



THIS DISTINGUISHED GROUP includes the Governor's Committee on Technical Excellence in New Mexico, which met last week in President Hornbeck's office. They are listening to Bruce Van Domelen (1913) second left, a Labs scientist who serves as the Governor's Science Advisor.

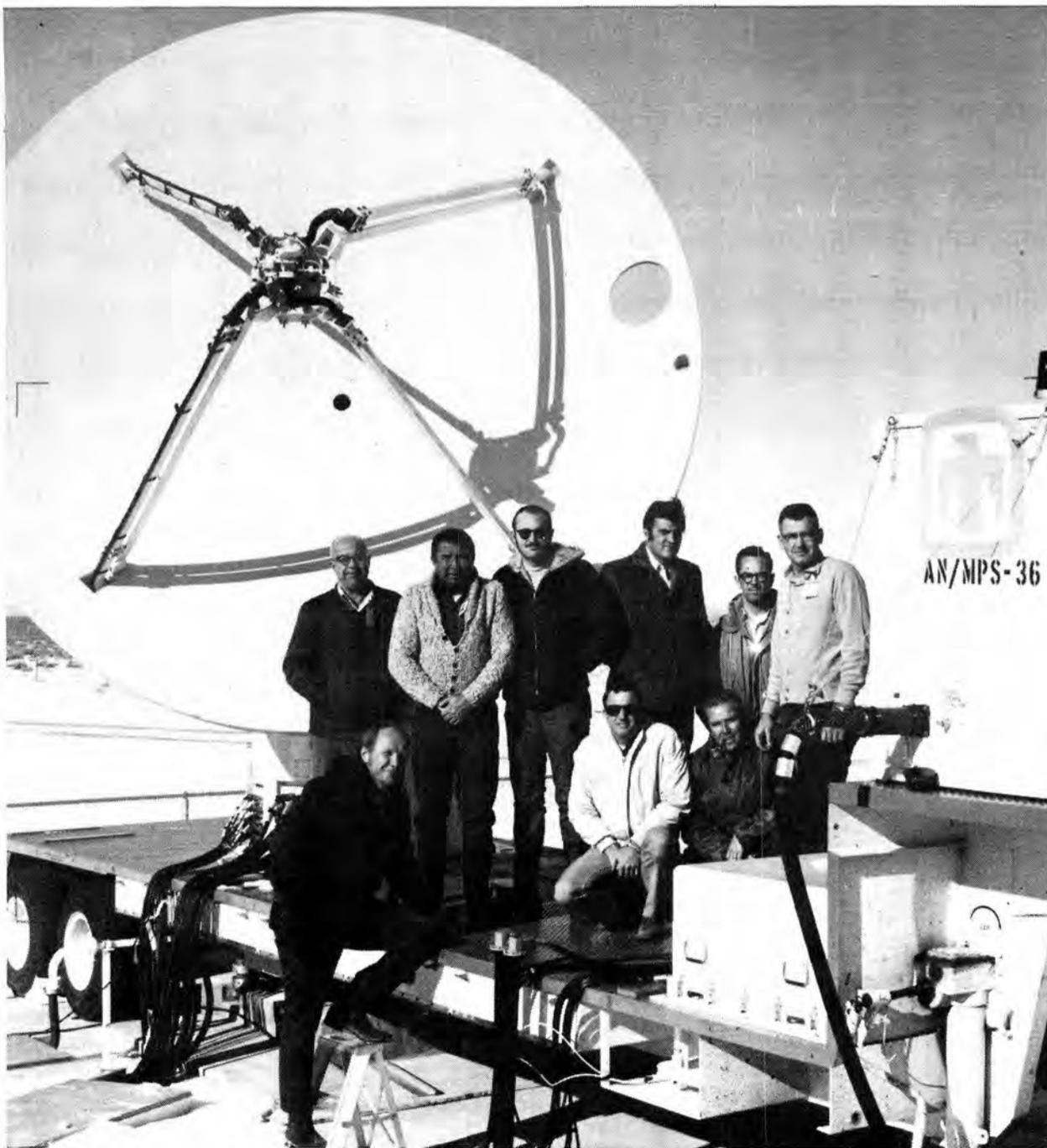
LAB NEWS

VOL. 24, NO. 3

FEBRUARY 4, 1972

SANDIA LABORATORIES • ALBUQUERQUE NM • LIVERMORE CALIF • TONOPAH NEV

New Radar Operating at Tonopah Test Range



SHOWN with the new AN/MPS-36 radar at Tonopah Test Range are the people most concerned with it. From left front: Milo Navratil, Clarence Arndt, and Lyle Hake. Back row: Bob Spence, Bill Moore,

Diwiatt Barker, Howard Gipson, Richard Rupp and Richard Williams. Advanced design radar is used to track high performance targets.

A new radar, built by RCA's Missile and Surface Radar Division, was accepted and is now operational at Tonopah Test Range. It is used to track high performance targets. Called AN/MPS-36, 14 of these advanced radars are being built for use by the Army, Air Force and AEC.

The C-band radar is mobile and is contained in two units — a van housing the major electronics and a flat-bed trailer carrying the antenna and support pedestal. Although the radar is designed for rapid transport from one site to another, the antenna must be supported on a concrete base for precision measurements of azimuth, elevation, range, and range rate.

Among many unique features, one of the most significant is the capability of the radar to take direct measurement of target velocity by pulse-doppler signal-processing techniques. It is also the first time that an instrumentation radar has been developed from the outset to be fully coherent. Radiating up to one megawatt of RF power, the MPS-36 can track a beacon-equipped vehicle out to 50,000 kilometers (31,000 miles) or skin track an object about the size of a football out to 140 kilometers (87 miles).

A general-purpose digital data processor and a digital magnetic tape recorder are integral parts of the MPS-36 radar.

Extensive use of integrated circuits was made throughout the design of the electronics, with digital techniques taking preference over analog circuits wherever possible. This approach permitted repetitive use of standard modules, minimizing the need for new designs.

Bob Spence, radar systems project leader in Division 9471, had chief technical responsibility in the many activities involved in bringing the radar to operational status. Richard Shaum of the same group also made significant design contributions.

Afterthoughts

Most persons who knew Marcel Weinreich more than in passing had rather definite feelings about him. The Labs translator for many years, he died last month a youngish 60 after recent retirement. Marcel filled the role of the European-educated high intellectual to perfection, and his occasional hauteur and condescension toward the American product--both people and things--could be infuriating. But if you persisted, you learned that this was one of several poses, all assumed for the titillation or exacerbation of his audience. I don't believe Marcel ever really took himself seriously in these roles, because he was a genuinely witty person who was devoid of pomposity. Consider the elements of this man's life: a childhood in Czarist Russia; fleeing before the Bolsheviks during the revolution; young manhood in western Europe (PhD, Sorbonne); a period in Hitler's Germany; emigration to this country; finally, the move from New York to the Southwest. The early death of this erudite and charming man somehow seems uncalled for.

* * *

Chicken Little Was Right--This morning, January 26th, on an otherwise clear day the smog was so bad in Albuquerque that Mt. Taylor was not visible.

* * *

Join The Howard-Who? Institute--This Institute requires no dues and offers a serenity of spirit to members that ordinary mortals --beset by overwhelming trivia concerning a zillionaire named Howard something-or-other--can never hope for. The blood oath of HW?I membership is rigorous, and members are sworn to the studied disregard of all items in newspapers, magazines, TV, radio, billboards, flyers, books, cereal boxes and other media that relate to the subject whose name appears in the title of the Institute. Final test and full acceptance in HW?I is contingent upon immediate delivery of the proper response when a secret agent of the Institute insinuates The Name into an otherwise innocent conversation. The sole acceptable response, which must be forthrightly, even rudely, interjected: "Howard-Who?"

* * *

Comfort For Yawners--"Ennui, felt on the proper occasions, is a sign of intelligence." Clifton Fadiman •js

Sandia Labs Bike Riders Organize

At the well-attended noontime meeting on the 24th, Labs bikers decided to form the Sandia Bicycle Association. Purpose of the Association: to improve cycling conditions in Albuquerque.

A committee of nine, headed by Irwin Janney (9312), will undertake the immediate business of the Association, which includes the development of a number of recommendations relating to cycling that can be submitted by the Association to appropriate authority. In this regard, the many detailed responses to the earlier LAB NEWS survey on bike riding are being studied for inclusion in the recommendations.

Other committee members include: Bob Easterling (1643), Gordon Pike (5155), Joe McDowell (1323), Lyle Wentz (1222), Doug Drumheller (5163), Billy Thorne (5162), Sharla Vandevender (1753) and Deanna Rawlinson (1724).

Because the effectiveness of the Sandia Bicycle Association will be largely a function of how many members it can claim to represent, the group urges all persons interested in biking to join this Association. Contact a committee member in order to join. About 175 persons, mostly those who answered the survey, are now counted as members. Looking ahead, the Association foresees a newsletter to keep members informed and periodic releases to the news media aimed at educating the motoring public about bicycle riding on city streets.

Variable Annuity Unit Value

February 1972	1.688
January 1972	1.559
Average 1971	1.628

LAB NEWS

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SANDIA LABORATORIES

An Equal Opportunity Employer

ALBUQUERQUE, NEW MEXICO
LIVERMORE, CALIFORNIA
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Don Graham Ass't. Editor.

Norma Taylor Pitches In &
Bill Laskar is the Photographer.

In Livermore, Matt Connors &
Lorena Schneider are
Writers



MEMBERS of the General Advisory Committee of AEC met recently with President Hornbeck. From left, they are Rolf Eliassen, James Sterner, Melvin

Harrison, H.G. Vesper, Norman Ramsey, and Jane Hall who is Chairman (Chairwoman?) of the Weapons Subcommittee of the GAC.

WE Sponsors Radio Special— 'The Twenty-First Century'

A series of radio broadcasts examining man's future is being sponsored by Western Electric on the CBS Network (KGGM) this weekend, Feb. 5 and 6. Hosted by Walter Cronkite, the series — "The Twenty-First Century" — will feature guest authorities, personalities and well-known CBS news correspondents, offering a dramatic insight to anticipated changes and developments in the century starting just 28 years from now.

Twenty-eight four-minute programs and two nine-minute programs will be broadcast throughout the weekend. The wide range of subjects includes: the computer in everyday life, synthetic foods, a three-day work week, controlling our environment, genetics, drugs, international sports, increased life span, education, religion, leisure time, pets, mass transportation, crime and medicine of the future.

KGGM Radio time schedules for both Saturday and Sunday are: morning — 8:25, 9:25, 10:06, 10:25, 11:06, 11:25; afternoon — 12:06, 12:25, 3:25, 4:25, 4:30, 5:06, 6:06, 6:25 and 7:25. On Saturday there will also be a morning report at 7:30 and on Sunday the 10:06 a.m. time period is eliminated.

Events Calendar

Feb. 4-6, 8-10 — "Boeing, Boeing," Albuquerque Little Theatre, 8 p.m. For reservations, 242-4750.

Feb. 6-March 6 — Brandywine Galleries — Opening reception, Museum of N.M. Traveling Exhibition "N.M. Winter Wonderland," 1-5 p.m.

Feb. 6 — N.M. Ski Touring, Beginning Clinic, Western Skies, 9 a.m.

Feb. 6 — Canadian National Opera Company, "Orpheus and The Underground Opera," 8:15 p.m., Popejoy Hall.

Feb. 7 — Vienna Choir Boys, Methodist Benefit, 8:15 p.m., Popejoy Hall.

Feb. 10 — ASUNM Lecture Series presents Clark E. Moustakes, sociologist and author. Topic: "Being Alone vs. Being Lonely," 8 p.m. Keller Hall.

Feb. 10 — Basketball, UNM vs. U. of Wyoming, 7:30 p.m., UNM Arena.

Feb. 10-13, 17-20 — "A Midsummer Night's Dream," Old Town Studio, 8 p.m. For reservations, 242-4602 or 265-0589 after 6 p.m.

Feb. 12 — Basketball, UNM vs. Colorado State U., 7:30 p.m., UNM Arena.

Feb. 12 — Albuquerque Symphony Orchestra, 8:15 p.m., Popejoy Hall.

Feb. 13 — N.M. Ski Touring, exploratory trip to Mt. Taylor, tour 5-10 miles, Bellas Hess, 8 a.m.

Feb. 14 — Valentine's Day — Be all heart today.

Feb. 15 — Community Concert, Mildred Miller, soprano, 8:15 p.m., Popejoy Hall.

Feb. 16 — "Butterflies Are Free," comedy, 8:15 p.m., Popejoy Hall.

Feb. 17 — ASUNM Lecture Series, Alan Watts, philosopher and Zen expert, 8 p.m. Keller Hall.

Credit Union Reporter

By Bill Bristol,
Credit Union Manager

Twenty-Fourth Annual Meeting

Our annual meeting was held on the 27th at the Coronado Club with President Bill Prekker presiding before some 600 members. The Financial Statements show that the Credit Union's rate of growth has continued at a phenomenal rate. Assets increased by \$1,584,847 (12 percent) to an all time high of \$14,586,174. Loans to members — 9271 — increased our loan balance by \$798,026 to an all time high of \$11,240,773, and our net profit increased by \$116,873 to \$762,188. We remain the largest credit union in New Mexico and rank 57th (among 12,977) in the country.

Four Board members and one Credit Committee member were elected for three year terms. Karl Waibel (4117) was elected to the Board of Directors to fill the vacancy created when Jack Wesbrook (5411) chose not to seek re-election. Joe Miller (4122), Alan Pope (5600) and Earl Simonson (4122) were re-elected to the Board, and George Wayland (3243) was re-elected to the credit committee.

Each member at the meeting received a carving set and a chance for one of the two portable color television sets. The lucky winners were Robert Workhoven (9341) and James Schirber (5150).

On Jan. 28, the Board of Directors met to elect officers and appoint committees for 1972. The elected officers are: Bill Prekker,



(4122) President; Clarence Sandy, (7453) Vice President; Joe Miller, Secretary; and Bill Bristol, Treasurer. The remaining Board members are Bill Olheiser (4511), Ralph Hampy (2633), Bill Funk (8230), Alan Pope, Joe Maldonado (4611), Karl Waibel and Earl Simonson. Appointed committees and their chairmen are: Supervisory Committee, Bob Butler (4364); Operations Committee, Earl Simonson; Executive Committee, Bill Bristol; Education Committee, Ralph Hampy; Building Committee, Clarence Sandy and Data Processing Committee, Karl Waibel.

Reduction of Interest Rates Announced

Bill Prekker announced at the annual meeting that the Board of Directors had voted to reduce interest rates effective Feb. 1, 1972, from the annual percentage rate of 8.4 percent to 7.2 percent for those loans secured by stocks, bonds, mutual funds, and life insurance. This reduction will be applied automatically to outstanding loans secured by these types of collateral as well as to all new loans.



CO-INVENTORS Cecil Land (left) and Willis Smith (both 5153) demonstrate a "cerampic" — a transparent ceramic which can receive and store photographic type images (or be projected as a transparency as in this case). The image is formed by shining light through an ordinary photographic negative onto the surface of the ceramic while

applying voltage. The picture needs no developing. It appears within the ceramic after application of the proper exposure and voltage. Most promising use is in storage of images from electrical signals received by telephone or radio. Lab News plans an in-depth article on this development in a March issue.

LIVERMORE NEWS

VOL. 24, NO. 3

LIVERMORE LABORATORIES

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First-Time Voters Talk

When the 26th Amendment to the Constitution was passed last June, over 11-million new voters came into the political arena. These are the newly enfranchised 18- to 21-year-olds who will be voting for the first time in a national election this November.

We talked to four of these new voters and asked them: "Now that you are able to vote for the first time, what are your thoughts on the subject?" Their replies:



Annette Freitas (8212), age 18—

"I'll be more interested in what's happening politically. I plan to read more and ask other people their opinions on the various candidates. I'll probably register like my Dad — he's a Democrat. I always think of the Republicans as the rich ones. I'm 18 and I don't think 18-year-olds really know what it's all about — 21 is the right age. We don't really know much about government. Some will probably vote intelligently, but others will vote without giving it too much thought."



Ricky Reese (8411-1), age 20—

"I favor an anti-war candidate - someone with a strong leaning towards peace. I also favor young candidates, for I can relate to them better. And I'll vote for those who will help the ordinary people. Now, with a lot of youths voting, changes will start to take place. Young people have seen presidents elected and had nothing to say about it. Now we'll have a voice in the election."



Wendy Grady (8181), age 20—

"I don't believe I'm qualified to vote because I know very little about politics. Young voters generally aren't as qualified as older, more experienced voters. I probably sound cynical, but I feel it's pointless to vote in a presidential election when the electoral college actually elects the candidate."



Glenn Kawamoto (8331), age 20—

"In the upcoming election, I don't think young people will make much difference because only a fraction of them will vote. These are the ones actively involved or concerned about politics and government. In the college I went to, about 30 percent said they were going to vote, the rest didn't really care. But as time goes by, I feel more young people will become involved. Look at last November's elections — a 25-year-old councilwoman in San Diego and a 19-year-old mayor in a small midwestern town."

Bicyclists Pump For Safe Bikeways

In conjunction with LLL, Sandia conducted two bicycle surveys last October and last December, to check the feeling of riders and non-riders toward bikeways on East Avenue.

To the October survey we had a 60 percent response. There were many comments — most on the problem of safety. Others discussed bikeway location and financing.

October Survey Results:

	Yes	No
1. Do you now ride a bike to work?	108	316
2. If not, would you be encouraged to ride by improved bikeways?	260	142
3. Do your children ride bikes to LLL to use the recreation facilities?	74	248

If so, how many? 159

In December, the survey zeroed in on the type of location of bikeways. Eighty-five bicyclists and 273 motorists returned the survey, and the results were clear cut. By a majority of four to one, respondents preferred dual bikeways on the north side of East Avenue versus single bikeways on north and south sides of the avenue.

Since then, Sandia and LLL people have met with representatives of the County, the Director of Public Works and his staff, and Livermore city planners to convey survey results, which will be studied.

At the same meeting, County representatives also presented two proposals — one covering "near future" improvements and the second, a "possible ultimate plan." Under the "near future" plan, East Avenue will be resurfaced with a light, asphalt seal coat and restriped to include space for bicycles. Under the long range plan, the avenue would be widened to 104 feet to accommodate bike riders.

Sympathy

To Louise and Loren Converse (both 8411) for the death of their son near Rapid City, S. Dak., Jan. 15.

To Bud Pearson (8257) for the death of his father in Palm Springs, Calif., Jan. 14.

To Gary Drummond (8322) for the death of his father-in-law in Indianapolis, Ind., Jan. 23.

Authors

Ron Musket (8313) and R.J. Fortner (LLL), "Chemical Effects on the Auger Electron Spectra of Beryllium," SURFACE SCIENCE.

Speakers

Ron Musket (8313), "Direct Comparison of Auger Electron Spectroscopy with Appearance Potential Spectroscopy," International Conference on Solid Surfaces, Boston.

John Schipper (8341), "Energy Transport and Phase Conversion in Solids," Ninth Topical Meeting of the Society of Engineering Science on Interaction Phenomena, Rensselaer Polytechnic Institute, Troy, N.Y.

Monte Nichols (8311), "Computer Identification of X-Ray Powder Diffraction Pattern," Seminar Series at Department of Ceramic Engineering, Alfred University.

Charles Landram (8351), "Heat Transfer During Vessel Discharge: Mean and Fluctuating Gas Temperature," Winter Annual Meeting, ASME, Washington, D.C.

Retirement Plans Turn Sandian Into Pilot

"What's an old guy like you interested in flying for?"

"You're never too old to learn something new."

So began an amiable conversation between two Sandians last October at Alameda Naval Air Station. It ended in agreement that Bill Ryan (8264) would teach Jim Curtin (8333) how to fly.

Why would a man, retired from the Navy in 1959 after 30 years' service and planning to retire from Sandia in about six years, take up flying?

"It's been in the back of my mind," explains Jim, "since 1938 when I became an aviation mechanic. But family responsibilities always seemed to conflict. Now the children are grown and my wife and I are thinking about my second retirement. This time to Rancho Carmen, a 190-acre spread located near Guanajuato, Mexico. Driving in Mexico can be tough and flying would have many advantages."

"That's motivation," notes Bill. "And one of the essentials for learning to fly." A B-24 pilot in WWII, Bill now has both private and commercial pilot's license with instrument rating and an instructor's certificate.

How does a guy learn to fly?

"Join the club," said the Chief at the Alameda Flying Club.

Shortly thereafter, Jim was in the passenger seat beside a pilot who observed his reaction to the flight.

"Although I had a lot of rear-seat time in Navy aircraft," Jim recalls, "I hadn't been up in a small plane in 16 years. There we were. Out in the open. Nothing really protecting us. Then the feeling was gone. I was going to like flying."

A medical exam followed. And a medical certificate which doubles as a student pilot certificate.

With Bill as flight instructor, Jim's lessons proceeded. Ground instruction first — know the plane (a single-engine Cessna 150). Know the general operating rules (e.g., right-of-way, visual flight rules). Save a couple of hours each Sunday for a few weeks; these are spent with Bill in seemingly endless sessions of preflight inspection, taxiing, takeoff, landing, traffic pattern procedures, maneuvers and emergency landings. Next, flight-planning elements such as plotting courses, estimating time and fuel required, evaluating weather reports, and two-way radio communications.

"There was never any time to look around at the scenery," laments Jim. "I was too busy solving problems."

"During these stages," Bill says, "I de-emphasize soloing, well aware that it is uppermost in Jim's mind. Learning is the most important thing — not the time it takes you to solo. In the teaching process, the instructor must also recognize how 'body language' affects the student's learning. An instructor's grimaces, arm motions, sighs and gasps can rattle the student, so I try to respond to his performance naturally but without overreaction."

Then the time to solo arrives.

"I just knew I was ready," claims Jim. "With Bill sitting beside me those past



INSIDE THE PLANE after their "walk-around" check, student pilot (I) Jim Curtin (8333) and instructor Bill Ryan (8264) discuss pre-flight inspection and "run-

up" procedures. Piloting an aircraft figures strongly in Jim's plans for retirement.

Sundays, I knew I'd have to be ready or he wouldn't let me go. Then he got out, saying, 'OK, it's yours.' Don't think I'll ever make five landings again as good as my solo ones were."

"When you turn over the plane to the student at that moment," Bill says, "you wonder if it's the right decision. Does he use good judgment? Does he do maneuvers safely?"

When he's landed the last time, you realize he can handle the aircraft. And that's pretty thrilling."

Next came the cross-country flight.

"It went pretty well," says Jim. "With a little more flight instruction and solo time, I'll be ready to try for my private pilot certificate. I guess you're never too old to learn — or to teach for that matter." •mc



SANDIA LABS educational TV facility, used in transmission of engineering courses live from UC at Davis, is observed by (from left) Art McMullen (8183) who designed the system; Tom Cook, VP 8000;

Training Specialist Jim Smith (8236), and David Gardner, UC's VP for Public Service Programs and Dean of University Extension.



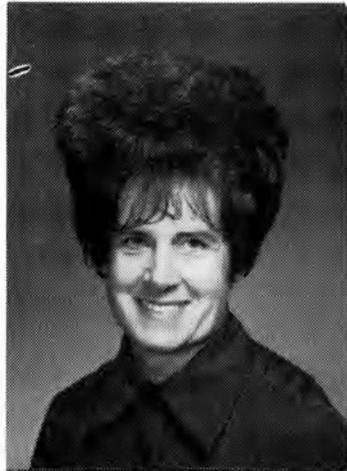
Loren File — 7111



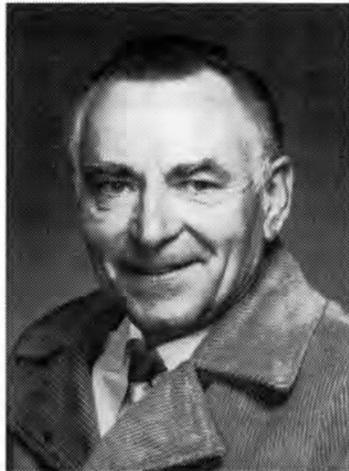
O'Donna Scalf — 3256 15

MILEPOSTS

LAB NEWS February 1972



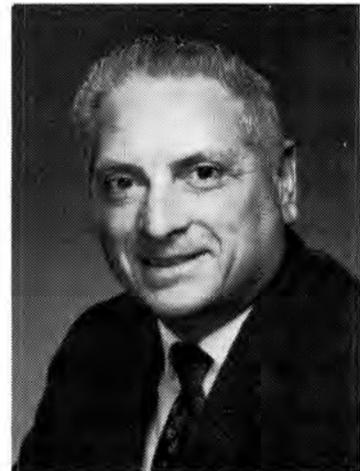
Evelyn Arterburn — 3256 10



Leslie Balint — 7512 15



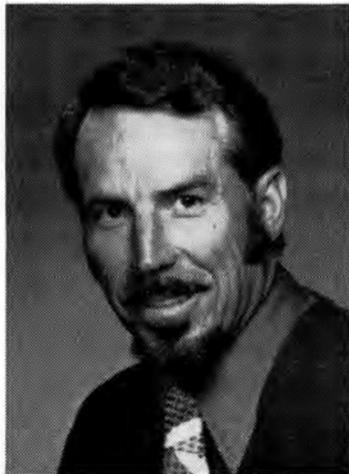
Virginia Miller — 7121



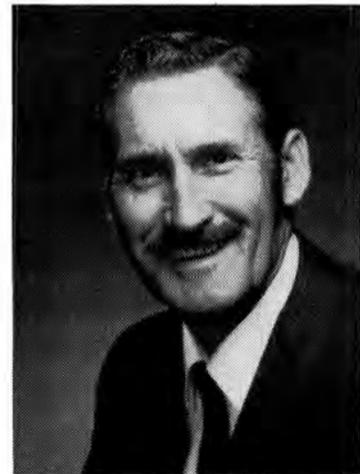
David Brown — 4112 20



Robert Brooks — 1611 15



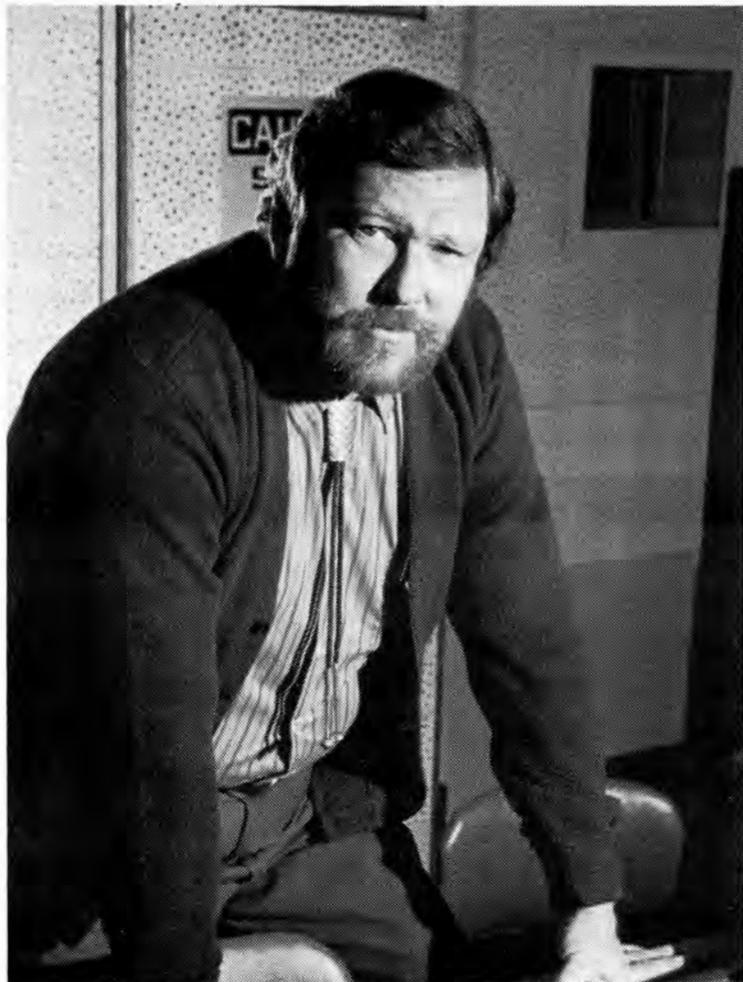
Harold Barnett — 1315 20



Bernard Brown — 7132 25



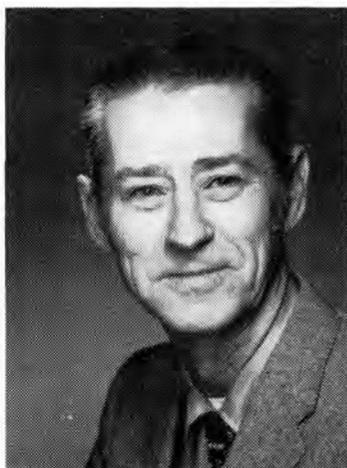
Ruth Brooks — 3132 20



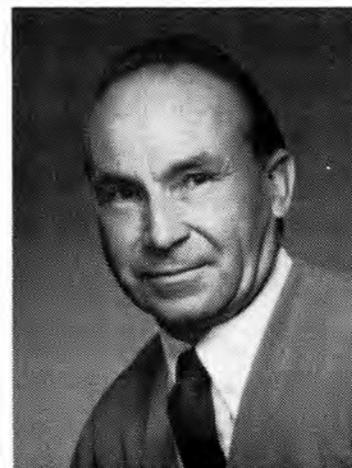
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John Chifalo — 7542 15



Roscoe Brooks — 7113 20



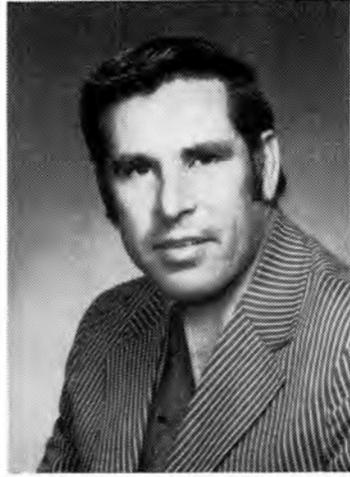
Manuel Chavez — 4514 15



Barbara Curry — 1930 10



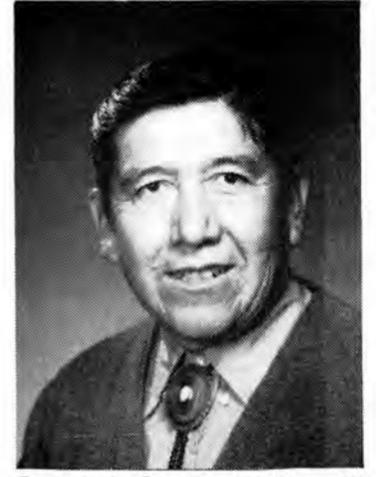
Flavio Gonzales - 7112 20



Leo Chavez - 4614 15



Cecil Jordan - 3512 20



Candelario Garcia - 7112 20



John DeBaca - 9342 20



Henry Flowers - 4511 20



Ramona Grandstaff - 7633 15



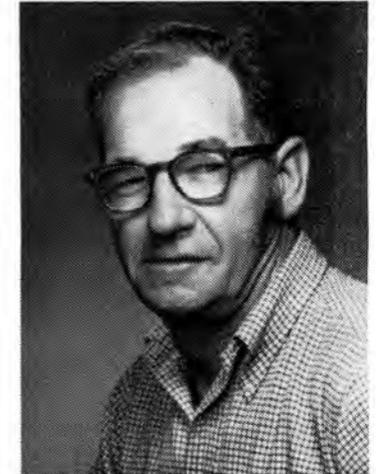
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Beryl Hefley - 3141 10



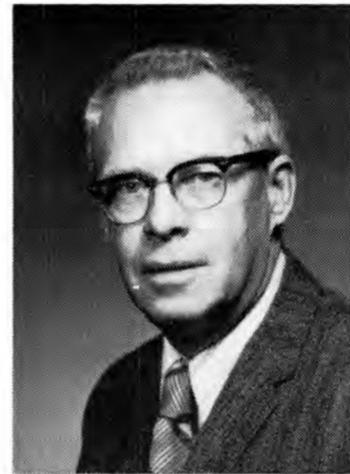
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Albert Eno - 7652 15



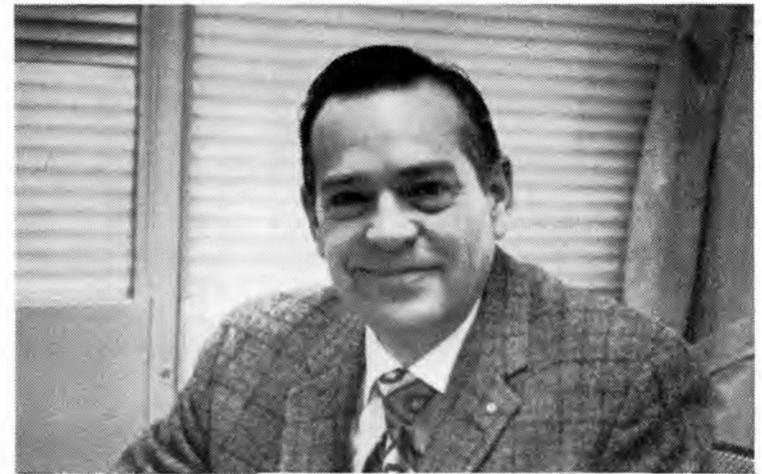
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John Flanigan - 7613 20



Doomas Easton - 4513 20



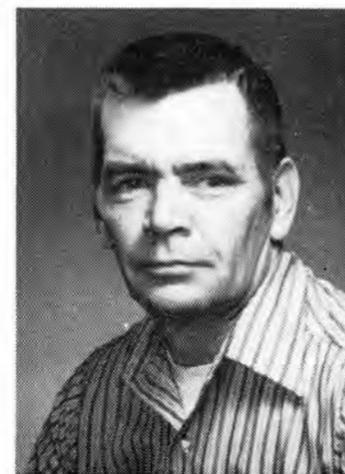
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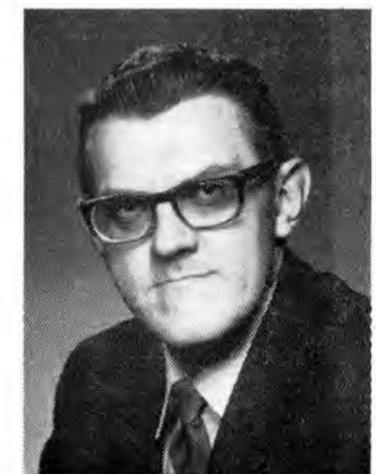
Robert Fueger - 4137 15



Joe Paruta - 4154 20



Donald Hoffheins - 4622 15



Marvin Coon - 4113 15



Arthur Hylton - 7613 15



Lew Longmire - 1325 20



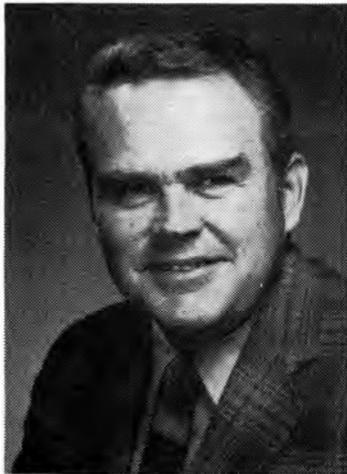
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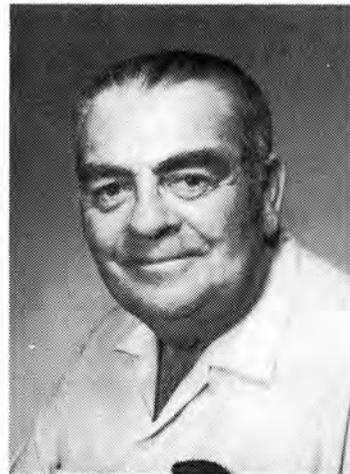
Jim Jones - 1832 15



Carl Johnston - 1425 15



Edwin Johnson - 7432 20



George Lester - 4511 20



Mac McKay - 4374 20



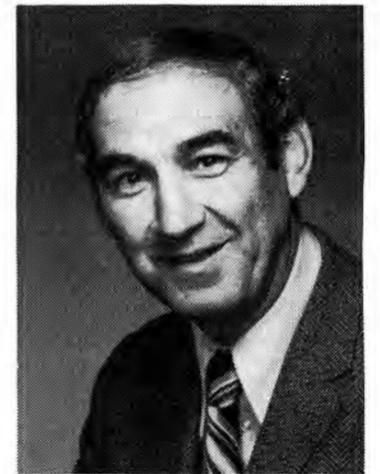
Woodrow Lerke - 4511 20



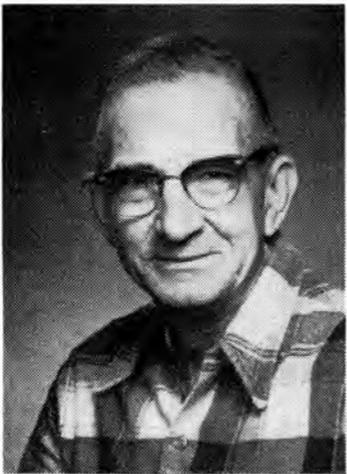
Walt Troy - 3511 15



Bennie Longfellow - 7122 15



Richard Lujan - 9242 20



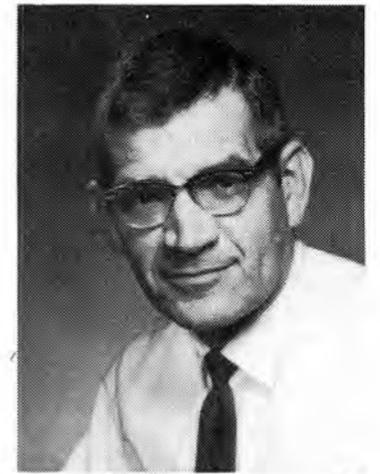
Albert McMurray - 7142 15



Lucille Montoya - 1612 15



Eleanor Slutts - 6010 15



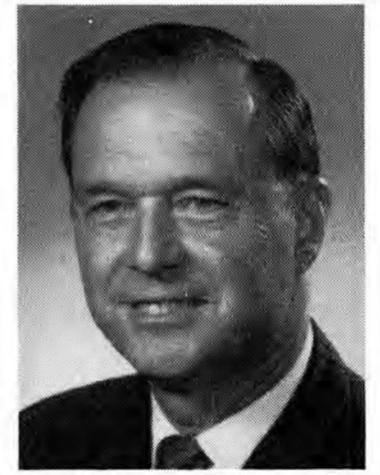
George Martin - 7654 20



Herman Romero - 4623 20



James Reid - 9221 15



Edward Haut - 1526 15



DEPARTMENT OF THE NAVY
STRATEGIC SYSTEMS PROJECT OFFICE
WASHINGTON, D. C. 20390

Mr. J. A. Hornbeck, President
Sandia Laboratories
Sandia Base
Albuquerque, New Mexico 87115

Dear Mr. Hornbeck:

The deployment of the SSBN 627, USS JAMES MADISON on 31 March 1971 with the POSEIDON Weapon System was a most significant milestone representing a major increase in the nuclear deterrent capability of the United States and of the free world.

Sandia Laboratories can be justifiably proud of its accomplishments and the outstanding contribution it has made to the success of the POSEIDON Program. You have been responsible for the design, development, and test of various AEC portions of the W68-0/Mk-3 Re-entry Body as well as the Mk-3 Arming Fuzing and Firing System. Your laboratories through participation in the Mk-3 Project Officer's Group have significantly contributed to the attainment of POSEIDON program objectives. You have demonstrated a high degree of management, technical ability and competence in your contributions to the success of the program.

Accordingly, I would like to convey my personal thanks as well as that of the U. S. Navy to Sandia Laboratories and the many dedicated and competent individuals employed by you and to the subcontractors who provided support for a job well done.

Sincerely yours,


LEEVERING SMITH
Rear Admiral U. S. Navy
Director, Strategic Systems Projects

THE NAVY says "Thanks" for Sandia Labs work on the POSEIDON Weapon System. Systems work on the W68-0/Mk3 was done at Sandia Livermore, while

component and AF&F work was done at Sandia Albuquerque.

Authors

B.E. Hammons (5132), "High Pressure-Low Temperature Electrical Feedthroughs," Vol. 42, No. 12 (1971), REVIEW OF SCIENTIFIC INSTRUMENTS.

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E.R. Frye (5312), "Carbon Carbon Materials for Ablative Environments," Vol. 12, Sept. 1971, NUCLEAR TECHNOLOGY.

R.W. Lynch (5323) and B. Morosin (5152), "A Hemispherical Furnace for High Temperature Single Crystal X-Ray Diffraction Studies," Vol. 4, No. 5 (1971), JOURNAL OF APPLIED CRYSTALLOGRAPHY.

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D.B. Longcope (on leave) and M.J. Forrestal (7346), "Transient Axisymmetric Bending Stress in an Infinite Cylindrical Shell at an Elastic Ring Stiffener," Vol. 9, No. 2 (1971), AIAA JOURNAL.

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H.T. Weaver (5154), "Nuclear Magnetic Resonance Determination of the Isotope Effect in Titanium Tritide," Vol. 35, p 417 (1971), PHYSICS LETTERS A.

M.R. Scott (5222) and C.W. Maynard, "Invariant Imbedding of Linear Partial Differential Equations Via Generalized Riccati Transformations," Vol. 36, p 432-459 (1971), JOURNAL OF MATHEMATICAL ANALYSIS AND APPLICATIONS.

R.J. Baughman (5154), "Growth of Small Single Crystal Spheres for X-Ray Studies," Vol. 7, No. 1 (1972), MATERIALS RESEARCH BULLETIN; "Simplified Vapor Growth of Arsenic Single Crystals," Vol. 6, No. 11 (1971), MATERIALS RESEARCH BULLETIN.

W.H. Leighton (5153), "Coupler Theory for X-Band Microstrip Balanced Mixers," Vol. 19, No. 10 (1971), IEEE TRANSACTIONS ON MICROWAVE THEORY AND TECHNIQUES.

Recreation Notes

FUN & GAMES

The Sandia Labs Volleyball League's organizational meeting for the 1972 season will be held during the noon hour, Feb. 7, in the Coronado Club El Dorado Room. Men's A and B leagues and a women's league are planned. Persons interested are invited to attend the meeting, or send your name to J.A. Cooper (1426) or any of last year's team managers. Play begins on Feb. 22.

* * * *

A membership drive meeting of the Sandia Women's Golf Association will be held Feb. 15 at 12 noon in Bldg. 802, Rm. 229. The season will include regular play and tournaments on courses in Albuquerque, Los Alamos, Socorro and Belen. Lessons for beginning golfers — with a local pro at reduced rates — will start March 11 at the Los Altos course. Intermediate classes are scheduled later in the season.

* * * *

Skiers — here's a goody. Thanks to the efforts of Walt Westman (7414), head of Coronado Ski Club, Purgatory lift tickets are now available for \$5.25 (vs \$6). Buy them by check at the Coronado Club, whether you are a member or not.

— Norma

Speakers

A. Goodman (5323), "Development of a Fiber Optics System for Hydrodynamic Measurements"; R.A. Graham (5134), "Conductivity in Shock Loaded X-Cut Quartz"; C.M. Percival (5323), "Side Gaging Technique for the Determination of Gruneisen Parameter"; R.R. Boade (5323), "A Technique for the Direct Measurement of Effective Gruneisen Parameters at NTS"; E.D. Jones (5214), "Pulse Width Dependence of Laser Produced Impulses in Solids"; N.C. Anderholm (5214), "Experiments on the Measurement of the Equation of State of Carbon Using a Q-Switched Laser"; R.M. Elrick (5325), "On Making an Accurate Impulse Measurement in the Field," Underground Nuclear Test Measurements Symposium, Dec. 7-9, Sandia Laboratories, Albuquerque.

R.D. Maydew (5620), B.M. Bulmer (5628) and J.F. Muir (5641), "Boundary Layer Transition on Graphite/Carbon Reentry Vehicles," Aerospace Corporation Boundary Layer Transition Specialists Workshop, Nov. 3-5, San Bernadino, Calif.

R.U. Acton (5322), "Recent Developments in the Measurement of Thermal Diffusivity"; W. Herrmann (5160), "Constitutive Equations for Compaction of Porous Materials"; M.J. Forrestal (9324), G.E. Sliter (Stanford Research Institute) and M.J. Sagartz (9324), "Stresses Emanating from the Supports of a Cylindrical Shell Produced by a Lateral Pressure Pulse," Winter Meeting, American Society of Mechanical Engineers, Nov. 28-Dec. 2, Washington, D.C.

L.D. Tyler (5166), "The Flow Dynamics of a Liquid Drop During High Speed Impact"; F.G. Blottner (5643), "Boundary Layer and Viscous Shock Layer with Hydrogen Injection"; K.J. Touryan (5640), "Thermal Nonequilibrium Studies in Highly Expanded Hypersonic Nitrogen and Argon Plasmas"; R.L. Fox (5641), "Calculation of the Turbulent Energy Spectrum Using Multipoint Distribution Functions"; A.J. Mulac (5642), "Photoionization of N₂ and O₂ Ahead of Strong Shock Waves in a Shock Tube," American Physical Society Meeting, Nov. 22-24, San Diego.

S.W. Key (1541), "The Transient Dynamic Analysis of Thin Shells by the Finite Element Method," Lecture at Texas A&M, Department of Aerospace Engineering, Dec. 2.

Skiing — A Risky Business?

By John Shunny (3162),
Sandia Peak Ski Patrol

I get many inquiries about skiing, and when the questioner is a novice or a non-skier about to take up the sport the discussion sooner or later touches on the risk involved in downhill (as opposed to cross-country) skiing. After 10 or so years Ski Patrolling and experience involving hundreds of ski-related injuries (including one of my own), I think it's possible for me to give you a qualitative assessment of the danger in skiing according to your personal circumstances. "Qualitative" rather than "quantitative" because skiing injury statistics are both suspect in their derivation and virtually useless insofar as answering that pressing question: "Will I get hurt skiing?"

To illustrate. On weekends at Sandia Peak, assuming the average 1000 skiers or so, the Patrol handles seven or eight injuries per day, of which perhaps three or four are significant — fractures, dislocations and the like. (The weekday rate is different — probably something to do with movement of the planets . . .) I suppose you could examine this injury rate and conclude that chances were less than one in a hundred that you'd end up on the treatment table. But you may be familiar with this expression: "The man drowned in a stream whose depth averaged two feet." Well, we have somewhat the same situation in the application of skiing injury statistics.

That which follows is over-simplification, but the purpose of this exercise is to enable you to make an approximate judgment about the risk involved in your (or perhaps your children) taking up this sport. I shall ask you to make four choices from a set of opposing values that most accurately describe you, your approach to skiing, and your equipment

Opposing Values in Skiing

Young	Not Young
Fit	Not Fit
Cautious	Reckless
Good Bindings on Shorter Skis	Poor Bindings on Long Skis

Obviously, if you are one of those happy creatures whose selections are entirely from the left column, well you've got it made. If you've made one or more selections from the values to the right, you should enter skiing totally aware of this negative value and attempt to compensate for it. For example, you're not young. You can, however, be exceptionally fit, be cautious, and possess good equipment. Your risk of injury is low.

Some definitions:

Young — Under 25. The young bounce better and come up smiling from falls that cause viewers to wince and look away. On the other hand, youthful natures tend to a high correlation with "reckless."

Fit — The fitness that is the product of a near-daily regimen of vigorous exercise. For middle-class Americans, skiing is likely to be the hardest work over the longest period of time (you ski six to seven hours a day to get your money's worth) that most have encountered. One comfort: as you get better, you substitute skillful technique for some of the hard work.



NOT SO FUNSY is this aspect of skiing. Ski Patrolman readies leg for splint as rescue toboggan approaches. Accompanying article explains how you

can assess your likelihood of ending up in a rescue toboggan if you choose to ski.

Cautious — As opposed to "reckless," a consideration that applies chiefly but not entirely to young males. The thinking man takes a few lessons, skis with caution, and doesn't feel his manhood is at stake when a friend zooms by. Female skiers of all levels of skill are generally not aggressive skiers, hence by and large are "cautious." (I have a theory that females secretly don't care for skiing, going chiefly for show and in response to the herd instinct. But these are treacherous waters and I am reluctant to appear pontificating.)

Good Bindings — Consist of a two-piece (toe and heel) binding, *properly* installed and *properly* adjusted. Cubco and Miller bindings are top rated by Consumer Reports (although Millers are tricky to adjust). No cable binding meets my notion of "good"; unfortunately, some rental skis still carry cable bindings because of their ease of adjustment to boots of different size. Without proper binding adjustment, you might as well bolt your boots to the skis, so study the instructions and gain an intimate knowledge of the way the binding works. Forget the term "safety" or "release" binding. Nowadays all bindings theoretically release under stress; some do the job better than others.

Shorter Skis — Don't try to ski on those 6-1/2- or 7-foot monsters that Uncle Ned passed on to you. And if you're buying and the clerk measures skis up to your wrist held overhead, then you'd best walk away and find another clerk. Ideally, novices should start on skis shorter than their own height, and certainly not much above their height.

Perhaps I should also define "injury." Since every skier, however skillful, takes spills, it follows that every skier comes up with a random assortment of bruises, minor lacerations, sore shoulders and the like in the course of a season. These don't count. What counts are fractures or severe sprains requiring casting, dislocations, and lacerations severe enough to require stitching.

What is your risk of incurring an injury of this type?

If you are not young, not fit, and are skiing on rental equipment with cable bindings, your risk is high. Of course, the number of days you spend skiing is another factor, and if you ski only two days a season, your risk on those two days remains high but the likelihood of your ending up in a cast is less than if you are out on the hill for, say, 10 days per season. It's analagous to racing a car with bald tires. Maybe you'll make it for 20 miles, but the longer you race the greater the likelihood of disaster.

If you are not young, not fit, but consider yourself cautious and have good equipment, I'd say your risk is moderate, i.e., you'll probably make it through this season without injury. As you get deeper into the "not young" category, with no redeeming physical fitness, your risk increases.

One observation that will be of interest to parents of young girls: For the Ski Patrol, the near stereotype of the accident victim is a girl in junior high or high school. She's "young" and "cautious" (sometimes), but is totally inept physically — a sad commentary on the state of physical education. In addition, she is utterly without comprehension of how her bindings work and how they should be adjusted. Too bad. If this girl takes lessons she may make it. Otherwise it's just a matter of time.

Finally, you may want to weigh the rewards you derive from skiing against, say, six weeks in a cast. If you don't make it an annual event, being casted isn't so bad. A few years back, I momentarily took leave of the "cautious" category — a jump of supreme grace quickly followed by a landing of supreme clumsiness — and shortly was sporting a cast. It was hell taking showers, but I took comfort in the knowledge that the accident had occurred on the very last day of the season. In skiing, a nice sense of timing is a good thing.

Take Note

Sandians were honored recently by the Central New Mexico Chapter of the National Multiple Sclerosis Society with the presentation of a plaque "for distinguished service to our fellow Americans who suffer with multiple sclerosis . . . you have hastened the day when this crippling disease of young adults eventually will be brought under control."

Sandians gave \$4256 to the society last year, 1.4 percent of Employee Contribution Plan funds.

* * * *

The 1972 Annual Reliability and Maintainability Symposium of the AIAA was held in San Francisco, Jan. 25-27. Sandians presenting papers included: J.O. Muench (1641), "A Complete Reliability Program"; F.W. Muller (7425), "A Surveillance Program Based on a Profit Motive"; and R.G. Easterling (1643), "On Combining Component and System Data."

J.M. Wiesen (100) served as a vice chairman of the program committee, and C.H. Purdue (1812) was an instructor of a special workshop on Computer Aided Reliability Analysis and Design.

Honcho Wins Prizes While the Ryans Enjoy Mexico

Bill (7121) and Terry Ryan (1934) recently combined a sightseeing trip to Mexico with the entering of their two-year-old German Shepherd in an international dog show and came out winners on both ventures.

As a matter of fact, Honcho took four top prizes and was named "High Scoring Dog in Trial" in the competition.

Terry handled the dog during the show. Honcho had already won his U.S. novice degree last fall and picked up the Mexican equivalent in the show in Mexico City. The trials were held in beautiful Chapultepec Park. More than 500 dogs competed. Besides the usual blue ribbons, prizes included a silver candelabra, silver plaque and plate.

After the show, the couple drove their camper vehicle to Mazatlan, Acapulco and San Blas. "It's the only way to go," Bill says. "We saw a lot of country and had a great time."

Since returning to Albuquerque, Bill has been active in the Central N.M. German Shepherd Club helping with the Search and Rescue Unit. He figures a smart dog like Honcho should be useful in searches for missing persons in wilderness areas. That's the purpose of the S/R unit.



TERRY RYAN (1934) and Honcho display one of the first prize won in competition in Chapultepec Park in Mexico City.

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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

BENCH SEATS for Ford van prior to 1969, 2 ea. w/seat belts & mounting hardware, \$10 ea. Baxter, 344-7601.

FLUORESCENT LIGHT fixture, 8' long, 2-tube, w/tubes, \$12, wo/tubes, \$10. Stuart, 299-9190.

HO MODEL railroad equip., everything needed (plus some) for the serious beginning enthusiast, \$100. Deverman, 296-8317.

CAMPER, tear drop Junior w/new stove & oven; female poodle, has been spade, \$25. Rhoden, 268-7191 after 5.

CHEROKEE II sailplane plans, complete engineering drawings, instructions w/photos, \$75; many metal parts, fittings, leftover materials, \$45. Schellenbaum, 299-1005.

KIDS SKIS, 4'8" (140cm) Northland metal, white tops, \$23. Lenz, 298-3872.

6-YR-OLD REG. Palamino mare, well trained, gentle; 1 1/2-yr-old AQHA filly, gentle, training under way. Hansen, 898-3173.

'68 HONDA cl.350, low mileage, \$450. Blain, 256-7114.

SLENDERETTE machine, \$25; GE deluxe dryer, needs repair, \$35. Grimes, 299-2548.

MOTORCYCLE TRAILER, will handle 2 any size dirt machines, \$65. Roth, 877-4997.

'69 CL HONDA 450, low mileage. Baca, 255-3057 or 268-4129.

TAPE RECORDER; 67 Vette hubcaps; elec. heater; new cat scratch post; 2 used 7.75x15 Firestone tires. Snelling, 268-5895.

GE PORT. dishwasher, motor needs work, \$15; '68 Suzuki, 100cc, needs work, make offer. Lewis, 294-1692.

GIRL'S bicycle, 20" Huffy Camero, \$20; child's refrig.-stove combo, \$5. Sullivan, 298-0148.

NORWEGIAN ELKHOUND puppies, reg., pedigree, available late Feb. Taylor, 296-5665.

SOFA BED, gray nylon frieze, \$25. Stewart, 268-2786.

TRADITIONAL COUCH, ivory brocade, \$100; 2 barrel chairs, \$12.50 each. Gasser, 255-4562.

'66 HONDA 50cc motorcycle, \$100 or trade for bass guitar w/amps. Frasier, 299-6933.

CORVETTE Stingray parts: AM/FM radio; Hood 4-bar. manifold carb.; 3 F70x14 W.L. recapped tires; foam steering wheel. Fuller, 256-1593.

SKIS, 185's, Skitque; boots, ladies 7; BarreCrofter poles; safety straps; Salaman step-in bindings; never used. Lord, 299-5098.

SAKO 222, retails new \$195, sell for \$125 w/Redfield scope mounts & ammo. Sower, 296-7455.

GARBAGE DISPOSAL, In-Sink-Erator, model 333, \$15. Parks, 296-2261.

YASHICA electro 35mm w/flash attachment, view finder, tripod, lenses, carrying case, almost new. Bridge, 296-2310.

TWIN-SIZE birch bed, mattress, box spring & matching small student desk; full-size rollaway bed; storage shelves w/built-in chest-of-draws. Dodd, 299-6330.

AM-FM STEREO receiver, 32 watts RMS. Konkel, 299-5108.

AKC Beagle pup, female, 6 wks. old, needs country home, free. Martin, 282-3794.

KAWASAKI '71 Mach III, 500 cc, 2900 miles, blue, \$850. Stone, 256-0905.

ELECTRIC stove & oven, built-in, Signature, copper tone, \$25. Sanchez, 256-1064 before noon.

SHOTGUN: 16 gauge, Savage, pump w/adjustable choke, \$60; 4-bulb light fixture, \$7. Krumm, 299-2279.

SOFA BED & matching chair, Kroehler, green nylon. Booker, 299-3554.

SQUASH BLOSSOM NECKLACE; concho belt; Win. 308, Savage 30-30; Brno 30-06; want old guns & Indian items. Zaluga, 344-1564.

BASSET HOUND: mature female w/papers, good w/children, needs good home, best offer; dog house, \$10. Beckmann, 296-1829.

'66 HONDA CB 77 motorcycle, 305cc, rack, mirrors, recent overhaul, new battery, ignition components, fork lock, new helmet w/face shield, \$440. Herndon, 268-8269.

KROEHLER couch hide-a-bed, \$35; swivel arm chair, \$25. Caster, 299-1239 after 5.

FREE PUPPIES, born New Years Eve, fny, short haired, cute. Johnson, 258-1011.

CARS & TRUCKS

'63 CORVAIR, engine leaks but doesn't burn oil. Russell, 298-0285.

'68 COUGAR XR-7, AT, PS, PB, AC, \$1700. Clem, 296-5204.

'71 PINTO, low mileage, R&H, bucket seats, std. trans., \$1795. Turner, 299-0704.

'64 INTERNATIONAL Travelall, model 1000, PS, PB, dual tanks, AT, V-266 engine. Northrup, 298-9933 after 6.

'63 DODGE 880, 4-dr., AT, PS, PB, AC, \$350. Bozone, 299-2986.

'67 DODGE pickup, 8' style-side, white, radio, low mileage, slant 6, 3-spd., Craig, 299-8719.

'63 CORVAIR, bucket seats, AT, \$335. Coalson, 298-0061.

'63 CORVAIR Monza convert., new top, new tires, bad trans., make offer. Rex, 299-6264.

'68 PLYMOUTH Fury III convert., loaded, sell \$200 below book. Scott, 242-7339.

'71 TRIUMPH Trident 750 Triple, workshop manual included, \$1550 (\$1850 new). Vanderpool, 296-5370.

'64 FALCON station wagon, std. trans., \$600. Herron, 268-7279.

'64 FORD 2-dr. Custom, white, V8, stick, R&H, extra wheels, needs tires, \$350 cash. Brinegar, 299-7887.

'67 VW, factory air, AM/FM radio, low mileage. Ortiz, 247-1401 daytime, 242-7989 after 5.

'66 PONTIAC 4-dr. HT, PS, PB, AC, below book \$795 or best offer. Ross, 265-4990.

'58 FORD pickup, lwb, V8, 3-spd., OD, cab-high shell. Elder, 268-7479.

'69 PONTIAC LeMans, PS, AC, 4-spd., vinyl top, buckets, tape deck, AM/FM stereo, radials & snow tires, \$1850. Bernard, 282-3279.

REAL ESTATE

AUTOMOTIVE GARAGE; '69 Holmes wrecker; 2-bdr. home; 5 furnished rentals, possible \$15-20,000/yr. Kirchmeier, 344-5783.

2-YR-OLD custom-built brick, 4-bdr., 2 baths, lg. FR w/fp, formal DR, 2430 sq. ft. w/all extras. Viet, 296-3596.

3-BDR., den, Mankin, extras, full carpet, fp, dbl. garage, formal DR. Farina, 299-9375 after 5:30.

FIVE R-1 lots near Montgomery & Eubank, paving, sewer, etc., being installed. Hawk, 265-2228.

CHAMA AREA, 3 acres w/trees & view, \$2600. Baack, 296-2312.

WANTED

MOTORCYCLE, 90 to 120cc, Enduro or trail type, reasonable. Adams, 268-5943.

UTILITY TRAILER, 4' x 8', fair condition. Jewett, 298-1475 after 5:30.

CARSLAW, JAEGER, "Conduction of Heat in Solids." Will trade: Korn, "Mathematical Handbook for Scientists and Engineers," Overmier, 268-4992.

FIBERGLASS BAGS for BMW or Moto Guzzi motorcycle. Deverman, 296-8317.

GRAND PIANO, good condition. Miller, 265-0029.

BUMPER, rear, pickup, Ford F-100, cheap. Shunny, 265-1620.

HAM RADIO GEAR. Ross, 265-4990.

SKI BOOTS, size 12 to 14, narrow preferred; go-cart frame. Fisher, 299-9235.

FOR RENT

UNFURNISHED HOME, just repainted, 6 rooms, 1 3/4 bath, near Winrock Shopping, req. 1 yr. lease, adults, \$185/mo. Harrell, 299-2416.

2-BDR. APT., unfurnished w/utilities and pool, \$165. Beroldi, 4619 9th St. NW.

LOST AND FOUND

LOST—Man's white gold wedding band, woman's red-white-blue double-knit jacket, pr. SC safety glasses in black case, 2 keys on chain. **LOST AND FOUND**, tel. 264-2757, Bldg. 832.

FOUND—White metal earring, pr. men's black knit gloves w/leather palms, silver & white button, white metal cuff link, house/car keys on chain. **LOST AND FOUND**, tel. 264-2757, Bldg. 832.

Coronado Club Activities

THE WORD IS that if you can't find a parking space in front of the Club on Friday evenings, try the back swimming pool lot. We mention this because Happy Hours are better than ever these days. Tonight, for instance, Smiling Jim Noonan, Club manager, is featuring his special Italian food buffet at \$1.25 for adults, \$1 for kids, and a glass of Chianti for 20 cents. Combine this with standard Happy Hour prices from 5 to 10 p.m. and put the Country Express on the bandstand and you have a first class evening that is very easy on the pocketbook. Try it (you'll like it) and bring the gang. Denny Gallegos and guitar will entertain in the main lounge from 9 to midnight.

NEXT FRIDAY the Club's famous chuckwagon roast beef will be the buffet feature and Wildman Bob Banks and the Terror Trio will be on the bandstand. Yolanda Adent will take over the main lounge for a sing-along. On Friday, Feb. 18, Frank Chewiwie will be making the happy music and the Club's fried shrimp (lots of it) buffet will be spread.

* * * *

TEENAGERS can do their thing tomorrow night when something called "Ghost Rose" is wired into the bandstand from 7:30 to 10:30. Chuck Logan of KDEF will be master of ceremonies. Member parents should pick up tickets for their youngsters (25 cents for members, 50 cents for guests) from the Club office.



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Bring the Gang....



HAPPY HOUR TONIGHT



DOOR PRIZE for the Sanado Club luncheon Feb. 8 is this painting shown by artist Jo Ashcraft. Sanado Art Groups will display their work, and the "The Company" will entertain during the meeting.

LITTLE KIDS (12 and under) should enjoy the "Kids Carnival" Saturday, Feb. 12, from 11 until 2:30 p.m. There will be games — fish pond, lollipop tree, bumper car, pitch-til-U-win, ball bingo, darts, etc. — movies, clowns, prizes, plus hot dogs, cokes, cotton candy and stuff like that. A book of eight tickets good for the games costs only 25 cents and is also admission for kids while member parents (who should accompany their youngsters) are admitted free. The games and refreshments will be upstairs in the ballroom while the movies will be shown downstairs in the El Dorado Room.

* * * *

DEADLINE for signing up for the Coronado Club's 16-day package tour to Spain and Portugal in October of this year has been extended to Feb. 29. All those interested in the trip (a minimum of 170 persons is needed) should pay a \$100 deposit at the Club office. Total fee for the package is \$565.