



NSPE Committee Urges Certification of Engineering Technicians

The Engineering Technician Committee of the National Society of Professional Engineers will meet in Kansas City, Mo., Apr. 3-4, to discuss organization of a society of engineering technicians.

The NSPE is sponsor of the Institute for the Certification of Engineering Technicians, a non-profit examining group formed in 1962. Several Sandia engineering technicians have been certified by the Institute.

Vern Barcafar (7253) was the first Sandian — and the first New Mexican — to be certified. Other early recipients of certification include Roger Kurtz (7331), A. G. Bauer (7332-3), and E. M. Bauer (7334-3).

Larry R. Gallo (5312) is coordinator at Sandia for the program. "We're interested in increasing the participation of engineering technicians in the program," he said, "and especially in organizing certified technicians by means of a national society."

Larry has the necessary reference forms and applications for certification. He may be contacted by telephone at 255-9129.

Contributions for Local Groups Up To \$51,992 for '64

With the mailing of checks last week, a total of \$51,992 has been distributed by the Employees' Contribution Plan to the United Community Fund and the eight additional agencies participating in the plan.

The following distribution has been made:

	Feb.	Year to Date
United Community Fund	\$11,783	\$42,047
American Cancer Society	722	2,657
Bernalillo County Heart Association	592	2,228
National Arthritis and Rheumatism Foundation	187	688
New Mexico Society for Crippled Children and Adults	534	1,927
National Multiple Sclerosis Society	187	688
Cerebral Palsy Assn. of Bernalillo County	101	363
Muscular Dystrophy Assn. of America	202	732

Sandia Physicists Develop Ceramic Memory Device For Electronic Computers

A new kind of ceramic computer information storage device, or memory element, is under development by Component Physics Division 5136. The ceramic material, made of hot-pressed rhombohedral lead-zirconate-titanate, can store information in more than 10 stable states.

Conventional computers use binary memory units which store only two digits (either 1 or 0) and require decimal to binary conversion for storage. Frequently, a second conversion process (binary to decimal) is required in the readout of the stored information.

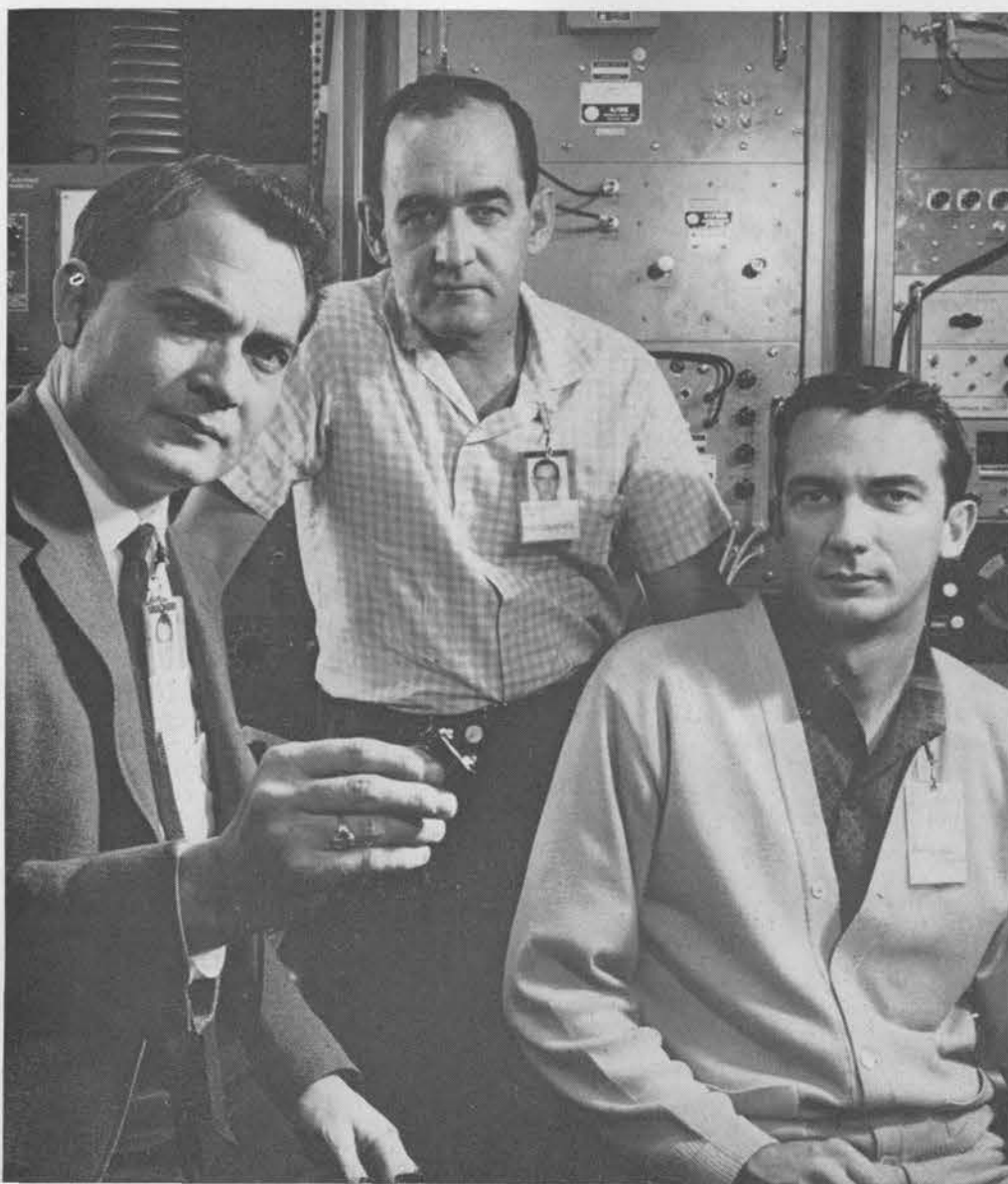
Using the new ferroelectric ceramic multi-remembrance memory elements developed by Division 5136, information could be stored using the decimal system. This would, in effect, provide increased storage capacity for a given number of memory elements, and eliminate the decimal to binary conversion process required for conventional information storage. Results of recent investigations indicate that both write-in and readout of information may be ultimately faster using the ferroelectric memory elements.

"The device has possible use in computers designed for space applications," Cecil E. Land says. "The material is relatively insensitive to high energy particle irradiation, high electromagnetic fields, and temperature variations."

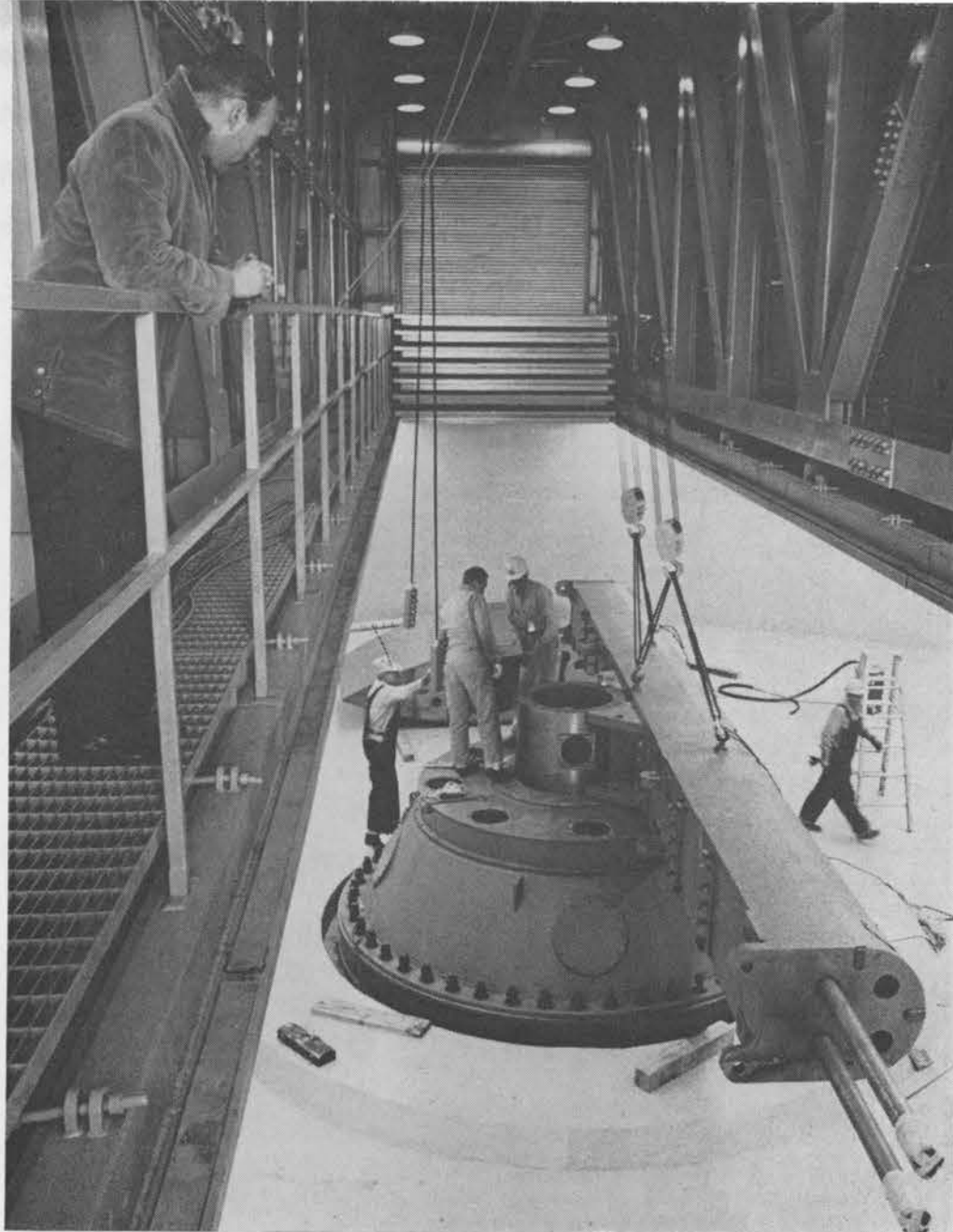
Cecil and co-workers G. W. Smith and I. D. McKinney have spent several months investigating and evaluating the possibilities of the material. The results of their work were presented this week in a paper, "Polycrystalline Ferroelectric Multi-Remembrance Memory Elements," during the Institute of Electrical and Electronics Engineers international convention in New York City.

The technique for producing the ferroelectric material was developed by G. H. Haertling of Materials Research Division 5135. He mixes powdered lead, zirconate, and titanate; inserts it into a special Sandia-developed mold; and places the mold in a hot press assembly. The hot press can

PROJECT TEAM responsible for the development of a new information storage device, are from left, C. E. Land, I. D. McKinney, and G. W. Smith (all 5136). The small solid-state device which Cecil is holding resembles a shirt button, but can store decimal information in more than 10 stable states.



(Continued on Page 3)



J. L. Wheeler Promoted To Commander in U. S. Naval Reserve



John L. Wheeler, recruiting coordinator for Employment Division 3151, has been promoted to Commander in the U. S. Naval Reserve. He is currently executive officer of the Reserve's Mobilization Team 8-2.

Commander Wheeler served during World War II as a Radioman on PT boats in the Pacific. Upon discharge from active duty, he joined the Naval Reserve and was commissioned in 1948. During the Korean conflict he was recalled to active duty and served on an attack transport. He previously was assigned to Surface Division 8-106 (M) and was that unit's commanding officer for the last two years.

NEW CENTRIFUGE — Contractors last week completed assembly of Sandia's newest test device in its underground Area III building. The 55-ft., 30-ton arm will rotate an eight-ton test specimen to forces of 100 G. Environmental Research and Operations Department will operate the centrifuge when it is completed, John C. Krimmel, Division 7311-2 project engineer, is at left.

New Centrifuge Will Yield 200-G Force

Contractors lowered four massive pieces of the 55-ft. arm of Sandia Laboratory's new centrifuge into place last week. The underground Area III facility is now almost completed. The new centrifuge will perform to meet design specifications of Facilities Engineering Division 7311.

John C. Krimmel (7311-2), project engineer, expects the new facility to be in operation next month.

The new centrifuge is the largest in the free world in terms of dynamic load capacity. The machine is designed to accelerate an eight-ton specimen at 108 rpm, producing forces of 100 G and a dynamic load of 1,600,000 G-lbs. With a four-ton test specimen, the centrifuge will have speeds up to 154 rpm (200 G), equivalent to 274 mph.

The arm of the centrifuge has a 25-ft. radius. Constructed of heavy welded steel and assembled in four pieces, the arm weighs 30 tons. Contractors poured a special steel and concrete base weighing 225 tons to anchor the centrifuge assembly and to absorb the forces of its spin.

Environmental Research and Operations Department 7320 will use the new centrifuge in combined environmental tests—both acceleration and vibration—to simulate forces of rocket launch, reentry, and other field environments.

The hydraulic power supply from Sandia's existing centrifuge will drive the new machine. In addition to the combined environment capability, the new centrifuge has a greater load capacity and more versatility of operation than the present centrifuge. The old machine will continue to be used to accelerate specimens weighing up to five tons.

The new facility is located about 200 ft. northwest of the present centrifuge. A reinforced concrete arena 80 ft. in diameter houses the equipment. A metal service building with overhead bridge cranes, and adjacent instrumentation and control rooms complete the facility.

(Editorial Comment)

Making The Company Go —

Employees of Sandia Corporation make the Company go. Employees are and should be deeply concerned about the Company, its success, and its future. Their feeling toward the Company goes beyond doing only what the job requires, beyond being pleasant, agreeable, willing, and always present.

A small group of men demonstrated recently how they feel about Sandia.

An employee was on vacation in a west coast city. At a social gathering, the fact was mentioned that he worked at Sandia. Another person in the group quickly launched into a discussion of the high quality of Sandia, its outstanding technical accomplishments, and its position of respect in his own company, which happens to be one of the larger employers on the west coast.

It became apparent that the person making the remarks had never visited Sandia in Albuquerque, nor had he been at Sandia's Livermore Laboratory in Livermore, Calif. How, then, had he formed his opinion of the company with which he had had so little contact?

He had seen a group of Sandia engineers working in his company on a Sandia project. He saw his company reports on the Sandia engineers' accomplishments. He had talked to people who worked closely with the Sandia people over an extended period of time. To him, and to the personnel of his company, these few men were Sandia Corporation.

Sandia employees' concern for the company which provides them with a livelihood has been seen on other occasions.

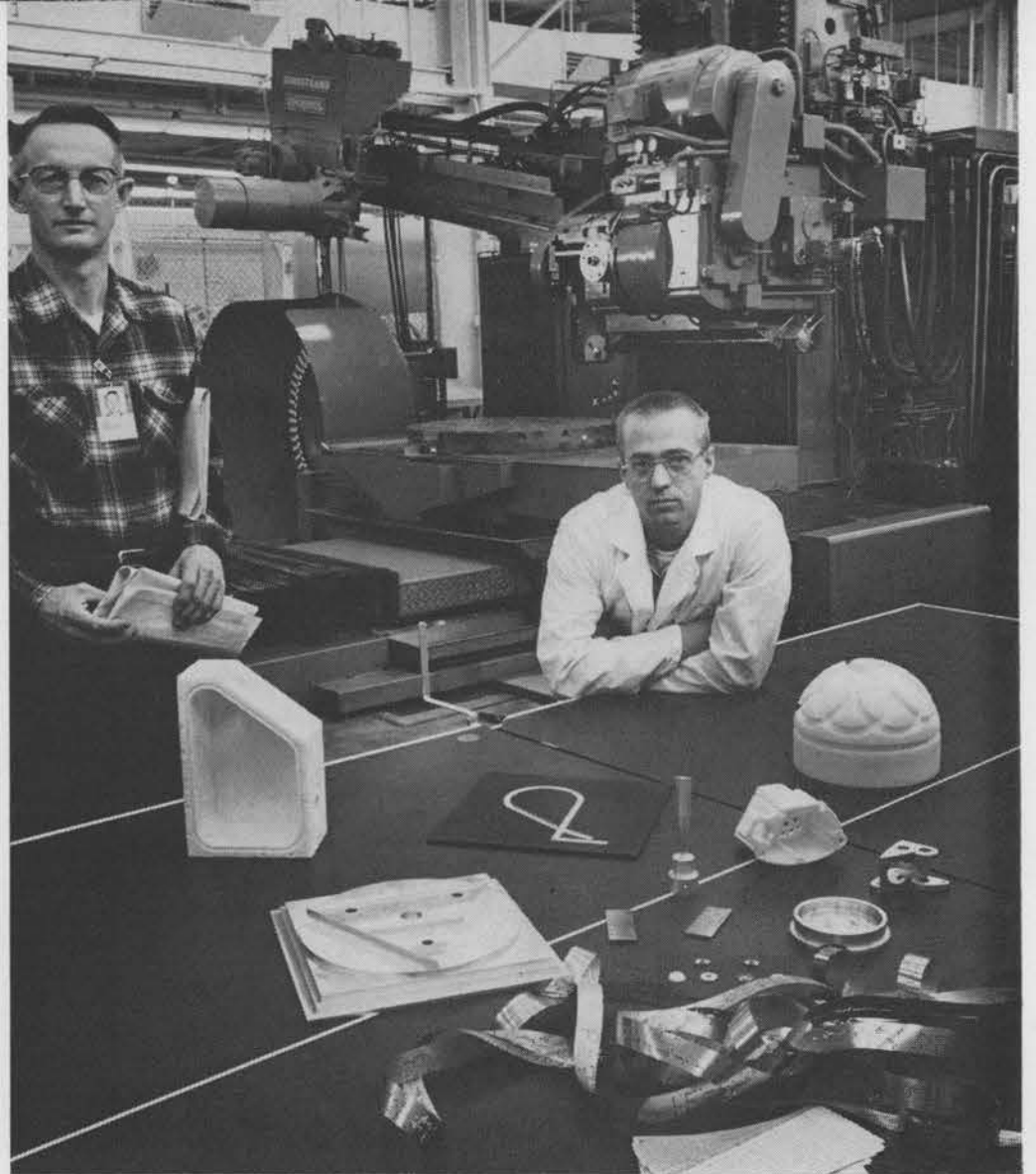
There is the Sandia employee who always is careful to explain to his questioning neighbors the reason for Sandia's close attention to safety and security. Not one to pass off the queries with the words "it's policy," he relates that a safe place to work operates more economically than one which shrugs off safe practices. He counters comments of "kid-type cloak-and-dagger stuff" with a calm explanation of the part national strength plays in maintaining peace.

His neighbors have decided he is a well-informed, sensible, realistic person — and so is Sandia a well-informed, sensible, realistic concern.

Then there is another member of the company who is Sandia Corporation to many in the local area. His job takes him to establishments doing business with Sandia. The businessmen recognize the car he drives as a Sandia car; they recognize his business knowledge as Sandia business knowledge; they recognize his manners as Sandia manners.

There are other examples of Sandians who perform beyond the call of duty. There are many employees who make a habit of going that extra mile.

Some call this company loyalty.



Omnimil Gets Good Workout These Days At Sandia Laboratory

The five-axis Omnimil OM-3, a programmed milling machine installed a year ago in Bldg. 840, and being operated by Program Machining Division 4251, supervised by L. W. Stouder, is proving its mettle these days.

It's being used for a variety of operations, and from it, Division 4251 is learning some interesting things about programmed milling applications which will be useful as the programmed-machine program expands at Sandia.

The machine is being used for tasks which are difficult or impossible to perform on conventional equipment. It's proving to be especially useful in work with cams and three-dimensional cuts. But perhaps its greatest value lies in milling analytical geometric shapes such as curves produced by mathematical formulae.

Omnimil performs sequences of milling, drilling, boring, tapping, and tool-changing functions on electronic commands from control tape used in a computer-like control unit. The tape is the product of milling programs prepared by Machine Tool Programming Section 4251-1, using "SPLIT" and "APT III" which are English-like programming languages using word-number combinations. Personnel of Applications Oriented Systems Division 7624, supervised by D. K. Robbins, are working on computer phases of the program preparations.

Sandia Corporation is a member of the Automatically Programmed Tools program, a national effort for the development of programmed tooling equipment, and the development of the APT language for standardized program tooling.

Promotions

Candido Montoya (4624) to Material Handler
Frutoso Gurule (4511) to Helper-Trades
John T. Sandoval (4432) to File Clerk
John E. Arnold (3413) to Messenger
Glen D. Casey (7612) to Messenger
Naomi A. Gallegos (4431) to Typist
Isabelle Allan (2321) to Record Clerk
Lina J. Harbo (8144) to Secretarial Steno
Doris M. Brown (8214) to Record Clerk
Frances M. Johnston (8233) to Typist
Michael Drago (4413) to Draftsman
James A. Dyer (1313) to Lab Assistant
C. Trujillo, Jr. (7623) to Staff Member, Administrative
Sidney H. Wagner (8231) to Staff Member, Administrative
Donald D. Robie (2542) to Staff Associate, Technical
William E. Schuetz (7226) to Staff Assistant, Technical
Richard J. Eisold (4413) to Staff Assistant, Drafting
Charles F. Collier (4233) to Coil Maker
James J. Ryan (4233) to Assembler
Charles E. Smith (4574) to Janitor
Einar H. Morterud (4611) to Instrument Technician
Barbara C. Garcia (3126) to Secretarial Typist
Cynthia Hanna (3421) to Library Assistant
Jean A. Kirby (2642) to Service Clerk
Enid A. Morton (4153) to Accounting Clerk
Ronald B. League (8214) to Shipping and Receiving Clerk
Glorianne S. Garcia (3153) to Typist Clerk
Joan E. Jackson (4411) to Draftsman
Emory E. Padgett (8223) to Machinist
Supervisory Lateral Transfers
E. L. Emerson from 4214-1 to 1521-3
J. P. Myers from 1521-1 to 4214-1
L. M. Jercinovic from 2640 to 3210
A. B. Church from 1433-1 to 7254-2
W. H. Myers from 4183-1 to 4137-2
J. N. Timmons from 3245-1 to 2641-3
G. O. Thorne from 2641-3 to 3245-1
C. Summers from 2632-1 to 2631-2

PROGRAMMER Oran D. May (4251-1), left; and Operator John Malpas, Jr. (4251-2) working with punched cards and programming tape are using the numerically controlled milling machine in Bldg. 840 to produce a variety of milled products made of several materials. Although Omnimil (in background) weighs 60,000 pounds, it can be used to produce very small parts, like tiny geared wheels shown here, to extremely close tolerances. Foam hemisphere in right background illustrates machine's ability to mill materials on five axes.

Congratulations

Mr. and Mrs. L. C. Jeffers (7245), twin girls, Barbara Rhea and Deanna Kay, Feb. 19.

Mr. and Mrs. E. H. Gallegos (4152-2), a daughter, Venisa Marie, Mar. 5.

Mr. and Mrs. R. E. Martin (2543-1), a son, Steven Jeffrey, Feb. 26.

Mr. and Mrs. F. Toya (3462-3), a son, Feb. 29.

Mr. and Mrs. J. A. Lipham (1414), a son, Robert Michael, Mar. 9.

Mr. and Mrs. B. C. Bader (1541), a daughter, Deirdre, Mar. 10.

Mr. and Mrs. R. L. Flury (1542), a daughter, Dana Lee, Mar. 9.

Mr. and Mrs. M. M. Plugge (1512-3), a daughter, Carol Diane, Mar. 9.

Mr. and Mrs. C. S. Selvage (1533), a son, Walter David, Mar. 13.

Mr. and Mrs. Dale Shenk (4412), a son, Kevin Dale, Mar. 17.

PAGE TWO

LAB NEWS

MARCH 27, 1964

SANDIA CORPORATION LAB NEWS



ALBUQUERQUE, NEW MEXICO • LIVERMORE, CALIFORNIA

Editor: Robert S. Gillespie
Sandia Corporation, Albuquerque, New Mexico

Editorial Offices
Sandia Laboratory
Albuquerque, New Mexico
Employee Publications
Bldg. 610
Tel: 264-1053

Livermore Laboratory
Livermore, California
Publications & Public Relations
Bldg. 912
Tel: Hilltop 7-5100, Ext. 2395

Permission to reprint material contained herein for other than governmental use may be obtained from the Editor, Lab News, Sandia Corporation.

7



— Kay Hunemuller —
3126/4432-4

Take a Memo, Please

Keep all floors dry and clear of grease or other substances that might cause someone to slip and fall.

Sandia Authors

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

J. A. Corll (5132), "Fabrication of Epoxy Electrical Lead Insulation for Pressure Vessels," February issue, *Review of Scientific Instruments*.

Albert Narath and W. J. O'Sullivan (both 5151), "Low-Frequency Super-regenerative Oscillator Design for the Detection of Broad-Line Nuclear Magnetic Resonance," April issue, *Review of Scientific Instruments*.

H. L. Davis and Albert Narath (both 5151), "Spin-Wave Renormalization Applied to Ferromagnetic CrBr₃," April issue, *Physical Review*.

Bruno Morosin and Albert Narath (both 5151), "X-ray Diffraction and Nuclear Quadrupole Resonance Studies of Chromium Trichloride," April issue, *Journal of Chemical Physics*.

L. S. Nelson and N. L. Richardson (both 5414), "The Use of Flash Heating to Study the Combustion of Liquid Metal Droplets," April issue, *Journal of Physical Chemistry*.

G. P. Carter (1433), "Circuit Prevents Pulse Interruption or Chatter," Mar. 16 issue, *Electronics Design*.

Sympathy

To Ray Bishop (4224-3) for the recent death of his mother in Marshall, Mo.

To Archie J. Lackey (7241-2) for the death of his infant son on Mar. 10.

To L. J. Woolrich (7322-1) for the death of his father in Wyoming on Mar. 20.

Sandia Speakers

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

Ira T. Holt (7424), "Design, Development and Testing of a Ram-Air Inflated Flotation Device," Parachute Technology and Evaluation Symposium, Apr. 7-9, El Centro, Calif.

R. H. Braasch (2423), "The Sequential Multiplexing Scheme," the International Conference on Non-linear Magnetics, Apr. 6-8, Washington, D. C.

R. H. Braasch, E. J. Bernard, and T. A. Howard (all 2423), "Programmable Timer: Utilizing Feedback Shift Registers and Sequence Detectors," the International Conference on Non-linear Magnetics, Apr. 6-8, Washington, D. C. Mr. Braasch will make the presentation.

J. C. Moody and J. C. O'Neal (both 2411), "Temperature Control in Interferometric Measurement," American Ordnance Association, Standards and Metrology Division's 19th annual meeting, Mar. 18-19, San Diego, Calif. Mr. Moody made the presentation.

M. K. Laufer (2411), "Leak Detectors and Their Calibration," American Ordnance Association, Standards and Metrology Division's 19th annual meeting, General Physical Standards Workshop Session, Mar. 18-19, San Diego, Calif.

W. A. Gardner (7300), "Tailoring the Evaluation Organization to Fulfill its Role in Hardware Development," Institute of Environmental Sciences Symposium, Apr. 13, Philadelphia, Pa.

R. I. Butler (7325-2), "Low Cost Extensions of Mechanical Shock Test Capabilities," Institute of Environmental Sciences Symposium, Apr. 13, Philadelphia.

W. J. Zimmer (1443), "On the Choice of Acceptance Numbers in Double Sampling Plans by Attributes," 1964 Western Regional Conference of the American Society for Quality Control, Apr. 9-11, Portland, Ore.

E. S. Roth (2564), "The Gray Area of Intent," American Ordnance Association, Standards and Metrology Division's 19th annual meeting, Mar. 18-19, San Diego, Calif.; "Optical Inspection of Constant Form Element," American Society of Tool and Manufacturing Engineers, Mar. 3-4, Detroit, Mich. Mr. Roth was also co-chairman of the ASTM's Cylindrical Measurements Seminar.

A. F. Cone (2110), D. L. Field (2111), and Jean LaPaz (2111), "Quality Surveys from the Vendor's Point of View," 1964 Western Regional Conference of the American Society for Quality Control, Apr. 9-11, Portland, Ore. Mr. Field will make the presentation. The paper was previously presented by Mr. Cone on Mar. 3 before the Portland Chapter of ASQC.

D. L. Field (2111), "Surveying and Evaluating Supplier Quality Systems," 10th annual seminar, Southern Connecticut Section of the American Society for Quality Control and the University of Bridgeport, Mar. 21, Bridgeport, Conn.; "Finching, A Factor in Estimating Success Probabilities," 5th Annual West Coast Reliability Symposium, Feb. 19, Los Angeles, Calif.

T. J. Tucker (5133), "Exploding Wire Detonators: The Burst Current Criterion of Detonator Performance," Conference on

Exploding Wires, Mar. 10-12, Boston, Mass.

E. C. Cnare (5131), "Exploding Wire Detonators: An Approximate Method of Predicting Exploding Wire Detonator-Capacitor Discharge System Performance," Conference on Exploding Wires, Mar. 10-12, Boston, Mass.

M. I. Weinreich (3421), "Relationship of the Humanities and Exact Sciences," Valley High School mathematics class, Mar. 17.

M. A. McCutchan (3132), "Vocational and Technical Education," New Mexico School Board Association, Mar. 20, Albuquerque.

D. J. Jenkins (3130), "The Challenge of Cultural Change," Central Methodist Church, Mar. 22, Albuquerque.

Retiring . . .



Ruth Acher, an employee in Sandia's Vouchering Division 4135 for the past 13 years, will retire the end of March.

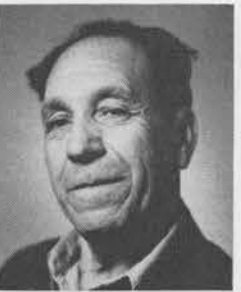
She will continue to reside at 516 Dartmouth Pl. NE, and intends to devote a portion of her time to church work. Mrs. Acher enjoys playing bridge and is looking forward to a chance to "catch up on reading."



Retiring Mar. 31 will be George E. Cunningham, a Corporation employee since April 1952. His work has been in packaging and in plumbing maintenance (Section 4514-1).

Mr. Cunningham and his family moved to Albuquerque 18 years ago from West Virginia. Mr. and Mrs. Cunningham and their three children live at 1728 Maxine NE.

His immediate plans call for "taking it easy, fishing, and probably a vacation trip to Colorado."



Antonio Jinzo retired from Sandia Laboratory Mar. 19 after almost 16 years with the company. He worked for 10 years in the motor pool and for the past five years he has worked in Janitor Service Division 4574.

He plans to "work around the house" at his home in Tijeras and visit his children and grandchildren. The Jinzos have one daughter living at home and a son in the Army. In addition, there are two sons and three daughters who have families of their own in Albuquerque. There are 23 grandchildren.



GENE HAERTLING (5135) produced the lead-zirconate-titanate ceramic which forms the multi-remnance device. He developed special molds and the hot pressing technique which gives the material its unique properties. In the background is the hot press assembly which forms the material.

(Continued from Page 1)

Sandians Develop New Memory Unit for Electronic Computers

subject the material to pressures up to 10,000 psi and temperatures up to 1350° C. for periods up to 10 hours.

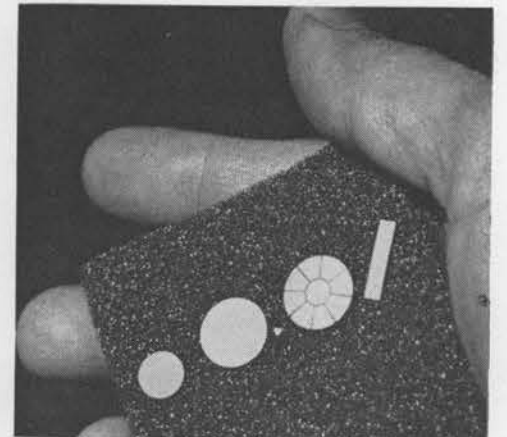
Various combinations were tried until the desired qualities in the material were produced.

The material used for the Division 5136 study was hot pressed at 1300° C. for one hour at 3000 psi pressure. The resulting ceramic has properties which do not vary in production lots. The ceramic is sliced or cut into simple discs or bars and electrical leads attached to allow use as resonators. The material is then polarized by applying a number of voltage pulses.

The original pulses "set" the resulting performance of the resonator. More than 10 stable polarization levels, or separate states, can be set into the material and later detected by measuring the small-signal response of the element.

The small (one volt or less) interrogation signal does not affect the ferroelectric domain configurations. Repeated non-destructive readout is possible.

The new ferroelectric element has other possible applications also, Cecil believes, as variable reactance devices, electromechanical filters, voltage variable coupling



EXPERIMENTS with the polycrystalline ferroelectric multi-remnance memory elements have resulted in these configurations. Division 5136 project team developed a number of geometries searching for desired characteristics and performance.

transducers, ceramic transformers, or in parametric devices.

Capabilities of the ferroelectric material, special measuring techniques, and instrumentation developed as part of the Division 5136 project are described in another paper written by the project team, "The Dependence of the Small Signal Parameters of Ferroelectric Ceramic Resonators Upon State of Polarization," which was presented at the Symposium on Ultrasonics Engineering last December in Washington, D. C. The paper is scheduled for publication in **Transactions of the Professional-Technical Group on Ultrasonics, IEEE**.

PAGE THREE

LAB NEWS

MARCH 27, 1964

BOARD OF DIRECTORS, Sandia Corporation, met at Sandia Laboratory recently. L to R: R. W. Henderson, Vice President, Weapon Programs, Sandia Corporation; L. R. Cook, Vice President, Engineering Division, Western Electric Co.; H. G. Mehlhouse, Vice President, Personnel and Public Relations Division, Western Electric Co.; J. B. Fisk, President, Bell Telephone Laboratories; S. P. Schwartz, President, Sandia Corporation; P. A. Gorman, President, Western Electric Co.; A. P. Clow, Vice President, Defense Activities Division, Western Electric Co.; H. K. Onstott, Vice President, Bell Telephone Laboratories; and J. P. Molnar, Executive Vice President, Bell Telephone Laboratories. Seated at far right is F. C. Cheston, Jr., General Attorney, Secretary and Treasurer, Sandia Corporation, and secretary of the board.





New Light Appears in Hawaiian Sky

The glowing white cloud was visible for 300 miles in the night sky over the Hawaiian Islands. The Nike-Apache rocket had left a burning trail as it rose 100 miles into the atmosphere from Sandia Corporation's Barking Sands launch site on Kauai.

Watching the cloud at Barking Sands, Lawrence B. Smith was pleased. Larry is scientific director for the Aerospace Physics Division upper air research project. The glowing cloud represented a new tool for use in the study.

A compound of trimethylaluminum (called TMA) spewed into the atmosphere from the rocket producing the cloud. It is believed that the TMA combined with atomic oxygen present in the upper atmosphere to give the chemical glow. It is expected this mechanism will provide information on the composition of the atmosphere at these altitudes.

Prior to TMA, the study had to rely on sodium trails which could only be photographed in the 10-minute periods near sunrise and sunset. With TMA, which creates its own light, the Sandia men fired rockets at any time during the night when weather conditions were favorable over the four Sandia camera stations in the Islands. Photographs of the clouds are used to analyze flow patterns of winds in the region between 50 and 100 miles altitude.

For J. J. Miller (7431) and the team of rocketeers at Barking Sands, the cloud represented another launch success. Sandia originally used the facility during Operation Dominic, the last full scale test series in the Pacific. Many of the rockets fired by Sandia from Barking Sands have been in connection with high altitude studies. Others were development efforts and technical exercises to perfect testing techniques.

Optical instrumentation camera stations were near the top of Mauna Loa volcano, on the crest of Mt. Haleakala, on Kauai, and near Honolulu. Their specially-adapted 9x9-in. cameras zeroed in on the cloud

SODIUM CLOUD reflects the bright light of the setting sun above the Hawaiian Islands. Sandia cameramen took this picture from Mauna Loa, 300 miles away from the launch site, about five minutes after launch. The falling rocket is at the needle point of the left side of the cloud. Winds up to 350 mph have already started dispersal of the earlier-formed part of the sodium cloud.

and exposed some 200 frames of film during the half hour after the cloud appeared. A programmed tape and electronic control at each of the camera stations provided synchronized exposures. Data from the four cameras would be compared later to "fix" the position of the cloud in relation to the stars. Correct exposure times and development of the film had to be carefully computed and controlled to provide maximum cloud contrast against the black sky background.

Dale Fastle (7226), who developed the camera tape control, and Alan Netz (7241) operated the camera station on Mt. Haleakala, 10,000 ft. above sea level. After the night's work, they would unload the 180-ft. roll of film from the camera magazines and store it. They would drive the 44 miles down the narrow twisting mountain road, and next morning, pick up the film flown in from the other stations. They would drive back up the mountain and develop the film using the film processing equipment at the camera station.

Al's primary job was to check the data for completeness and accuracy. He organized it, labeled it, and ran preliminary processing for later reduction by Data Center and Operations Department 7610.

Ninety miles away, on the lava slopes of Mauna Loa, Marvin Bush (7226) and Jim Smith (7221) faced the same kind of drive down the 13,000-ft. volcano. Although Hawaii is a "tropical paradise," the mountain peaks frequently see freezing temperatures, ice, snow, and fog in the winter months.

Henry Sweeney (7226) operated the camera station just outside Honolulu and William B. Foy (7226) was at the station at Kauai. Both of these stations were at sea level.

In all, three TMA rockets and one sodium rocket were fired from Feb. 2 through Feb. 7 for the high altitude study. In addition, four smaller chaff rockets, which



E. R. PARSONS (7214) readies a Nike-Apache rocket at Barking Sands launch site. Launcher is at work position and will be raised to vertical position for firing.



A NIKE-TOMAHAWK rocket starts into the 200-mile-high trajectory. Rocket Projects Division 7431 has fired rockets from Barking Sands launch site since January 1963.



TMA TRAIL glows in the night sky 100 miles above the Hawaiian Islands. Created by a rocket launched from Barking Sands, the TMA cloud is a new tool for charting upper atmosphere winds. Bright flare at end of the cloud trail is believed to be caused by entry into a layer of air containing greater concentration of atomic oxygen.

H. G. SWEENEY (7226) is shown here working on the 10,000-ft.-high Mt. Haleakala station. In the background are clouds which hover at lower altitudes. Henry operated a Sandia camera station near Honolulu during actual operations.

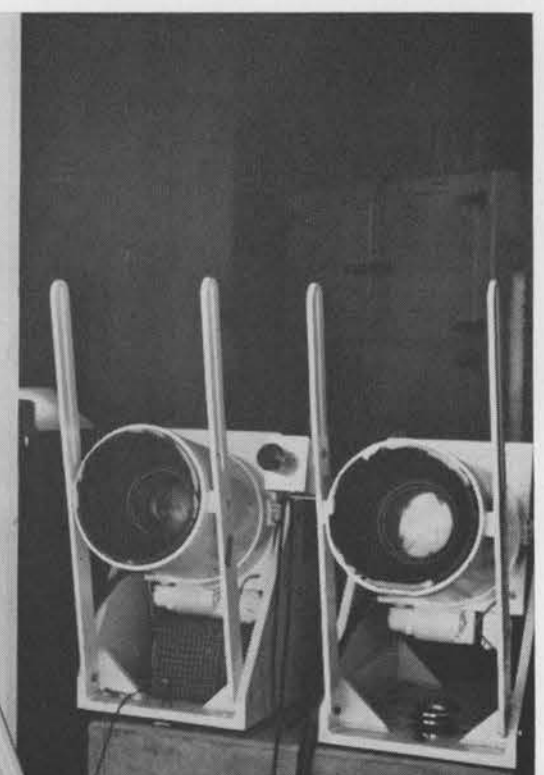
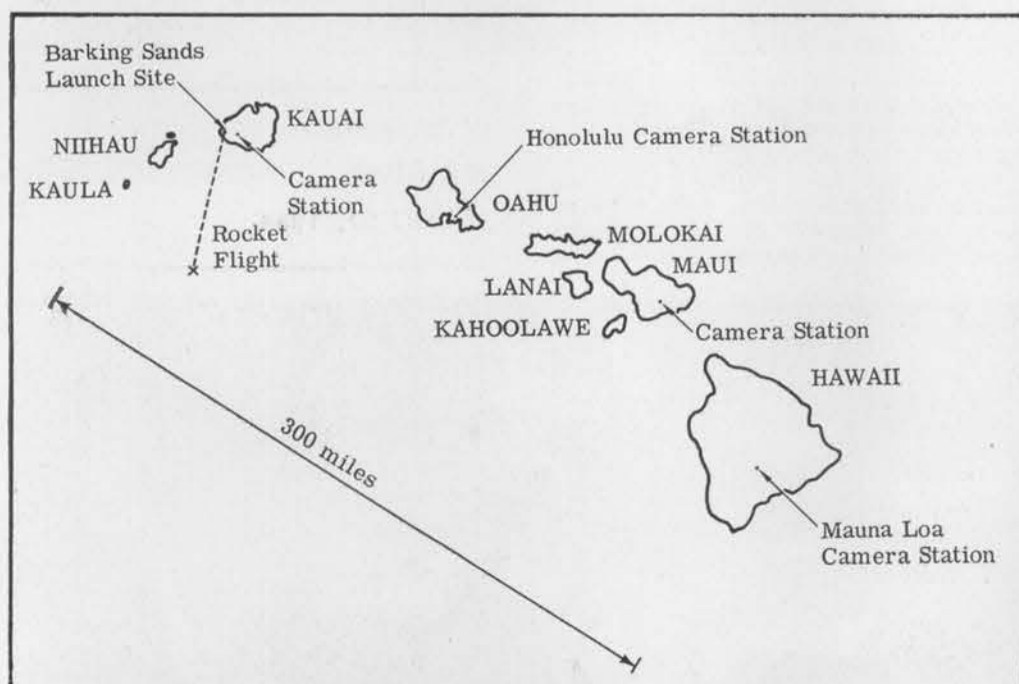


PAGE FOUR
LAB NEWS
MARCH 27, 1964

spread thin strips of aluminum foil into the atmosphere, were fired. The chaff was tracked by radar to give additional data at lower altitudes. This, combined with wind balloons released from the surface, provided a continuous wind profile from the surface to 100 miles altitude.

The study of the upper atmosphere is closely associated with Sandia Corporation's SAND program (Sampling Aerospace Nuclear Debris). One of the purposes of the study is to gather enough data to create a mathematical model of the upper atmosphere which can be used for predicting the dispersion of foreign particles injected into the region.

DALE FASTLE (7226) uses a theodolite to align cameras at the Mt. Haleakala station. Twin 9x9-in. programmed-controlled cameras operated at each of the four Sandia stations. With 12-in. focal length and f2.8 lens, they can easily cover 50,000 sq. miles of sky in their field of view. Camera magazines hold 180-ft. rolls of nine-inch film.



The Story of Sandia

With the passage of time, there came a realization of a need for an independent laboratory to engage in research and development and manufacturing production and procurement for the Atomic Energy Commission. This installment of the Story of Sandia relates events which lead up to the founding of the Corporation Nov. 1, 1949.

Part III

Roger Warner, second Z Division leader, moved to Washington in early 1947 and a search was made for an outstanding man with an established reputation to replace him as leader of the Z Division. The name of Paul J. Larsen was submitted in July 1947 by Lawrence R. Hafstad, then directing the Applied Physics Laboratory of the Johns Hopkins University in Silver Spring, Md.

Mr. Larsen was a native of Denmark and had received his academic training at the Newark College of Engineering, The College of the City of New York, and Columbia University. His professional background included work with the old Marconi Wireless Telegraph Company, Bell Telephone Laboratories, Radio Corporation of America, Warner Brothers, Baird Television, Department of Terrestrial Magnetism of the Carnegie Institute, and the Applied Physics Laboratory.

Mr. Larsen had just completed an outstanding job of production-engineering the proximity fuze for the latter laboratory, was dedicated to the necessity for continued weapon development, and was an extremely enthusiastic and energetic

FIRST PRESIDENT of Sandia Corporation, George A. Landry (left), and M. J. Kelly, then Executive Vice President of Bell Telephone Laboratories, are pictured here during one of Dr. Kelly's visits at Sandia. Mr. Landry died in 1961 after leaving Sandia. Dr. Kelly later became President of Bell Telephone Laboratories, retiring in February 1959. At the request of the AEC he made a study of Los Alamos Scientific Laboratory in early 1949 and recommended formation of Sandia Corporation as a separate production-type organization.



individual. Mr. Larsen was selected as Leader of the Z Division and assumed his new office Dec. 4, 1947.

The Z Division, under Mr. Larsen, was to handle production engineering, procurement, surveillance, military liaison, and applied physics. It was to investigate weapon effects, prepare operational manuals, conduct full-scale weapon tests, and design improved weapons.

Mr. Larsen undertook the job of building up the Division with the greatest determination. In carrying out this objective, he seldom permitted defeat of his aims. If local reactions were not favorable to any given proposal, he carried the battle directly to Washington. In his pursuit of funds, people, and facilities, strong assistance was provided by the international situation. The need for national preparedness had by this time become evident to military and civilians alike, and, reluctantly, the United States began to rearm.

On Apr. 1, 1948, it was announced that Sandia would become an independent branch of the Los Alamos Scientific Laboratory, with the following organization under Mr. Larsen and R. W. Henderson: Director (and Associate Director, LASL)

Technical Associate Director
SLE Engineering Department
SLA Applied Physics Department
SLT Field Test Department
SLR Road (production) Department
SLS Surveillance Department
SLX Administration Department
SLD Document Department
SLP Procurement and Supply Department

Training Liaison (SLM), Secretarial Training and Coordination (SLC), and Architectural Liaison (no symbol) were attached as staff to the Director, with no supervisors named.



The term "Road" for production is of interest. The fact that Sandia was assembling weapons was classified, and a cover or code term was needed. This word was selected because most of the weapons were transported via "road" to their storage sites. There was also the connotation of "Let's get this show on the road," as the effort required extensive teamwork to build the facilities, acquire the tools, and train and educate the personnel necessary for the task.

Z Division created the Road organization from scratch, as no formal group for this purpose existed. Prior work in this area had been performed by military people (now withdrawn) and by Sandia technical employees on a spare-time basis.

The Surveillance organization was established to improve weapon quality and reliability. The first fuzes, handmade adaptations of existing radars, proved unreliable, and the flight characteristics of early bombs left much to be desired. A monitoring agency, independent of production, was needed to help improve quality of components and the completed bombs.

The personnel strength of the new Sandia Branch was 470 in April 1948, an increase of 100 over the December 1947 figure. Plans were made for an expansion to 700 in the next half year, at which point it was expected that a maximum level of operating efficiency would be reached. In preparation for this increase in personnel, strong efforts were made to provide an appropriate wage and salary structure, and all employee records and jobs were reviewed to determine proper job classification.

Vigorous employment recruiting was undertaken, and the results were clearly apparent by the fall of 1948, when the personnel roll for the first time exceeded 1000, or 2½ times that of January. Even this rate of growth could not provide enough manpower for the work of the Branch.

Meanwhile, action was taken on construction at Sandia and, by the middle of 1948, plans had been completed and contracts placed for seven permanent and 10 temporary buildings. A new Tech Area (II) was established ½ mile south of Tech Area I, to be used for high-explosives assembly. Work at Salton Sea was started to provide better testing facilities.

Homes for employees were needed as the Branch expanded. An Employee Relations office obtained some quarters, but it was difficult to find suitable housing for those in the lower salary brackets. The Federal Housing Administration held a meeting in Albuquerque and noted that there was an adequate supply of expensive homes, but a critical shortage of lower cost houses. This sparked an interest in small-home construction among builders, banks, and mortgage companies, and provided an impetus for an Albuquerque building boom which was to continue for several years.

By October 1948, employment had far exceeded the target figure established in April and, as fast as people were absorbed, additional "crash" jobs and areas of work developed. Consequently, each department was requested to review its personnel requirements in detail, and a new ceiling of 1400 employees was set up, to be reached in April 1949. This new goal was attained almost precisely on schedule, with 1420 on the roll as of Mar. 31, 1949.

Los Alamos Business Office personnel were transferred from the Hill as Sandia

PAUL J. LARSEN, Director of the Sandia Branch of Los Alamos Scientific Laboratory by 1948 better known as Sandia Laboratory, left the project in 1949. Pictured here with Mr. Larsen (second from right) are C. W. Campbell, head of the Administrative Department; George P. Kraker, Sandia Field Manager for the AEC; and R. W. Henderson, Technical Associate Director.

expanded, and others were hired for administrative duties. These early beginnings were not made without considerable debate with Los Alamos, and it was a signal accomplishment when Sandia was allowed to have its own letterhead stationery. Sandia Branch, now more commonly called Sandia Laboratory, began to assemble cost records and reports on July 1, 1948. These costs served as guides for budgeting and planning, and established records of materials received and expended, both by organization and weapon project.

The establishment of a separate weapons manufacturing facility became desirable; partly to create quality of such facilities, partly because of increasing need for ever higher production quantities, and partly to prepare for the eventual divorce of production responsibilities from Sandia.

Meanwhile, since its operations continued to expand beyond the purview of a purely academic institution, Sandia was again being scrutinized by the University of California and AEC. As this heralded the end of an era, it is well to sum up the changes made at Sandia Laboratory under the direction of Mr. Larsen.

At the start of the period, in December 1947, most Sandia facilities were of temporary and wartime construction. Two years later, a major building program was 35 per cent complete. Permanent floor space had increased from 22,000 to 171,000 sq. ft., and temporary floor space, from 91,000 to 215,000 sq. ft.; with 333,000 sq. ft. of buildings under construction and 165,000 sq. ft. ready for bid. Structures covering 60,000 sq. ft. had been erected at Salton Sea. The personnel roster had risen from 370 to 1720, and total annual disbursements had increased from \$18 million to \$61 million.

The above record becomes even more meaningful when it is considered that it was accomplished in a period when the question of civilian or military control over atomic ordnance was being resolved, and at a date when the need for a strong program of weapon development was somewhat under question.

(Continued on Page 6)

Tonopah Road Construction

The AEC will invite bids about Apr. 9 for construction of eight miles of asphalt roads at Tonopah Test Range.

The project includes grading, constructing base course, applying 24-ft. hot mix asphaltic concrete surface roadway, and constructing associated culverts, contour ditches, markers and sign posts.

John C. Snowdon (4543-3) is the Plant Engineering Department project engineer. The project is to be completed within 120 days after the successful bidder is notified to proceed by the AEC.

PAGE FIVE

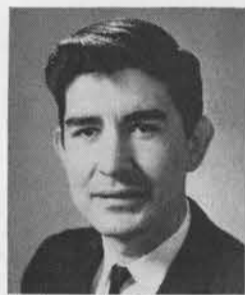
LAB NEWS

MARCH 27, 1964



OPEN HOUSE at Sandia's Sphere of Science recently attracted 335 employees and members of their families. About the youngest visitor was 3-month-old Sherrie Sue Arnett, above. John Arnett, center, is in Division 2452. Open House at the Sphere will be held again tomorrow morning from 9 a.m. until noon. "The Sandia Story" movie will be shown at 9:15, 10:00, 10:45, and 11:30 a.m. Employees and families invited.

Take Note . . .



A. C. Bustamante of Re-Entry Aerodynamics Section 7421-2 will lecture Apr. 9 at the University of New Mexico on "Aerodynamic Stability."

His talk will deal with stability of rockets or finned vehicles during trajectory flight.

The presentation will be part of a lecture series on solids, sponsored by the University's Civil and Mechanical Engineering Departments.

Persons not enrolled in the course may attend the individual lectures, which are given on Thursdays at 4 p.m. in Rm. 2, ME Bldg.

The Albuquerque White Water Club (Ratas del Rio) will meet Apr. 8 at 7:30 p.m., at the American Savings and Loan, 2300 Louisiana, N.E.

Earl Oliver of the University of New Mexico will speak on "White Water Training and Techniques." Movies and slides will be shown.

The meeting will be open to the public. Additional information is available from the club secretary, Hugh Church, Tel. 299-2175.

Brig. Gen. J. H. Rothschild (ret.) will speak on "Is Rule of Law Possible in Our World?" at a dinner meeting of the Albuquerque chapter, United World Federalists, at 7 p.m., Apr. 1, in La Hacienda.

At the time of his retirement, General Rothschild was commander of the U.S. Army Chemical Corps' Research and Development Command, in charge of research in Chemical, Biological and Radiological Warfare.

Further information on the meeting may be obtained from Rodney Driver (5421), chairman of the Albuquerque chapter.

AEC Records Best Safety Record Since Start of Commission

A new low in on-the-job injuries among the 130,000 employees of the Atomic Energy Commission and its contractors was recorded last year — the best since AEC was established in 1946.

Approximately 113,000 of the people employed by AEC and its contractors were engaged in work which offered the possibility of radiation exposure. Throughout this organization there were no lost-time injuries because of exposure to radiation.

Nearly half of AEC's contractors had no lost-time injuries at all in 1963.

Falls were the principal single cause of fatalities connected with operations during 1963. Of nine fatalities, four were caused by falls, two by moving vehicles, one by accidental electrocution, one by suffocation, and one as the result of burns.

The number of lost-time injuries during calendar 1963 for each million man-hours of work by AEC government employees and AEC contractor employees was 1.49. This rate compares with the National Safety Council's 1962 "all industry injury rate" of 6.19 and is second only to the communications industry rate of 0.98 among American industries.

For the Commission's Albuquerque Operations Office and its associated offices and contractor operations in a 10-state area, the lost-time frequency rate was 1.33 for 1963 — second lowest in ALO history.

Sandia Laboratory and Livermore Laboratory employees' achievement in safety is included in the ALO record. Both Laboratories had a lower frequency rate than the AEC average. Sandia Laboratory's frequency rate was 1.15 for 1963 and Livermore Laboratory's frequency rate was 0.53.

Albuquerque Operations, which coordinates the operations for some 30,000 AEC and contractor employees, achieved its best safety record in 1962 when it reported a low 1.03 frequency rate.

Frontier Life to Be Used As Theme in New Security Posters

Life on the American Western frontier and the dangers encountered there are parallels to present-day hazards. This is the message in a new series of Security posters. Distribution of the first poster will be in April.

Some of the scenes will be adaptations of paintings by Frederic Remington, Charles M. Russell, and other famous artists. Others are appropriate subjects depicted by illustrators in Technical Arts Division 3463. The idea for the series was conceived by Security Education Division 3244.

The posters will be used during the coming year, each illustrating a basic security precept.

DANGERS INVOLVED in traveling with documents during the days of the Old West is the theme depicted by George Marks (3463) in this new Sandia Security poster.



(Continued from Page 5)

The Story of Sandia

The Regents Committee on AEC projects of the University of California had become increasingly aware of the growth in Sandia activity and, on Dec. 31, 1948, formally notified the AEC that it wished to divest itself of this operation. The Committee stated that the Sandia work of production, stockpiling, and surveillance were not appropriate for University management, and asked that steps be taken to "move toward the transfer" of Sandia to other hands by July 1, 1949.

The AEC-Washington management staff had discussed the possibility of the takeover of the Sandia operation with several industrial organizations, but had secured only indifferent responses. Among those contacted was Dr. Oliver E. Buckley, President of the Bell Telephone Laboratories and member of the General Advisory Committee of the AEC. Dr. Buckley indicated that the Laboratories could not become interested in operating Sandia Laboratory because an internal policy restricted them to holding expenditures for defense activities to 15 per cent of its total budget.

As a step toward a solution of the problem, Dr. James B. Fisk, later President of the Bell Telephone Laboratories and then ending a tour of duty as Director of Research for the AEC, suggested that an impartial authority be secured to survey the entire Los Alamos operation. He proposed the name of Dr. Mervin J. Kelly, Executive Vice President of the Bell Telephone Laboratories, and AEC was receptive to the idea.

Dr. Kelly visited Los Alamos and Sandia at various times between February and April 1949. He came to the conclusion that Los Alamos was competently performing its work in nuclear physics, chemistry, metallurgy, and explosives, but felt that Sandia would be more effectively operated as a production-type organization under industrial management.

Dr. Kelly made an oral report of these findings to the Atomic Energy Commission on May 4, 1949. In accordance with the agreement made when he started the investigation, he did not recommend any specific company to operate the project, but stated that the one selected should have experience in systems work and a high order of ability in scientific fundamentals.

The General Advisory Committee of the AEC, in subsequent sessions, discussed this problem. Several organizations were proposed, but the final decision was in favor of the Bell System. David E. Lillenthal, Chairman of the AEC, met with President Truman on May 13, 1949, informed him that the Bell System had outstanding qualifications for management of the Sandia project, and that the national military establishment was also in agreement.

President Truman dispatched a letter on the same day to Leroy Wilson, President of the American Telephone and Telegraph Company, stating that the AEC intended to ask the Bell System to assume direction of the Sandia Laboratory, and requesting that the task be undertaken.

On May 17, 1949, Mr. Wilson replied to President Truman, stating that he had not yet heard from the AEC nor did he understand the details of the problem, but that prompt and sympathetic consideration would be given to the request. Subsequently, Messrs. David Lillenthal, Carrol Wilson (General Manager), and General McCormack of the AEC met with Leroy Wilson on Memorial Day, May 30, 1949.

At this meeting, Leroy Wilson indicated willingness to arrange for operation of Sandia Laboratory, but said that, first, he must submit the proposition to his Board of Directors. Mr. Wilson took the position that if the Bell System were to accept, the operation should be on a cost basis and without fee.

On June 24, 1949, Mr. Lillenthal wrote to Leroy Wilson, recapitulating the points discussed in the meeting of May 30. The letter outlined the various responsibilities of Sandia and stated that these encompassed work normally done by both Western Electric and the Bell Telephone Laboratories. Mr. Lillenthal said that the Commission was interested in drawing on

the managerial and technical resources of the entire Bell System, and suggested that the new operator of Sandia take over the entire package of operation, including housekeeping and administration.

Mr. Wilson replied on July 1, 1949, that the Bell System would agree to manage the project and the Bell System was ready to send a team of Western Electric and Bell Telephone Laboratories people to Sandia to examine the problem in detail.

The Atomic Energy Commission issued a press release July 12, 1949, stating that the services of Western Electric Company, Inc., and the Bell Telephone Laboratories had been obtained for operation of the Sandia Laboratory at Sandia Base, N. Mex. The release noted that the new operator of the Laboratory would bridge the gap between Sandia Laboratory development work and the manufacture of atomic weapons.

It was desired to use the name "Sandia Corporation" for the new company, but it was found that an Albuquerque real estate holding company already owned this title. The company had been deactivated, but had retained the name for possible future use. Officials of the company graciously agreed to release the name to Western Electric Company without charge.

The Certificate of Incorporation of the new Sandia Corporation was dated Sept. 29, 1949, and signed by Western Electric executives H. C. Beal (Vice President, Manufacturing), F. R. Lack (Vice President Radio Division), and Walter L. Brown (Vice President and General Counsel) as incorporators. The stated purpose of the new corporation was "to engage in any kind of research and development, and any kind of manufacturing production and procurement to the extent that lawfully may be done and to enjoy all the powers conferred on corporations organized under the general corporation laws of the State of Delaware." A unique feature of the contract was the provision that the work would be on a cost basis and without fee or profit.

The Western Electric Company and the AEC executed a contract, AT-(29-1)-789, on Oct. 4, 1949, calling for the operation of Sandia Laboratory until Dec. 31, 1953. The first meeting of the Board of Directors of Sandia Corporation was held Oct. 6, 1949, at 195 Broadway, New York City. A corporate seal was adopted and the form of stock certificate approved. The Corporation endorsed the basic contract between Western Electric Company and the AEC, and formally became a party to the agreement.

Sandia Corporation assumed active direction of Sandia Laboratory on Nov. 1, 1949, with George A. Landry, the Western Electric Operating Manager of Installation, as president. The capitalization of the new Corporation was \$1000, the minimum required by the corporation laws of Delaware and New Mexico. This money was paid by Western Electric Company for 100 shares of no-par-value stock (the entire issue) of Sandia Corporation, and the Corporation invested this money in Series F United States Savings Bonds.

Project to Improve Tonopah Water System

The Atomic Energy Commission has announced the apparent low bidder for a construction project at Tonopah Test Range.

TAB Construction Co. of Las Vegas, Nev., is the apparent low bidder to install pumps, pump houses, and water lines at Stations 3 and 9 at the Range. The firm's bid was \$48,338. R. G. Piper (4543-3) is the Plant Engineering Department project engineer.

Deaths . . .

E. L. Deeter



E. L. Deeter, manager of System Test Equipment Development Department 2440, died suddenly Mar. 11. He was 62.

Mr. Deeter joined Sandia Laboratory in August 1948 as a Group Leader; in 1950 he was promoted to division supervisor; and in 1952 he became manager of Department 2440. Previously he was with the Naval Ordnance Laboratory in Washington, D. C.

During past years, Mr. Deeter was national vice president of the Instrument Society of America and served on several of the technical society's national committees. He was also active in Toastmaster International and was a past area and district governor.

Survivors include his widow, a son, Richard, in San Gabriel, Calif., three grandchildren, two sisters and a brother. Burial was in Pasadena, Calif.

W. S. Roberts



Warren S. Roberts, a Sandia employee for 12 years, died Mar. 15. He was 39.

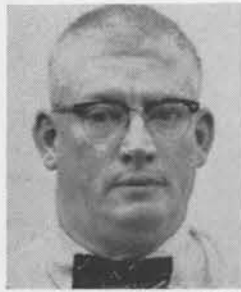
Mr. Roberts was a technical staff assistant in Dynamics Stress Research Division 5133. He had resided in Albuquerque

15 years.

Survivors include his widow; two sons, Russell and Bruce; two daughters, Roxanne and Lisa; his mother, in Dalhart, Tex.; and nine brothers and sisters residing in Texas and New Mexico.

Interment was at the National Cemetery in Santa Fe. Mr. Roberts was a World War II veteran.

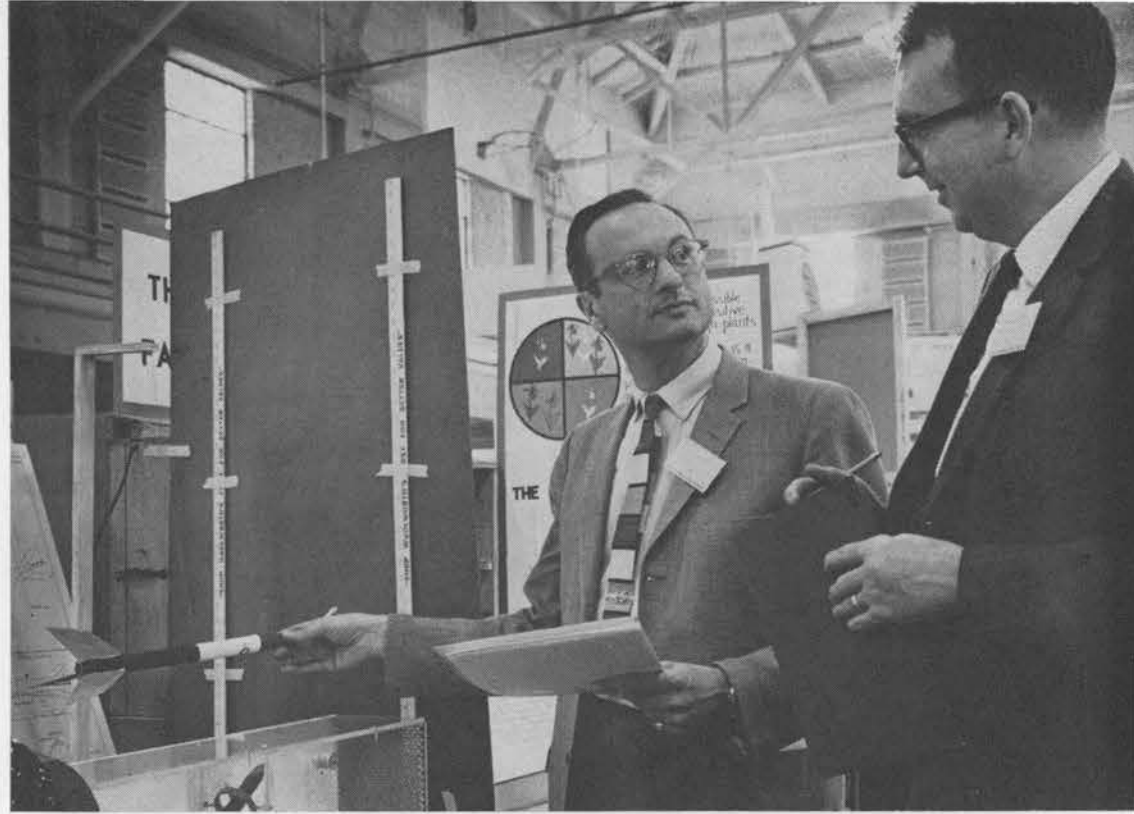
J. L. Coursey



James L. Coursey, a Sandia employee for nearly 13 years, died in Elkton, Ky., on Mar. 7. He was 53.

Mr. Coursey was a technical staff member in Surveillance Division 2135.

Survivors include his widow and two sons, ages 19 and 20, who are attending college.



Sandia Scientists Judging Schools' Science Fairs

Twenty-six Sandians were judges for the Fifth Northwest Regional Science Fair held in Albuquerque Mar. 20-21 at UNM, and at the Sandia High School Science Fair, Mar. 13-14.

D. E. Irvin, supervisor of Community Relations Division 3143, was a member of the Regional Science Fair Committee, and members of Division 3143 participated in Fair arrangements. Sandia supplied displays for science fairs being held at Lincoln Junior High School and Cleveland Junior High School.

Judges from Sandia for the Regional Fair included R. C. Heckman (1124-3), Jean Antoine (1314), E. H. Beckner (5153), C. R. Blaine (1425), Albert Goodman (7434-2), R. P. Clark (1323), R. G. Els-

JUDGES for the Northwest Regional Science Fair, Albert Goodman (7434-2) and G. W. Rolloson (7434) examined entries prepared by high school science students. Some 23 Sandians participated as judges for the fair, held at UNM, Mar. 20-21.

brock (3211), W. B. Estill (1122), R. I. Ewing (5152).

E. G. Franzak (1413), R. C. Hildner (5422), W. R. Hoagland (1531), F. P. Hudson (5411), L. K. Jones (1121), B. T. Kenna (1122), L. H. Koopmans (5425), G. W. Rolloson (7434), J. E. McDonald (1124), D. R. Morrison (5426), M. M. Newsom (1532), D. M. Olson (1532), J. M. Peek (5152), G. E. Seay (5133), B. K. Seely (1122), Ann W. Shiver (5426), and G. P. Steck (5425).

Judges for the Sandia High School Fair included W. R. Hoagland, M. M. Newsom, and D. M. Olson. At the Albuquerque High School Science Fair, held Mar. 10, C. W. Allen (2313), M. D. Clark (1425), and R. D. Volk (1413) served as judges.

PAGE SEVEN

LAB NEWS

MARCH 27, 1964

SHOPPING CENTER

SHOPPING CENTER

SHOPPING CENTER

SHOPPING CENTER

SHOPPING CENTER

CLASSIFIED ADVERTISING

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

RULES

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

FOR SALE

- '55 CHEVROLET, 2-dr., R&H, stick shift. Jordan, 298-4706.
- '63 GALAXIE 500XL, 390, 4-speed manual, 12,000 miles, sell under book or trade for 3/4-ton pickup and/or camper. Etherton, 298-5155.
- FRIGIDAIRE, 10 1/2 cu. ft. refrigerator, white, modern square design, \$125. Collins, 299-6452.
- '62 16' TRAVEL TRAILER, \$895. Satterwhite, 268-2687.
- DINETTE SUITE w/6 chairs, buffet, \$100; Thor automatic Gladiron, \$30; Ford 2-speed, 6-volt car heater, \$10; double concrete laundry tubs, \$5, will trade. Flowers, 1833 Kentucky NE.
- FOUR BAR STOOLS, swivel-type, turquoise upholstered seats, copper (needs repainting) wrought iron backs and legs, \$20. Taylor, 344-8176 after 5 p.m.
- AQUARIUM, 10-gal. w/reflector top, all accessories needed, \$15; Strombecker Road Race, 1/32 scale, 25 sections track, 2 cars, controls, \$20. Bear, 298-2744.
- '49 JEEP WAGON, 2-wheel drive, recent paint, rings, valves, R&H, 6-cyl., \$175. Harnar, 299-3400.
- 3 LIMED OAK TABLES, 2 step, 1 coffee, \$30 total; Fryrite deep fat fryer w/basket, cover, cookbook, \$10; modern gold upholstered chair w/ottoman, \$25. Smith, 299-1264.
- '60 VW, 30,000 miles, radio, wsw, black, seat belts, '64 tag, \$1045. Hipsher, 299-0673.
- '55 CHEV. 210, automatic transmission, 4-dr. sedan. Phillips, AX 8-0541.
- PIANO, Baby Grand, dark wood finish, \$1000. Sample, AL 6-6968 after 6 p.m.
- 6 1/2 HP WALKING GARDEN TRACTOR w/disk-harrow and plow. Lerke, AM 5-0780.
- 12x15 RUG, black/brown tweed, \$20 or best offer. Davis, 265-4882.
- 2-BDR. HOUSE, 3 rooms in separate building, 3/4 acre, fruit trees, garden, horse corrals, Conventional-GI loan, \$12,500, N. Valley. Rutledge, 244-2071.
- 8'x35' MOBILE HOME, 1 bdr., tub/shower. Newton, 265-1042.
- FIVE ACRES Frost Road 4 mi. east of North 10 in the mountains, paved road soon within 1 mi. Bauhs, 282-3497.
- MIDDLE SEAT for '60 IH Travelall, \$35. Calvert, 255-4190 evenings.

- CLASSICAL GUITARS. McCulloch, CH 2-2468.
- EMERSON 21" TV, console model, mahogany veneer cabinet w/swivel casters, \$40. Stark, 1334 Marron Cir. NE, 299-5953.
- PICKUP CAMPER, \$100. Sowards, 3015 Quincy NE, DI 4-5487.
- JUDSON BLOWER for 40 HP Volkswagen, used less than 500 mi. Sharp, 247-2665 after 6 p.m.
- '61 BUDDY MOBILE HOME, 55x10, w/living room extension, newly carpeted, completely furnished. Hunt, 243-0162 after 6 p.m.
- LARGE STANDARD POODLE, charcoal grey, registered, proven stud, \$50. Kochmann, 299-5133.
- .45 AUTO. TARGET PISTOL, \$65; Saeco lubricizer w/.4515 and .309 dies, \$30; H&G #130, 4-cavity mold, \$17.50. Cranston, 256-1662.
- KENMORE ELECTRIC STOVE, double oven w/glass doors, 4-burner, \$50; GE stove, double oven, 4-burner, \$25 or will trade for equal value. Myers, 877-9714.
- '53 STUDEBAKER Classic 2-dr. coupe, all white; '54 Allstate motorcycle. Chandler, 298-5069.
- COLEMAN COOLER, large size, metal, \$10; Leitz Valoy 35mm enlarger, \$30; preamplifier for tape head or magnetic pickup, \$5. Souther, 299-2964.
- MINIATURE DACHSHUND, 2 1/2 years old, AKC registered, housebroken, w/leash, basket, etc., \$25; HiFi records, played once, \$2 ea. Jackson, AX 9-5996.
- '60 MUSTANG MOTORCYCLE, Thoroughbred model, solid black w/saddlebags, make offer. Parsons, 615 Monroe SE, 268-6680.
- MATTRESS & BOX SPRINGS, twin size, slightly soiled, \$18; 6'x9' light colored wool rug and felt pad, needs cleaning, \$10. Duvall, 299-8744.
- FULL-SIZED BED mattress and springs \$20. Scranton, 299-4902.
- '63 NASH AMBASSADOR 4-dr. station wagon, a/c \$300, take over payments. Cummings, 298-5173.
- '55 VOLKSWAGEN SEDAN, sunroof, \$395. Shea, 115 Quincy NE, 255-8092.
- GOLF CLUB starter set: 1 wood, 3, 5, 7, 9 irons, putter, bag, and cart, \$27.50. Rainman, 256-9737.
- '60 CHEVROLET pickup, 6 cyl., 3-speed, R&H, wide bed, sportsliner cover. Make offer. Benson, 268-5597.
- MOSSMAN 3 BDR., 1 3/4 baths, 2-car garage, den, F/A, AC, hwf, recently decorated, new carpet, \$1300 down to FHA loan. Wheeler, 256-7284.
- '53 BUICK Special Straight 8, R&H, tinted windshield, snow tires and 3 spares, 1964 license. Butler, 299-1316.
- CAMPING TRAILER, Hawthorne, model 1961. DeMoss, 299-2916.
- '61 CHEVROLET station wagon, 38,000 miles. Smits, 298-4946.
- '53 FORD V-8 tudor, std. trans., R&H, \$130. Duvall, 299-8744.
- VW RIM, \$7; 2 VW fan belts, \$1; 1 set VW chains, \$3; rear view mirror cover, free; Kenmore combination washer-dryer, \$65. Gallo, 255-9129.
- 3-BDR, 1 3/4 bath, 1393 sq. ft. of living area, fireplace, central location in all brick neighborhood, bluegrass lawns, fruit trees. Stark, AM 8-8674.
- '63 FALCON convertible, automatic, R&H, white walls, under warranty, 12,000 miles, \$1850. Horton, 255-7428 after 5 p.m.

NEXT DEADLINE FOR SHOPPING CENTER ADS Friday Noon, April 3

- '59 WESTINGHOUSE 21" TV. Sons, AX 9-4238 after 5 p.m.
- DINETTE SET with 4 chairs, center leaf. Hole, AL 5-5925.
- FORMULA VEE race car. This is latest design and approach to "poor man's sports car racing." Denison, 255-3535.
- GE PORTABLE TV, 19", remote control. Lincoln, 268-9649.
- GOLF CLUBS, matched set of Power Bilt stainless steel irons, Nos. 2 thru 9. Willis, 1408 Mesilla NE, AM 8-7867.
- CROSLEY 17" console TV, wood cabinet, \$35; push lawn mower, \$3; 4 gal. crock and bottle capper, \$5. Yingst, AM 8-2896.
- '57 FORD club coupe, R&H, 6 cyl., auto. trans. Brown, CH 3-0717 after 5 p.m.
- DINING ROOM suite, drop leaf mahogany table, two leaves, seats 10, arm chair, five side chairs, \$60. Hawley, 255-0332 after 5 p.m.
- TILED TABLES, \$5; playpen, pad, \$8; crib, \$10; rugs, 9x12 gray, \$7; 6x9 floral w/pad, \$20; bookcase, \$10. Vandil, AL 5-0685.
- HEATHKIT CB-1 citizens band transceiver with 6/12 volt power supply, \$40. Melick, 256-6449.
- LADIES' GOLF clubs, 7 irons (3 thru 9), 3 woods (1, 2 & 3). Michele, 514-5174 after 5 p.m.
- TRAILER, swivel wheel type, complete with hitches, \$35 or best offer. Latta, 299-9380.
- '53 PONTIAC, new battery and spare, radio, auto. trans., recent major tune-up, \$160. Goughenour, 299-0914.
- LINED DRAPES, 1 pr., white antique satin, 135"x94", new, \$55; Travel Aire portable air cooler #831 w/stand, \$25. Dalton, 299-3024.
- '63 COMET, custom 4-dr., 170 cu. in. engine, 4-speed, R&H, other extras, under warranty, make offer. Fisher, AX 8-0526.
- '55 BUICK Special, 4-dr. HT, R&H, w/tires, recent overhaul, \$275. Ortiz, 877-3025.
- 21" TV CONSOLE, w/doors, \$50; portable typewriter, Remington, \$45. Toya, 125 El Pueblo Rd., N.W., 898-0491.
- DRAKE SSB/AM/CW 80 thru 10 transceiver w/AC supply. Elrod, 344-6609.
- PORTABLE BABY CRIB w/mattress; metal locator geiger counter; Rem. 12 ga. pump; 300 Savage model 99 w/2 1/2 Lyman scope, will trade. Zaluga, 344-1564.
- BUTANE/PROPANE TANK, 23 gal. capacity, 14"O.D.x39" long, side mounting, \$35. Gubbels, 298-3528.
- '58 OLDSMOBILE 98, 4-dr., HT, AC, PB, PS, R&H, electric windows-seats; also 2 new 9:00x14 tires. Brooks, 299-1884.
- BABY CRIB w/mattress, adjustable, \$18. Winkeljohn, 298-1592.
- '57 CHEVROLET Bel-Air, 4-dr. sedan, V-8 stick, \$695 or trade for later model pickup. Everett, 298-3994.
- '55 CHEV 1/2-ton pickup, 6-ply tires, \$399. Baca, 255-8452.

- SIZE 34, boy's lightweight summer suit, brown, \$15. Karns, 268-3529 after 5.
- LIGHTMETER, GE, PR1 w/case, \$10. Dauphinee, AL 5-6367.
- 2-WHEEL utility trailer, steel frame, title included. Miera, CH 3-1826.
- BOY'S 26" lightweight 3-speed bicycle, \$35; 2 revolving bar stools, \$5 ea.; portable evaporative cooler. Stiegler, 299-6763.
- '57 HEATHKIT oscilloscope, \$15; new fan belt, owners manual, service specifications manual and factory shop manual for '60 Ford, \$8. Baremore, 268-7286.
- 16' FIBREGLAS BOAT, 75 hp Evinrude motor, electric starter w/generator, tilt trailer. Wader, 898-0355.
- COLDSPOT REFRIGERATOR, 9 cu. ft., \$30. Corey, AX 9-5168.
- 3-PIECE bedroom suite, walnut, w/mattress and box springs, \$75. Wilson, 298-0049.
- '53 PLYMOUTH 4-dr., R&H, tinted glass, almost new paint and tires, needs some mechanical work, \$150. Scheiber, 299-4743.
- ELECTRIC DRYER, GE or Westinghouse, rebuilt and guaranteed, \$35 and \$50; ironite ironer, \$10. Elliott, AL 6-7909.
- PINK MAHOGANY bed frame (headboard, footboard and side rails) twin size, \$15; large white lamp shade, \$1. Post, 298-0481.
- 24" SEAR's rotary self-propelled mower, 20" girl's bike w/training wheels; car cooler, window-type, evaporative, used twice. Lowe, 299-7725.
- '56 FORD 6-cyl. engine; two 5-gal. butane bottles and 2 matching regulators. Ernst, 268-9414.
- STEREO TAPE recorder w/\$55 in pre-recorded stereo tapes, \$128; slide projector, \$18; Heathkit HiFi F-M monaural tuner, \$20. McIntire, 298-6145.
- DOUBLE BED, 4-drawer chest, 6-drawer dresser, new 6" mattress, all blond; 8'x7' steel Berry garage door; or trade for twin bedroom suite or truck camper. Naumann, 299-5576.
- UPRIGHT PLAYER PIANO; divan w/matching chair; Hotpoint electric range; Kenmore automatic washer. Pollett, 298-6534.
- STEEL PATIO TABLE and chairs, \$15. Nelson, 2823 Claremont Pl., N.E., AL 5-2364.
- NITROMETHANE, methanol, Bakers AA castor oil, and nitrated additives for blending 2-cycle fuel. Svensson, DI 4-7700.
- WARDROBE, \$5; refrigerator, \$85; gas range, \$50. Schultheis, 247-2812.
- GRAND PIANO, Kimball, recently refinished, \$675. Malpas, 256-1356.
- SOLID MAPLE COFFEE TABLE, 2 drawers, \$25. Shepherd, 299-9066.
- '58 WHITLEY MOBILE HOME, 10'x50', a/c, 3-bdr., tub w/shower, many extras, \$500 below Bluebook. Beeson, 247-2744 or 255-3249.
- BICYCLE, \$8; medicine cabinet, \$2; flush light fixture, \$2; vacuum cleaner w/attachments, \$5; new bamboo drapes, 132"x8", \$3, 108"x7", \$2. Schorr, 255-7234.
- 25 HP JOHNSON MOTOR; 5 HP Mercury motor; 14' aluminum boat and boat trailer, \$225. Peckum, 256-3363.
- REGISTERED APPALOOSA Brood Mare in foal to permanent registered stud, \$375; registered Appaloosa stud colt, \$400. Harker, 282-3435.

- TENT, 9x18' umbrella, used one season, external aluminum frame, floor, \$85; bicycle, boy's Schwinn, 26", \$15. Stixrud, 298-0478.
- 2-bdr. HOUSE, large kitchen, front faces University Golf Course, 1224 Stanford N.E. Hamilton, 268-9787.
- '52 HENRY J., 6-cyl., OD, R&H. Roh, 299-3749.
- '57 CHEV. BEL-AIR 2-dr. sedan, \$475. Ryanczak, AX 9-3527 after 5 p.m.
- NEW 36" gas range and a gas refrigerator, both for \$100. Eslinger, 268-1209 or 299-0908.

FOR RENT

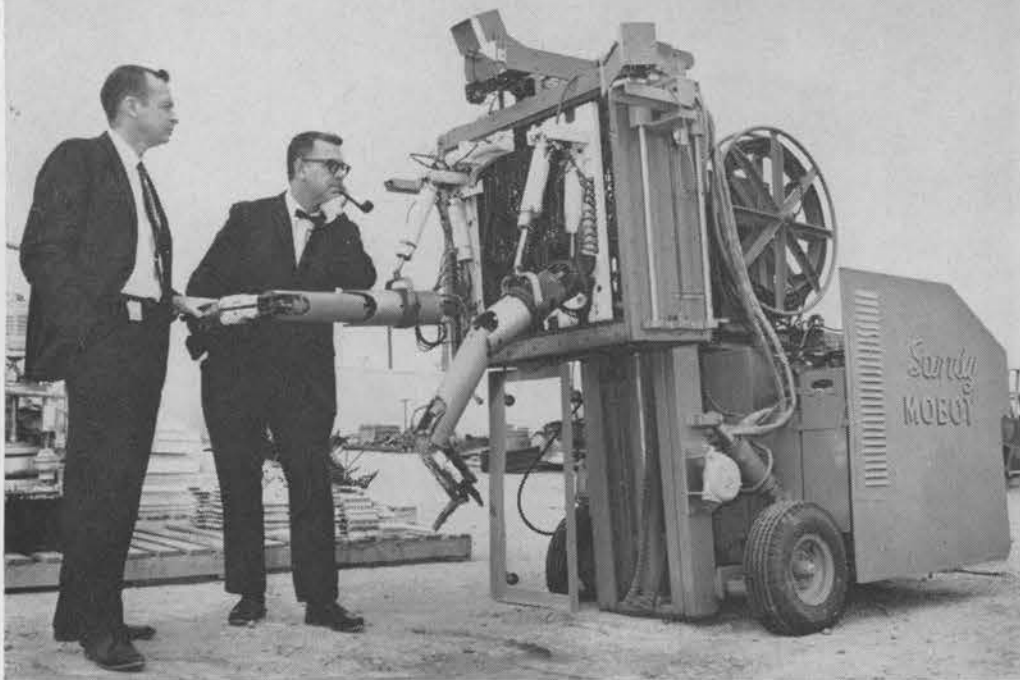
- FURNISHED 1-bdr., clean, 4 blocks south of University. McReynolds, AL 5-2615 after 5 p.m.
- TRAVEL TRAILER, my personal 15' trailer, sleeps 5, reserve now for your World's Fair trip. Colp, 268-8035.
- 3-BDR., 2 bath, carpets, drapes, a/c, landscaped, SE location, Gallo, 255-9129.
- FURNISHED 2-bdr. apt. recently redecorated, a/c, near Sandia and bus, \$85, see at 233 Penn. N.E. Mares, 299-6958.

WANTED

- USED FREEZER. Lewis, 255-2488.
- GIRL'S bicycle, 2-wheel trainer, 16" or 20". Garcia, 256-7606 after 5 p.m.
- TRADE '55 Cadillac for one or two lots, pay difference. Chavez, AL 5-5461.
- TRADE 30-40 Krag rifle for good pistol. Pritchard, 268-9618.
- USED PLAY PEN. Paul, 256-6228.
- RIDERS from 10,000 block N. Second St. to Bldg. 800. Hoffert, 898-2862.
- JOIN CAR POOL from Princess Jeanne Park (Lomas and Claudine) to Bldg. 880. Wilson, 298-0049.
- WOULD LIKE TO RENT or lease 2-bdr., unfurnished home in NE or SE area, starting in May or June. Gottlieb, 345-1009 after 6 p.m. or weekends.
- YOUNG GENTLEMEN to share furnished house w/two others, private room. Ristine, 298-3998 after 5 p.m.
- JOIN OR FORM car pool from vicinity of Eubank and Baldwin to gate 9 parking lot. Nevin, 298-0383.
- USED CONCRETE wall blocks; 4" sewer pipe; 8" form lumber; 16-20' extendable ladder; crow bar; small mortar boat. Collins, 268-3612.
- HOME for Shepard-Collie. Toya, 898-0491.
- JOIN OR START car pool from vicinity of Carlisle and Central. George, 265-0117.
- KLH-6, AR-2A, or any hi-fidelity speaker system consisting of two matched speakers. McIntire, 298-6145.

LOST AND FOUND

- LOST—Silver cuff link w/monogram JWP, man's billfold w/ID for Sam Apodaca, 2 truck keys on ring, 10-yr. lapel pin, gold filigree and pearl earring for pierced ear, ladies black leather ID folder, black pearl tie tack, ladies white sheer scarf w/white coin dots, men's sunglasses in Jones Optical case, ladies black nylon glove. LOST AND FOUND, ext. 264-2757.
- FOUND—Gold clip-type earring, ladies black leather glove, ladies black wool glove w/bead trim, orange drop-type earring, blue heart-shaped earring. LOST AND FOUND, ext. 264-2757.



Sandy Ends Career After Pioneering Remote Handling

More than 100,000 persons knew Sandy Mobot. He was the star of Sandia Laboratory's State Fair exhibit in 1959 and made many friends for the company. He served Sandia well. He was the granddaddy of generations of mobile remote handling devices.

He was born in the Spring of 1957, reached the peak of his career when Sandia's Engineering Reactor Facility went into operation in May 1962. He died last week in Sandia's Salvage Yard.

This is not a sentimental age. Technological improvements and advances are welcomed. Sandy Mobot was a technical milestone, and now that his work is done, nobody grieves him.

Still, his obituary needs to be written. He made an important contribution to our time. He was the first mobile remote handling device and proved the feasibility of the breed.

Sandy was the brainchild of John L. Colp (7412) and Robert M. Jefferson (5332). In 1957 they were working on the design of the Sandia Engineering Reactor Facility. One of the primary requirements for SERF was to irradiate very large specimens. This was solved in the facility design by including a large irradiation chamber and a post-irradiation room for analysis of experiments. Overhead bridge cranes and a small tug operating on a track were designed to shuttle experiments from the irradiation chamber to the analysis room. Still, a mobile remote handler was needed to manipulate the test items inside the big "hot" analysis room.

At the time, there was no such device. Remote handling equipment consisted of mechanical arms projecting through a shielding wall. The operator worked from one side and viewed the operations through a thick lead glass window. Only relatively small objects in a small area or "hot cell" could be handled.

It did not seem feasible to build a mobile device that could operate without direct visual contact between the handler

STAR OF THE SHOW — Sandy Mobot fascinated visitors at Sandia Laboratory's "Sphere of Science" exhibit at the 1959 New Mexico State Fair. More than 100,000 visitors watched the mobile remote handler, the first of its kind, perform precision maneuvers. Operator worked without direct visual contact, viewing the action through Sandy's TV "eyes" as relayed to two screens at the remote control console.

GOODBYE SANDY — Bob Jefferson (5332), left, and John Colp (7412) say goodbye to Sandy Mobot in Sandia's Salvage Yard. Bob and John designed Sandy back in 1957. He was the first mobile remote handling device and proved feasibility of the breed.

and the operator. First idea John and Bob considered was a heavily-shielded vehicle which would carry the operator. This was finally dismissed since the vehicle was estimated to weigh about 40 tons.

So to the concept for Sandy Mobot evolved — a mobile vehicle combining the performance of a forklift with the dexterity of a handyman. It would have television eyes and mechanical arms and hands. The operator would not need direct visual contact since he would see through two TV cameras and be able to judge depth and distance from two screens in the control console. Sandy would be made from radiation resistant electronics components and materials.

John and Bob worked out the detailed conceptual design. A contract was awarded late in 1958 to the Nuclear Electronics Laboratory of Hughes Aircraft Company to develop and build the machine. Sandy was delivered in the Fall of 1959.

He arrived before the reactor was completed, but in time to be part of Sandia's 1959 State Fair exhibit. Sandy was an attention-getter. He operated on a concrete apron in front of Sandia's exhibit. The operator was stationed inside the exhibit. He was able to have Sandy execute precision maneuvers using only the information relayed via the television eyes. Sandy was the star of the show. More than 100,000 visitors trooped into Sandia's "Sphere of Science" exhibit.

After the fair, Sandy went into the laboratory for modification and improvements. A flexible third TV camera was added, larger wheels were substituted, and a new Sandia-designed control system was installed.

When SERF went into operation in 1962, Sandy saw his first service. As a result of Sandy's creation, a whole new industry building mobile remote handling devices came into existence.

As time passed, Sandy became outdated and clumsy in comparison with compact new third generation machines. SERF now utilizes two smaller remote handling devices in connection with a remotely-operated forklift and an electric tug.

Mobile remote handlers now perform many dangerous tasks other than in radiation environments. They handle high explosives and hazardous chemicals. They even work underwater.

Sandy is now in Sandia's Salvage Yard — immobile, non-radioactive, a victim of progress. All reusable components are being removed. The shell that was Sandy Mobot will be on sale soon.



PLAN CONFERENCE — Users of Control Data Corporation computers will meet in Albuquerque Apr. 8-10 to discuss mutual projects and problems. Members of the arrangements committee are, from left, Jack Tischhauser (7620), Charles Clendenin (7612), E. K. Montoya (7622) and James W. McCaulley, CDC representative. About 150 delegates are expected.

Sandians Participate in Computer Conference Planned for April 8-10

CO-OP, an association of users of Control Data Corporation large scale computers, will hold their 13th Conference in Albuquerque Apr. 8-10. Several Sandians are active in the arrangements committee and others will participate in the conference program.

Jack Tischhauser, manager of Programming Department 7620, heads the arrangements committee. C. M. Clendennin (7612-1) and E. K. Montoya (7622-1) are members of the committee.

Mr. Tischhauser will chair sessions of the CO-OP charter revision committee.

C. L. Lane (7621) will chair a technical session on plotters and D. B. Saylor (7621) will be chairman of a session on disk file techniques. The technical discussions will deal with applications of the CDC 1604 computer.

Purpose of the conference is to exchange information, techniques, and programs among the users of CDC equipment. Joint standards are developed for interchangeable programs and recommendations are made for improvement of equipment.

Iben Browning of the Thomas Bede Foundation staff and a former Sandia consultant will be the luncheon speaker Thursday, Apr. 9.

About 200 conferees are expected to attend, several from foreign countries. Meetings will be held at the Hilton Hotel and a tour of Santo Domingo Pueblo is planned.

A second group, users of the CDC 160 computer, will hold contiguous meetings Apr. 7. E. K. Montoya is vice president of this group, called SWAP, which shares the purposes of the other group as they relate to smaller computers.

Service Awards

15 Year Pins



Arthur E. Johns
4232
Mar. 25, 1949



Dale J. Massey
2132
Apr. 1, 1949



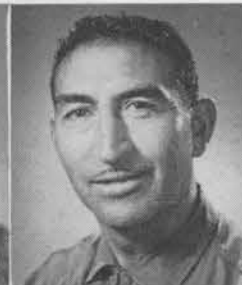
John A. Roach
8226
Apr. 4, 1949



Salvador Armijo
4511
Apr. 6, 1949



Joe L. Sanchez
3462
Apr. 6, 1949



Carlos M. Ortega
4573
Apr. 7, 1949

10 Year Pins

Mar. 1-31

Dorothy E. Mann 3411, William E. Zemka 4413, W. F. Shoemaker 1551, Oscar F. Goodwin 3465, Clifford M. Stover 7434, Bruno Paoletti 4252, Willis M. Bisenius 2341. Thomas D. Harrison 2561, Lawrence J. Bowen 4254, Alice Marie Simon 4431, George R. Norris, Jr. 7214, Hugh L. Smith 4231, F. S. MacDonald 3241, Truman N. Casson, Jr. 8231, Frank E. Chavez 4152, and Tex E. Samuelson 7325.



PAGE EIGHT

LAB NEWS

MARCH 27, 1964

Sandia's Safety Record

Sandia Laboratory

HAS WORKED
1,330,000 MAN HOURS
OR 38 DAYS
WITHOUT A
DISABLING INJURY

Livermore Laboratory

HAS WORKED
347,500 MAN HOURS
OR 63 DAYS
WITHOUT A
DISABLING INJURY