

# Sandia to Again Start Work at Barking Sands Rocket Complex

A continuing research study of upper atmosphere by Sandia Laboratory's Aerospace Physics Division 5414 will contribute data to an international project in late May or June. Twelve rockets will be fired 100 miles into the atmosphere to release chaff and clouds of sodium for tracking to study high altitude winds. Launch site will be the reactivated Barking Sands rocket launch complex on Kauai in the Hawaiian Islands, used last year during the full scale nuclear tests in the Pacific.

The rocket firings will be synchronized with launches in several other locations around the world to provide global data of upper winds. The project is an activity of The National Aeronautics and Space Administration.

Scientific Advisor for the Sandia contribution to the project is Lawrence B. Smith (5414). Project en-

gineer is John J. Miller, supervisor of Rocket Projects Division 7231. Alfred A. Young (7231) will be in charge of the Kauai activities and Dale L. Fastle of Technical Photography Division 7244 will be in charge of photographic stations on Kauai, Maui, and Hawaii.

Other Sandians participating include A. J. Canute (7231), W. E. Walker (7133), V. P. Strascina (7133), W. G. Foy (7244), M. E. Bush (7244), E. R. Parsons (7214), Pierre Chevalier (7214), and D. R. Salazar (2643).

Present schedules call for 12 rocket firings in late May or early June, and 12 in September. Each set of 12 will consist of four Nike-Apache rockets, four Deacon-Judi rockets, and four Judi-Dart rockets.

The Nike-Apache rockets will carry sodium to altitudes of about 100 miles where it will be photographed by cameras on Kauai, Maui, and Hawaii. The Deacon-

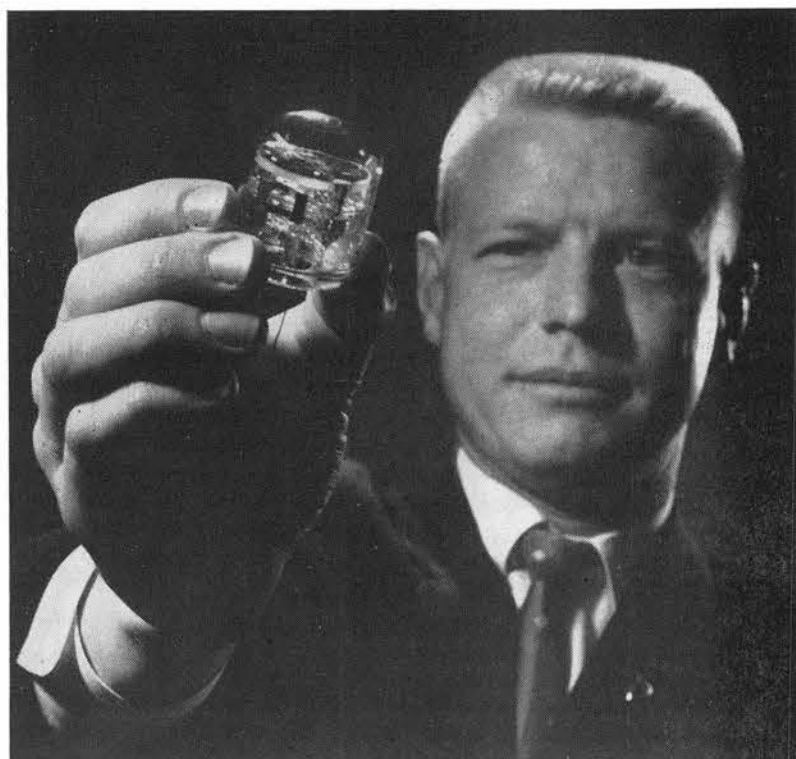
Judi rockets will carry thin metal strips called "chaff" to altitudes of about 80 miles and the Judi-Dart rockets will carry the chaff to about 37 miles. The chaff will be tracked by Pacific Missile Range radars.

The sodium will be visible from most of the islands as a reddish-orange cloud. The chaff will not be visible from the ground.

The Nike-Apache and Deacon-Judi rockets will be scheduled to be fired shortly after sundown and the Judi-Dart rockets will be fired about one hour later.

Holmes and Narver, Inc., of Los Angeles and Honolulu, a support contractor to the AEC, will, in the near future, begin the construction required to reactivate the launch complex. Cost of the construction will be about \$70,000, according to the Atomic Energy Commission.

Assisting in the construction work will be D. P. Fifield (4542) and R. L. Harrison (7246).



VACUUM TUBE containing high-purity quartz crystal is displayed by Dick Bemis of AC and RF Standards Section 2412-1. Crystal is the heart of high-precision crystal oscillator that provides frequency standards.

## Standards Laboratory Maintains Highly Accurate Electronic Clocks

"You are not born for fame if you don't know the value of time," a French moralist once observed. Time has become one of Man's most persistent preoccupations. Today, its accurate measurement is an area for some of science's most ingenious research techniques, and some of those techniques are in use at Sandia Laboratory.

"Measurement of time can be derived from accurately measured motion," R. G. Bemis of AC and RF Standards Section 2412-1, observed. "We use high-precision crystal oscillators to provide constant frequencies, from which accurate time measurements can be derived."

The heart of the crystal oscillator is a pure quartz crystal housed in a small glass vacuum tube. Frequency of the oscillation will change with changes in crystal temperature; therefore, the crystal and its associated equipment are maintained in a highly-stabilized oven, which keeps the temperature of the device relatively constant.

The crystal "ages"; that is, as it's used it becomes more stable, and its drift rate becomes smaller. "We compensate for drift by adjusting the oscillator," Dick said.

If drift is controlled, the oscillator can be used as an electronic "clock" of considerable accuracy; its estimated deviation is no more than one second in thirty years.

The frequency of the crystal oscillator is continually compared to a frequency produced by the National Bureau of Standards laboratory at Boulder, Colo., and transmitted on 20 kilocycles.

Recording apparatus provides a plot of the deviation of the Sandia oscillator. Information on the deviation is used to adjust the Sandia oscillators for accuracy. Two oscillators are used at Sandia, each of which is alternately compared with the NBS signal. The two oscillators are also compared with each other, an arrangement which increases the reliability of the system.

Two frequencies for use as standards are derived from the 2.5-megacycle oscillators: one megacycle and 100 kilocycles. One-hundred-kilocycle signals from the two oscillators are divided by 100, thus providing two 1000-cycle signals, which are used to drive two clocks. The clocks provide Sandia's primary time standard.

Standard frequencies derived from the crystal oscillators are used for calibration of other measuring instruments. Arrangements have been made with the Sandia Base Signal Officer to distribute standard frequencies of 1000 cycles, 10,000 cycles, and 100 kilocycles through the Sandia Base telephone exchange. Laboratories on Sandia Base having a need for these frequencies may request that they be wired in. Currently, there are some 30 users of the frequency standards at Sandia Laboratory.

"The crystal oscillators we use at Sandia are an accurate means of measuring frequency . . . or time," Dick observed, "and they serve our current purposes well. Work in measuring time continues, however, and new techniques are being devised."

One of these new techniques is using an instrument that measures the frequency of the vibration of an individual atom—a frequency which, for most of Man's purposes, does not vary. This technique provides a nearly "absolute" measurement interval, but instrumentation of an "atomic clock" is expensive, and, like the crystal oscillator equipment, requires careful attention and adjustment.

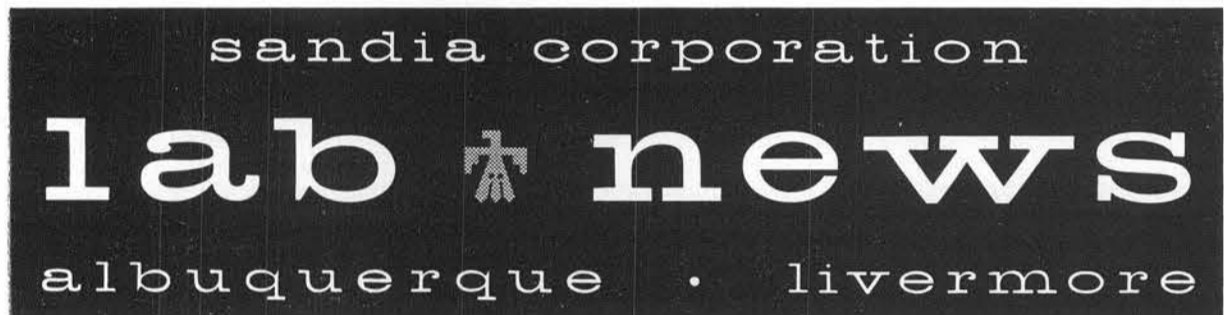
Meanwhile, Section 2412-1 is spending part of its time developing better ways to use the frequency standards it provides. "And we're looking for new ways to accommodate the organizations that use our standards," Dick concluded.

## R. S. Hooper Discusses Information Retrieval Before Library Groups

R. S. Hooper, supervisor of Test Project Engineers Section 7331-1, will be the speaker at a joint meeting of the Rio Grande Chapter, Special Libraries Association, and the New Mexico Library Association on Thursday, Apr. 4.

The subject of his talk will be "An Environmental Engineer Experiments with Mechanized Information Retrieval."

The dinner meeting will be held at the Alvarado Hotel starting at 6:30 p.m.



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### To draft federal standards

## Clean Room Meet Here Apr. 9-10

About 150 specially-invited representatives of federal agencies and government contractors will attend a conference on Clean Room Standards at Sandia Laboratory, April 9-10. The meeting, originated by Advanced Manufacturing Development Division 2564, is sponsored by Sandia Corporation; Field Command, Defense Atomic Support Agency; and the Albuquerque Operations Office, Atomic Energy Commission.

Purpose of the meeting is to survey the technical aspects of the current state of the art in clean room development and to establish a working group to draft federal specifications and standards for clean rooms.

Authority for preparation of federal clean room standards has been assigned to Sandia Corporation through an agreement between the AEC and General Services Administration.

Welcoming address to the conference will be made by Sandia Corporation President S. P. Schwartz. Moderator for the first session will be R. W. Henderson, Vice President, Weapon Programs. L. A. Hopkins, Jr., Director of Manufacturing Development 2500, will outline objectives of the conference.

J. G. King, supervisor of Advanced Manufacturing Development Section II 2564-2, will discuss general aspects of contamination control. C. F. Bild, Director of Materials and Process Development 1100, will discuss cleaning and verification.

Maj. Gen. H. C. Donnelly,

Commander, Field Command, DASA, will be the luncheon speaker.

Other speakers on the program include T. R. Casberg, Office of Assistant Secretary of Defense for Installations and Logistics; A. L. Lieberman, Manager, Fine Particle Research, Chemistry Division, Armour Research Foundation; Col. I. R. Perkin, Director, Middletown Air Materiel Area; Lt. P. R. Austin, Middletown Air Materiel Area; F. C. Shadewald, Overhaul and Repair, U.S. Naval Air Station, San Diego, Calif.; J. W. Hodges, USA Missile Command, Redstone Arsenal; and Dr. W. R. Lovelace II, Lovelace Foundation.

R. A. Bice, Vice President, Engineering for Manufacture, will be the Company's host for the conference dinner meeting after the first day's sessions.

On Wednesday, April 10, W. J. Whitfield (2564), inventor of

the Whitfield Clean Room, will discuss the state of the art in contamination control and laminar air flow concept.

R. C. Marsh (2564) will discuss applications of clean rooms.

K. F. Hertford, AEC/ALO manager, will be the luncheon speaker.

During the afternoon, D. W. Ballard, supervisor of Advanced Manufacturing Development Division 2564, will present Sandia's proposal for clean room standards and organize a working group to draft specifications.

After a tour of Sandia Laboratory clean room facilities, the working group will report to the assembly its recommendations.

Division 2564 organized and arranged the program with the assistance of representatives from Field Command/DASA, and AEC/ALO. Technical and Trades Training Division 3132 provided assistance.



CALIBRATION TECHNIQUE, using frequency derived from crystal oscillators in AC and RF Standards Section 2412-1 laboratory, is demonstrated by J. B. Gibbons. The instrument resting on table is frequency meter.

### Calling All Opinions

The Lab News calls your attention to the editorial on Page 2.

It's an invitation to speak up on the matter of information included in this paper. Read the editorial, then let us hear from you.



**Editorial Comment**

**Still Seeking Your Opinions**

A couple of **Lab News** issues back we attempted to put our finger on the pulse of the **Lab News** readers.

In the editorial appearing on Page 2 of the March 1 issue (entitled "In Search of Your Opinions") we said: "Now, we feel, it is time to ask the readers of the **Sandia Lab News** to write down their reactions to what they have been reading (in the **Lab News**) . . . We hope that you will be perfectly frank in stating your feelings. If you want less of this or that let us know. If you feel you need more information in any areas, please say so."

Included was a special form for your comments.

About the only thing we learned was that many employees apparently didn't read that particular editorial. The number of responses to the Editor's invitation has been small enough that the volunteered comments cannot be considered as representative of all employees.

We are studying the returns, hoping to glean some information that will help us make the **Lab News** serve you better. However, to be sure we are on firm ground in any changes contemplated we need more employees who are willing to take the time to put down their thoughts.

For a starter you might answer these three questions:

What would you like to see included in the **Lab News**?

What would you like to see left out of the **Lab News**?

What would you like to learn from the **Lab News**?

Don't sign your name. Just let us know your department number, also if you are a supervisor, staff member (administrative or technical), staff aide (administrative or technical), or graded. Also, we'd like to know if you are a man or woman.

Write your comments in any form, on any size of paper and send through company mail to: Editor, **Lab News** — 3432.

**Mabel L. Sylvester to Retire Today from Sandia Laboratory**

Mabel L. Sylvester retired today after 10 years at Sandia Laboratory. She has been in Technical Library Division 3421 for the past four years.

Immediate plans call for visiting her son, Paul, his wife and three children. He is stationed in Seattle with the Navy. Later, Mrs. Sylvester will visit her only sister, who resides in Acadia, Calif.

Mrs. Sylvester intends to remain in Albuquerque. She moved here in 1912 and has lived in the same house for 27 years—at 3411 Purdue Pl. NE.

"In addition to travel," she said, "I'll have time to garden and to practice playing the piano."



Marge Mancuso (3423)

**Take a Memo, Please**

Apply the same safety rules at home that you use at work. Safety shoes and safety glasses are equally effective in both surroundings.

**D. F. Palmer Earns \$1,000 Bond for Beam-Switching Tube Suggestion**

On the eve of the opening of the Institute of Electrical and Electronic Engineers' national convention in New York City this month, D. F. Palmer (7331) was one of four honored guests. He was feted by a testimonial dinner at which he was awarded a \$1,000 savings bond.

This award on Mar. 24 was the outgrowth of his responding to an ad which appeared in several trade magazines. The Burroughs Corporation had constructed a new beam-switching tube and decided to hold a circuit design contest with awards given for novel uses of the tube.

Mr. Palmer saw the ad, thought about possible uses, and drew up a

rough design at home, which he submitted. His entry, entitled "Shock Spectrum Analyzer," made use of the new device in a peak-value memory circuit.

His prize included a Burroughs-paid trip to New York for him and his wife in addition to the savings bond. The company built a model of his entry which was on display during the Mar. 25-28 IEEE convention, and the winning circuits were published this month in four trade magazines.

Mr. Palmer has been at Sandia nearly three years. He has a BS degree in electrical engineering from the University of Washington, and a Master's degree from the University of New Mexico.

**Lee Hollingsworth Named to Head Hospital Board**

Lee Hollingsworth (8120) has been named president of the Board of Directors for the Valley Memorial Hospital in Livermore.

Lee has been vice president of the Board since it was organized in 1950. He was re-elected to a three-year term on the Board in 1961.

Before serving on the Board, Lee headed the hospital's first building fund campaign, which netted three-quarters of a million dollars. As a board member, he served on the Building and Administrative Committees.

**Sandia Speakers**

Following is a list of speakers, titles, and places of presentation for recent or forthcoming talks by members of Sandia Corporation.

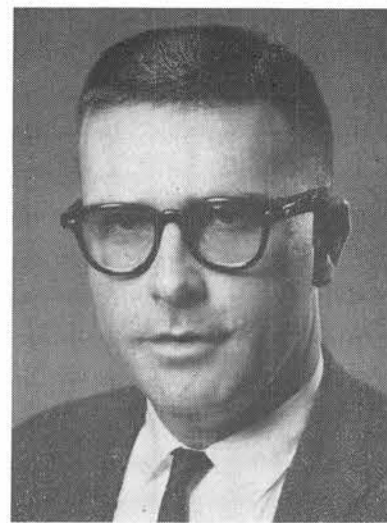
Robert F. Gentzler (7243-1), "Meteorology at Sandia Laboratory," Denver area chapter of the American Meteorological Society, Mar. 1, Denver, Colo.

P. A. Weber (2561), "Quality Control at Sandia Corporation," Waco, Tex., chapter of the American Society for Quality Control, Mar. 18, and the San Antonio section on Mar. 19.

J. A. Hood (1431), "Degradation of NPN Silicon Planar Transistors with Bombardment by High Energy Neutrons," IEEE meeting of the Professional Group on Electron Devices, Mar. 12, Albuquerque.

Marvin Moss (5132), "Thermal Conductivity of Plastically Deformed CaF<sub>2</sub> and LiF," Thermal Conductivity Meeting at Cornell University, Mar. 22, Ithaca, N.Y.

C. E. Land (5132), "Analysis of the Equivalent Circuit of a Ferroelectric Ceramic Transducer," IEEE Professional Group Meeting on Electron Devices, Mar. 12, Albuquerque.



**M. J. Ahern Will Receive Ph.D. Degree in English From Tulane University**

Matthew J. Ahern of Publications Section 3423-1 will receive the degree of Doctor of Philosophy in English from Tulane University in May.

Matt received a BA degree in English from St. Thomas College in 1953, and an MA degree from Tulane in 1955. He's been with Sandia Corporation since 1959. Prior to that time, he taught English at the University of New Mexico.

Title of his doctoral dissertation is "The Roman History Play: 1585-1640."

**Congratulations**

Mr. and Mrs. R. E. Church (2313) a son, Keith Glenn, on Mar. 11.

Mr. and Mrs. Dean E. Irwin (3433) a daughter, Tracey Lynn, on Mar. 11.

Mr. and Mrs. R. L. Maxwell (1332-4) a son, Dale Leon, on Feb. 10.

Mr. and Mrs. R. S. Urenda (1331-1) a daughter, Terri Lyn, on Mar. 11.

Mr. and Mrs. Frank Chavez (4231-2) a daughter, Rosalee Antoinette, Feb. 27.

Mr. and Mrs. William B. Goldrick (7232) a son, Bruce Owen, on Jan. 26.

Mr. and Mrs. Ross R. French (7232) a son, Keith Robert, on Mar. 8.

Mr. and Mrs. Lloyd A. Morrow (3446) a son, David Brian, on Feb. 19.

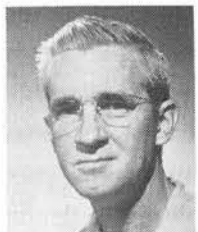
Mr. and Mrs. Ernest Garcia a daughter, Cairn Maria, on Mar. 4. Glorianne is on leave from Division 3121.

**R. A. Roane Died Suddenly Mar. 12**

Ralph A. Roane, a Sandia employee for nearly 12 years, died suddenly at his home Mar. 12. He was 47.

Mr. Roane was a Staff Assistant - Technical in Tube Engineering Section 1413-1, and had resided in Albuquerque for 26 years.

Survivors include his widow, three sons—Joe, Tommy, and Bobby (4233), a brother in Chicago, his father in Michigan, and six grandchildren.



**Nuclear Rockets to Explore Mysteries of Venus, Mars**

Among the AEC's programs, none challenges the fancy as much as its undertakings in space. This article, one of the series telling of the Commission's programs, deals with the atom in space. Discussed is the SNAP program, in which Sandia Corporation plays an important role.

It is not recorded whether Fermi ever envisioned a nuclear reactor making possible man's exploration of the solar system. Today, the Atomic Energy Commission is working on projects designed to develop propulsion and furnish auxiliary power for vehicles that will probe the mysteries of outer space and investigate Mars, Venus and possibly other planets.

This work is in the research and engineering development stage. The AEC seeks to develop highly compact and light-weight reactors that will make possible a great decrease in the weight of space ship engines.

The world's first use of nuclear power in space came on June 29, 1961. An "atomic battery" weighing five pounds provided power for two of the four transmitters in the Navy's navigational satellite, TRANSIT IV-A, put into orbit on that date. A second navigational satellite, TRANSIT IV-B, was launched on Nov. 15, 1961. Both transmitted signals back to earth successfully and the nuclear power came from thermo-electric generators fueled with plutonium 238.

There are two major Commission programs in the space field, conducted in cooperation with the National Aeronautics and Space Administration (NASA) and the Department of Defense. One is called SNAP, which stands for Systems for Nuclear Auxiliary Power.

The goal of the SNAP program is to develop both isotopic and reactor powered units. The work got underway in 1955 after several years of feasibility studies, and the TRANSIT satellite experiments are part of this program. As described earlier, other uses for isotopic power were developed.

The Atomic Energy Commission has assigned to Sandia Corporation the responsibilities for nuclear safety engineering and testing of aerospace nuclear systems under the SNAP program. The objective of the aerospace program is to obtain data on the safety aspects of nuclear systems during launch, flight into outer space, and re-entry into the earth's atmosphere.

Sandia will: perform long-range aerospace safety research and development to establish techniques for assuring safe performance of nuclear systems; develop and conduct ground tests to determine the performance of aerospace nuclear systems during handling and launching; develop a flight test program which will demonstrate that the safety aspects of the system will function as designed; and support and coordinate nuclear aspects of missile range safety during launch of nuclear devices.

The other part of the AEC's space effort, the ROVER program, seeks to develop nuclear reactors for rocket propulsion. Chairman Glenn T. Seaborg has summed up the possibilities of rocket propulsion as follows:

"Nuclear propulsion provides the potential for large reductions in the weight of the propellant required to perform any space mission. The percentage reductions become larger and larger as we go to more and more distant space missions . . . We believe that the nuclear rocket will provide ability to perform missions not feasible with chemical combustion rockets."

New basic data must be acquired, especially on materials permitting very high temperature operation, and many technical problems must be solved before we reach the much higher power levels that will be required of SNAP units.

Private enterprise is entering into the nuclear field more and more. Industrial and academic contractors operate all major AEC plants and laboratories and in turn subcontract much of the work. The next article in this series tells of the new nuclear industry.

**Sympathy**

To Owen H. Schutt (4513-4) for the death of his wife on Mar. 14.

To Augustin Pohl (4575-1) for the death of his father-in-law in New Mexico, Mar. 11.

To Jim Ryan (4233-4) for the death of his mother in Iowa, Mar. 18.

To Al Vogt (7145) for the death of his mother in Detroit, Mar. 11.

To Beulah Sutherland (7241-4) for the death of her sister in Denver, Mar. 21.

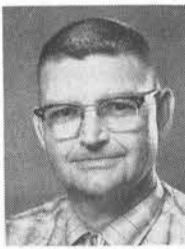
**Service Awards 15 Year Pins**



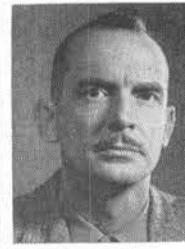
Frank A. Baczek 3444 Apr. 5, 1948



Raymond L. Brin 8160 Apr. 5, 1948



John P. Hertweck 4573 Apr. 12, 1948



Robert F. Thomas 2624 Apr. 12, 1948



Wynne K. Cox 3441 Apr. 6, 1948



Jose A. Suazo 4623 Apr. 7, 1948

**10 Year Pins Apr. 1-10**

William R. Guntrum 8124, Clyde Ira Millard 2563, Evelyn A. States 2321, Ralph R. Davies 4332, Friend L. Skinner 8141, Helen L. Kluber 3121.

Donald A. Baumann 8114, Floyd A. Kunz 2534, Robert G. Taffe 2642, Dorothy C. Pratt 4234, B. S. Gardiner 4234, and Gene W. Mead 7145.

sandia corporation

**lab news**

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# Fermi's Team of Scientists Recalls Gus the Carpenter

"And don't forget Gus, the carpenter. Without him, we doubt if Fermi and the scientists could have put the reactor together."

That was one of the firm recollections of some members of the "Fermi team" who met late last year and talked about who did what on Dec. 2, 1942. On that historic day, Enrico Fermi and his group completed the world's first nuclear reactor and, for the first time, at 3:25 in the afternoon, achieved a controlled release of the energy of fissioning atoms.

No reporters, cameras or tape recorders were present on this occasion, which has been called the "birth certificate of the atomic age." Building the reactor was a vital part of the huge and secret World War II project to make a nuclear weapon.

Anyone entering or leaving the closely guarded raquets court under the West Stands of the University of Chicago stadium had to present his badge but no attendance records were kept. The effort to get a controlled self-sustaining nuclear reaction was part of the project which had the code name of Metallurgical Laboratory.

Counting the project leaders, the scientists, engineers, skilled craftsmen and administrative assistants, it is believed that about 50 persons made up the "Fermi team." One or two of the scientists may have been away from the reactor at the moment of criticality — when the reaction was achieved. There probably were other "visitors" in the room at the time, for, inside the secret project, excitement ran high as the crucial hour approached.

There was one woman among the group, Leona Woods, a physicist. Today she is Mrs. Leona Woods Marshall, a professor of physics at New York University.

After the reactor had operated successfully, Dr. Eugene P. Wigner, now at Princeton University and a member of the General Advisory Committee to the AEC, produced a bottle of wine. The team members drank a toast to their leader, Dr. Fermi, and to the "pile," as the early nuclear reactors were called.

Twenty-seven of those present autographed the Chianti bottle in wicker container, and it is now a treasured possession of Dr. Albert Wattenberg, a member of the

Fermi team who at this time is doing research in France.

## Gus The Carpenter

And the carpenter? He is August C. Knuth, who gave his advice directly to Fermi and Walter Zinn, now with Combustion Engineering, Inc. Knuth had to estimate correctly the effect of the heavy reactor parts on the wood-supporting structure that kept the reactor level. He still lives in Chicago.

Four of the group are dead. Fermi, whose early work with neutrons in Italy laid the foundation for his successful reactor concept, joined the staff of the University of Chicago Institute for Nuclear Studies set up after the war and worked there until his death in Chicago in 1954.

Dr. Arthur H. Compton had as one of his major responsibilities the direction of the wartime Metallurgical Laboratory. He returned to teaching after the war and died in California in 1962. His book, Atomic Quest, is considered one of the best personal accounts of the bomb project.

Lewis A. Slotin was transferred to the Los Alamos, N. Mex., Laboratory where, in 1946, he died from radiation exposure in one of the few fatal radiation accidents during the entire history of the atomic era.

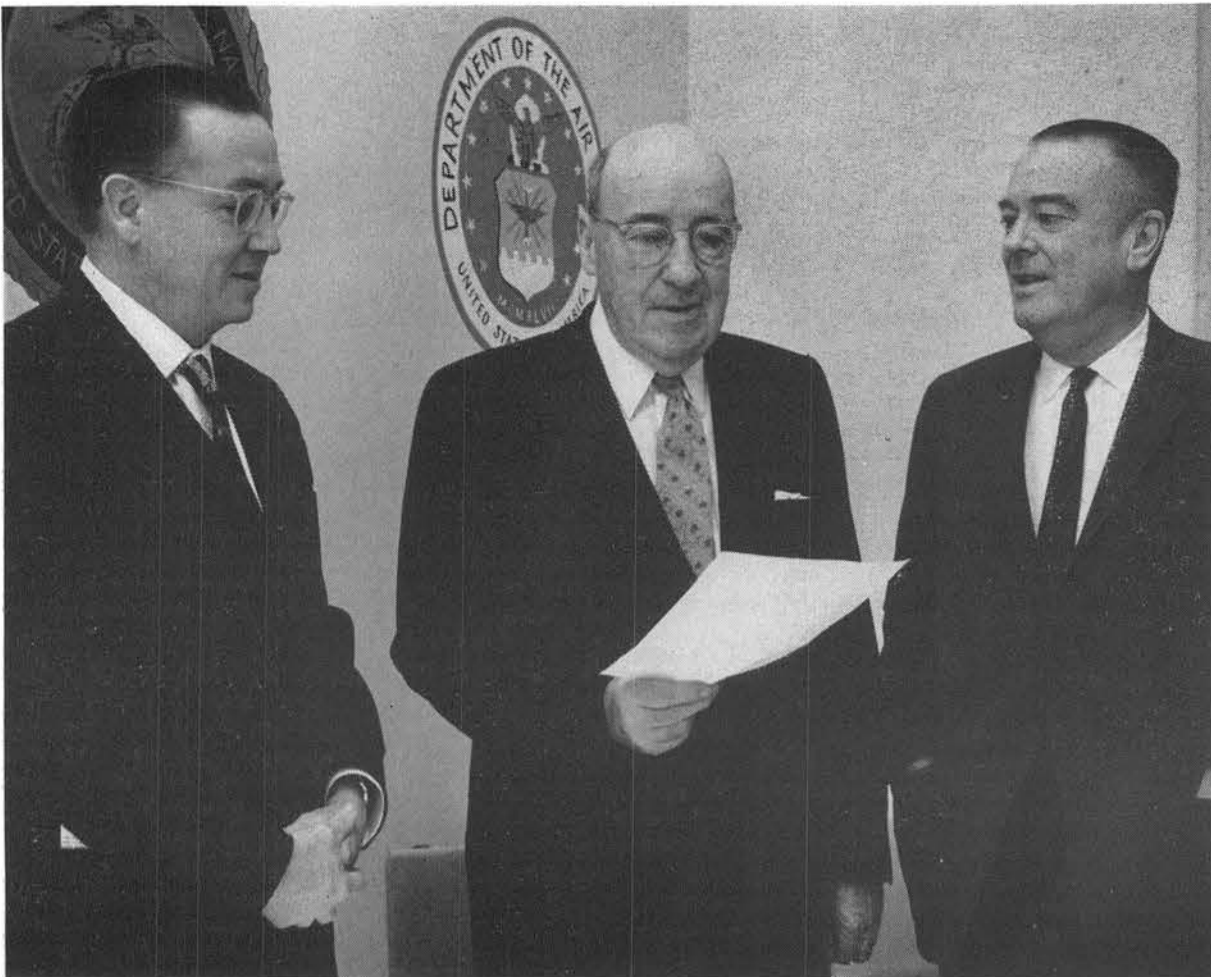
Wayne Arnold was a young physicist working on his Ph.D. when called to the Metallurgical Laboratory. He died several years ago in an auto accident.

## Local Chapter of Management Society Is Being Organized

A local chapter of the Industrial Management Society is currently being organized, according to K. C. Weir, special studies analyst 3460.

Goals of the Industrial Management Society are to advance the professions of industrial management and engineering, to promote research in the field of industrial activities, and to deal with problems of social sciences as related to industry.

After organization is completed, the local chapter hopes to concentrate its efforts into community projects, Mr. Weir said. He invites anyone interested to contact him for further details. Call ext. 41257.



ATOMIC ENERGY COMMISSIONERS James T. Ramey (left) and Dr. Robert E. Wilson (center) and K. F. Hertford, Manager of the Atomic Energy Commission's Albuquerque Operations Office, conferred in Albuquerque on Mar. 18. The commissioners, along with seven members of the AEC General Advisory Committee, held group meetings and toured Sandia Laboratory, then visited Los Alamos Scientific Laboratory Mar. 19.

## AEC General Advisory Committee Meets At Sandia Laboratory

Two Commissioners of the U.S. Atomic Energy Commission and seven members of the General Advisory Committee to the AEC visited Sandia Laboratory Mar. 18 and 20.

The group, including Commissioners Robert E. Wilson and James T. Ramey, held group meetings and laboratory tours at Sandia. They visited Los Alamos Mar. 19.

Dr. Manson Benedict, Professor of Nuclear Engineering, Massachusetts Institute of Technology, is chairman of the GAC and Anthony

A. Tomei of the AEC's Washington headquarters is secretary.

Other members of the Committee visiting here were: Drs. P. H. Abelson, Director, Geophysical Laboratory, Carnegie Institution; Kenneth S. Pitzer, President of Rice University; J. C. Warner, President of Carnegie Institute of Technology.

Drs. Eugene P. Wigner, Palmer Physical Laboratory, Princeton University; John H. Williams, School of Physics, University of Minnesota; and L. K. Hafstad, Vice President Research Laboratories, General Motors Corporation.

## Science Fair Housing For Students, Teachers Sought at Sandia

Sandia Laboratory employees are being requested to consider whether they could accommodate a student or teacher in their home during the forthcoming National Science Fair.

The majority of the visitors will be in Albuquerque during the period May 5-11. Residents are asked to provide bed and breakfast for a minimum of three nights and a maximum of five nights. Hosts are also requested to furnish transportation to their nearest junior or senior high school each morning and from the State Fair grounds' Coliseum each evening.

Offers of housing are being handled by the Seminar Housing Office at 5900 Domingo Rd. NE, telephone 265-1771. Attempts will be made to match the interests of the visitors with families providing housing.

## Sandian Participates

# Rainstorms and Saddle Sores All Part of Texas Trail Ride

A Houston, Tex., newspaper printed an unusual weather forecast recently: "Cloudy and cool, thunderstorms, with scattered saddle sores and light cussin' through Tuesday."

The forecast applied to Donald J. Sullivan (4514-3) because he was among 1300 horseback riders making the annual 103-mile trek from Brenham to Houston, Tex. Once at their destination, the Salt Grass Trail Riders participated in the grand parade opening the 1963 Houston Livestock Show and Rodeo.

The trail ride was originated 11 years ago by Brenham Mayor Reese Lockett. For three days, cowboys and dudes live like frontier

cattlemen, who used to drive their herds from the Brenham area to the coastal stands of salt grass for fattening.

Don hadn't ridden a horse in two and a half years, but he still says the trail ride was "the most fascinating thing that ever happened to me." He rode with L. F. E. Koehler, former supervisor of Section 4512-1 who now operates a family ranch and guest cottages at Hunt, Tex.

Don went prepared with a supply of liniment, but he didn't need it. "Saturday I felt rather uncomfortable," he recalls, "Sunday I was immune to everything, Monday I felt real good, and Tuesday, it seemed that I had been in a saddle all my life."

The trail riders encountered a wide assortment of weather. Temperatures ranged from 22° to 48°. On Tuesday, in the middle of a rice field, a "blue norther" brought hail. The group Don was riding with cheated a little; they detoured through a nearby town to dry their bed rolls in a laundromat.

The pace was rather slow — 22 to 32 miles a day — to accommodate teams pulling the chuck-wagons. Even so, 20 horses went lame and had to drop out of the ride.

"Now," Don says, "I'd like to organize a trail ride from the State Fair Grounds in Albuquerque via north Highway 10 to Santa Fe. The riders' arrival would coincide with the start of the Santa Fe Fiesta in September.

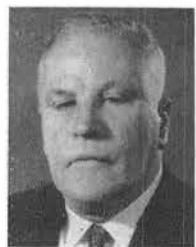
Anyone interested in such a trail ride is asked to contact Don at Route 1, Box 342, Los Lunas, or tel. TO 5-9550.

## A. S. Abergo Retires Today

Alexander S. Abergo will retire today after nearly 12 years at Sandia Laboratory. He is a storekeeper in Warehouse Services Division 4612.

A native of New York, Mr. Abergo moved here 13 years ago from Brooklyn, and he plans to remain here. He and his wife live at 6901 Zuni Rd. SE.

When Mr. Abergo's health improves, he intends doing a little fishing, "or at least dangling my feet in a stream." He also enjoys "puttering" around the house and yard.



SAFETY AWARD—Sandia Laboratory employees earned the Atomic Energy Commission's Award of Honor for working 3,655,475 man-hours without a disabling injury from Sept. 10, 1962, through Jan. 13, 1963. The plaque was presented last week by W. Lee Hancock

(second from left), manager of the AEC's Sandia Area Office. Accepting for Sandia Laboratory employees were R. H. Schultz (7320), left, R. D. Flaxbart (4570), and W. M. O'Neill (1120), right. The new plaque will be displayed in the entrance hall to Bldg. 802.



Helps make printed circuit boards . . .

# Language Known As SPEED Youngest Member of Family

Livermore Laboratory has come up with a new way of making printed circuit boards—using Laboratory-developed numerical programs, a computer, and a numerically-controlled milling machine.

What makes it new is the use of numerical description and direct machining to scale, to produce printed circuit-board negatives. Automating the processing of tapes for the numerically-controlled machine is a numerical language known as SPEED. SPEED stands for Sandia Program for Engineering Etched Designs.

SPEED is the youngest of a family of three numerical languages used at Livermore Laboratory for describing and fabricating machine-made parts. Its cousin, SHAPE (Sandia Hi-Precision Automated Parts Engineering) and APT III (Automatic Programmed Tools), are being readied for use in the design, checking, fabricating, gaging, and acceptance of machine-made parts.

All three languages will speed the effort now required in the design and manufacture of nuclear-weapon components. It will also enhance communications between the engineer, the draftsman, and the machinist, thus reducing the possibility of error and improving the reliability of the finished part.

The SPEED language, developed by Jim Rogers and Freddy Whitworth (8142-1) has been in use on an experimental basis for the past two months, according to Bert Barker (8142-1). Bert's section is developing numerical description systems at Livermore Laboratory.

"Its use marks the first routine application of numerical description in the design and manufacture of parts at Sandia Corporation," Bert said, "and it may be the first time that numerical control techniques have been applied to printed circuits."

#### How SPEED Works

This is the way SPEED works: The engineer designing a new printed circuit board starts with a rough sketch of his circuit, indicating whatever critical dimensions are necessary to make a design layout.

The sketch goes to Drafting Division 8114 where a detailed design layout is prepared. From this detailed drawing, the draftsman selects the critical features and translates these into a numerical description based on the SPEED language.

This description, in the form of a series of letters and numbers, is punched onto IBM cards by Data Processing Section 8213-3, and fed into the Laboratory's IBM 1620 computer, operated by Preliminary

Design Division 8142. The output from the computer, in the form of punched cards, can be used to make a paper tape.

The paper tape is fed into a numerically-controlled milling machine in the model shop. Following the instructions on the tape, the milling machine cuts the printed circuit-board pattern into a piece of transparent material which has been coated with an opaque surface. This material is thus transformed into a machine-made "negative," through which printed circuit boards can be exposed in a conventional photographic manner.

"While this may seem to be an elaborate way of going about making negatives for printed circuits, it is expected to be cheaper, more accurate, and faster than the conventional process currently in use throughout industry," Bert said.

Previously, many different drawings were needed for each printed circuit design. Now, two or three will do the job. Enlarged artwork drawings, once needed to make photographic negatives of the printed circuit design, are now unnecessary. Instead of reducing the artwork photographically to the intended size of the printed circuit, an exact-size replica is made by the milling machine from punched paper tape. This process eliminates all possibility of error in reduction.

#### System Simplifies

The new system simplifies changes in printed circuit designs. Instead of redoing the artwork and repeating the photographic process, the change has only to be incorporated in the description to produce another punched paper tape. If the change alters relationships of other dimensions in the printed circuit, the computer, in many cases, will make these changes automatically.

"The milling machine will produce a negative to much closer tolerances than could be done by conventional artwork and photography," Bert said. The machine can hold a tolerance ten times better than the old system. Another advantage of the system is that it can be used to turn out exact copies over and over again. With the conventional photographic process, errors could creep in each time a new negative was made.

"Many of the same advantages and techniques of the SPEED program have even greater applications in the SHAPE and APT III programs," Bert said. SHAPE and APT descriptions can be used in the design and fabrication of many parts.

"These numerical description techniques will provide the engineer with new avenues of approach in the design of new components," Bert said. "In almost the same time that it now takes the engineer to come up with a single design, the computer can automatically derive several variations of the basic design, giving the engineer several alternatives to choose from. This will eliminate many of the tedious manual calculations now required to do the job."

#### Three Parts

The numerical description used in the SHAPE and APT languages is made up of three parts: A word picture or description of the part to be made, an arithmetical translation of the word picture into standard mathematical form, and a "post processor" program to adapt the mathematical form to whatever use will be made of the information. This description is presently contained on punched cards, from which punched-paper tape can be produced automatically.

If a part is to be made by ordinary machine methods, the word picture can provide sufficient information to make the part. The description, printed out from the punched cards, is compatible with present drawing systems and can be applied by trained personnel in any conventional machining operation.

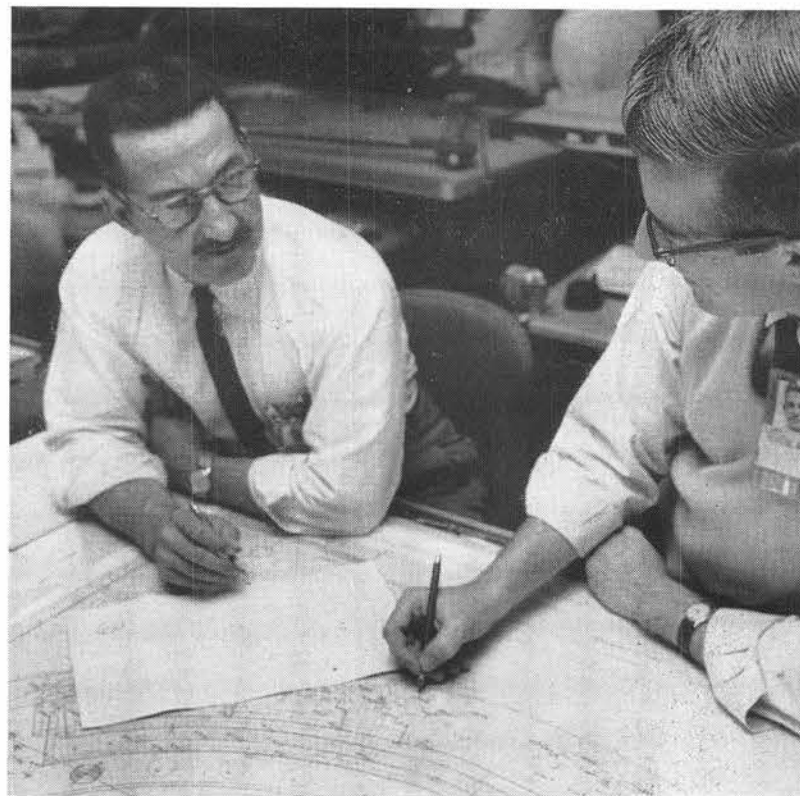
If the part is to be made by an integrated AEC manufacturer, the part description can be punched on paper tape and sent to them by wire, utilizing data transmission systems, at a great saving in time. The punched paper tape can be stored and re-used easily.

If the part is to be made by numerically-controlled machines the post processor program produces information to make a tape which can direct the machining operation automatically.

"Different post processor programs can be set up to offer a wide variety of engineering applications," Bert said. Such information as the weight, center of gravity, and moments of inertia of a proposed part can be determined automatically, according to Bert. "Information needed for gaging and accepting the final product can be derived in a similar way," he added.

One of the chief uses of numerical description techniques is in the fabrication of templates for machining operation, Bert said.

"In fact," he added, "once a part



SPEED PROGRAM for producing printed circuit negatives uses data derived by Lou James (left), and Gene Lopp (both 8114), from layout of printed circuit board. This data, transcribed into machine language by the 1620 computer, is fed into a numerically-controlled milling machine which automatically produces the desired printed circuit negatives.

is defined by numerical description, almost all of the information needed for the manufacture of the part can be determined automatically."

"Eventually, numerical description techniques may, in many cases, eliminate dependence on drawings, but, in a practical sense, a drawing is still worth a thousand words," Bert said. He pointed out that visual descriptions are still an important aid to the engineer.

"The chief advantage of numerical description in the drafting area," according to Bert, "is that it will eliminate many intermediate steps in drawing parts. Numerical description will also give the draftsman the additional responsibility of providing input data for programming parts for machine operations."

Numerical description techniques have already been taught to a pilot group of draftsmen and technicians at Livermore Laboratory. Taking the course were Herman L. Reis (8223-1), Lou James, R. E. Hoffer, and Chet Wolowicz (all of 8114). Chet acted as a drafting consultant in setting up the numerical descriptions. Jim Rogers and Freddy Whitworth (8142-1) taught the pilot course.

"Additional courses in numerical description are planned for engineers, draftsmen, and management," Bert said. "Eventually,"

he said, "we hope that numerical description techniques will free the engineer and draftsman of much of the detail computation work now required in the design and layout of machine-made parts." Right now, Lou James and Herman Reis are doing much of the actual programming work, translating engineering designs into numerical language.

"Currently on order are two machines which will further increase the Laboratory's capabilities in numerical description and machining," Bert said. One, a numerically-controlled plotter, has been scheduled for delivery in June.

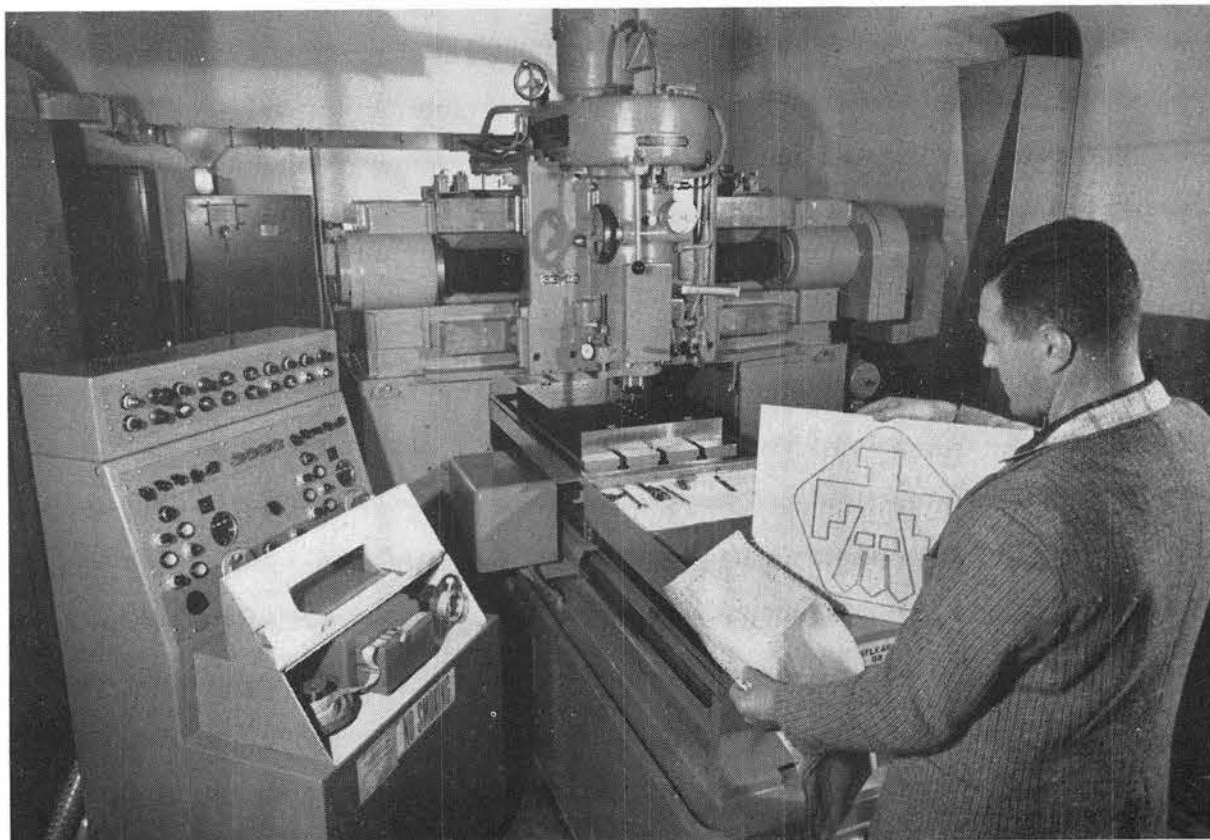
"The big advantage of this machine," Bert said, "is that it will relieve the draftsman of the job of changing or coming up with an entirely new drawing each time a change occurs in the design. If a change is made, the machine will turn out a new drawing with much greater accuracy and in far less time than it would take using conventional techniques."

The other machine, a numerically-controlled lathe, will provide greater capabilities for numerically-controlled machining at Livermore Laboratory. Delivery of the lathe is expected in June. Both machines will operate on programs similar to that used to operate the milling machine.

A numerically-controlled drill and a smaller tape-controlled mill are expected to be ordered soon to further broaden Sandia's numerical-control capabilities.



ADAPTATION OF SHAPE PROGRAM to automatically compute weight, center of gravity, and moments of inertia of a proposed component is checked over by computer operator Ann Crow, and mathematicians Freddy Whitworth and Herb Turnbull (all 8142-1). IBM 1620 Computer is used in numerical description programming for SHAPE (Sandia Hi-Precision Automated Parts Engineering), and for SPEED (Sandia Program for Engineering Etched Designs). The programs control milling machines.



SANDIA THUNDERBIRD, programmed by Herman Reis (8223-1) was made on the numerically-controlled milling machine to show varied applications of numerical description in fabricating parts. Border of Thunderbird

design employs same techniques required in programming templates, using SHAPE system. Details in Thunderbird are similar to printed circuit patterns, which are made using Sandia-developed SPEED programs.

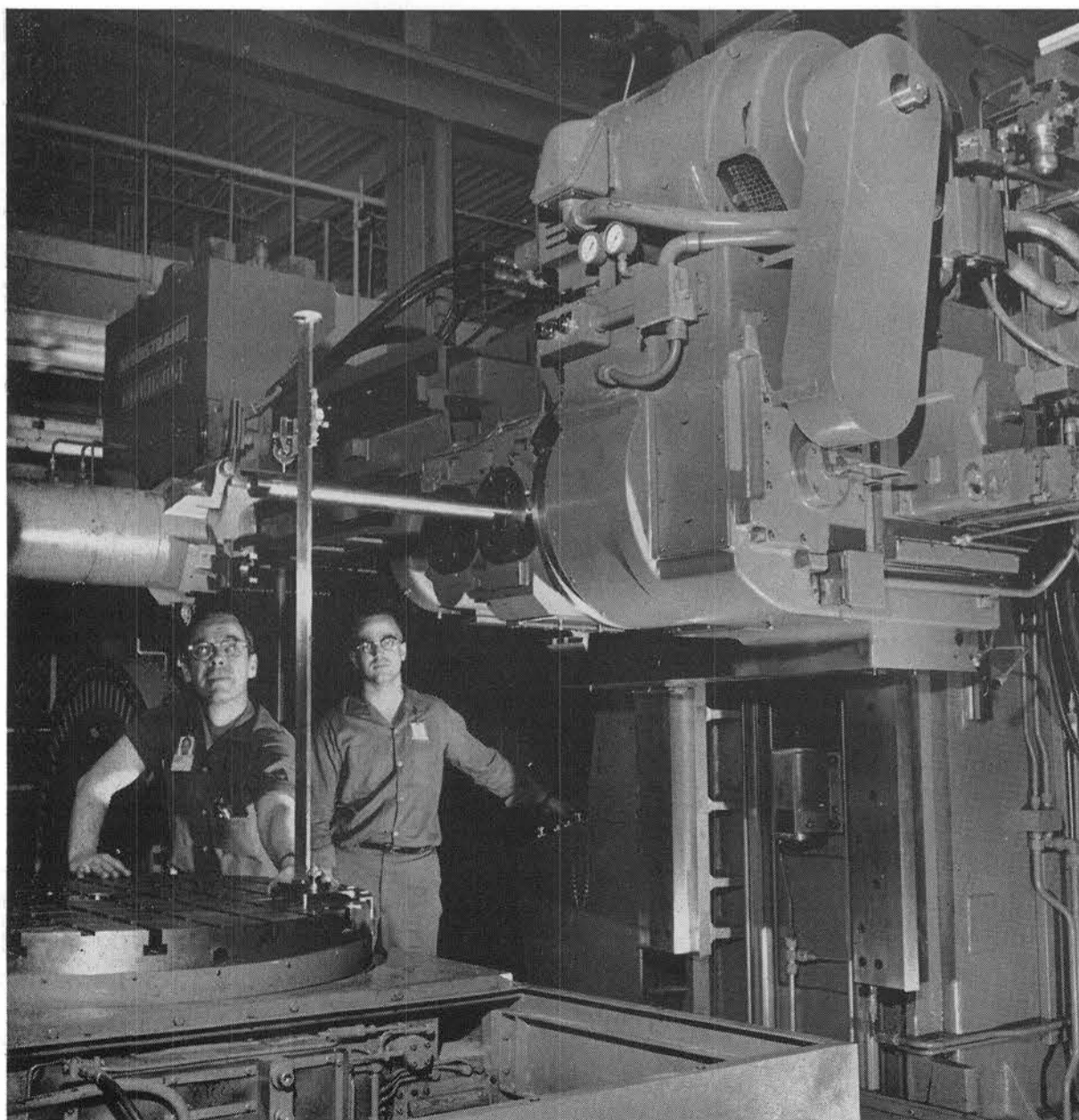


# Varied Talents Used in Operation of Omnimil



EASY DOES IT. Several weeks ago, installation of Omnimil OM3, numerically-controlled milling machine, started in Bldg. 840. Two overhead cranes were used to

move this component into place. At left is Roscoe L. Bryant of Millwright and Machine Service Division 4512; at right, Lloyd Norquist of Sundstrand Machine Tool Co.



CALIBRATING spindle of the Omnimil OM3 are operators Edgar L. Miller (left) and John I. Malpas, Jr., both of Project Shop Division 4253. Careful calibrations and adjustments are made before milling operations.

It weighs 60,000 pounds, but it handles its work with the delicacy of a jeweler. When one operation is done, it selects the proper tool for the next one with no hesitation, no indecision.

It's known as the "Omnimil OM3," a five-axis, numerically-controlled milling machine, but it's only a part of a manufacturing process which uses the talents of a number of specialists. The machine, built by Sundstrand Machine Tool Company, was installed in the Shop Area of Bldg. 840 several weeks ago. The operators for the system, John I. Malpas, Jr., and Edgar L. Miller (both of Project Shop Division 4253), will be Sundstrand-trained.

"The Omnimil represents a giant step forward," Walter Hall, manager of Mechanical Department 4250, said. "With such a step, Development Shops Organization 4200 begins an extensive concern with programmed machining processes."

Work flow for the system goes something like this: The engineering drawing forms the basis for part drawings, which come to a parts programmer. The programmer prepares a manuscript of word definitions, descriptions, and commands which, in turn, are sent to Electronic Data Processing Department 3450, where special routines are used in conjunction with the IBM 7090 computer to prepare the output listings and the punched control tape for the milling machine's control unit. Then the part is placed on the work table, the machine is synchronized to the control tape, and the machining sequence begins.

#### Control Tape

To operate the machine, the operator loads a reel of control tape into the reader of the machine control unit, which was built by Bendix Industrial Controls Division, Detroit. The control unit then translates the tape commands into electronic signals for the various machine functions.

The mill performs a sequence of milling, drilling, boring, tapping, and tool-changing functions as they are written on the control tape. "The operator may over-ride the system to control feed rate, spindle speed, and stopping," Mr. Hall continued. "He also has manual control of slide motion during set-up operations."

Programming for the system is provided by Program Machining Division 4251, supervised by L. W. Stouder. Parts programmers are R. L. LaChance and O. D. May, both of Special Assignment Section 4211-4. They received two weeks of training in the use of "SPLIT"—"Sundstrand Programming Language Internally Translated"—as written by the Sundstrand firm for the Omnimil. "SPLIT is being used at present," Mr. Stouder said. "Later, we'll use 'APT III'—for 'Automatically-Programmed Tools.'" The APT III programming language is well on its way to becoming standard among numeric control users.

The programmer describes the cutter motion and machine functions in APT III or SPLIT, English-type languages using word-number combinations. Such computer systems as APT III will simplify communications between programmers and the computer, and between design engineers regarding part descriptions.

#### Developed by 3454

Development of the computer program for the system was completed by Advanced Development Division 3454, supervised by D. K. Robbins. D. F. Jordan (3454) served as coordinator for the programming. Both Mr. Robbins and Mr. Jordan have been trained in the APT III and SPLIT languages. "We're anticipating the day when design engineers will use such computer language from the

beginning of their work on a new design," Mr. Robbins (3454) continued. "Such use will enable computers to provide them with invaluable aid during the initial stages of their work. Division 3454 will be glad to provide engineers with information about the features of the APT language."

Sandia Corporation is a member of the Automatically Programmed Tools program (APT III), a national effort for the development of programmed tooling techniques, and the development of the APT language for standardized program tooling. The APT III project is under contract and administration of Armour Research.

"Among the obvious advantages of such standardized systems as the Omnimil OM3 are their accuracy and speed," E. L. Emerson, supervisor of Shop Engineering Section 4214-1, and shop engineer for the new system, observed. "The numerically-controlled milling system here at Sandia will provide us with information about possible use of other new numerically-controlled systems in the future."

Individuals or groups who desire additional information about Omnimil applications are requested to contact L. W. Stouder (4251) at ext. 27140, or E. L. Emerson (4214-1) at ext. 31156.

## R. J. Hansen Elected Chairman of Bernalillo Chapter Red Cross

Sandia's Director of Development Shops, R. J. Hansen, was elected chairman of the Bernalillo Chapter of the American Red Cross this month. His term of office is for one year.



Mr. Hansen has served on the Chapter's Board of Directors since 1957, and has been vice chairman for Disaster and Nursing Services since 1959.

Other Sandians holding official positions with the local Red Cross Chapter include: S. P. Schwartz, President, member of the Board of Directors; J. W. Galbreath (3430), member of the Board of Directors and chairman for public information; and A. B. Metzger, former Sandian, member of the Board of Directors and chairman in charge of first aid.

Police Boys' Camp Provides Recreation For Local Children

## Police Boys' Camp Provides Recreation For Local Children

This year, some 600 children of the Albuquerque area will attend the Fraternal Order of Police Boys' Camp. The camp is maintained for children from eight to 14 years of age who, through no fault of their own, are unable to attend a private camp.

Deserving children, selected by church and civic organizations, are sent to the camp for a week, with all expenses paid by the Fraternal Order of Police. No charges are made to the children's parents.

At the camp, a full-time director, coach, and dietitian are provided to see that the children have the best of care and a well-rounded program of sports and recreation. The seven-acre camp area is open on weekends to groups and organizations who have arranged to use the camp facilities.

The success of the camp is made possible through individual donations. Sandians who wish to contribute should make checks payable to the F. O. P. Boys' Camp, in care of Frank L. Doyle, Deputy Chief of Police, P. O. Box 1260, Albuquerque.



## Society for Nondestructive Testing Seeks Highest Standards of Service

This is another in a series of articles describing activities of member organizations of the New Mexico Council of Technical and Scientific Societies.

The Albuquerque Section of the Society for Nondestructive Testing was chartered Nov. 14, 1960, with 42 members. For several years prior to this time, local members of SNT were affiliated with the Los Alamos Section.

"The Society is dedicated to the development and perpetuation of the highest standards of professional service and efficiency in the field of nondestructive testing," according to Don R. Johnston (1121-3), chairman. "The efforts of the Society are devoted toward improved product quality, predictable reliability, effective process control, reduction in waste and ex-

pense, and prevention of accidents to save human life."

The subjects are explored in monthly meetings of the Society which usually feature out-of-town speakers considered authorities in specific areas of nondestructive testing. Special events are also held each year. On May 31, SNT will sponsor an educational clinic covering methods and applications of eddy current testing, a technique of nondestructive testing.

In the past, other symposiums sponsored by the local SNT chapter have received national recognition. Last year, a Leak Detection Symposium attracted more than 125 representatives from all areas of the country.

National publication of SNT is the *SNT Journal*, which keeps members current on new developments in the field. The organization also publishes the *Nondestructive Handbook*, a reference text.

The national organization was founded in 1941 as the American Radium and X-ray Society. In 1947, the name was changed to Society for Nondestructive Testing in order to recognize technical advances in methods using not only penetrating radiations but also magnetics and electricity, sound and heat, penetrants, and visual-optics.

Nationally, SNT has more than 3500 members in 41 sections including affiliated groups in Canada and Israel. Membership consists of management, engineers, scientists, technicians, and manufacturers.

D. W. Ballard, supervisor of Advanced Manufacturing Development Division 2564, is currently serving as the national vice-president of SNT. He was the first chairman of the local section and has held other national offices including treasurer and member of the board of directors.

The 65 local members are primarily employees of Sandia Laboratory, ACF, Kirtland AFB, and local machine shops. Other local officers include H. L. Anderson (2542-2), secretary; and W. E. Bergsten (2564), R. J. Dill (4630), and J. G. King (2564), members of the board of directors.

### Double Program Set For IEEE Dinner Meeting April 9

Daniel B. Noble, director and vice president of the Solid State and Military Electronics Division of Motorola, Inc., will be the principal speaker at a dinner meeting of the Albuquerque-Los Alamos Section of the Institute of Electrical and Electronic Engineers Tuesday, Apr. 9. He will discuss objectives of the recently reorganized IEEE.

Beginning at 6:30 p.m. with a social hour, the meeting will be held at Four Hills Country Club. A separate program has been arranged for ladies attending the meeting. Dr. Ruben Rumbaut, chief of the Mental Hygiene Clinic, VA Hospital, will discuss "The Cuban Situation, Past and Present." Formerly, he was a psychiatrist in Cuba.

Malcom C. Heffleman, senior vice president of Public Service Company of New Mexico, who has recently been named an IEEE Fellow, will be honored during the evening.

Reservations to attend the meeting should be made prior to Apr. 6. Contact Charles Schmidt, AL 6-0798.

### E. S. Roth Writes Chapter for Book On Tool Design

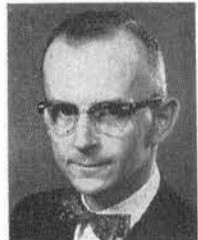
E. S. Roth (2564) contributed a chapter to the book, "Fundamentals of Tool Design," which was published in late 1962 by Prentice-Hall. His chapter dealt with design of tools for inspection and gaging.

The book is part of a manufacturing engineering series sponsored by the American Society of Tool and Manufacturing Engineers.

## Supervisory Appointments

THEODORE M. GEMBERLING to Attorney, 6040.

"Ted" joined Sandia in September 1961 as a division supervisor in the General Attorney's office.



Previously he had been with the law firm of Crumpacker, Gemberling, and Enslin in Hammond, Ind., for eight years.

He received his AB and LLB degrees from Harvard University.

From 1944-46 Ted served in the Army.

He is a member of the Bar of Illinois, Indiana, New Mexico, and the Supreme Court of the United States.

CLARENCE E. SANDY to supervisor of Electronic Components Division 1432.



"Sandy" has been with Sandia Corporation for 11 years. The first year he worked in the Manufacturing Development organization. He has been in the

Electronic Components Department ever since and has been supervisor of Capacitors, Delay Lines and Transformers Development Section 1432-1 since August 1953.

For two years prior to coming to Sandia, Sandy worked in the electromotive division of General Motors at LaGrange, Ill.

Sandy has both Bachelor's and Master's degrees in electrical engineering from the University of Illinois. He is a registered professional engineer in New Mexico.

He served five and a half years in the Army during World War II.

NEITH J. POLLARD to supervisor of Solid State and Thin Film Devices Division 1433.



Neith has worked in Electronic Devices Department 1410 since he came to Sandia Laboratory in November 1952 and has been supervisor of Tube Engineering Section 1413-1 for the past five years.

Previously he was an instructor in electrical engineering for three years at Tulane University and for two years at the University of North Dakota.

He also worked a short period as an industrial electronics engineer for the Buick Motor Company.

Prior to attending college, Neith served five years in the Navy.

He is a member of the American Physical Society and is past chairman of the New Mexico Section of the American Institute of Electrical Engineers.

## Job of Improving Already Good Equipment Is Everyday Undertaking for Sandia Group

Machines, the same as automobiles, often need fine adjustments to improve their operation. Even with a brand new car, the carburetor must be re-set in higher altitudes for better economy and smoother running motor.

Likewise, a machine may be designed to operate with certain tolerances, but repair may be needed periodically to maintain this tolerance, or, perhaps with some reworking, even closer tolerances than those designed by the manufacturer may be obtained. Or maybe with a minor modification, the machine could be used for a different or additional purpose.

Such modifications are often handled by Millwright and Machine Service Division 4512, headed by D. C. Hake.

Considerable ingenuity and skill are needed to make these design changes and improvements. A wide variety of items are covered in the work of members of Millwright Section 4512-1, J. M. Winter supervisor. William J. Moulds, Sr., designed and fabricated a braking device for a hand truck; Roscoe L. Bryant changed the bottom loading platform and lifting track on three furnaces in the Ceramic Shop; Leonard Glover was responsible for a special locking device for a test chamber; Samuel K. Tabet originated the bike racks in use at Sandia Laboratory which provide maximum storage but only minimum damage.

### Improved Operation

"Some of these projects have resulted in improved operation or reduced maintenance," Mr. Hake said. Others have made possible additional safety protection for employees.

In Machine Section 4512-2, supervisor W. N. "Jack" Bullock worked with others in design of an alignment disc, placed between the couplings of the motor and compressor of a refrigeration unit. Due to misalignment, the coupling was having to be replaced every three months at a cost of \$300. There has been no need to replace the coupling since the disc was installed four years ago.

Another addition was a locking device for a Bridgeport mill, which improved operation and increased the measure of safety. There are now 11 of these locks in use.

In the past few years Sol Chavez has designed, modified, fabricated, and installed numerous pieces of

equipment for Industrial Photographics Division 3465.

Martin Serna has received training in the field of microfilm processing. Herman Chavez specializes in small tool repair whereas Henry R. Welch works mainly in modifications to centrifuges and shake tables. All are in Section 4512-2.

### Keep Up-To-Date

"Sometimes our man will come up with a workable idea in a couple of minutes after hearing the problem or desired use; other times several models may be built before the design is right," Mr. Hake explained.

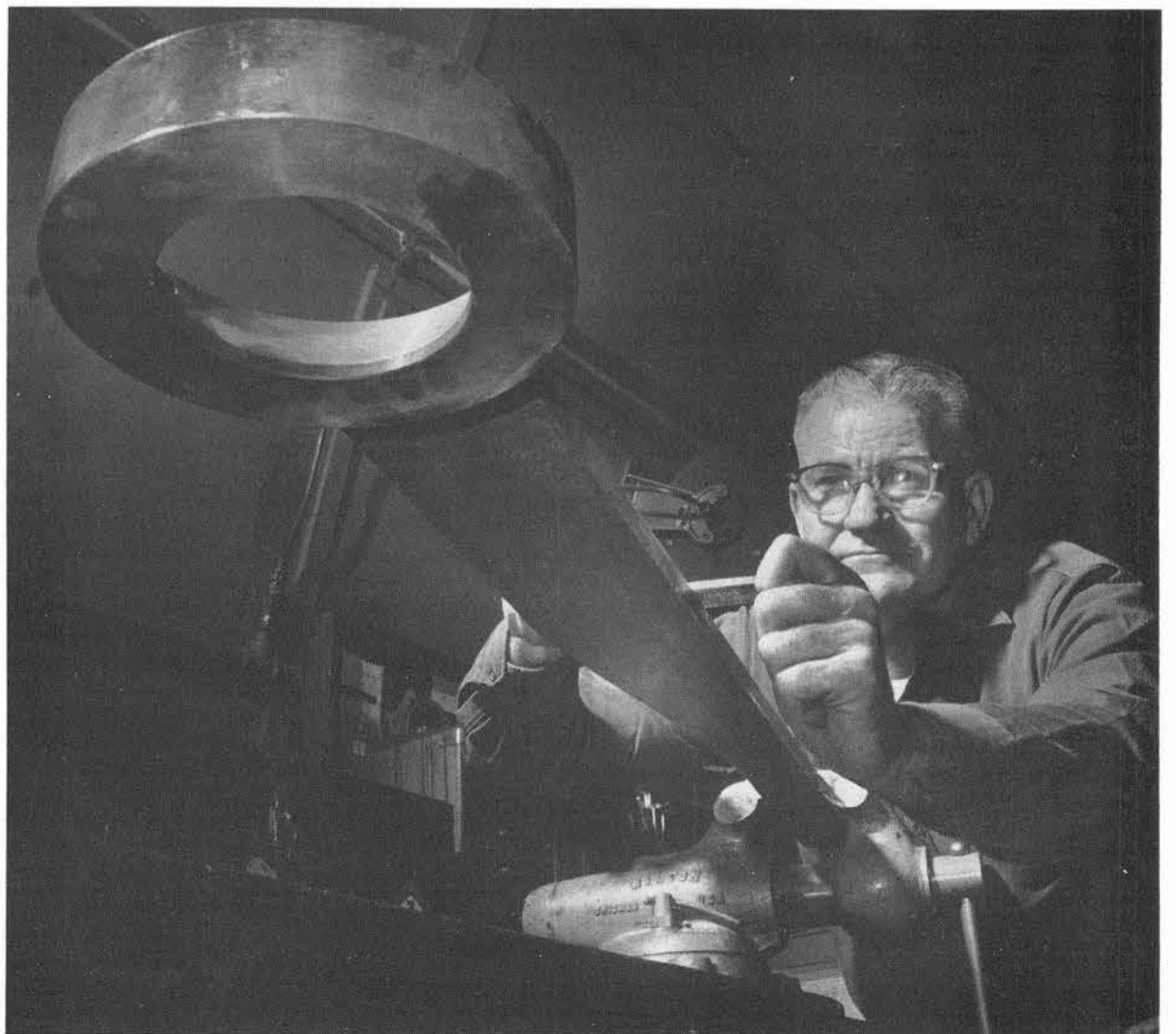
It's a constant job to keep the men up-to-date and trained in

maintenance of complex, new machines. All the millwrights in this division have taken the four main courses in welding offered by the Company, including inert-gas arc welding. In addition, manufacturers' representatives will occasionally conduct a week-long training course (also after normal working hours).

The division's regular responsibilities include such things as installing and leveling all machinery; maintaining overhead doors, hoists, and cranes; test loading all sling devices used for picking up weights; repairing machines; and carrying out preventive oiling of all machines at Sandia Laboratory.



THIS GAUGE is used to determine the friction adjustment between three discs in a centrifuge. Henry R. Welch (4512) worked to manufacturer's specifications in fabricating this tool at Sandia Laboratory.



A SPECIAL WRENCH was needed by Field Test to remove the nose from a nose cone. Apparently the threads were damaged when the mock-up underwent a drop test. William C. Baldwin (4512) designed this wrench with a tapered round opening. Dowels can be fitted through the side holes in the wrench and nose cone.



## Panel Discusses Training Programs For Members of S.W. Indian Tribes

A. J. Fuller, a recruiting coordinator with Sandia's Employment Division 3151, served recently on a panel before the Adult Vocational Training Seminar of the Bureau of Indian Affairs. Also on the panel were Richard Hansen, Employment Supervisor of ACF Industries, and R. W. Heim, a Vice President of the First National Bank of Albuquerque. Topic of the panel was "The Nature of Demands of Specific Jobs in Various Trades."

The seminar was concerned with the vocational training of mem-

bers of Indian tribes of the Southwest. Seminar meetings were held at the University of New Mexico, and were conducted by representatives of the Bureau of Indian Affairs.

## Sandia Scientists Present Speeches At Science Fairs

Sandians were awards banquet speakers at two of the regional Science Fairs in New Mexico last Saturday.

G. C. Dacey, Vice President, Research 5000, spoke on "Science and the Citizen" during the northwest regional fair in Albuquerque.

Glenn E. Seay, supervisor of Dynamic Stress Research Division 5132, spoke on "Explosives, Guns and Physics" during the south-east regional fair in Roswell.

## Sandian Demonstrates Glassblowing Skills At Science Fair Today

Ron Snidow, supervisor of Scientific Glass Section 4224-5, is presenting a talk and demonstration at the Trans-Pecos Regional Science Fair in El Paso, Tex., today. Ron will discuss glass as an engineering material and its scientific applications while presenting a glassblowing demonstration. He will appear during an assembly of the students who have science exhibits at the Fair.

## Sandia Authors

Current or forthcoming articles by Sandia authors in technical journals include the following:

C. S. Williams (1442), "The Rectified Voltage on a Line with an Antenna Load for Pulse Excitation," May issue **IEEE Transactions on the Professional Technical Group on Antennas and Propagation**, Communication Section.

John A. Larson (2331-1), "Improving Supplier Performance," April issue, **Industrial Quality Control**.

A. T. Fromhold, Jr. (5151), "Space Charge in Growing Oxide Films II. Nonhomogeneous Field," Apr. 15 issue, **Journal of Chemical Physics**.

C. B. Pierce (5151) and A. D. Kantz (formerly of 5311), "Defects Introduced in Neutron Irradiated Esaki Diodes," April issue, **Journal of Applied Physics**.

F. R. Sweet (2532) and G. C. McDonald (2530), "A Working Approach to the Bent Pin Problem," February issue, **Mechanical Engineer**.

MARCH 29, 1963

LAB NEWS

PAGE SEVEN

## Lab News Field Inspection Reporter Calls Her Family Her Only Hobby

Rosemary Morrissey came to Sandia Laboratory 11 years ago. Two years later she transferred to Field Inspection Division 2341, where she remained, and became a volunteer Lab News reporter.

"My hobby," she said, "is seven Fords: my daughter, son-in-law, and five grandchildren, who live in Denver." A native of Denver, Rosemary doubly enjoys her visits there.

Her other special interests are the kind adaptable to any circumstances. "I like reading and people—all kinds," she explained.



Rosemary Morrissey

## Fifteen Judge Science Fair

Sandia Laboratory scientists and engineers were active last week as judges for the Northwestern New Mexico Regional Science Fair held at the University of New Mexico.

Sandians who judged student science exhibits included G. V. Porter, Jr. (3131), Jean Antoine (1314), Lewis K. Jones (1121), George W. Arnold (5311), Everett H. Beckner (5153), George P. Steck (5425), Sydel P. Gold (5426).

Hamilton H. Mable (1332), James M. Peek (5152), Bruno Morosin (5152), Bernard T. Kenna (1122), Wesley B. Estill (1122), Donald M. Mattox (1124), Lynn T. Ritchey (5426), and John E. McDonald (1121).

## Coronado Club Swim Team to Organize

The Coronado Club swim team is now being organized for the 1963 competitive swimming season, according to C. B. O'Keefe (3126), president of the Boosters' Club. Management and coaching staff will meet with those interested Thursday, Apr. 11, at the Club. Ages of swim team members range from 10 and under through 17. Parents are encouraged to attend the meeting with their youngsters.

## Sports Car Club Holds Gymkhana

The Rio Grande Region of the Sports Car Club of America will hold a medium speed, precision type, gimmick gymkhana on Sunday, Mar. 31, at the southeast corner of the Winrock parking lot.

Registration is from noon to 1 p.m., when the competition starts. A navigator is required for each car.

All Sandians owning sports cars are invited to participate by Jack Shoup (1430), activities coordinator.

## ECP Fund Distribution Reached \$49,889 at Close of February

Members of the Employees' Contribution Plan have contributed \$49,889 to the 25 participating agencies of the United Community Fund and nine other health and welfare agencies since December.

As the February checks—totaling \$13,176—were mailed, the following distribution had been made:

	February	Year To Date
United Community Fund	\$10,282	\$38,161
American Cancer Society	659	2,581
Bernalillo County Heart Association	540	2,074
Arthritis and Rheumatism Association	210	801
Albuquerque Association for Mental Health	131	490
N. Mex. Society for Crippled Children and Adults	527	1,942
National Multiple Sclerosis Society	92	369
Albuquerque Association for Retarded Children	197	790
Cerebral Palsy Association of Bernalillo County	276	1,033
Muscular Dystrophy Association of America	131	485

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#### CLASSIFIED ADVERTISING

Deadline: Friday noon prior to week of publication unless changed by holiday.

#### RULES

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2. One ad per issue per person
3. Must be submitted in writing
4. Use home telephone numbers
5. For Sandia Corporation and AEC employees only
6. No commercial ads, please
7. Include name and organization

#### FOR SALE

'60 ITALIA 2000 coupe, Vignale body by Michelotti, Triumph chassis, fully equipped, red w/black leather, \$2875. Losa, AM 8-0095.

SELL OR TRADE: Firestone elect. stove completely rewired, \$25; '55 T.W.N. 200 cc motorcycle, 2500 miles, \$200. Little, 255-7864.

'60 JAWA SCRAMBLER, complete w/ road equipment, 250 cc, 6200 miles, \$325, terms, \$300 cash. Whitlow, DI 4-1991.

PORTABLE "A" FRAME welded pipe construction, \$7. Schneider, AX 9-6243.

PING-PONG TABLE, one piece, regulation size, \$25. Burnett, DI 4-0273.

SLIDE PROJECTOR, 35mm Argus portable, 100-watt, carrying case, 3 metal slide containers, 300 capacity each, \$21.50. Church, ext. 31140.

'59 VOLVO, Model PU-544, 4-speed transmission, ww/tires, R&H, \$970. Jeffers, AX 9-8124.

CHIHUAHUA PUPPIES, AKC registered, Craig, AX 9-8719.

TWO-PIECE sectional sofa, \$20. Petrini, 298-0433.

BLACK PERSIAN PAW cape stole, styled by Lauers, size 12-14, \$75. Baxter, 1610 Bayita Lane NW, DI 4-7601.

ASPHALT FELT roofing paper, 15#, 1 1/2 rolls, \$3; grey clothes hamper, \$4; '60 Falcon rim for T/T tire. Evans, AM 8-8419.

B&K DYNA-QUIK model 500 tube tester, \$70; Williamson MP w/B.O. 807 output trans., \$50. Valdez, AM 8-5375.

METAL SWING SET, needs paint, \$7.50; metal wheelbarrow, needs handle repaired, \$2.50. Asturias, 299-4173.

ZEISS CONTAFLEX, single lens reflex 35 mm, F 2.8 lens, built-in meter, range finder, case, flash, 4 close-up lenses, wide angle, tripod, \$145. Wagoner, AX 9-6801.

ASHCRAFT RESALE by owner, 3-bdr, 1 1/2 baths, carpet, drapes, near schools, Winrock, \$17,500, \$900 down FHA. Reed, AL 5-8094.

30-06 RIFLE w/pad and sling, bolt action, \$60. Myers, AX 9-8727 after 6 p.m.

YOUTH TABLE, approx. 7'x2'x2 1/2' high, plastic top, removable legs, \$10; western trousers, size 34, \$10. Pardee, AL 5-1998.

POWER LAWN MOWER, reel-type, Briggs & Stratton 4-cycle, new catcher and tires, \$20; ski pants, size 32, \$10. Glass, AX 8-0842.

STEP TABLES, 2 ea., and coffee table, blond finish, formica top, \$15 total; 2 ea. table lamps, contemporary, \$7 ea. Carter, AX 9-6653.

4-BDR ROBERSON, 1 yr. old, near Candelaria, Eubank, hw/floors, walled, draperies, covered patio, 2-car garage, 2 baths, \$18,000. Ahern, AX 8-0956.

USED AUTOMATIC WASHER, Ward-O-Matic, \$10. Frasier, AX 9-6933.

FEMALE PUPPY, small part Chihuahua, \$10. Gagg, AX 8-0267.

5-DRAWER CHEST, vanity desk and chair. Syme, AX 9-4100.

B-FLAT CORNET, Lafayette (French model), mouth pieces and all accessories included, make offer. Wright, AM 5-0519.

HEATH VTVM, \$20; 3" oscilloscope model OL-1, \$25. Allen, AX 9-9075.

J. C. HIGGINS single mantle gasoline lantern, \$7. Melick, AL 6-6449.

BABY CRIB w/mattress, trainer chair, \$10. Lew, 298-7194.

SADDLE MARE, 10 yrs. old, gentle, fast, sensitive to reining, \$175; kid's horse, gelding, former competition calf-roping horse, \$115. Taylor, AL 6-3774.

CARTOP CARRIER, aluminum and hardwood, less than half price, \$16.50. Johnson, 255-5427.

COLLECTION of Kentucky rifles, Colt rifles, Sharps carbines and Springfield musket; trade for German lugers or old handguns. Smitha, AX 9-1096.

COMPLETE AQUARIUM, Pemco 10-gal. tank, reflector-heater, filter system, air pump, hose, fish, plants, gravel, power-dip tube, decorations, \$20. Snodgrass, 268-8820.

UMBRELLA TENT, 9'x9', sewn-in floor, Ezy-up corner poles, \$25. Stark, 1334 Marron Cir. NE, 299-5953.

HAND OPERATED lawn mower, make offer. Devor, 256-7720.

FIVE ACRES, 11 miles East of city limits, overlooks Gutierrez and Tijeras Canyons, title insurance, call collect. Norcott, TO 5-7789.

STAMP COLLECTION, Regent Alban and approx. 3000 World-wide stamps, fine for beginner or for trading, \$20 or best offer. Duvall, 898-2295.

3-BDR SNOW, a/c, carpeted, walled, established neighborhood, two blocks north of Menaul, \$350 down FHA. Ray, call Sunday, AX 8-0408.

MAYTAG, 40" gas range, dutch oven, deep well, \$90. McCoach, 298-5960.

RECORD PLAYER, V-M automatic changer, 3-speed, portable, \$15; 1-burner camp stove, burns propane gas, \$3. Thayer, 1424 Hoffman Dr. NE, AX 9-3127.

3-BDR. attached garage, walled, carpet, a/c, \$350 down, \$11,250 FHA appraisal, 2412 Elizabeth NE. Higgins, AX 9-4302.

3-BDR. ASHCRAFT, w/entry hall, landscaped, FHA appraisal \$17,000. Andes, 1104 Alcazar NE, AM 8-8951.

MERCURY OUTBOARD, 5 1/2 HP; carpet sweeper, \$5; typewriter table, \$5; adjustable posture wren chair, \$5. Newman, AL 6-3295.

3-BDR. HOUSE, single garage, pullman bath, covered patio, drapes, carpet, landscaped corner lot, sprinklers, price FHA appraisal. Larsen, AX 9-3496.

NEW DKW-AUTO union workshop manual, covers all models from 1955 thru 1962, \$5. Laskar, AX 9-1024.

BOY'S size 16 sport coat, \$10, boy's 26" bike w/new tires—thorn-proof tubes, \$25; 2 7.50x14 wsw tires, \$10/ea. Christy, 265-0247.

'62 LAMBRETTA MOTOR SCOOTER, \$300. Morgan, AX 9-8192 after 3 p.m.

17" GE portable TV, \$50. Bentz, AM 8-8267.

SELL OR TRADE EQUITY, '60 mobile home, Lot 6, Lakeview Acres, Los Lunas. Hamilton, 865-9249.

IRRIGATION PUMP, Jucuzzi, 1 1/2" inlet, 1" outlet, \$40. Metzgar, 1585 Denison Rd., SW, CH 2-1028.

KITCHEN TABLE and 4 chairs. Mueller, 2728 Vermont NE, 299-1079.

#### NEXT DEADLINE

FOR SHOPPING CENTER ADS  
Friday Noon, Apr. 5

KODAK MOVIE CAMERA, new warranty, \$12; giant philodendron fiberglass urn, brass legs, \$15; Bissell carpet sweeper, \$5. Mitcham, AX 9-8425.

FULL-SIZED Hollywood bed; portable evaporative cooler; 5-piece dinette set. Zottnick, 299-6339.

RADIO RECEIVER, 3-bands, plus all band antenna, in console walnut cabinet, \$18. Browning, AX 9-6384.

SUPREME ACCORDION: 120 button base, full key board, ivory keys, complete w/case, \$125. McCutcheon, AX 9-6655.

FOUR residential lots in Albuquerque, sell or trade; Kenmore gas range \$85; old refrigerator, \$25. Kane, 256-6847.

FREE—small black male dog, 9 mo. old, short-haired, Dachshund cross, has rabies shot, good w/children. Weber, AX 9-1389.

HEAVY-DUTY Eaz-Lift trailer equalizing hitch, complete, \$40. Barth, BU 2-3134.

4x5 PRESS CAMERA and Omega enlarger, both for \$250. Finnell, AX 9-0619.

WEDGEWOOD deluxe gas range, separate broiler, clock, griddle, \$65; GE Mobile Maid dishwasher, \$65. Parsons, AX 9-0400.

HEATER, upright wall type, 35,000 BTU, manual, \$35 or best offer. Monette, AX 9-3517.

SPEAKER SYSTEM, 5-way, Electro-Voice "Patrician." Taylor, AL 6-3221.

27" MUNTZ TV; Universal ironer; 180' of 1 1/2" black pipe; wrought iron railing 30' high by 35' long. Salazar, AL 5-1301.

'57 CHEVY 1/2-ton pickup, 3-speed, R&H, new paint last summer, \$650. Chester, BU 2-3145.

AKC REGISTERED male Welsh Terrier pups, these are relatively small, non-shedding dogs, make fine family pets. Cockerleas, 298-3740.

3-BDR, 1 1/2 ceramic bath, Fatima-Hiland, carpets, drapes, fireplace, dbl. garage, corner, below GI or trade for 2-bdr, near base. Easton, 256-7717.

BABEE-TENDA, \$15; '49 Chevrolet 2-dr., '63 license, new battery, \$125. Beatty, AX 9-3429.

MUST SELL all household furnishings by noon 3/30/63; beds, refrigerator, gas range, washer, tables, chairs, chest, lamps, etc. Massey, 298-4650.

GAS RANGE, apartment size, \$35. Sayers, 344-8597 after 5 p.m.

12 GA. DOUBLE, custom Enfield; nicked Colt-45; 8mm Mauser; scoped 30.06 Enfield; 1911-M1A1 Colt-45; B&L shooting glasses. Kasperek, 255-0224 after 5:30 p.m.

DISHWASHER; sofa, other items. Piraino, 616 Madison NE.

REGISTERED APPALOOSA stud colt, 9 months old, very gentle and colorful, \$375. Harker, 282-3435.

ENGLISH BIKES, man's, woman's, \$35/ea.; mangle, \$20; guitar and pickup, \$140; mandolin and pickup \$60. Abbott, AX 9-8860.

16'x20' CABIN set on your lot; '53 Buick Special; aluminum windows, 5'x3'; 12" P.M. speaker; three cemetery lots. Villella, 299-6261.

CHAPMAN RESALE, 3 bdr., dining room and den with fireplace, pitched roof, double garage, very large backyard. Tucker, AX 9-7711.

GE MIXER, \$5; 3-piece carving set, \$2; tilt-top cord table, \$3; crocheted bedspread, linen tablecloth and napkins, make offer. Strickler, 256-3830.

HEYWOOD-WAKEFIELD corner table, champagne maple, \$90 new, sell for \$40. Kubiak, 256-1513.

EVINRUDE ELTO Ace 2.2 hp outboard motor, some spare parts. Goss, 299-3093.

'59 RAMBLER classic 4-dr, 6-cyl., overdrive, R&H, ww, reclining seats, only 30,000 miles, \$950. Bytheway, 299-2791.

REGISTERED PEKINGESE, female, house-trained. Keyser, AL 6-1285.

'58 LINCOLN Premier, hardtop coupe, power, factory air, seat belts, \$1250. Nielsen, AL 5-2045.

GRETSCH Electromatic guitar, cost \$135, sell for \$75; pair of hearing aid spectacles, cost \$250, make offer. Lopez, AX 9-0941.

'56 BUICK Roadmaster, 4-dr., PS, PB, R&H, \$300. Disch, AX 9-1201.

ELECTRIC STOVE, \$25; automatic washer, \$20; chrome dinette, \$25; rolltop desk, \$40; baby bed, buggy, bathinette, high chair, teeter-babe, \$20. Allison, AX 9-1400.

4 BDR, 1 1/2 baths, dbl. garage, large LR/ fireplace, electric built-ins, dishwasher, AC, sprinklers, no down GI, low down FHA, \$17,500. Bassett, 299-5685.

POWER MOWER, Jacobsen 18" rotary, vacuum grass catcher, \$35. Maglidt, 268-7601.

MEN'S GOLF clubs: complete set new Spalding woods; used MT irons, lightweight bag, \$85. 1962 T-Bird, 12,000 miles, all power, AC. Chandler, 298-5069.

DOUBLE BUNKBED w/mattresses, \$45; Coleman 2-burner camp stove, \$4; Argus 35mm slide projector, \$10. Sasser, AX 8-1439.

FORMICA KITCHEN table, 36"x48"x60", decorative grey pattern, chrome trim, four matching chairs, \$45. Sundberg, AX 9-2177.

YASHICAMAT 2 1/4x2 1/4 twin lens reflex camera, leather case, cable release, filter adapter rings, \$40. Berg, AX 9-7334.

7:10x15 tires, battery, Allstate guarantees, ignition coil, starter, headlamps, six-volt, shock absorbers, water pump, all recent Hudson parts. Anderson, ext. 27174.

2 TV SETS: 21" console Philco; 21" table model, \$150. Speakman, AX 9-0241.

KIT ALUMINUM camp trailer, teardrop, sleeps 2, butane hot plate and icebox under rear lid. Montgomery, AM 8-2960.

'55 FORD Ranchwagon, V-8 with overdrive, R&H. Redding, 298-2516.

21" TV and 4-speed phonograph stereo combination, mahogany cabinet, \$150 or best offer. Schaefer, 298-1041 after 5 p.m.

'57 CHEVY 210 V-8, overdrive, Hurst floor shift, radio, original upholstery, ww, electric wipers, \$850. Small, AX 9-0023.

TRUMPET w/case, \$50; fireplace screen, tools, \$10; ladies' unlined blue spring suit, size 14, \$10. Love, 298-6640.

TOBAGGAN, six ft. Lund; 16" Admiral Brooks TV; baseball shoes, size 11. Brooks, AX 9-1884.

BAY FILLY, \$90; bay mare, \$175; at stud, "Joe Saul," AQHA King bloodlines. Drannon, TR 7-9144 after 6 p.m.

CHERRY BR suite; mahogany bedroom suite; dropleaf mahogany table w/two chairs, matching chest of drawers. Welch, 1117 Richmond Dr. NE, AL 5-4876.

FLOWER POTS, clay, approx. 175, various sizes 2 1/2 to 7 in. in diameter, \$4 for the lot. Hill, CH 3-3493.

'61 CORVAIR, 4-dr. sedan, 4-speed transmission, 98 hp engine, R&H. Hollar, 256-3840.

SHELLAND SHEEPDOGS, three, six-weeks old (toy collies), AKC registered, champion bloodlines. Heuer, AX 9-2263.

ACCORDION, Italian-made, \$50. Gower, 877-1223.

VACUUM CLEANER, new Revelation, w/ polisher and paint sprayer, paid over \$100 two weeks ago, sell for \$80. Little, 255-7864 after 5 p.m.

'61 CUSHMAN Mustang Thoroughbred motor scooter, 2700 miles, emerald green, \$400. Henderson, 255-1941.

POODLES, black, miniature male, 8 weeks, purebred, no papers, \$40 each or trade. Eversgerd, AL 6-6345 after 3 p.m.

DISHWASHER, Kitchenmaid, built-in model, stainless steel front, \$120 or trade for portable model. Tennyson, 299-3208.

SHELLAND PONY; 300 gal. gasoline storage tank; 40" Tappan gas range. Wolfe, 877-9528.

AUTOMATIC WASHER, new Westinghouse, used three months, \$150. Whitcomb, 256-0577.

DINING ROOM SUITE, dark oak table, buffet, 4 chairs, \$45. Hutton, AL 5-7435 after 5 p.m.

POWER MOWER, 21" Toro, Briggs & Stratton engine, \$25; reed screening, 4' wide & 20' long, \$5. Hansen, 3119 Lykes Dr. NE, AX 8-0308.

#### FOR RENT

TRAVEL TRAILER, 15 ft., sleeps five, butane stove with oven, lights, ice-box. Have low cost vacation this year. Colp, AM 8-8035.

NEW 2-BDR. APT., unfurnished, SE near bases, new stove and refrig., \$75/mo. West, AL 5-0456.

#### WANTED

RIDE or will drive in turn in car pool, vicinity Kathryn, Southern or Bell on Palomas SE. Rettinger, AL 6-1552.

6' 9" x 36" SCREEN DOOR. Gay, AX 9-5625.

VALLEY OR RANCH HOME for 1 1/2 yr. old sprayed female dog, mostly Basset, very friendly, loves children, points, could be good hunter, needs more room to run. Stromberg, AL 5-6131.

TO TRADE: useable crib (mattress good) for useable tricycle or other sidewalk toys. Beckley, AX 9-3440.

SPLICER with viewer, 8 mm film. Windham, 256-9455.

SHOE SKATES, men's, size 9-10. Barrett, AM 8-2963.

RIDE daily from vicinity of Tulane SE (near Carlisle) to bldg. 800. Fitzpatrick, AM 8-8342.

RIDE badly needed by handicapped employee from 1100 Wilmore Dr. SE to vicinity Bldg. 800. Montague, CH 2-5153.

RIDER from vicinity of Comanche and Montclair to Bldg. 800. Winblad, DI 4-3109.

RELIABLE, economical transportation car. Will pay up to \$495. Browning, AX 9-6384.

TO RENT, NE Heights home, 2 or 3 bedrooms. Will occupy about Apr. 12-June 15. Hauer 298-3624.

CLOTHING, bedding, furniture, curtains, etc. for needy families. Lopez, AX 9-0941.



## W. Lee Hancock Will Head City's UCF Campaign

W. Lee Hancock, AEC-Sandia Area Office manager, has been appointed general chairman for the 1963 United Community Fund.

Mr. Hancock has been active in UCF for several years. He has been a member of the board of directors for three years, directed the campaign within the AEC-ALO in 1960 and 1961, and served on the UCF budget panel.

During the last campaign, Mr. Hancock headed the UCF atomic division which raised more than \$250,000. Sandia Laboratory employees' contributions are included in the figures for this division.

Mr. Hancock has been manager of the Sandia Area Office since February 1962.

## Citizenship Action Program Attracts Sandia Employees

Several Sandians attended the recent U. S. Chamber of Commerce seventh annual AIRCADE for Citizenship Action.

Purpose of the nationwide tour of 15 cities was to present a picture of the 88th Congress, its mood, makeup, likely tempo, strengths, weaknesses, and probable course in the months ahead. Solid facts were given on analyses of all major congressional issues—their potential effect on business, family, community, and nation. Arch N. Booth, National Chamber Executive Vice President, served as discussion leader.

Those attending from Sandia were L. J. Heilman (2600), K. A. Smith (3400), R. J. Hansen (4200), C. J. McGarr (4600), K. S. Spoon (4300), T. B. Sherwin (3431), T. M. Gemberling (6041), and A. L. Winkeljohn (7113).

## Millions of Americans Suffer Some Type of Heart Disease

by S. P. Bliss, M.D.  
Sandia Corporation  
Medical Director

More than 10 million Americans of all ages have some form of cardiovascular (heart) ailment. In addition, these diseases are responsible for more than 54 per cent of all deaths. In 1961 about 35 per cent (243,330) of these deaths occurred in people under 65 years of age.

However, there has been great progress in the diagnosis and control of these diseases. Thousands of people who receive proper medical care now survive these disorders that were considered hopeless only twenty years ago.

This is the picture today:

Most people who have heart attacks recover and can go back to work.

High blood pressure can usually be controlled.

Recurrent attacks of rheumatic fever, forerunner of rheumatic heart disease, can be prevented, and progress is being made in preventing attacks.

Strokes are not hopeless. Invalidism can often be reduced or prevented.

Heart defects can often be repaired, and sections of diseased arteries can be replaced through surgery.

Many patients with circulatory disorders affecting their legs and arms are helped by medical or surgical treatment.

To understand the problem of cardiovascular diseases, it is nec-

essary to know something about the heart and the circulatory system.

The job of the circulatory system is to distribute blood throughout the body, bringing a steady flow of nourishment and oxygen to the billions of body cells, and removing wastes from the cells.

The heart is a muscular pump that keeps the blood circulating through the network of arteries and veins. A system of valves regulates the flow of blood through the veins, and through the heart into the arteries.

The red blood going through the arteries carries nutrients and oxygen to the body cells. Blood in veins, which has turned a dark bluish-red, carries waste products, including food wastes and carbon dioxide, from the body cells.

Most waste products are filtered out of the blood by the kidneys. In the lungs, the blood gets rid of carbon dioxide and takes on a new supply of oxygen. This turns the blood bright red again. Then it flows back to the heart, to be pumped out through the arteries to the rest of the body. This cycle is repeated thousands of times a day.

When any part of this circulatory system is seriously impaired, the body cells it serves are deprived of their blood supply and will break down. The damage may occur in the heart itself, in the brain, the lungs, kidneys, skin, or any other part of the body.

## No Rocking Chair Retirement

# S. A. McCollum Brings Lifetime of Skill Into Work at New Mexico Rehabilitation Center

"No rocking chair retirement for me," S. A. McCollum, Sr., says. "I tried it. I took a couple of trips to Alaska to visit my daughter. I took up golf. I joined a bridge club. It didn't fill the bill."

For almost a year now Mac has been production supervisor at the Work Adjustment Center of the New Mexico Rehabilitation Center. He works with mentally and physically handicapped persons to help train them in manual and machine shop skills ultimately to become self-supporting citizens.

Mac retired from Sandia Laboratory in September 1960 at the age of 70. He will be 73 this month, but the age doesn't show. He walks briskly, his conversation is hearty, and smiles often, a rare quality of enthusiasm.

"I started to work when I was 14," Mac says, "and I'm too old to change my habits now. The thing about working after retirement is that you can choose your job. This one is ideal for me. I no longer have to work for myself — my retirement income is adequate. I work only for what I can do for other people. In this way, I seem to put some meaning into my life, and I certainly get plenty of satisfaction from it."

Mac tells the story of "a little squirt" who came to the Rehab Center. "This kid was small and felt useless. He had not received much encouragement or much help. We worked with him for a while and told him that being small is not particularly a handicap. In fact, some jobs require little people. We arranged for him to take training to become a jockey for a racing stable in Arizona."

## Apparent Low Bid Received for New Laboratory Facilities

G. W. Stuckman Construction Company of Albuquerque is apparent low bidder to construct two new facilities for Sandia Laboratory, the Atomic Energy Commission announces.

The firm's bid of \$176,192 was the lowest of seven received.

One of the new facilities will be located in Coyote Test Field and will be used by Physical Properties Division 1113 to examine properties of materials subjected to explosions. Main building will be of reinforced concrete and will contain about 1200 sq. ft. A metal igloo and three small buildings for high explosives storage will complete the facility.

R. G. Piper (4543-3) is the Plant Engineering project engineer.

The second facility will be a reinforced concrete building of about 1700 sq. ft. in Tech Area II. It will be a laboratory building for Electronic Component Development 1400.

K. D. Harper (4543-3) is the Plant Engineering Department engineer.

Work is to be completed on both facilities within 150 days after the contractor is notified to proceed by the AEC.

## Kit Carson Council Boy Scouts Present Award to Company

The Kit Carson Council of the Boy Scouts of America has awarded a certificate of Appreciation to Sandia Corporation for "exceptional cooperation and support" of the Scouting movement during the past year.

The certificate was awarded Feb. 15, with a citation expressing "deep and sincere thanks and appreciation to the Management and Personnel of Sandia Corporation for its generous support, help, and cooperation during the past year." The citation was made in a letter by Fred D. Huning, Jr., president of the Kit Carson Council.

Suddenly he cared about himself. Some new clothes, a haircut, and he left for the new job feeling like somebody special."

Mac can tell other success stories about the people who come to his workshop.

"A retired worker can almost be compared to a handicapped worker," Mac says. "People need something worthwhile to do — real, useful work, geared to their particular situation. There's nothing worse than feeling useless."

Special feature of the Work Adjustment Center is that trainees do perform productive work. They are paid a wage for the tasks performed. The Center provides a number of services to local firms—jewelry production and polishing, electrical assembly, packaging, buttons and buckles for clothing, and wooden parts.

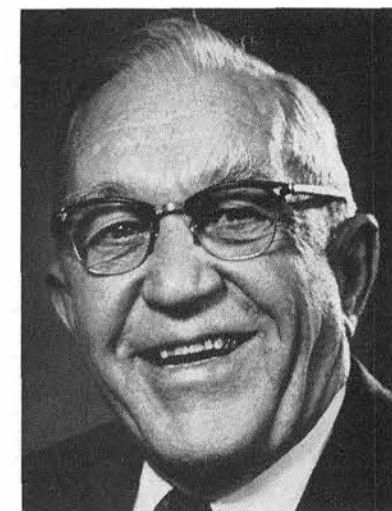
The Center staff also provides specialized evaluation and vocational counseling. Most of the trainees are referred to the Center by the New Mexico Division of Vocation Rehabilitation.

Mac puts some fun into his life too. He still golfs and plays bridge. He is a member of the Senior Citizens organization and attends social functions at the VFW club. "Dancing is my second hobby," he says.

During one of his trips to Alaska he was held up by bad weather. He learned the twist in Yakuta at an Elks Club dance. "I couldn't sit around the airport for two days," he said.

Mac worked in Sandia Field Test organizations from 1948 until 1960. He had previously taught in-

dustrial arts at Kansas State University and the University of Wyoming. During World War II, he was employed by the Physics Laboratory at Johns Hopkins University working on the development of proximity fuses.



S. A. McCollum, Sr.  
"I don't have to work for myself."

## L. J. Vortman Reviews 'Project Plowshare' Book

A review by L. J. Vortman (5412) on the recently-published book, "Project Plowshare," by Ralph Barden, appeared in the Natural Resources Journal of Dec. 1962, and has been reprinted by the University of New Mexico School of Law.

## AEC Reports List of Popular and Semi-Technical Nuclear Science Books

The following book list was compiled by the Atomic Energy Commission in connection with observance of the 20th anniversary of man's first control of the energy of the atom, achieved at Chicago in 1942.

The books primarily contain background material on nuclear progress.

A notation following each book indicates local libraries in which it is available.

Bishop, Amasa S., *Project Sherwood: the U. S. Program in Controlled Fusion*, prepared for the United States Atomic Energy Commission. New York: Anchor Books, 1960. 227 pp. (Sandia and Livermore Laboratories' Technical Libraries, Albuquerque Public Library).

Dean, Gordon E., *Report on the Atom: What You Should Know About the Atomic Energy Program of the United States*, New York: Alfred A. Knopf, 1957. 359 pp. (Sandia Laboratory Technical Library, Albuquerque Public Library).

Fermi, Laura, *The Story of Atomic Energy*, New York: Random House, 1961. 184 pp. (Albuquerque Public Library).

Gamow, George, *The Atom and Its Nucleus*, New Jersey: Prentice-Hall, 1961. 153 pp. (Albuquerque Public Library).

Glasstone, Samuel, *Sourcebook on Atomic Energy*, New Jersey: Van Nostrand, 1958. 641 pp. (Sandia and Livermore Laboratories' Technical Libraries, Albuquerque Public Library).

Technical Libraries, Albuquerque Public Library, Sandia Base Special Services Library).

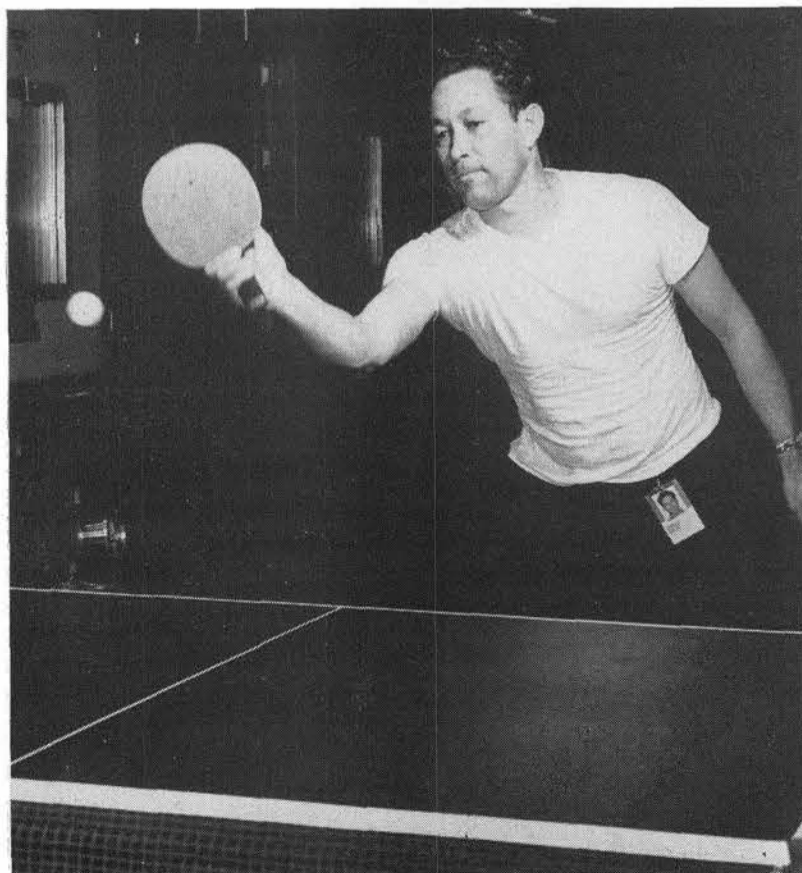
Hewlett, Richard G. and Oscar E. Anderson, *A History of the United States Atomic Energy Commission: Volume I: The New World, 1939-1946*, Pennsylvania State University Press, 1962. 766 pp. (Sandia and Livermore Laboratories' Technical Libraries, Albuquerque Public Library).

Pearl, Carleton, *The Tenth Wonder: Atomic Energy*, Boston: Little, Brown, and Co., 1956. 129 pp. (Albuquerque Public Library).

Romer, Alfred, *The Restless Atom: The Awakening of Nuclear Physics*, New York: Anchor Books, 1960. 198 pp. (Albuquerque Public Library).

Schwartz George I., *Moments of Discovery*, ed. George Schwartz and Philip W. Bishop. New York: Criterion Books, 1958. 184 pp. (Sandia and Livermore Laboratories' Technical Libraries, Albuquerque Public Library, Sandia Base Special Services Library).

The U. S. Atomic Energy Commission supplies a variety of informational literature without charge. Requests should specify the area of interest (power plants, medicine, particle accelerators, etc.) and occupational uses such as 7th grade teacher, discussion group chairman, etc. Write: U. S. Atomic Energy Commission, Division of Technical Information Extension, Educational Material Section, P.O. Box 62, Oak Ridge, Tenn.



UNDEFEATED CHAMP of the Sandia Laboratory table tennis singles tournament is Ernie Gurule (7332). Ernie took the title for the second year in a row by defeating Jack Chavez (2625) in the finals last week.

## Sandia's Safety Record

**Sandia  
Laboratory  
HAS WORKED  
805,000 MAN HOURS  
OR 23 DAYS  
WITHOUT A  
DISABLING INJURY**

**Livermore  
Laboratory  
HAS WORKED  
1,086,000 MAN HOURS  
OR 207 DAYS  
WITHOUT A  
DISABLING INJURY**