well drill stem. Wireless detonators are at the bottom of the 10-ft. shock generator unit.

LAB NEWS

VOL. 26, NO. 6 MARCH 15, 1974

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

VOLUNTEER FIREMEN Norbert Molter (7615), District 6 Chief, and Bob Weaver (7122), the Assistant Chief, man their pumper's high pressure hose. Both are trained in rescue as well as firefighting techniques.

They're Ready

Volunteer firemen are cynical altruists. They have to be altruistic to forego leisure time, physical energy, and out-of-pocket cash so that their neighbors' property and lives are protected. Last year Bernalillo County Volunteer Fire Departments made well over a thousand runs, 660 for fires, 400 for rescues (and 110 for false alarms).

Their cynicism is an on-the-job acquisition. Charley Byrne (7115) is the Chief of District 11, a hundred square miles of rugged country on the far side of the Manzanos. He tells it: "We pulled the pumper into this yard; the house was just starting to really flame up — good chance to save it. We jumped out to go to work and found ourselves staring into the ugly end of a 30-06. 'You boys stay right where you are,' said the man on its other end. 'The old lady was bitching about the house. I says to her, "If you don't like it,

(Continued on Page Six)

ALOTS

A Two-Hundred Inch Eye in the Sky

A high-speed missile strikes a high-speed drone aircraft, as part of the AIRVAL test series (LAB NEWS, March 1, 1974). The outcome is predictable — boom — but a record of the exact sequence of events leading to that outcome is important to the program.

Sitting inside the drone and taking careful notes is not a recommended procedure. Good, sharp photographs of the event, taken from several miles away, are preferable. Hence, ALOTS — the Airborne Lightweight Optics Tracking System. It is a unique system in several ways. For one, it's a re-tread. Northrop built it several years ago to photograph staging events on large manned rockets. After those missions it was dismantled, stripped of everything except the optics and tracking mount, and mothballed.

"In the fall of 1972, the AIRVAL program required a high resolution photographic system," says Al Watts (1255), the ALOTS project engineer. "We rescued the remnants and designed and built a tracking system and the auxiliary electronics. We then installed the system in a specially modified Air Force NKC-135." The optics are contained in a pod attached to its cargo door.

"The heart of the automatic tracking system is a digital TV tracker which processes video from two TV cameras," says Dennis Reynolds (also 1255) who did the tracker design work. "One is a wide angle for locating the target. When the operator acquires the target, he switches to the second which has a telescopic lens and serves as the primary tracking device. The TV tracker locks onto the target and sends its location coordinates to a mini-computer inside the C-135. The computer in turn controls the pointing angle for the telescope and the associated ciné camera.

"The lens has a very long focal length — 200 inches," says Al. "So we have a very narrow field of view — we see only a tiny portion of sky. That's why we have to have an extremely accurate tracking system. But it works well. We're able to take high resolution photographs from quite a distance away. It doesn't focus any nearer than five miles; at that distance, we can distinguish lines only three inches apart. That's high resolution."

Either a 70mm or a 35mm motor-driven ciné camera may be mounted behind the lens. The 70mm camera can shoot up to 60 frames per second; the 35mm can take 200 frames per second. The camera is locked on target as soon as the second video camera picks it up, but it is the console operator (usually Al) who starts the actual picture-taking sequence. Terry Leighley (9412) provided most of the support for both the optics and cameras.

The center portion of the pod fixed to the aircraft rotates vertically through a 210° arc. The telescope itself swings up to 60° horizontally. Even though that makes a fairly large "window," the aircraft has to be in reasonable proximity of the target so that the TV cameras have a chance to locate it. "A good deal of our success," says Keith Smith, 1255 Division Supervisor, "is due to the skill of the Air Force crew. They've done a fine job of putting ALOTS at the right place at the right time. We expect to continue to give good support on the AIRVAL Program; we suspect ALOTS will prove its worth there and qualify for other high speed, mid-air event documentation."

AT THE ALOTS console inside the aircraft is Al Watts (1255). Operator locates a target on one of the two TV screens above him and locks the tracking cameras on it. Just before impact he starts the ciné camera which records the event.

Other Sandians involved in ALOTS include Les Sandlin, Larry McConahy, John Deasy, Dick Corn, Ed Marsh (all 1255), and Leroy Paulson (9412). • bh

THE ALOTS POD fixed to the cargo door of the NKC-135. Large lens is the telescope, smaller ones to the right are the TV lenses.

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bruce hawkinson writes
as does norma taylor while
bill laskar takes/makes pictures
&
in livermore lorena schneider does all

Distinguished Service Award To AEC's Sam Donnelly

Sam Donnelly, Manager of AEC's Albuquerque Operations Office, is one of three officials selected to receive the AEC's highest honorary award, the Distinguished Service Award. Mr. Donnelly was cited by the Commission for his work in the management of the AEC-industrial laboratory weapons complex and his leadership in personnel management at Albuquerque. The award is scheduled for ceremony presentation at a later date.

Sandia Will Host Symposium for Weapon Quality Managers

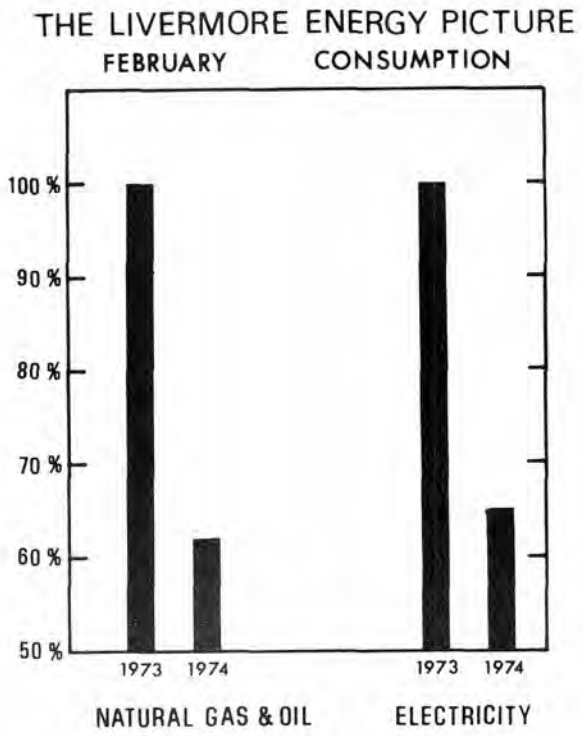
Some 40 Quality Managers from AEC area offices and AEC contractor agencies will meet at Sandia Laboratories March 19-22 to attend a technical refresher symposium. Bill Kraft, manager of Quality Assurance Components Evaluation Department 9510, is chairman of the Symposium.

Luke Heilman (9500) will open the symposium. Speakers and subjects for the four-day meeting include Will Gauster (5323), "Materials Technology"; Frank Biggs (5223), "Engineering Mathematics"; Bill Gardner (1200), "Non-Weapon Programs"; Ray Reynolds (1562), "Phase II Concepts"; Marv Daniel (2342), "Design Process."

Jim Williams (2112), "Microelectronics"; Paul Cooper (2510), "Technology of Explosives"; Dick Prairie (1643), "Statistical Design and Analysis"; Jim Hillman (9115), "Design Review"; and Frank Muller (9525), "Reliability Assessment."

In addition, Gene Ives (1560), Ben Bader (1537), Sam Jeffers (1536), Bob Pinkham (1514), Charlie Burks (1511) and Del Olson (1510) will discuss specific weapon systems.

The managers will also tour Sandia environmental test facilities and attend a special social session of the Albuquerque Section of the American Society for Quality Control on Wednesday evening, March 20, at the KAFB-East Officers Club. Dave Schafer (9342) will be tour guide.



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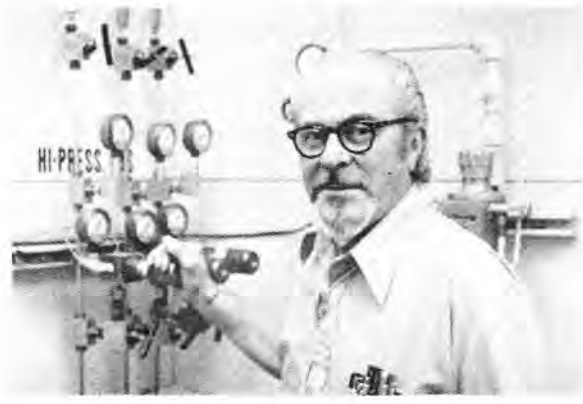


Mike Gregory (8332)

Sympathy

To Pat O'Brion (8161) on the death of his sister in Somers, Iowa, Feb. 2.

To Hanloy Quock (8441) on the death of his sister in San Francisco, Feb. 27.

To Dennis Rathbun (8040) on the death of his mother-in-law in Los Angeles, Feb. 18.

LIVERMORE NEWS

VOL. 26, NO. 6 LIVERMORE LABORATORIES MARCH 15, 1974

Magnetic Field Study

New Gage Modification Technique

A technique has been developed by Vern Barr, an engineering staff assistant in Device Studies Division 8342, for adapting metallic, etched foil manganin gages to meet test requirements beyond the normal capabilities of commercial gages.

Manganin foil gages are used to monitor high amplitude stress wave phenomena associated with material studies. Usually .0002 to .0005 inches thick, the gages come with square grid patterns ranging from .125 to .250 inches across.

Normally the gages are calibrated and utilized by simultaneously exposing the gage's entire active area to the stress phenomenon being measured. Making a stress measurement, therefore, requires that a gage small enough to insert into an existing test specimen be selected. If a small enough gage is not available, a new gage must be fabricated and calibrated, a process that takes several months. In lieu of this, the test dimensions must be scaled up so that an existing gage can be used. Often, however, "scaling" or changing the physical dimensions of a test to allow use of an existing gage is not feasible and can lead to more unresolved questions.

The size problem has been overcome by masking off the desired active area of the gage, then copperplating the remaining active area to shunt its normal resistance change. The part that was masked is now the only effective area left that will respond significantly to stress. Any unique shape can be thus formed to meet the requirements of the test and a more direct evaluation of the test (or materials) can be made.

VERN BARR (8342) checks masking before manganin foil gage is plated to modify its physical definition. Inset shows gage grid after plating.

The masking operation is done in several ways. For thin gages of .0002 to .0004-inch thickness, commercially available stick-on masks used for photo etching printed circuit boards are adequate; for thicker gages, a photosensitive masking may be sufficient.

If the original gage resistance must be maintained to match the electronic systems impedance, external resistance is added to the gage-test assembly. This series resistance is then accounted for during data reduction and analysis.

Plating of materials, even on manganin, is a fairly standard practice; however, selective plating of the active elements of an etched foil gage to modify its physical definition is considered a new contribution to measurement engineering. • ls

CAR POOLING ON THE RISE — 135 car pools are now operating each day at Sandia/Livermore — up from 94 when reserved parking spaces for car poolers were established early this year. In some cases existing car pools have combined. This now includes (clockwise from upper left) Don Adolphson (8312), Wally Klikoff (8361), Spike Leonard (8151), Hilary Jones (8441), Tom Brumleve (8184), and Mike Baskes (8314). Originally three, two-man car pools, the six Sandians commute from Danville, about 50 miles every day.

Take Note

Marlin Pound (8214) was recently reelected to the board of the California Association of Park and Recreation Commissioners and Board Members. A Livermore Area Recreation and Park District (LARPD) board member since 1967, Marlin has served the state association since 1972 as a member of the executive committee and treasurer. The state association promotes the advancement of park, recreation and conservation movements throughout the state.

Congratulations

John Warmouth (8266) and Becky Brewster, married in Hayward, Jan. 17.

Supervisory Appointments

ROY BRETT to Lieutenant, Administrative and Operational-Hours Patrol Division 9551, effective March 1. Roy has been a Labs security inspector since September 1950. Before coming to Sandia he had worked in the oil fields for four years in San Juan County in northern New Mexico.

During WWII Roy served in the Marine Corps with duty in the South Pacific. For the past 10 years he has worked with Boy Scouts and been active in the Little League Baseball organization.

Roy and his wife Emilu have a son who is a senior at Del Norte High School, and a daughter in her senior year at UNM. They live at 3801 Palo Duro NE.

* * * *

GENE McGUIRE to supervisor of Laser Theory Division 5211, effective March 1. Since joining Sandia in August 1965 as a staff member in Atomic and Molecular Theory Division, Gene has worked primarily in the areas of atomic theory, atomic cross sections, and Auger spectroscopy.

He earned a BS degree in EE from Manhattan College in New York, and a PhD in theoretical physics from Cornell University in 1965. He is a member of the American Physical Society.

Gene and his wife Coralie have three children and live at 4083 Dietz Farm Circle, NW.

* * * *

GEORGE LARAMORE to supervisor of Surface Physics Division 5114, effective March 1. Since coming to Sandia in March 1971 George has been involved in solid state theoretical research, primarily involving the structural and electronic properties of surfaces. He has made model calculations of low-energy electron diffraction spectra and used them to study the geometric and vibrational properties of surfaces, and developed models for the many-body effects that occur when deep-lying atomic core levels are excited in solids.

He earned a BS degree in physics from Purdue University, and an MS and PhD, also in physics, from the University of Illinois. While at the U. of Ill., he was the recipient of two National Science Foundation Fellowships — pre-doctoral and post-doctoral. He was also a research associate in surface physics at the university.

George is a member of the American Physical Society and the American Vacuum Society. He is a national secretary-treasurer of the Surface Science Division of AVS. His favorite leisure time activities are hunting and fishing.

George and his wife Mary Ann have two sons, and live at 3309 Lykes Dr. NE.

* * * *

WAYNE JOHNSON to supervisor of Advanced Laser Physics Technology Division 5216, effective March 1. He joined the Labs in May 1969 as a staff member in the Plasma Physics Division. In his work with this group, Wayne has measured the electronic recombination coefficient for molecular helium ions and also measured the reaction rates for self-destruction of helium metastables. Wayne worked on the rare gas Dimer laser when it was determined for the first time that such a system could be used for a high powered laser.

Wayne earned BS, MS and PhD degrees in physics from the University of Oklahoma. He is a member of the American Physical Society and Sigma Chi honorary society. Camping is a popular activity with the Johnson family — Wayne, Gail and three children. They live at 12110 Princess Jeanne NE.

* * * *

BOB GERBER to supervisor of Laser Physics Research Division 5212, effective March 1.

Following graduation in 1966 from the University of Minnesota — BS, MS and PhD in EE — Bob joined Sandia's Electro Explosives Division. For the past three years he has been a member of the Plasma Physics group, doing research in gaseous electronics. During the past year he has been concerned with electron beam initiation of lasers.

Bob was in the Navy from 1952-'56, serving in the Pacific. He is a member of the American Physical Society. Off the job activities include camping, hunting and fishing.

Bob and his wife Marge have three children and live at 3300 Rhode Island NE.

* * * *

GENE IVES to manager of Advanced Systems Department 1560, effective March 1. Gene has been involved in systems development work since joining the Labs in June 1956. He was promoted to division supervisor of a systems group in 1964 and for the past eight years has worked on arming and fuzing systems in the Navy's Poseidon and Trident programs.

He received a BS degree in EE from Auburn University and, under Sandia's Educational Aids Program, earned an MS in EE from UNM. Gene and his family — wife Dot, 17-year-old twins Kathy and Ken, and 14-year-old Jeff — are skiers. Gene is well known for his singing and acting performances with various local groups. His wife and children share that interest and are active with theater and music groups at Eldorado High School, Civic Light Opera, and their church.

Gene is currently working on a oratorio with the First Methodist Church and will appear in the Albuquerque Opera Theatre's production in May of "la Boheme." The Ives live at 1920 Snow Court N.E.

NEW SUPERVISORS — (l to r) Harold Garcia (9552), Gene McGuire (5211), Roy Brett (9551), and Tom Young (2341) are among nine recent promotions.

* * * *

HAROLD GARCIA to Lieutenant, Nonoperational-Hours Patrol Division 9552, effective March 1. A native of Fort Sumner, N.M., Harold joined Sandia in August 1956 after completing high school. He worked as a messenger and later as mail clerk for the mail services organization, and became a security inspector in January 1967.

Harold enjoys sports and helping young people. He's combined these interests by assisting the coaching staff at his sons' school and helping at the Albuquerque Boys Club. He has helped organize and present judo and karate exhibitions for nonprofit groups.

* * * *

TOM YOUNG to supervisor of Special Test Equipment Division 2341, effective March 1. Tom's assignments since joining the Labs in June 1962 have been chiefly with the component development organization, working on explosive devices, firing sets, and radioisotopic power supplies.

Graduating from Kansas State University with a BS degree in EE, Tom came to Sandia as a member of the Technical Development Program and earned an MS in EE from UNM. Under the Labs Educational Aids Program, he earned a second MS from UNM in nuclear engineering.

Tom is a member of IEEE. His hobbies include music, camping and backpacking. Tom and wife Joan have two children and live at 3113 Riviera Place NE.

* * * *

JIM GERARDO to manager of Laser Physics Research Department 5210, effective March 1.

He came to Sandia in September 1965 from the University of Illinois where he had been a research associate. His BS, MS, and PhD degrees in EE all were gained from that school.

At Sandia, Jim has done work in plasma physics, gaseous electronics, atomic physics and, more recently, research relating to gas lasers. He was promoted to division supervisor in December 1967.

Jim is a member of the American Institute of Physics. He and his wife Harriet live with their daughter at 7911 Palo Duro NE.

Continued from Page One

New Way to Drill Oil Wells

device's spark and shock wave.

Rock strata below 5000 feet are under great pressure from weight pressing from above pressures up to 20,000 psi or more. This internal pressure should actually aid the cavitation drilling process. Pressure inside the hole, controlled by the fluid system, might be kept at 10,000 psi for example, so that the rock strata at 20,000 psi would be under stress to break into the area of less pressure. A slight "ping" from the spark detonator could be sufficient to fracture the rock. Collapse of the bubble cavity produces a second shock which would add to fracturing effectiveness.

Cavitation effects, spallation, pulse rates, and spacing between detonator and the bottom of the hole are factors that need to be investigated. Much laboratory work remains to be done before the proposal could become a reality.

"Still, all of the proposed system is easily within Sandia's technical capability," Max says. "Sandia developed the bridge-wireless detonator. We are the unquestioned leader in fire set technology. We have built reliable hardware that functioned in more extreme environments than the bottom of an oil well. We have the people and the experience to analyze shock interaction for optimum rock fracturing. Existing computer codes could be used."

Modest efforts on elements of the program are already underway. Gordon Henry, Bob Silva and Lloyd Faucett (all 5724) salvaged a machine tool that came with a large capacitor bank and control panel. Using this tool, several prototype bridge-wireless detonators are being tested on various kinds of rock. Results look promising, according to Max.

Other Sandia groups are contributing to the present effort. Tillman Tucker and Al Stevens (both 5131) are investigating cavitation and rock spallation, Bob White (2312) is designing a prototype bit, and Dick Holland (2115) and Charley Huff (5724) are contributing a hydrodynamic analysis to the deep drilling problem.

"Assuming we receive the required funding," Max says, "we plan to complete preliminary studies, build a prototype pulse generator with detonator array, and field an experiment within a year."

In the meantime, two other novel improvements for conventional rotary drill bits are being proposed.

One idea would be to use Sandia terradynamic technology to add extra "zap" to a conventional rotary drill bit. For a number of years, Sandia has investigated earth penetration with projectiles and now has considerable knowledge on the subject. An application of terradynamics would be to add gun barrel-like launchers within the rotary bit say .25 calibre, backed up by large projectile magazines. Projectiles could be fired into the rock, fracturing it, as the rotary bit grinds away. Wear and tear on the bit would be lessened, and the drilling rate should increase inpressively.

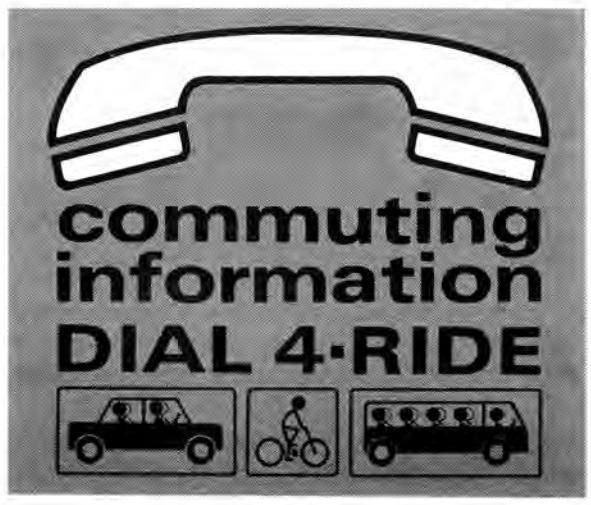
"These gun barrels could easily fit into conventional drilling equipment," Max says. "Tests are now being conducted on sandstone in Area III by Curt Moses (5724) and Karl Svensen (9333) to explore the possibilities."

Another idea was conceived by Bob Fox (2325) and Dick Ashmore (2322). Called the circulating chain rotary drill bit concept, it calls for changing the design of the drill bit to resemble a giant chain — say a hundred feet long and containing hundreds of rotating cutting and grinding surfaces. As one set of cutters became worn, another set from the chain could be moved into position. Or the entire chain might be designed to rotate — as the chain in a chain saw does.

These two ideas seem feasible to oil industry consultants working with Sandia, and patent applications have been filed on both. • dg

PROTOTYPE drilling head that employs shocks generated by electrical detonations was assembled from "off the shelf" components to prove feasibility of the concept. Gordon Harvey (5724) and Bob White (2315) check the unit.

HOLES punched in solid concrete blocks in the laboratory by the drilling head average five inches in diameter, about three inches deep. Robert Silva (5724) displays a couple of the test blocks.



Car Pool Notes

Since March 5 when the new car pool listings went out, some 20 new pools have been registered with Security. The Employee Transportation Committee would like to get an accurate count of numbers of poolers, so if you're in one that's not registered with Security for a reserved slot, please call 4-RIDE with names of those in the pool.

* * * *

An upcoming issue of LAB NEWS will carry a feature on car pooling at Sandia. If you're in one (either recent or established) with a possible claim to fame — farthest distance, most people, longest in operation, most unusual vehicle, etc. — leave name and phone number with 4-RIDE.

* * * *

Live in the Old Town area? Want to join a car pool? John Wood (7116) is looking for some more riders for his van pool. If you're interested, call John at 4-5649.

Bus Notes

Bit of excitement aboard the Belen/Los Lunas bus last week. Bearing froze, tire on fire, flames licking about. A passing motorist, Sally Gabaldon of Los Chavez, managed to flag the bus down. Quick action by driver Ray Behymer and his fire extinguisher prevented major damage to the bus and harm to the passengers.

* * * *

The Far South Valley bus is still looking for more passengers. Additional stops along the present route and three new stops (listed below) are being considered. If you're interested, call honcho Dave Shank (1522) at 4-2186.

Joe Sanchez & Blake	7:05
Tapia & Blake	7:06
Isleta & Blake	7:08

* * * *

An increasing number of Sandians in the North and South Valleys, West Mesa, and Downtown areas are finding that the regular city "Sandia Base" (sic) route meets their commuting needs. It leaves Fourth and Central at 7:10 a.m. and arrives at Sandia at 7:45, stopping only at the marked bus stops along Central (not at any corner like the Sandia Specials). Fare is 30¢ cash. For information on other routes that connect with the Sandia Base route, call 766-7830.

* * * *

Latest good news and bad news from Albuquerque Transit: The good — we have our doubleheader back on Sandia No. 2 route; the bad — no more word on the new regular route up and down Wyoming.

* * * *

The Employee Transportation Committee is exploring other ways to provide bus service to the Far East and Valley areas. One suggestion is a series of neighborhood associations, each of which would contract with a charter bus company for commuter service twice a day.

Continued from Page One

They're Ready

I'll burn it down." She says, "Go ahead, you SOB!" So I sprinkled a little gasoline around and dropped a match. Let it burn — I'll teach her to get smart with me.' Well, we don't argue with rifle-carrying arsonists; we did radio for the sheriff, but by the time the law arrived the house was completely ruined."

We talked with Charley; Cliff Condit (7131), his Deputy Chief; Norbert Molter (7615), Chief of District 6 in the Sandia Park/Cedar Crest area; and his Assistant Chief, Bob Weaver (7122). They make it clear that their determination to provide their communities with firefighting and rescue services is not daunted by the "let it burn" types. Or by:

— the evicted squatters who return and burn down the house — "If we can't live there, ain't nobody gonna live there."

— the girl bent on dying — traditional hose from exhaust pipe through the car window. District 11 saved the girl, was reviled by her in the process.

— a very unhappy Doberman at the entrance to a home where a heart attack was going on. District 6 spent 10 minutes subduing him enough to knock on the door. The response: "Why weren't you here 20 minutes ago?" Said District 6, "There's this dog . . . " "But you should have gone through the woods, around the back, and knocked on that door."

Luckily for the lives and property of most Americans, lots of people don't need rewards — 98% of all firefighters (men and women) in the US are volunteers. Of 240 in Bernalillo County, 40 are Sandians.

It's not easy. "Firefighting ranks as the most dangerous occupation in America," says Don Naylor, County Fire Marshall. "We've upgraded our equipment all over the County. But we need people — trained people or people willing to be trained. District 2, in the South Valley, responds to about 50 calls a month. It takes a lot of volunteers if anyone is going to get any sleep."

"Our district is getting a new rescue vehicle," says Bob Weaver; he's just completed the 81-hour course in Emergency Medical Training, which puts him even with his rescue-oriented counterparts in the City. "Rescue operations are vitally important in the mountains — we're a long way from the hospitals, so ambulances are likely to be late. Roads can be impassable — we're using a four-wheel drive vehicle with chains on all four wheels at the moment. And addresses are usually makeshift — "turn right at the tall pinon and then left at the old O'Neill place and we'll flick the porch light off and on for you."

"We're putting together a rescue team over and above our firefighting groups," Weaver continues. "We've got to respond to medical emergencies with skill — and fast!"

Norbert Molter illustrates: "I got a call at 3 this morning. A man was dying. I jumped into my car and headed over there as fast as I could on snowy roads. Bob followed in the much slower rescue unit. I gave Bob the symptoms over the radio, and he said it sounded like hypoglycemia. Advised me to give the guy a spoonful of sugar as soon as I got there. I did. Bob arrived and the guy was still in bad shape — weak, irregular pulse, convulsions. Finally the sugar took effect and he pulled out of it."

Says Bob, "We felt good then. We'd given the guy one more chance to go on living. We made the difference."

By any measure, that's a pretty important difference. • bh

Our Town

Can This Be Show Biz?

"No singing commercials, no jingles, no hard-sell. . ." proclaims the flyer for this singular Albuquerque institution. It is radio station KHFM, an FM station that devotes practically all of its broadcast day to classical music and that persists in surviving (20 years) when all conventional broadcasting wisdom says it should have gone under long ago.

Consider these attributes—

* a classical music station that stoutly sticks to classical music — 90% of the time between 6 a.m. and midnight is devoted to classical music.
* a commercial policy, quoted in part above, so-worded as to suggest that the would-be advertiser must approach, hat in hand, to surrender his offering. His message (and his money) is considered for what KHFM terms "appropriatness" and, surmounting this requirement, it may then be broadcast.
* a curious fiscal policy under which about three-quarters of the staff of 20 or so work for free. For kicks. Announcers, engineers, letter openers — the whole organization.
* and a funding arrangement that appeals, successfully, to the higher interests of the KHFM audience, some 500 of whom regularly send in a check for two, or five, or ten or more dollars, just to keep KHFM going. One older listener, totally dependent upon Social Security, sends in a dollar every third month.

Keith Taylor, an aerodynamicist in Org. 5625, is one of those for-free announcers (Friday nights, 7 to midnight), and he discussed the station's modus operandi.

"One night I heard the station say they needed more volunteer announcers. So I called up and they said 'Call back in a month.' Turns out this is their screening procedure — if you call back again in a month they know you're serious and they're willing to undertake your training."

What's to learn? Things like manipulating the "pots" (potentiometers) so that the signal that goes out over the airwaves, whether it be music or talk, is perceived by the listener to be at the appropriate audible level. How to start

records and tape recordings without preliminary noises. How to pronounce (among others) Moussorgsky, Scriabin, Dvorak, Smetana, Dohnanyi — even Wagner (more "Vohgner" than Wagner). And avoiding dead air — the silent hiatus that makes listeners think there's something wrong with their radios.

Keith has his license now and has been broadcasting a regular stint for several months. "I'm really not a classical music expert," he says. "Just enjoy listening. The station's on the air 126 hours per week and, you know, that takes a fair amount of man and woman power just to fill up that time." The other volunteers include university students, teachers, salesmen — people from a range of occupations sharing an enthusiasm for good music.

The station has one other distinction. Of 17 FM stations in the country devoted solely to classical music, KHFM resides in the smallest town. So Albuquerque is fortunate in having this cultural plus.

Tune in some day — 96.3 on the dial. It won't be Walter Cronkite you hear, but then it won't be Wolfman Jack either. • js

VOLUNTEER ANNOUNCER Keith Taylor (5625) gets set to read the news on FM radio station KHFM. Classical music occupies most of broadcast day. Station staff consists chiefly of volunteers.

Recreation Notes

FUN & GAMES

Softball — Sandia's Slow Pitch Softball Association has started organizing teams for this season. Interested employees should contact Joe Santana (7654), Floyd Salas (2632) or Dewey Berry (7611) before March 29. League play will start about May 1.

* * * *

Sandia Bicycle Ass'n. — The KAFB military are conducting a bicycle interest survey, whose results will be the basis for some sort of base bikeway plan. Today's issue of *Focus* contains a copy of the survey, and other copies are available on the bulletin boards or through a call to LAB NEWS, ext. 1053. Completed surveys are desired from all persons having an interest in biking, even if they do not now own a bike.

Century ride (100 easy miles) is coming up April 21. Prepare thyself (or at least thy posterior). That '75-in-New Zealand bike tour is shaping up. Don Mattox reports eight sign-ups, would like to get up to 15 for group airlines rates.

* * * *

Sandia Runners Ass'n. — Three Sandians, Irv Hall (1643), Bob Jeffrey (1231), and Mark Percival (2411) took part in the Portales marathon last month. Bob pulled up lame around mile 15, but Irv and Mark went the 26-mile-distance under four hours. This was Mark's first marathon. His comment: "You learn a lot about yourself during those last miles."

Whether you run or jog (and it isn't clear what the distinction is), keep a log of your runs — date, distance covered, and time. If you want to get fancy, add another entry — cardiovascular points earned under the aerobics system. Someday your log will give you the satisfaction that George Horne's (2634) is about to. His record indicates that he'll turn mile 2500 shortly, four years following his first outing. Anyone out there with 10,000?

There's a report of a Labs physicist streaking from Bldg. 806 to the library. Security isn't concerned because this person was wearing a badge (on what?) but SRA, nothing if not systematic, would like to note all appropriate data for record purposes — elapsed time, wind, gender, etc. Step forward please.

* * * *

River Runners — A Cataract Canyon trip down the Colorado from Moab to Hite (Utah) is being organized by Sharon Mackel (5811). Five days, 150 miles on J-rig boats that hold eight people, oars plus a motor. The outfitter recommends the last of May, beginning of June as the best times. Cost: $165, fairly reasonable considering the circumstance that it includes your air transportation back to Moab from Hite. Call Sharon on ext. 4030 for other details. • js

Sympathy

To Ernie (5623) and Mary Hall (9311) on the death of his brother, Feb. 21, in Indianapolis.

To Bob Wood (9533) on the death of his mother-in-law, in Chicopee Falls, Mass., Feb. 24.

To Herman Garcia (9718) on the death of his brother in Albuquerque, March 3.

FOOD SERVICES CENTERS, now in operation in Bldgs. 805, 836, 880, 892, and Area 3, are equipped with vending machines offering selections for lunch-time meals. The equipment in each lunch area also includes microwave ovens, dollar-bill changers, and stand-up counters. Szabo Food Service has the contract with Sandia to provide the service. A five-member committee, headed by Ken Sutton (4250), oversees operation of the centers.

Take Note

The Del Norte High School Band is sponsoring a spaghetti dinner Saturday, March 30, from 5 to 8 p.m. at the school cafeteria. Proceeds from the event will help finance the band's participation in the Greater Southwest Regional Music Festival in Amarillo.

* * * *

Today is the deadline for returning the survey on the back page of "The Comprehensive Plan: A New View of Albuquerque." Check the baskets by the Tech Area gates for a copy.

* * * *

Want to go for a balloon ride? Then show up *tomorrow morning* (Saturday) around nine or so at the St. Pius parking lot at Louisiana and Indian School. The New Mexico Diabetic Association is conducting a lottery, @ $1/chance, and balloon rides, as well as five $1000 US Savings Bonds, are offered as prizes.

* * * *

The Animal Humane Association is conducting a campaign this weekend, the 16th and 17th, to collect old newspapers. Funds they receive for the papers help stray cats, woebegone dogs, and an occasional senile canary. You can drop off the newspaper bundles at their place on 615 Virginia SE, just outside the Wyoming gate.

* * * *

Dr. Mossman from Medical commends to your viewing a TV report on breast cancer: Channel 13, March 17 at 4:30 p.m.; Channel 4, March 23 at 3 p.m.; and Channel 7, March 31, time to be announced. The film shows newest detection equipment and techniques, mammography and thermography, and breast self-examination.

Don't miss the lobby display in Bldg. 802. Entitled "The New Mexico Santero," the display consists of an outstanding collection of santos — holy figures and wood paintings — assembled by the Museum of New Mexico in Santa Fe. The display is on loan through March.

* * * *

If airplanes, defense-oriented R&D, nationally known speakers, and good fellowship are for you, then so is the Air Force Association, now conducting a membership drive. You do *not* have to be Air Force (or ex-Air Force) to join. Call Bill Denison (9521), president of the Albuquerque chapter, for more info; he's on 4-1733.

SMALL boys enjoy choo choo trains, and big boys like Russ Smith (7122) go for them too, so he's applied his considerable photographic talent to the subject and come up with a commercial folio of his best train prints. The collection is on display in the Technical Library.

ORGANIZERS of last week's Microelectronics Symposium (from left) Charles Tapp (2430), Jerry Hood (2110) and Bill Spencer (2100) are shown at opening of the Symposium. Laura Garcia (2431) presided at the registration desk. Some 100 people from laboratories around the country attended the three-day meeting.

March 17 - 23

Fun & Game — And Serious Business

"Next week is National Wildlife Week."

"Great. I'm ready for some."

Each year National Wildlife Week serves as stimulus for a vast quantity of amateur humor, most of it bad (see above).

But it also serves to focus the nation's attention on the survival of one of our natural resources — the wildlife, especially those on the ever-growing list of endangered species.

Over 100 species of mammals, birds, fish, reptiles, and amphibians are now in danger of extinction. The cause may be loss or change of living space, disease, pesticides, predation, or a combination of these. Overhunting, as in the case of whales, may also endanger a species. If they don't get help, they will join the 40 types of mammals and birds that have vanished from North America in the last 150 years.

Who's to help? Groups like the National Wildlife Federation and its state and local affiliates. Three of the latter are in the Albuquerque area: Paradise Hills Wildlife Federation, Sandia Mountain Wildlife and Conservation Association, and the Albuquerque Wildlife Federation. The city group traces its founding to a July 1914 meeting which established the Albuquerque Game and Fish Protective Association.

"Today we're still involved in protecting game species," says current president Dave Weingarten (2434), "but we also work for legislation to protect other species, help to choose areas to be set aside as wilderness, and review environmental impact statements as they relate to wildlife." Another Sandian, Ed Machin (2432) is vice-president of the Albuquerque group.

Local National Wildlife Week coordinator is KOB's Frank Joyce. Joyce Mendel (wife of Cliff, 5213) is Albuquerque Wildlife Federation's Director for Education. They're providing guidance and materials to the Albuquerque Public School teachers who wish to help their students understand the problems wildlife faces in an increasingly urbanized world. • bh

Speakers

C.E. Land (5113), "Sandia's Role in the Development of Electrooptic Ceramics," presented as a Fellow Award address at the Meeting of the Albuquerque Section of IEEE, Feb. 20.

W.H. McCulloch, D.O. Lee and W.P. Schimmel (all 1543), "The Solar Community — Energy for Residential Heating, Cooling, and Electric Power," annual meeting of the American Association for the Advancement of Science, Feb. 25-27, San Francisco.

C.M. Tapp (2430), "A Review of Hybrid Microelectronics," ISHM Meeting, Feb. 20, Huntsville, Ala.

J.B. Rivard and F.V. Thome (both 5221), "Local, Zero-Power Void Coefficient Measurements in the ACPR"; J.B. Rivard, "Closed-Form Solution of a Two-Dimensional Fuel Temperature Model for TRIGA-type Reactors"; J.S. Philbin (5221), "Criticality Analyses of the Annular Core Pulse Reactor (ACPR) Fuel Storage Rack," Triga Owner's Conference, Feb. 25-26, Albuquerque.

Adult Education, U. of A.

The Adult Education Program, University of Albuquerque, gives academic credit to students toward a Bachelor degree based on knowledge acquired on a job, previous education, and results of the CLEP (College-Level Examination Program) test. It is possible to be granted up to 60 credit hours, placing an individual in junior status.

Education and Training Division 3131 is offering a course to help prepare individuals to succeed in the Adult Education Program and to do well on the CLEP test. SP-107A will be offered on Tuesdays and Thursdays from 12:30 to 1 p.m. in Bldg. 632 auditorium. Call Ruth Brooks, 4-6538, for an enrollment card. Classes will run from March 19 - June 27.

Authors

M.R. Scott (2642), "An Initial-Value for Integral Operators: IV-Complex-Valued Kernels of Laser Theory," Vol. 13 (1973), JOURNAL OF QUANTITATIVE SPECTROSCOPY AND RADIATIVE TRANSFER.

B. Granoff (5843), H.O. Pierson (5846) and D.M. Schuster (5844), "Carbon-Felt, Carbon-Matrix Composites; Dependence of Thermal and Mechanical Properties on Fiber Volume Percent," Vol. 7, No. 36 (1973), JOURNAL OF COMPOSITE MATERIALS.

T.D. Harrison (2334) and L.E. Snodgrass (1641), "SQC: An Aid in the Purchase of a Machine Tool," Vol. VI, No. 10 (1973), QUALITY PROGRESS.

R.A. Hill (5642) and D.L. Hartley (8364), "A Focused, Multiple-Pass Cell for Raman Scattering," Vol. 13, January 1974, APPLIED OPTICS.

D.W. Swain (5242), "Effects of Induced Axial Electric Field on a Relativistic Electron Beam Pulsed Propagating Through a Plasma," Vol. 16 (1973), PHYSICS OF FLUIDS.

R.J. Thompson (5122), "Difference Approximations for Some Functional Differential Equations," published August 1973 in the Springer-Verlag Lecture Notes volume 333, NUMERISCHE, INSBESONDERE APPROXIMATIONSTHEORETISCHE BEHANDLUNG FUNKTIONALGLEICHUNGEN.

B. Morosin (5154) and J. Howaton (Univ. of Wyo.), "Crystal and Molecular Structure of Thiocyanotobis (triphenylphosphine) Silver (I)," Vol. 2 (1973), CRYSTAL STRUCTURE COMMUNICATIONS; Morosin, "Non-Magnetic Semiconducting Phase of (NMP) (TCNQ)," Vol. 42, No. 15 (1972), PHYSICS LETTERS A; Morosin and P.S. Peercy (5132), "Pressure and Temperature Dependence of the Raman Active Phonons of SnO_2," Vol. 7 (1973), PHYSICAL REVIEW B.

R.S. Blewer (2413), "Depth Distribution of Implanted Helium and Other Low-z Elements in Metal Films Using Proton Backscattering," Vol. 23, No. 11, APPLIED PHYSICS LETTERS.

G.A. Carlson (5323), "Spherical Detonations in Gas-Oxygen Mixtures," Vol. 21, No. 3, COMBUSTION AND FLAME.

R.A. Graham and R.D. Jacobson (both 5132), "Lithium Niobate Stress Gauge for Pulsed Radiation Deposition Studies," Vol. 23, No. 11, APPLIED PHYSICS LETTERS.

J.W. Reed (5644), "Comments on Paper by A.D. Pierce, J.W. Posey, and E.E. Iliff, 'Variation of Nuclear Explosion Generated Acoustic-Gravity Wave Forms with Burst Height and Energy Yields'," Vol. 78, No. 33, JOURNAL OF GEOPHYSICAL RESEARCH.

M.J. Landry (2441), "A Pulsed Ruby Laser with Individually Q-Switched Multiple Cavities," Vol. QE9, No. 6, IEEE Journal of QUANTUM ELECTRONICS.

R.C. Lincoln and R.B. Pettit (both 5823), "A Two Wavelength Technique for the Simultaneous Measurement of High Temperature and the Temperature Dependence of Spectral Emittances," Vol. 5, No. 4, HIGH TEMPERATURE/HIGH PRESSURE.

R.D. Krieg (1541), "On the Behavior of a Numerical Approximation to the Rotary Inertia and Transverse Shear Plate," Vol. 40, No. 4, JOURNAL OF APPLIED MECHANICS.

L.C. Bartel (5151), "Model Calculations of the Dynamic Susceptibility for the Modified Zener Model of Ferromagnetism and Comments on the RPA," Dec. 1973 issue, PHYSICAL REVIEW B.

feedback

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. Why is it that employees who request a copy of the Mediguard or Medicare contract are told by the Compensation and Benefits Department (CBD) that they cannot have it, particularly when Mr. Apodaca, State Insurance Commissioner, says they have a legal and legitimate right to possess a copy? CBD allows employees to read a contract in CBD offices, but wouldn't it be better for employee understanding to peruse it at home and lose less time on the job? If CBD argues it is expensive to make a large number of copies available, then why not place a dozen copies in the library which can be checked out? CBD kindly offers to interpret the contract for employees — does this imply that employees do not have the intelligence to correctly interpret and does CBD have a monopoly in this respect? In case an employee does desire interpretation on some point why should he not have the freedom to ask CBD or someone else of his choice for assistance?

A. Your question concerning distribution copies of the several health plan contracts has periodically been raised relative to all of Sandia's employee benefit contracts. The contract is a legally executed document between Sandia as your employer and the carrier. They generally are written using legal language and structured in such a way that it does require some experience with such documents in order to accurately and consistently interpret the various contract provisions. Because of this, the traditional approach has been for the distribution on an individual subscriber basis of a certificate or booklet describing the benefits of the plan. Experience has shown that this procedure provides information required by employees as to their rights and benefits under the particular plan when supplemented by explanations from the Benefits organization.

Further, the cost of reproduction, distribution and maintenance of current information copies has appeared unwarranted.

We will continue to maintain the present files in the Compensation and Benefits offices and these may be reviewed and studied by interested employees. In addition, beginning with the execution of new contracts, we will make them available through the Department Secretary, Organization 4210. Interested employees may check out a copy of the contract for their review and study outside of normal working hours. We would expect them to be returned within a few days.

—D.S. Tarbox-formerly 4200

* * * *

Q. It would seem appropriate that Sandia's purchasing power (or the power of a group of employees) could be utilized to make it convenient and economical for employees to upgrade their old slipsticks to the new electronic slide rules.

A. The Laboratories considered the purchase of electronic pocket calculators for resale to employees in June 1972. The decision was made not to do so based on the following:

1. Electronic calculators are just one of many items which are of interest to employees; i.e., typewriters, oscilloscopes, tools, etc.
2. Significant discounts are given only for very large quantity purchases.
3. There is a genuine reluctance to buy such items with Laboratories funds for resale because of the precedent that it would establish and because of the potential misuse of the Government priorities under which it would be bought.

A completely private company could purchase calculators for employees and offset a portion of the price, but Sandia is not permitted to use Government funds in such a manner. Indeed, a recent example is the 10% added to the selling price of Safety Shoes. This was the result of an AEC requirement that we recover administrative costs associated with the sale.

R. S. Kern - formerly 4100

* * * *

Q. I would like to see the Air Force make helmets mandatory for bicyclists on Base, just as they did for motorcyclists before the state helmet law came into effect. Does the Air Force plan any such action?

A. Your question regarding helmets for bicyclists on Base was discussed with a military representative. You are correct that the military did require a helmet for motorcyclists prior to any State of New Mexico law. However, an opinion was expressed that this requirement would not have withstood a court challenge, of which there was none. The current Air Force policy in matters of traffic control and safety is to abide by and conform to the laws of the host state. In consonance with New Mexico law, Kirtland has, by regulation, promulgated a similar requirement on-Base.

New Mexico does not have any statute requiring bicyclists to wear helmets. Therefore Kirtland has no plans for such a mandatory regulation. However, an Air Force Ad Hoc Bicycle Safety Committee of the Base First-Team Airman's Advisory Council is looking into the possibility of having the wearing of a helmet made *optional* formilitary personnel. One hold-up on doing even this is that current Air Force dress codes do not permit other than regulation headgear being worn, with the exception of that for motorcyclists.

Another reason the Air Force has turned down suggestions to make this optional is that "Their accident statistics do not show any injuries or accidents attributable to a rider's loss of hat." The Air Force representative said, "The Committee is still looking into accident statistics with an eye towards asking the Air Force to reconsider."

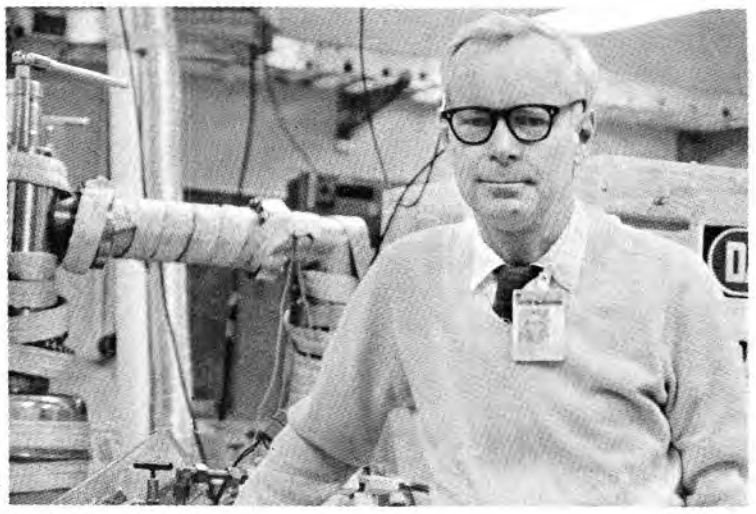
To encourage Sandia bicyclists to use helmets, an article in the *Lab News* of 11/16/73, described a helmet tested by Gordon Pike, 5155, who concluded that "The helmet offered as good protection as can reasonably be attained." The Air Force Committee is considering this helmet for use if approvals can be obtained for its use with the Air Force uniform.

L. J. Heilman - 9500

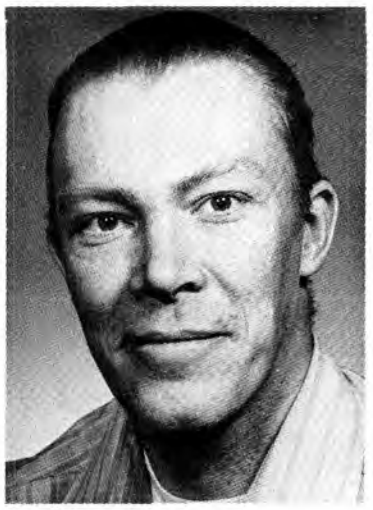
INFLAMMATORY PRESS — A clipping was sent to LAB NEWS that told how to convert newspapers into fireplace logs. We tried it, and found that the paper logs burn quickly and well. First, soak the papers in a tub filled with water and detergent (we used a cup of Tide) for several hours. Next, roll each one-inch or so stack onto a broom handle. Tap the log off the handle and set aside to dry. Function of detergent remains a mystery. Newspaper logs would be good summer project when drying time would be negligible.

MILEPOSTS

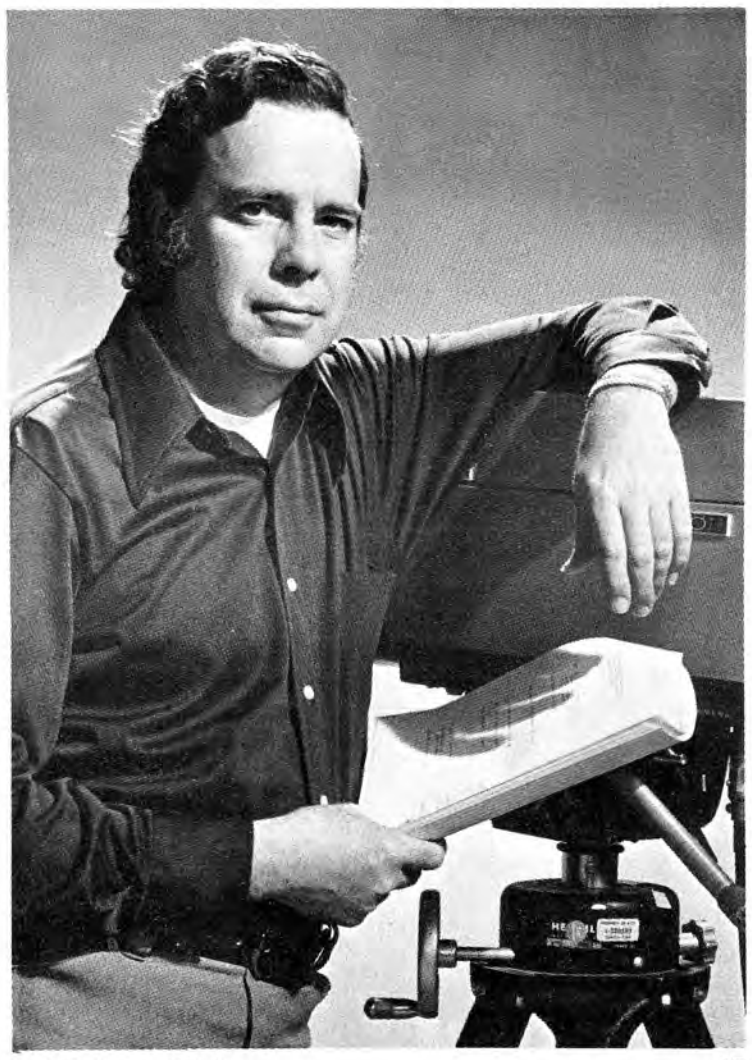
LAB NEWS March 1974



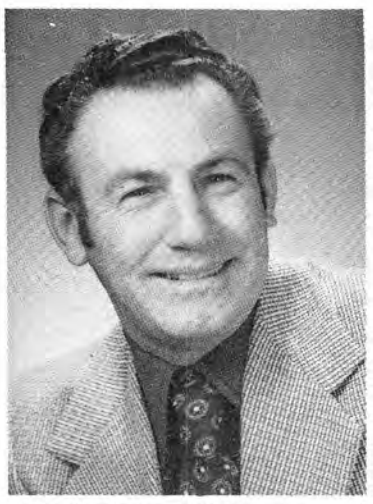
Frank Truby - 5215 15



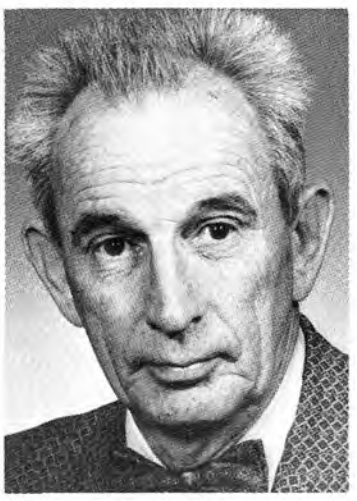
Richard Sons - 9353 10



Bob Colgan - 3153 15



John Seuser - 8421 15



Rudolph Sadler - 2331 25

Alan Stemm - 9513 10

Wilson Payne - 9342 20

R. Seibenforcher - 4152 15

Jerry Wackerly - 8213 15

Victor Roh - 5722 20

Robert Workhoven - 9342 15

Paul Jones - 2325 15

Abbie Williams - 3151 10

James Doggett - 9342 15

Eleanor Owens - 9443 10

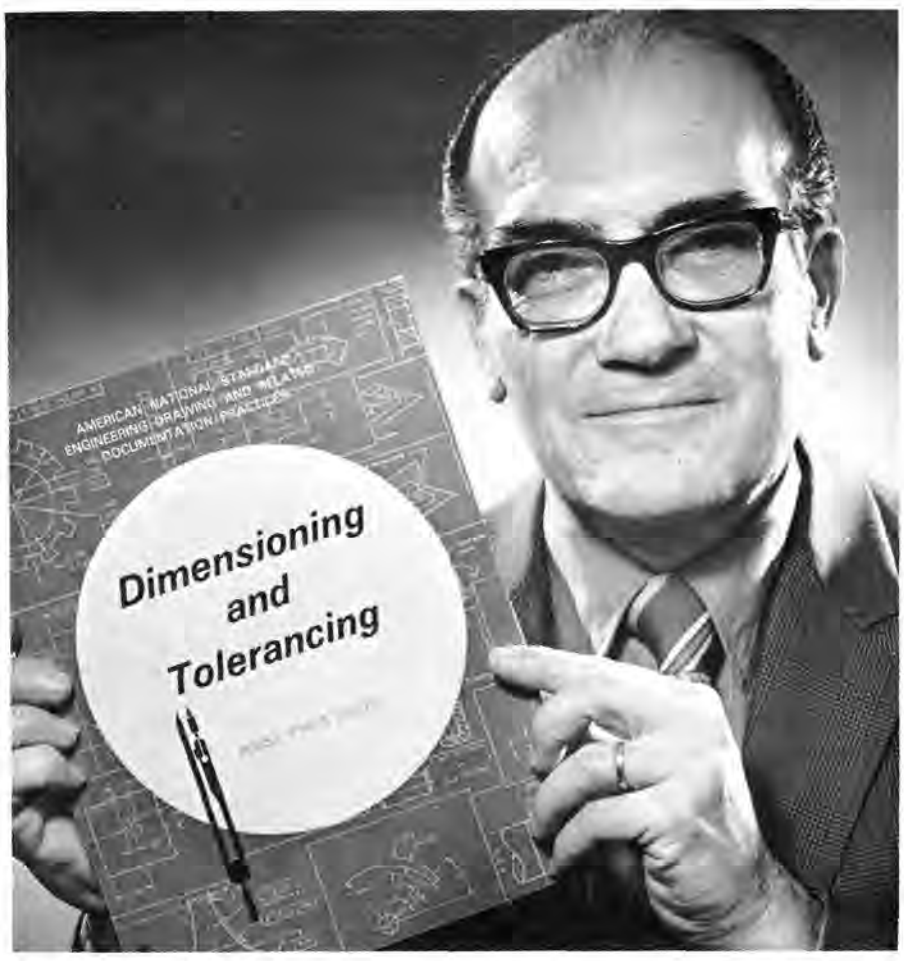
Gerald Stoker - 9352 10

Summer Science Program For High School Juniors

The New Mexico Academy of Science is sponsoring a summer science training program featuring a special section on "Water and the Energy Crisis." The program is for high school juniors and will be conducted at New Mexico Highlands University. Developed to stimulate the students' interest in science and to introduce them to college level work, the program investigates origins of the North American water supply and its chemical, physical and biological properties. Lecture and discussion sessions, extensive lab work, and field trips are planned.

The effects that exploitation of coal and oil shale deposits in western U.S. will have on the water resources of this area will also be investigated.

Two sessions will be held — June 17-July 5, and July 8-26. Students completing the junior year in high school are eligible to apply for this credit course. Application deadline is March 31. For more information contact Dick Meyer (5824), president of the N.M. Academy of Science.



PHIL NICOVICH, head of Project Design Definition Division 7655, is also chairman of an American National Standard subcommittee that is concerned with engineering drawings and related documentation practices. After five years of work, the subcommittee has published the revised "Dimensioning and Tolerancing," the definitive guide on the subject. Phil states that some 900 copies will shortly be available at the Labs.

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

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

MISCELLANEOUS

POOL TABLE, $135. Thompson, 296-1688 after 5.

APPALOOSA gelding, registered, excellent show horse, ready for '74 season, flats, reins, jumps, English/Western, good trail, $800. Meyer, 898-5224.

NAVAJO Yei rug; early Noritake tea service, $18; Hoover upright elec. sweeper, $25; Western oil paintings; antique items. Smitha, 293-1177.

KENMORE gas dryer, $20. Fite, 255-6943.

EXTRA FIRM full-size mattress & box spring, $40. Dalphin, 265-4029.

BULLETIN BOARD; 30' used 1" galvanized pipe. Peabody, 296-6239.

SETS of new table legs, various sizes, 2" to 24" wrought iron & unfinished wood, 50¢ to $2.50. Dean, 299-3281.

PORTA-CRIB, $8; G.M. love seat for infants, $8; Gerry baby carrier, $7; sling type carrier, $6; eat-&-play table, $15; kid seat for Chevy Blazer. Hansche, 281-5350.

SIMMONS hide-a-bed, full-size mattress, needs some reupholstery work or cover, $40. Hann, 299-4216.

G78-14 STUDDED snow tires, mounted on Chev. wheels, used less than 1000 miles, Sears best, $55 for two. Westman, 255-6048.

BLUE upholstered studio couch, $40; maple finished pine 10-dwr. chest, $15; Taylor Tot stroller, $12. Kinney, 298-5281.

DRAPES, fully lined & cleaned, 8 panels, each 48L x 30W, beige, print, $20. Beroldi, 268-7968.

ALL LEATHER bareback saddle, $25; S&W M19 Texas Ranger commemorative, $225. Nielsen, 255-2045.

18" COLOR TV by Singer, table model, walnut cabinet, also schematics, $100. Ashworth, 296-9126.

VACUUM CLEANER, Hoover convertible, 4 yrs. old, best offer. Young, 296-1963.

NUGGET turquoise necklace, 25" in length, $135. Allen, 255-4370.

GE white clothes dryer; approx. 50' red carpet runner; 9'x9' linoleum. Valerio, 345-2173 after 5:15.

PORTABLE typewriter, lightweight, $25. Guttmann, 299-7031.

FREE — mulch & goat manure, you haul. Davis, 877-0839.

REMINGTON 1100 automatics, 12 ga. mod; 20 ga. L/W IMPCYL, $150 ea.; Texan 20 ga. shotshell loader w/primer feed, $55. Benson, 268-9727.

ANTIQUED white French provincial bedroom set: bed, box spring, mattress, dbl. dresser w/mirror & desk. Ogle, 296-7125.

'72 RECO TENT TRAILER, hard top, sleeps 6, used very little, $800. Malpas, 299-7797.

WALNUT SPINET PIANO, $450; solid rattan den furniture, 5 pieces, $125. Sublett, 298-1004.

WASHER & DRYER, RCA Whirlpool, harvest gold, permanent press cycles, $250 for pair. Neiswander, 821-1652.

ELEC. RANGE, Kenmore, white, 30", $60. Snelling, 268-5895.

WING CHAIR; 8'x10' nylon rug; modern wall clock; crib w/mattress; playpen; deluxe stroller; nursery lamp. Lang, 299-8934.

'72 WAYSIDE MOBILE HOME, 3-bdr., 1-1/2 baths, furnished, AC, skirted, $1000 down & take over payments. Daniel, 268-8335.

ANTIQUE CHAIR, ladder back rocker w/splint seat, refinished. Millard, 299-2039.

WESTINGHOUSE frost-free refrig., 17 cu. ft., $200; O'Keefe & Merritt gas stove, $150; both used only 1 week. Sanchez, 298-9619.

TEDDY BEAR HAMSTERS, long haired, 5 wks. old, $3 ea. Robertson, 298-2388.

WEDDING DRESS, size 8-10, silk organza over taffeta, attached train, Venice lace trim w/pearls & crystals, $30. Shieler, 344-4064.

'73 MOBILE HOME, 14x60, 2-bdr., set up on corner lot in Four Hills Park. Leignninger, 299-6815.

HI-FI EQUIP: Harmon-Kardon recv; cassette tape dk; Garrard turntable; all in one unit w/walnut base & dust cover, $250; 2 Realistic 8" speakers, $75 or all for $300. Kelsey, 266-6460.

HEATH AJ-14 FM stereo tuner, $30; Heath AM Tuner, $15; Heath stereo-4 decoder, $20; Radio Shack stereo amplifier, $35. Garrison, 256-7267.

CHAIRS, Living room, make offer. Jewell, 256-0414.

STUDIO BED SET — 2 twin beds w/corner table & bolsters which are upholstered to match bed covers, $125. Thompson, 296-2235.

TRANSPORTATION

'69 MERCEDES 280S, $3800, book is $4300. Chavez, 255-1585.

'71 DATSUN 4-dr. sedan, $1700. Hart, 266-6811.

'72 MERCURY COMET, small 6, 2-dr., std. trans., R&H, $200 under NADA @$1995. Anderson, 299-2595.

'63 CHEVY, 6-cyl., 4-dr., 70,000 miles, $100. Laursen, 266-3190.

'71 HONDA 750cc, $1250; '67 Suzuki 80cc, $175. Carlson, 299-6610.

'72 LEMANS, 4-dr., $2000 or take over payments. Jordan, 243-7269.

'72 OPEL 1900, $100 under book. West, 281-3460.

'70 OPEL wagon, AT, radials. Schaefer, 281-3271.

'63 VW BUS, engine overhaul 8000 miles ago, tires have only 500 miles on them, $495 or best offer. King, 299-8768.

'63 VW 2-dr. sedan, white, heater, $450; '72 Mazda 4-dr., std. shift, 4-cyl., blue, R&H, 24,000 miles, $2100. Treharn, 299-6691 day, 869-2786 after 6.

'67 RAMBLER American wagon, AC, 6-cyl., std. shift, $575. Matthews, 869-2370.

GIRL'S 24" bike, banana seat, wire basket, $16. Guilford, 255-6294.

'66 CHEVELLE Malibu, 4-dr. sedan. AT, PS, AC, radio, 238V8, new paint-battery-alternator, low mileage, $700. Williams, 299-9150.

REAL ESTATE

200 ACRES on Juan Tomas & 217 State Rd. South, 1/2 of land woody & 1/2 clear, pinon, cedar, juniper & oak, 2 wells, $800/acre. Baca, 344-2683 after 5.

INEZ AREA, all brick, 1-1/2 baths, 3-bdr., den w/fp, carport, screened porch, lg. pool, 1650 sq. ft., under $29,000. Duvall, 299-8744.

FOR RENT

SPACE for campers and boats, $8/mo. Lovato, 298-9117.

1-BDR. furnished, 1127 Florida SE, 4 blks. west of Gibson gate, $130/mo. Andrzejewski, 255-9404.

FOR ONE YEAR if not sold, 3-bdr., den, dining, swimming pool, room for horses, SW Valley, about May 1. Crutcher, 877-7606.

NEW FURNISHED 2-bdr., 2 bath, refrigerated air home, dbl. garage, overlooks Elephant Butte Lake, monthly or weekly. Gallo, 255-2488.

2-BDR., unfurnished, attached garage, near schools & shopping, avail. April 1, water paid, $160/mo. Clark, 296-8668.

3-BDR., 2 bath, AC, disposal, walled yard, brick, partly furnished, cleaning deposit & references, adults, no pets, $225/mo., 1108 Kentucky SE. Barrett.

WANTED

AM ORDERING Delta Mark Ten ignition systems; need 20 buyers for $24 price. Guttmann, 299-7031.

PLAIN OR FANCY old sterling teaspoons and demitasse spoons. Smitha, 293-1177.

OSCILLOSCOPE, signal generators, associated test equipment; lady's golf clubs. Spray, 299-0412.

BASKETBALL backboard. Leeman, 299-9149

EXERCISE bicycle w/adjustable tension, in good condition. Zanner, 294-7613.

BICYCLE, girl's or boy's standard 20" model; Prestolite acetylene torch for silversmith work. Burr, 298-3718.

ANTENNA for CB mobile transceiver. Coleman, 299-2377.

SMALL adjustable height gage (Cadillac or other brands). Davis, 877-0839.

LIVE-IN/WORK ARRANGEMENT — 23-yr.-old Filipino girl, now in London, desires to come to U.S. Info from Muench, 867-5509.

410 GAUGE double barrel side-by-side shotgun. O'Bryant, 268-9049.

TWO FORD tot guards, bicycles, woman's & man's, $25 to $35 ea. Harrigan, 268-2759.

USED MOTORCYCLE MX BOOTS, size 9-9-1/2, must be in good condition. Snelling, 268-5895.

KODAK OR ARGUS slide projector, stack loading or wheel type, not carousel. Baxter, 344-7601.

LOST AND FOUND

LOST — Rx glasses w/brown case, $20 bill outside of C.U., turquoise tie tac, hammered silver pin. LOST AND FOUND, *Bldg. 832, tel. 264-3441.*

FOUND — Black cameo style earring, Rx sunglasses w/brown & silver frames, girl's bicycle, GM car keys in C.U. key case. LOST AND FOUND, Bldg. 832, tel. 264-3441.

• CRIBBAGE • IRISH TENOR • C-CLUB •

FRIDAY	SATURDAY
15 — HAPPY HOUR FRIED CHICKEN Adults $2.25 Under 12 1.50 *FRANK CHEWIWIE* Lounge Denny	16 — ST. PATRICK'S CELEBRATION Cocktails 6 p.m. Dinner 7 p.m. Dancing 9 p.m. (see below)
22 — HAPPY HOUR GERMAN BUFFET Adults $2.50 Under 12 1.50 *ERNIE & THE SAINTS* Lounge Barbara	23 — ANNUAL CRIBBAGE TOURNAMENT Entry $2.00 *Cash Prizes* Teams Only 11 a.m.

ST. PATRICK — Bing Grady, dedicated Irish tenor, will lead the Irish song sing; Barbara and Company will furnish the music. The annual Wearin' of the Green also features fantastic food — corned beef, ham, smoked tongue, etc.

TATOOS — The *Illustrated Man* by Ray Bradbury stars Rod Steiger as the man whose tatooed body foretells the future. With it is a W.C. Fields short and a Looney Toons cartoon. Cinema Classic Night at 7:30 on the 20th; free to members.

TOURNEYS — 1. Bridge tournament begins at 7 p.m. on the 19th. 2. Cribbagarians will gather at 11 a.m. on the 23rd to challenge champion Bill Weinbecker and partner in a double elimination team contest. $2 to enter; prizes for winners. Sign up before the 20th; bring your own board.

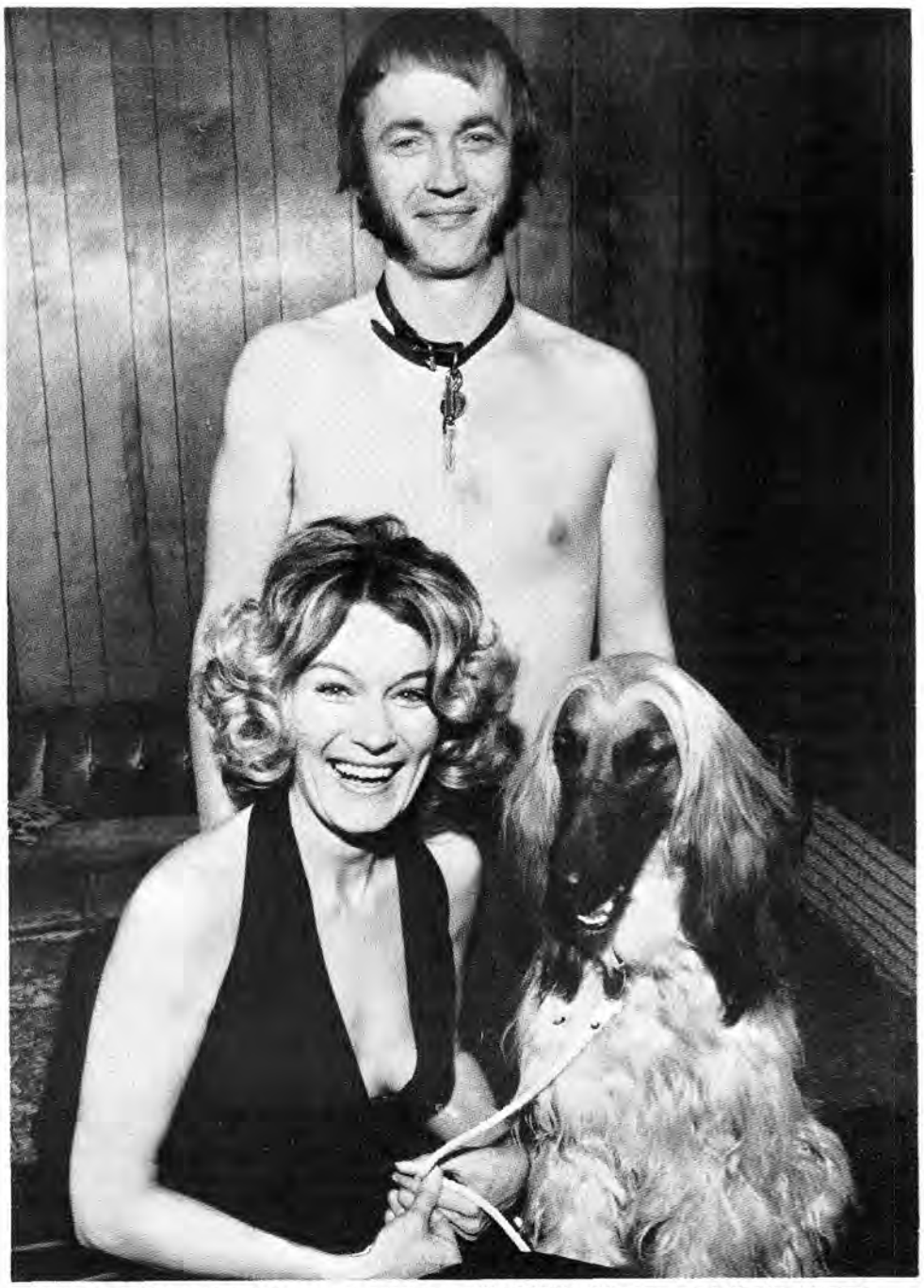
GO-GO — Teen Go-Go begins at 7:30 p.m. on the 30th with Bobby Unser's son's Smilin' Jack the musicmakers. Parents *must* purchase tickets for their teenagers — no parent = no ticket; no ticket = no admission.

AND TRAVEL — Still room on the trip to Austria in August. Still a chance to win a free trip (non-transferable) if you sign up before 8 p.m. on March 29. Still costs just $417 (double occupancy) for 8 days and 7 nights in the Tyrolian Alps.

AND WET TRAVEL — Colorado River trip #1 is now July 4-11; #2 is now July 10-17. There's some room on #1, lots on #2. Bus to Lee's Ferry, raft to Temple Bar, bus back to Albuquerque, remember the Grand Canyon forever. $325; for more info call the Club Office. Deadline is March 31.

MORE INFO — 265-6791.

W.C. FIELDS • WEINBECKER • ALPS •



UNLEASHED (ALMOST) joy shared by Bill (9424), Cherry, and Tasha Swartz. Known as The Unillustrated Man, Bill's looking forward to the Cinema Classic next Wednesday evening.

Events Calendar

March 15-17, 21-24 — ACLO presents "Hello, Dolly," 8:15 p.m., Popejoy Hall.
March 16 — Museum of Albuquerque Assoc. Art Auction, 8 p.m., Museum, Yale SE.
March 16 — "Summer & Smoke," 8:15 p.m., Rodey Theater.
March 16 — Moving Pictures, Ltd.: "Floating Weeds" (Ikigusa) 1959, 10 a.m. and noon at the Guild.
March 17 — N.M. Mt. Club, Dome Lookout & Stone Lions, 15 miles, Gulf Mart, 8:30 a.m.
March 17 — Alb. Road Runners, running events for all skill levels, Montgomery Park, San Mateo and Ponderosa NE, 1:30 p.m.
March 18 — Zimmerman Library, UNM, George Miller lectures on modern theater, 7:30 p.m.
March 19-20 — ALT presents "Relatively Speaking," 8 p.m., 242-4750.
Through March 21 — Friends of the Public Library Book Sale, 6-9 p.m. Fri., 9-1-Sat., Civic Auditorium.
March 23-24 — 1974 Women's Indoor 3-Meter Junior National Diving Championships and N.M. Age Group & Open Interstate Invitational Championships, UNM Pool.
March 23-24 — HYAC Invitational Swimming Meet, Valley Pool.
March 23-24 — N.M. Mt. Club, car camp in Sherman Canyon, San Mateos, call Roy, 344-8437.
March 23-24 — Ski Touring Club, Chama and Cumbres Pass, call Don, 255-1988.
March 25 — Speaker: R.D. Laig, 8 p.m., Popejoy Hall.
March 26 — "Ambakaila" Carnival of Trinidad, 8:15 p.m., Popejoy Hall.
March 27 — Audubon Wildlife Film: "Queen of the Cascades — Mt. Rainier," 8:15 p.m., Popejoy Hall.
March 28 — UNM Band, Fine Arts Center, 8:15 p.m.
March 31 — Music Vesper Series: "Noyes Fludde," music by Britten, First Methodist Church, 4th & Lead.
March 31 — "The Old Maid & The Thief," 8:15 p.m., Rodey Theater.

PHIL MEAD and Jean Crandal ham it up (turkey it up?) during rehearsal for Hello, Dolly, current Albuquerque Civic Light Opera production. Jean (of KAFB) has the title role; Phil (3151) plays Horace Vandergelder, the merchant who falls in love with her. The show plays March 15 - 17 and 21 - 24 at Popejoy; reservations from the box office (277-3121).