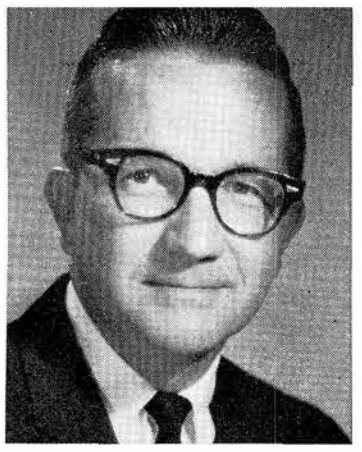
SANDIA LAB NEWS

VOL. 19, NO. 21, OCTOBER 20, 1967

SANDIA LABORATORIES ALBUQUERQUE, NEW MEXICO; LIVERMORE, CALIFORNIA OPERATED BY SANDIA CORPORATION FOR THE U. S. ATOMIC ENERGY COMMISSION



T. B. Cook to Succeed R. C. Fletcher as Vice President 5000

Thomas B. Cook, Jr., director of Physics and Mathematics Research 5200, was elected Vice President 5000, effective Nov. 1, at a special meeting of Sandia's Board of Directors in New York City last week.

Mr. Cook succeeds Robert C. Fletcher who is returning to Bell Telephone Laboratories to become executive director, Military Systems Research Division at Whippany, N. J., after heading Sandia's research and advanced systems development activities for three and a half years.

Mr. Cook joined Sandia as a staff member in the research organization in 1951. He was promoted to section supervisor in 1955, to division supervisor in 1956 and to manager of Nuclear Burst Physics Department in 1959. He was named director of Physics and Mathematics Research in June 1962.

He received his PhD in physics in 1951 from Vanderbilt University, his MS degree in physics from Vanderbilt in 1949 and his BS in physics from Western Kentucky State University in 1947, following service in the U. S. Navy in WWII.

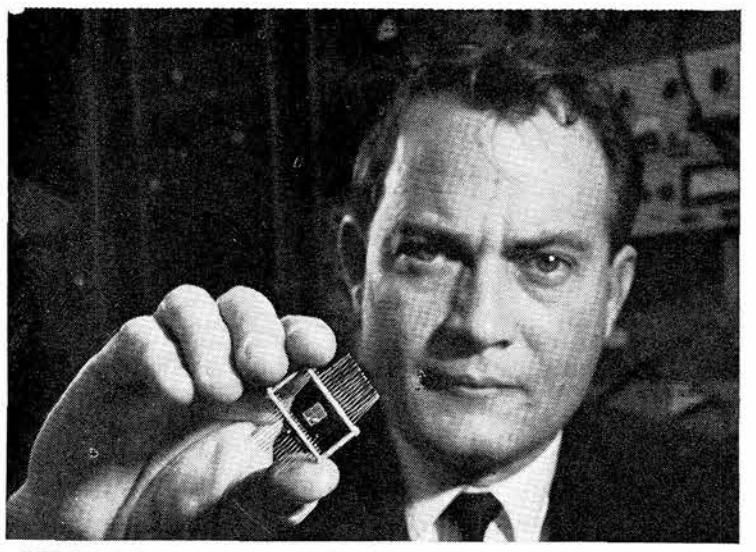
Mr. Cook is a Fellow of the American Physical Society and a member of the Air Force Scientific Advisory Board (SAB); he's serving as chairman of a task force for the Defense Science Board for the Director of Defense Research and Engineering (DDRE); member, Defense Atomic Support Agency's Scientific Advisory Group on Effects (SAGE). He is a member of Sigma Xi Honorary Research Society and a director of the Albuquerque Chapter of the American Ordnance Association. He has served on other DOD and AEC advisory groups and as a consultant to several military industrial organizations.

Mr. Fletcher joined Sandia as Vice President 5000 in April 1964. He had been with Bell Telephone Laboratories since 1949 and was director of the Electron Device Laboratory at BTL from 1962 until he was elected a Sandia vice president. He received both his PhD degree in physics and his BS in physics from Massachusetts Institute of Technology in 1949 and 1943 respectively.

Unique Properties of New Ceramics Show Potential for Computer Memory Application

A Sandia discovery that certain ferroelectric ceramics possess unique electro-optic properties has resulted in the design of a number of prototype devices for computer information storage and display.

Thin polished plates of ferroelectric ceramics make it possible to produce reliable, high density optical memory elements with characteristics superior for some special applications. The first prototype model can store over five times as much information in a given space than conventional computer memories.



OPTICAL MEMORY ELEMENT developed at Sandia is shown framed in an integrated circuit flat-pack mount held by co-inventor Cecil E. Land (5143). The one-quarter-inch by one-fifth-inch prototype model can store over five times as much information in a given space than those common to most computer memories.

The ceramics also appear adaptable for other uses, such as information display screens and light modulators. They may also lead to the development of television sets without picture tubes.

Ferroelectric ceramics are polycrystalline materials produced by subjecting a mixture of finely crushed compounds to heat and pressure for precise periods of time. When voltage is applied, internal changes occur which, in the Sandia development, determine the amount of light passing through them.

The ceramics and their applications were described in a paper presented yesterday by co-inventor Cecil E. Land (5143) at the International Electron Devices meeting of the Institute of Electrical and Electronics Engineers in Washington, D.C. The other co-inventors are Ira D. McKinney (5143) and Gene H. Haertling (1317) who developed the ceramic.

Two distinct kinds of memories were described by Mr. Land. One is a two-state (binary) memory which uses a voltage pulse to change the transparency of a coarse-grained ceramic (grain size greater than two microns). The other is a multi-state memory which uses a voltage pulse to produce a number of precise, detectable variations in the intensity of light passing through a fine-grained ceramic.

Information storage states are created in the ceramics by a system of electrodes which apply the voltages to prescribed areas in the plate.

The voltage switches or aligns (in the direction of the electric field) electrical charges in the ceramic molecules located between the two energized electrodes. Even when the voltage is removed, the charges in this very small area remain aligned until switched either back to the original state or to some other state.

In the coarse-grained ceramic, switching one of these very small regions in one direction makes the region less transparent — very little light passes through it. Switching in the opposite direction increases its transparency. This, then, gives the element two states — transparent and opaque — which correspond to the "yes-no" or "1-0" states created by conventional memories using the binary counting system.

The coarse-grained memory has an electrode system capable of switching 5120 separate areas on one square inch of ceramic, thus producing a memory which has that many storage sites or information "bits."

This number of bits is about five times the information density of conventional memories, and it appears theoretically possible to store one million bits of information on a square inch of the ceramic. A unit is now being developed which has 20,480 bits per square inch.

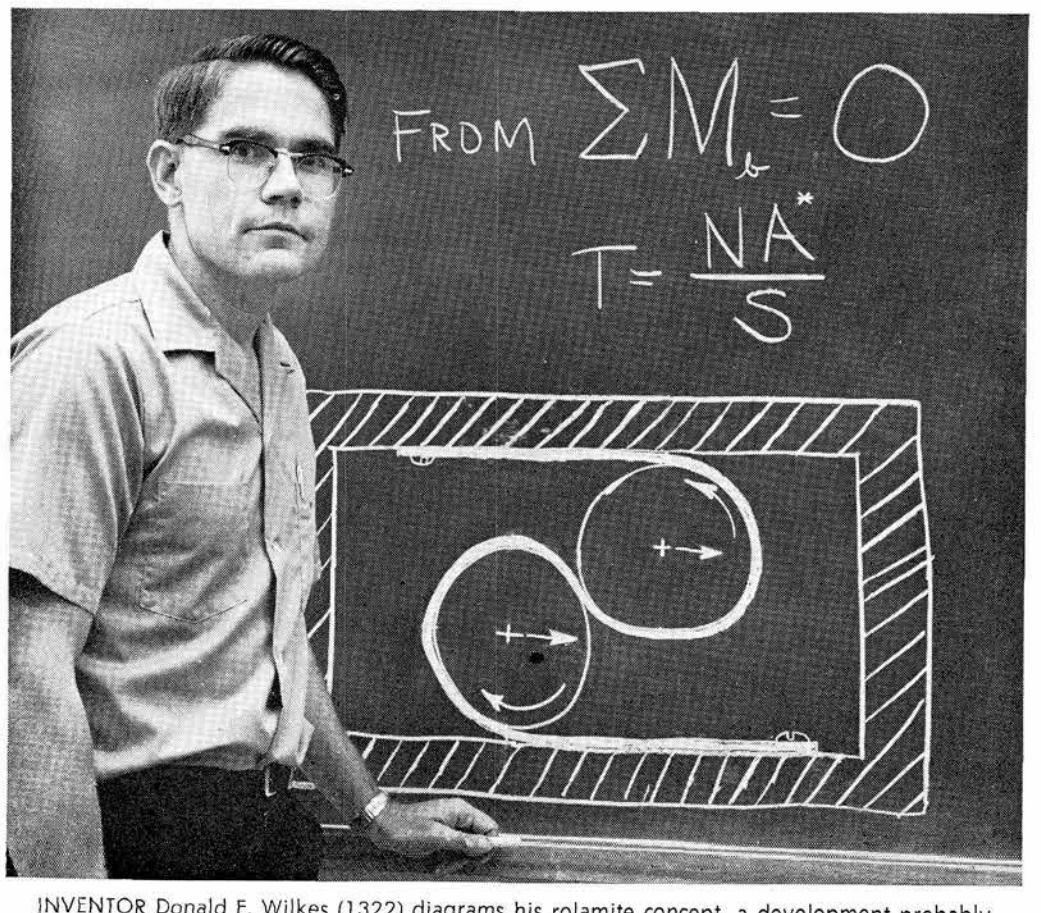
The state of the bit, whether it is transparent or opaque, is determined by shining a light through the area into a light detector (photodiode) located behind each storage location.

The photodiode easily distinguishes between the light transmitted during the transparent condition — a binary "0" — and the light transmitted during the opaque condition — a binary "1."

(Continued on Page Two)

May Be as Basic as Lever or Wheel

'Frictionless' Fundamental Mechanical Device Invented at Sandia



INVENTOR Donald F. Wilkes (1322) diagrams his rolamite concept, a development probably as basic to mechanics as the lever or spring. The roller cluster can move either to right or left without loss of energy through friction. The formula illustrates a basic premise which defines the balance of forces acting upon a stationary cluster. The rolamite has possible extensive applications at Sandia and throughout industry.

A new engineering concept so basic that it has potential application in hundreds of devices ranging from household appliances to inertial switches for spacecraft has been developed by Donald F. Wilkes of Advanced Development Division 1322.

Named rolamite, the principle involves a controlled interaction of two or more rollers with a flexible band or tape (usually metallic). It appears to be an elementary mechanism probably as basic as the lever, wheel, crank, spring or hinge. A search of technical literature indicates that a mechanical element of such a basic nature has not been invented in this century.

Although still in very early stages of development, the rolamite may offer solutions to many previously unresolved engineering problems or offer simpler solutions than some of those now available.

Already the basis of a complete new technology within Sandia, the rolamite concept may be used to produce a variety of nearly frictionless devices which in most cases require no lubrication.

Devices using the principle also can be miniaturized, are not so sensitive to contamination as most microminiature mechanical devices, and can be produced inexpensively and with high reliability because the concept is relatively simple, does not require precision tolerances, and permits use of modular construction.

54 Separate Functions

Mr. Wilkes has shown that rolamite has at least 54 separate functional capabilities, which may be applied in an almost infinite number of variations and combinations. The concept is expected to have a fundamental effect on mechanical and electromechanical design.

Among the possible scientific and industrial applications of the principle are relays, bearings, speed changers, pumps, pistons, dampers, shock absorbers, and sensing devices such as gravity switches, accelerometers and velocimeters.

The concept could have a number of common household applications. It is readily adaptable, for example, to thermostats, door hinges, locks, light switches and various appliances.

A typical rolamite design consists of four main parts—a rectangular frame, two rollers and a relatively long, flexible band.

The ends of the band are attached to the frame so that the band is formed into an "S" shape. The rollers are then inserted within the loops of the "S" and held in place by tightening the band.

Free of Friction

This configuration allows the rollers to move freely along the band, with little friction because there is no sliding—the same surface areas of the roller and band always meet.

This has resulted in rolling friction coefficients as low as about one-tenth of those for ball and roller bearings acting under comparably low pressures.

In contrast to friction in conventional devices, friction in rolamites tends to decrease with usage because of the continued nearly perfect re-mating of all points between the rollers and band and the band and guide surfaces.

Because their design in many cases eliminates the need for lubricants, rolamites appear particularly well suited for use in space, where extreme conditions

(Continued on Page Two)

RADIATION EFFECTS IN SEMICONDUCTORS was the topic of a Sandia-sponsored international conference held in Santa Fe, Oct. 3-5. Continuing a discussion during lunch are (l to r) J. L. Wirth (5212); J. W. Easley, director, Military Digital Systems Laboratory, Bell Telephone Laboratories; D. K. Wilson, supervisor, Nuclear Radiation Effects Group, BTL; and J. C. King (5210), who was co-chairman of the conference.

Continued from Page One

Unique Properties of New Ceramics

Each memory thus consists of light sources, a plate of ceramic capable of being switched in hundreds or thousands of locations by the electrode system, and a photodiode for each location. All of this is packed into a unit about one quarter of an inch thick — which is comparable to the thickness of conventional memory planes.

Preliminary tests indicate the information bit can be written or erased in about two-tenths of a microsecond — slightly more time than required to switch conventional memories. However, the developers of the new memory feel this time can be reduced.

The information bit can be written and erased many millions of times. It is not known, however, whether the ceramic will retain its switching properties during the billions of cycles required for computer core memories. For this reason, it is expected that the first applications of the new memories will be in special purpose memories which do not require extensive cycling during the life of the element.

The coarse-grained memory is relatively simple, with the switched areas of the ceramic acting much like tiny shutters which control the passages of light.

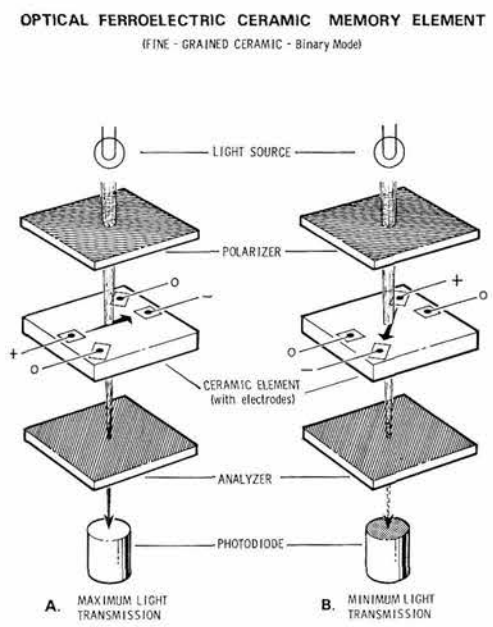
The fine-grained memory, with the ceramic sandwiched between two light polarizers, is more complex, although it too relies on the switching of small areas between electrodes to control the passage of light to a photodiode.

However, this memory acts as a light filter rather than as a shutter. In addition to the two states, it has intermediate states of light transmission. The intensity of light which passes through to the photodiode depends on the angle at which voltage is applied from electrode to electrode.

Using a system of 16 electrodes at each tiny storage site — eight on each side of the ceramic — it is possible to create at least eight distinct levels of light transmission.

This means that one of eight digits can be stored in one small area of the ceramic, giving the fine-grained memory much more versatility than the coarse-grained memory which can store only one of two digits at a given location. The fine grained memory also may have more storage sites per square inch.

"With further development, it is conceivable that more than eight optically identifiable states can be created at each storage location," Mr. Land said.



CERAMIC POLARIZATION is changed in the fine-grained ceramic (binary mode) memory element by applying current to various combinations of electrodes —only two of which are indicated in this simplified and enlarged diagram. When the polarization of the polarizer and analyzer differ by 90 degrees as indicated, the extent of light transmission will be determined by the polarization of the ceramic element. Multi-state memory is created by switching arrays of electrodes on both faces of the ceramic.

Because it has high optical resolution, the fine-grained ceramic appears to be adaptable for television use in several ways, for example, by controlling the individual translucency of tens of thousands of tiny spots on a flat ceramic screen.

However, further development of ceramic materials is required before a system competitive with conventional television can be produced. One primary problem would be the development of a practical method to produce a large ceramic with a uniform thickness. The ceramic is now produced in relatively small pieces.

Also, it would be necessary to develop a method of scanning large areas of the ceramic screen without introducing interference which would disrupt the video image. Mr. Land noted that neither of these problems appears insurmountable.

Controlling the transparency of the storage states to form a continuous line would also permit the ceramics to be used in information display devices, such as those used on computers to give instant visual answers to questions when it is not necessary to print out the answers. However, the black-white contrast of ceramics would have to be improved before competing commerically with existing display devices that use cathode-ray tubes.

The ceramic used in the Sandia experiments is a mixture of lead zirconate-lead titanate. However, Mr. Land said that other ceramic materials — notably barium titanate and sodium potassium niobate — have similar electro-optical properties.

Electro-optical properties of ferroelectric single crystals had been known for several years, but locally switched areas in such crystals are generally unstable, making them unsuitable for memories. For this reason, the polycrystalline ceramics had also been overlooked until the recent discovery.

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Operated for the United States Atomic Energy Commission by Sandia Corporation

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Fundamental Mechanical Device

make it difficult to select a suitable lubricant.

Low friction and absence of lubricants also mean that rolamites have one other advantage: they can be made extremely small in devices which require movement of mass to close a circuit or to complete some other function. Heretofore, a relatively heavy mass has been required just to overcome the effects of friction.

Rolamites, unlike many very small devices, are not particularly sensitive to contaminants since the rollers move easily over small particles on the band. Some roughness of band and roller surfaces also can be tolerated because of the springy behavior introduced by the band.

Though low friction is perhaps the most striking feature of the rolamite configuration, it is the ability to control the movement of the rollers on the band, simply and precisely, that gives the concept much of its versatility.

The performance of the roller cluster can be altered in several ways: by varying the size, shape and weight of the rollers; by varying the configuration of the frame; by adding springs and other controls; and by tapering or perforating the band to introduce forces of the desired type—this last is the most important means of control.

Force Bias Created

Slots in the band create a force bias—that is, the rollers are made to "prefer" one position on the band. For instance once one of the rollers begins to contact a triangular slotted section, the roller cluster will move automatically until the widest part of the slot reaches the point where the band first begins to curve around the roller. This point represents the weakest part—with the least energy storage—of the band in contact with the rollers.

As a simple illustration to explain the generation of forces, the two loops of the rolamite's "S" may be considered as springs which exert a force against each other. Like the metal of a watchspring, the band "wants" to lie flat and therefore stores releasable energy when it is elastically curved. The amount of energy it stores naturally will be decreased if it is weakened in some way in the region where it curves or bends.

When one of the loops is weakened by tapering or by a cutout, the stronger loop dominates the weaker loop and "unwinds," moving the roller cluster until the two loop forces are equalized or until some other force or detent interferes.

By capitalizing on this phenomenon, and by varying the width of the slot along its length, innumerable spring force functions —such as amplifying or damping—may be achieved.

Force bias is particularly useful in returning a mechanism to its starting position before or after a function is completed. For example, it can be used to re-set an acceleration switch if the acceleration is not sustained long enough to close the switch, or it can be used to return a piston after it completes a stroke in a pump or engine.

Negative Spring Action

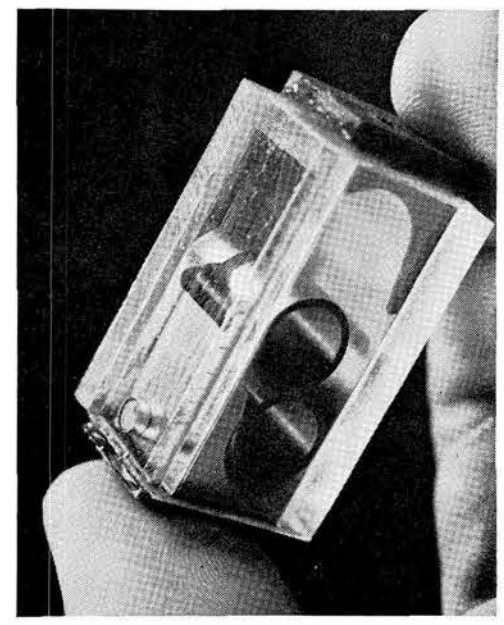
Force bias in the rolamite also may be used to create a useful but elusive mechanical function—the negative or anti-spring. Other ways of creating negative springs are complicated and generally only approximate the desired action.

A typical spring creates a positive force —the further it is pulled from its normal, unflexed position, the more force is required. The rolamite can provide a simple, precise and controllable mechanism which requires less force the farther it is stretched—similar to the manner in which the attracting force of a magnet weakens with distance.

The rolamite negative spring is used, for instance, in a single-level acceleration switch—in which the rollers are held in place by a triangular cutout until vehicle acceleration reaches a certain level. Once this "breakaway level" is achieved, the roller cluster very quickly snaps to the other extreme position, closing a circuit and signaling achievement of the desired acceleration.

While cutouts are the chief means of altering the performance of the rolamite, the band and other basic elements—the frame and rollers—can be varied in many other ways to produce devices with superior performance characteristics.

For instance, by applying spring tension to the band and widening the frame, or guideway, at one end, an extremely powerful force amplifier is produced. The energy released when the rollers slip into the wider portion of the frame may be used to actuate a firing pin or to perform some mechanical function such as forming or shearing metals or rapidly opening a high current or high voltage circuit.



TYPICAL ROLAMITE configuration is used here as a gravity switch. The cutout in the band around the rollers helps introduce a force into the roller cluster equal to a specified gravity, such as 12 G's. When an accelerating vehicle reaches this G-level, the cluster breaks away, snaps to the right, and closes (or opens) an electrical circuit.

When rollers of different sizes are used, a very simple speed changer is created, with speed reduction rates of 200 to 1 easily obtainable. Because of this simplicity, rolamite makes an ideal distance-measuring device.

By using a bi-metallic band containing a force bias cutout, an extremely sensitive thermostat—some three or four times more sensitive than conventional models—could be produced at reasonable cost. It could also have more durable contacts and provide greater contact pressure.

Lower Costs

In general it appears that rolamite devices can be produced for costs which are competitive or significantly lower than those of conventional products. Designs must of course include consideration of the properties of the materials used—notably their reaction to load stress in the band, temperature variations in precision devices, and extremes of cycling which could cause fatigue.

The rolamite grew out of Sandia's study of elastic suspension systems. One of the elastic suspensions considered was a band formed into an "S" shape, constrained between two parallel surfaces.

This configuration was attractive because of its virtually frictionless travel in a direction parallel with the frame surfaces. However, the element in this form had practical drawbacks since the attachment of other members of the suspension was difficult. It was found, however, that if rollers are placed in the "S" and are of a diameter to insure a locked cluster when tension is applied, a unique and useful geometry—rolamite—is formed, i.e. of large enough diameter that they will not slip past each other.

A patent application on rolamite has been filed by the Atomic Energy Commission in the name of the inventor. Mr. Wilkes has been at Sandia Laboratory since June 1954 except for military service from 1955 to 1957. The AEC holds patents in his name on an air bearing velocimeter and on an omni-directional weightlessness switch for which he was co-inventor.

LIVERMORE NEWS

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Ordeal of Earl Deno

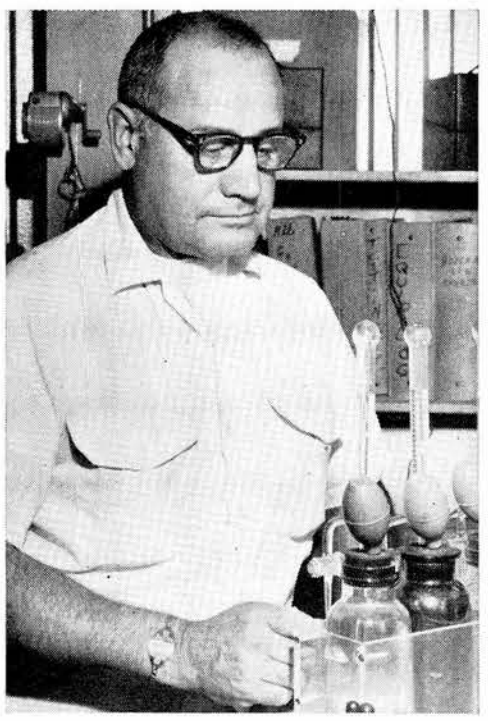
Speechless for 38 Days

Thirty-eight days may seem a long time to be speechless. But after a laryngectomy, it's a short time. And according to the speech therapist who taught the patient how to talk again, "There was instant learning."

A vicitm of cancer of the larynx, Earl C. Deno (8222-1) was able to talk just 38 days after his larynx and vocal cords were removed.

At first, doctors believed it might be six months before Earl would be able to return to work. There was the stay at Livermore's Valley Memorial Hospital and convalescent time to consider. Then the patient would need therapeutic training to enable him to speak again.

A boiler plant operator at Livermore Laboratory, Earl knew that he had to use the telephone in order to do his job satisfactorily. If he didn't come back talking, he could no longer handle his job. He decided that wasn't going to happen, and it didn't.



BACK AT WORK testing samples of boiler water for chemical and mineral content is Earl C. Deno (8222-1). Determination to talk even after his vocal cords were removed by surgery was an important factor in his returning to work four months ahead of original estimates. Reverse side of "Medic Alert" bracelet (on his right arm) indicates that he is a "neck breather" should he ever need emergency medical assistance.

Accepting the doctor's advice with unusual calm "as a thing that had to be done," Earl underwent the operation.

Surgery was successful. Despite postoperative complications, the patient defiantly vowed that "They're not going to count me out yet."

Twelve days later he talked to his wife, Jo. However, the wound had not healed sufficiently to produce the new sounds properly. So, his early attempts to talk ceased until his doctor gave him permission to try again 19 days later—31 days after the operation.

It was now impossible for Earl to produce voice sounds in the normal manner.

Breathing through the nose or mouth was a thing of the past. A hole in the throat was provided for this vital function. Speaking had to be accomplished by swallowing air and forcing it back out the mouth instantly before it got to the stomach—like forced belching.

The instructor repeated these principles to Earl when he attended his first American Cancer Society-sponsored class in speech therapy—38 days after surgery. When shown how to produce the voice in this manner, Earl uttered, "Like this?"

At the second meeting the therapist informed Earl that the class could do no more for him. So, Earl plans to help others by joining the "Lost Chord Club of Northern California."

Two months after his operation, Earl was working and talking in the steam plant—four months ahead of the original timetable. His vocabulary is unrestricted and he speaks a sentence of five and six words in one breath. "Maybe my work as a roofer several years ago helped me develop the strong stomach muscles I need today," he relates. He has no plans at this time to use any electronic-speech aid.

Other aspects of his life have also changed as a result of the operation.

He can't smell things anymore. But he maintains he can "taste" the chicken his wife is cooking or the cologne she wears.

Foods taste differently. He now likes oatmeal and poached eggs; formerly he didn't. Lemon juice tastes like diesel fuel used to smell. Salt and sugar have no taste.

"The thing I miss most," continues Earl, "is that I can't work on jobs around the house—such as painting. If I over-exert or twist my neck too far one way or the other, it cuts off my breathing."

Yet, he is thinking about rigging up some elaborate snorkel tube arrangement that will enable him to go swimming.

Past evidence of his determination to do things indicates he might do just that.

SCLL Surpasses United Crusade Goal

Employees at Livermore passed their 1967 United Crusade goal of $22,000 by contributing a record $24,053. This is an increase of 23 percent over last year's contribution of $19,541.

According to Marv Glaze (8243), campaign chairman, the average gift per contributing employee was $29. Seventy-nine percent of the Laboratory employees contributed.

Top three organizations for percentage participation were Product Engineering Department 8160, Administrative Services Department 8210 and Security, Purchasing and Material Services Department 8240.

Fair Share contributions also increased from 50 in 1966 to 80 this year. Engineering Services Department 8250 was the highest with 17 Fair Share givers.

"We are most pleased with the overall results of the drive, particularly the increase in the number of Fair Share contributors," says Marv. "Employees are to be commended on their response to the needs of the youth, family, senior citizen and health service activities in the Bay area."

Congratulations

Mr. and Mrs. Carl Wackerly (8213), a daughter, Audrey DeeAnn, Sept. 13.

Mr. and Mrs. Gary Ludwig (8131), a daughter, Lynn Elizabeth, Sept. 18.

Mr. and Mrs. Gene Springer (8117), a daughter, Kimberly Jean, Sept. 21.

Mr. and Mrs. V. K. (Gabe) Gabrielson (8114), a son, Paul Eric, Oct. 3.

Sympathy

To Ralph Jaegar (8231) for the death of his father-in-law in Walnut Creek, Oct. 2.

Chabot College Lecture Series Begins Oct. 26

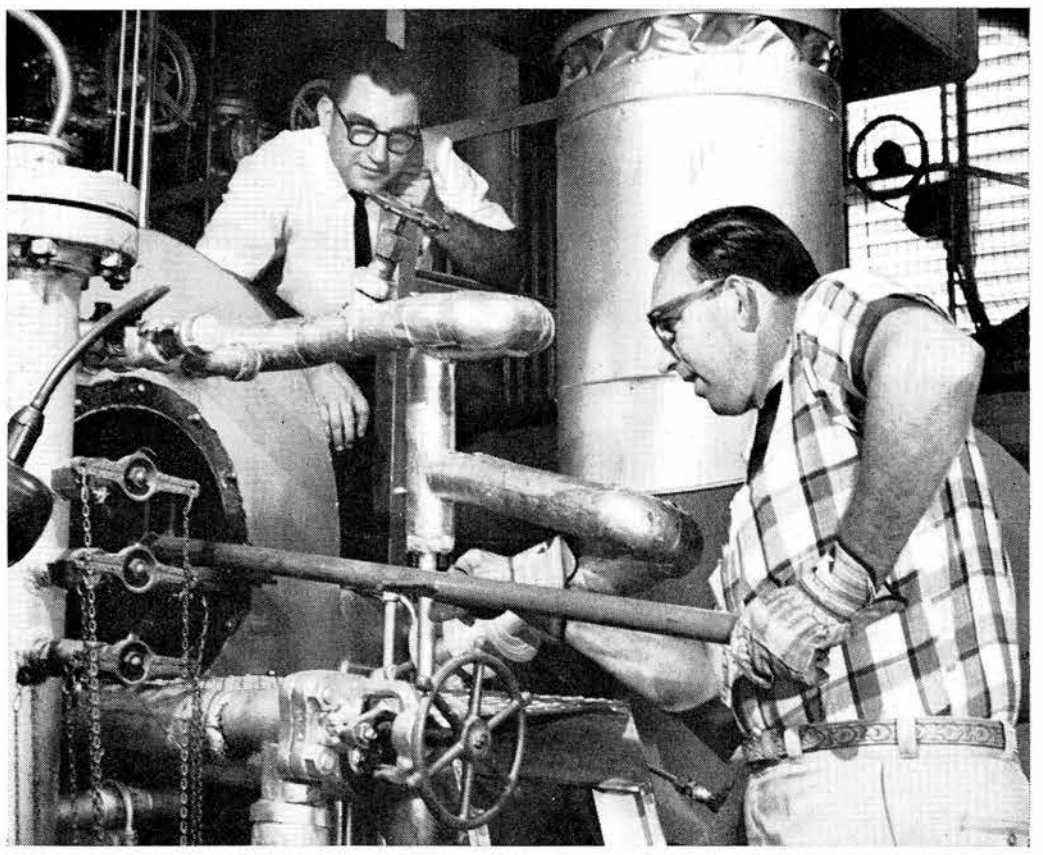
Twelve speakers of national and international fame will be featured during the 1967-68 Chabot College Lecture Series.

"A Look at the 21st Century," the theme of the autumn quarter of the series, opens on Oct. 26 with Pearl S. Buck, the first American woman to receive the Nobel Prize for literature. Her subject will be "An Evening with Pearl S. Buck."

Other speakers and topics scheduled for the autumn quarter include: Dr. Arthur Clarke, an authority on the Telstar communications satellite, "The Promise of Space," Nov. 6; Dr. Duke D. Fisher and Dr. J. Thomas Underleider, consultants to the California Attorney General on problems of drug abuse, "Drugs and Drug Abuse," Nov. 16; and Dr. John E. Cantelon, Director of the School of Religion at the University of Southern California, "Moral Values," Dec. 11.

The theme for the winter quarter of the series is "The Quest for Communication," followed by "The Adventure of Science and Technology" for the spring quarter.

The lectures are being presented in the new 1500-seat auditorium at the Hayward campus beginning at 8 p.m. Quarter season tickets can be purchased by sending $3 to the Office of Community Services, Chabot College, 25555 Hesperian Blvd., Hayward, Calif. Season tickets for the entire series (12 lectures) are $7.50 and assure a reservation for each event in the series.



OPERATION OF NEW TOOL for removing steam boiler manhole covers is checked by designer N. N. (Norm) Sirnic (8254) while J. R. (Rudy) Grund (8222-1) removes a boiler cover located two feet inside the circular opening shown. Tool eliminates the need for struggling with a 68-pound cover in cramped quarters during boiler inspections.

N. N. Sirnic Designs New Tool To Remove Boiler Manhole Covers

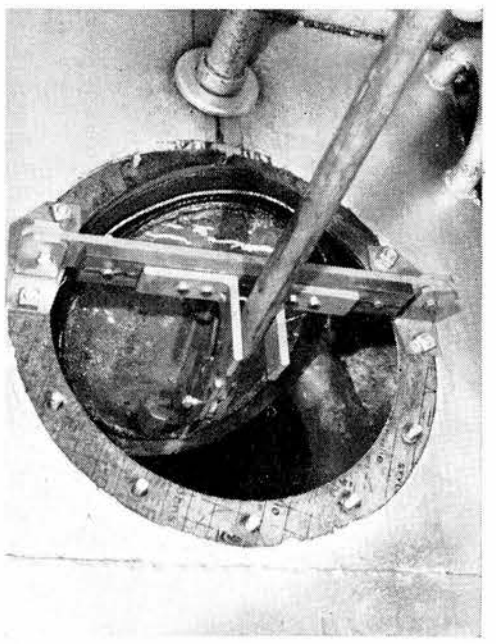
A handling tool that reduces the manual effort needed to remove and replace 68-pound manhole covers in steam boilers has been designed at Livermore Laboratory.

The tool is used when maintenance and inspection personnel need to check the inside of a boiler for loose or corroded tubing or metal erosion.

For the past nine years, maintenance men have pounded, pushed, twisted and pulled the manhole covers to get them out of the boiler. They've hefted 68 pounds with one hand at arm's length. They had no elbowroom, and were subjected to safety hazards despite attempts to use industrial handling equipment.

Designed by N. N. Sirnic (8254), the new tool consists of a six-and-one-half-foot rod with a clevis (U-shaped piece of iron with holes for a bolt to pass through) on one end. The other end is used as a handle. The clevis bolts to a metal tongue which is welded to the boiler manhole cover. In operation, the rod is supported and guided by a metal fixture which attaches to the standard bolt pattern in the opening of the boiler.

After the rod is attached to the manhole cover, the cover can be removed or replaced by manipulating the rod. Physical effort is reduced dramatically.



ROD OF HANDLING TOOL, resting on a metal fixture, supports 68-pound boiler cover after it has been removed from its position inside the boiler.

Take Note

Several Sandians participated in the ALO Computer Meeting held at Los Alamos Scientific Laboratory Sept. 27-28. Representatives from the entire ALO complex attended the meeting.

A. G. Schuknecht, supervisor of Computer Study Division 8115, made a presentation titled "Livermore Laboratory Computer Status Report" and J. L. Tischhauser, manager of Programming Department 9420, gave a similar presentation for Sandia Albuquerque. Other speakers included Mrs. M. L. Hendricks (9424) who discussed "Development of Color Plotting Capability" and C. R. Martell (2223) who discussed "Sandia Computer Graphics System."

* * *

Programmed self-instruction study during off-hours is again being offered at Livermore Laboratory. Seven math and three computer language courses — FORTRAN, COBOL and APT — are scheduled for Tuesdays and Thursdays; and basic electricity, electronics and transistors classes will be held on Mondays and Wednesdays.

Study halls will be held beginning Oct. 30 in the Personnel interview rooms (Bldg. 911), 4:20-5:30 p.m.

To enroll or for further information, contact Division 8214, ext. 2402.

A. R. Nurse to Address Colloquium At SCLL on Oct. 31

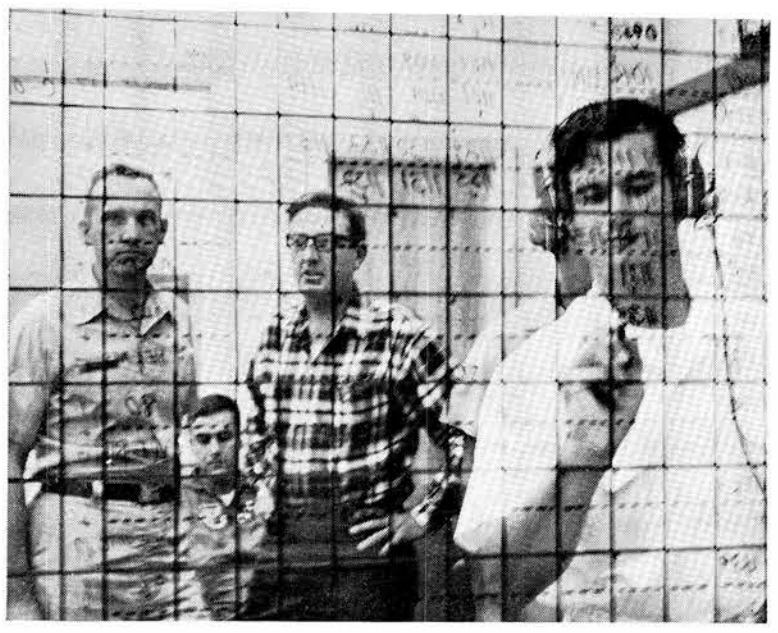
Alexander R. Nurse, Chief of the Center on Alcoholism in Alameda County, will be guest speaker at Livermore Laboratory's Colloquium on Oct. 31.

The title of his talk will be "Alcoholism in Industry."

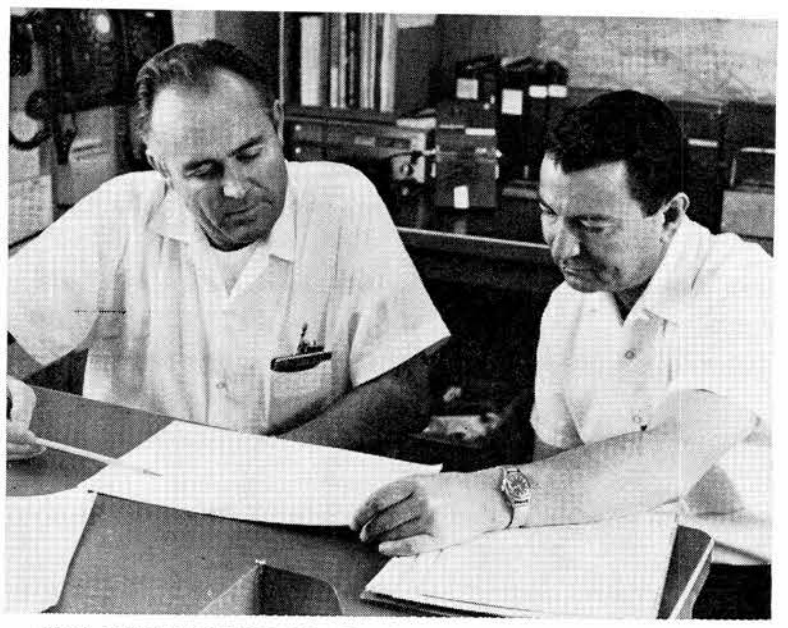
In addition to his responsibilities at the Center on Alcoholism, Dr. Nurse is an instructor in industrial psychology at the University of California at Berkeley extension school and a staff psychotherapist at the California Medical Clinic for Psychotherapy. He also has a private practice in which he specializes in group and individual psychotherapy, industrial evaluations, supervisory training programs and group counseling training programs.

Dr. Nurse holds BA and MA degrees from Southern Methodist University, and a PhD in psychology from the University of Texas.

Further information concerning the Colloquium will be posted on the bulletin boards next week. Tickets are required for admission. A. D. Pepmueller (8230) is serving as host.



BRIAN FINLEY (2152), center, watches progress of a JTF-2 flight on the operations plotting board with Lt. Col. J. T. Watkins (left), JTF-2 Operations officer. Brian headed a team of Sandia interviewers who "debriefed" JTF-2 pilots after test missions.



JTF-2 ASSIGNMENT SCHEDULE is discussed by Bill Johnson (9228), left, responsible for pod operations, and Frank Rivera (2551) who provided administrative and logistics support to the Sandia group.

'Best Test Series Yet'

JTF-2 Field Test 4.4 Complete; Sandians Return

The field portion of Joint Task Force Two's Test 4.4 was wrapped up this week and 35 Sandians returned from a summer of concentrated activities in a test area centered around Idabel, Hugo and Broken Bow, Okla. The test series was the fourth field test conducted since Sandia entered the JTF-2 program two and a half years ago. It involved more than 600 low-level flights of military aircraft in an exercise measuring effectiveness of collecting intelligence information over a simulated battlefield.

"This field operation was our most successful effort to date," J. J. Miller (9222), Sandia's JTF-2 Field Test Manager, says. "We had few operational hitches and the performance of the instrumentation — designed and maintained by Division 9214 under T. A. Sellers — was outstanding. Inclement weather caused the most trouble."

The data — collected by instrumentation in pods carried by the test aircraft and in ground stations at the target sites and transmitted to three high-flying C-130s orbiting the test area — became a monumental job of reduction as the test progressed.

Just under 20 million feet of data tape was collected during the exercise. It would stretch from New York to Paris. During each day of operations, about 80 miles of digital tape was recorded.

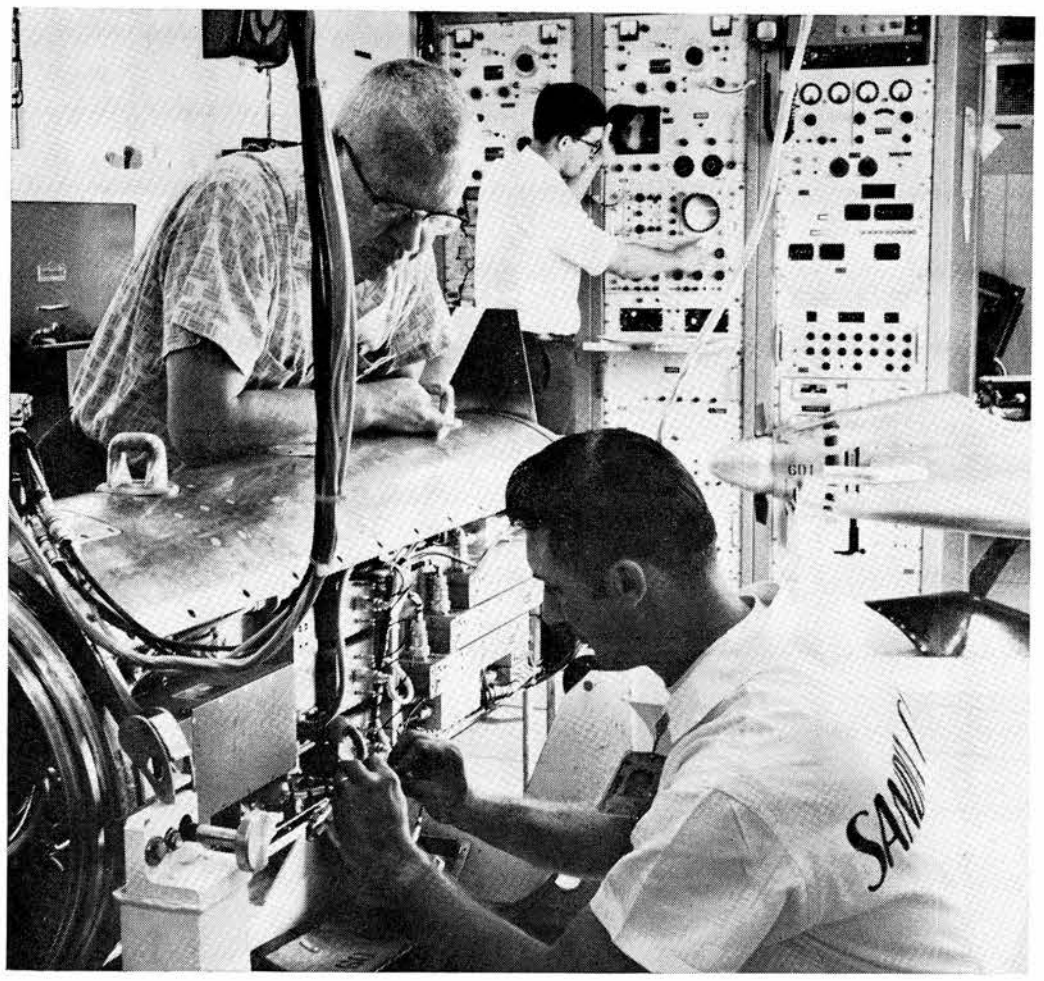
The data were accumulated as the aircraft — Phantom F-4C, A-4 Skyhawk, A-6 Intruder plus other reconnaissance, attack and helicopter aircraft — sped at altitudes under 1000 feet across the 175-mile test range. Aircraft crews were charged with locating and identifying simulated targets such as bridges, fuel supply storage, gun installations, tanks, etc. The instrumentation in the pods, in the C-130s and at the target sites recorded a complete flight profile. Ground stations also recorded visibility conditions and the first possible "encounter" time at the targets.

When the pilots recognized the target, they hit a "pickle button" to record their time of encounter. Some 3649 "target acquisition" events were recorded.

As the tapes came out of the recorders, they were sent to Albuquerque for immediate processing. Three contracting firms provided data reduction programs, computer service, and help in quality control of the processing.

Data reduction and processing of the tapes was the responsibility of D. H. Denton, supervisor of Data Processing Division 9217, and L. D. Watkins, supervisor of Division 9212. Delivery of the reduced data was accomplished ahead of schedule throughout the test.

The test plan called for 504 "valid" missions — ones where conditions for proper data were met. Actually, 508 successful missions were flown. Some 883 missions were scheduled. Most of the "aborts" were due to weather conditions. During top operational days, Sandians were at their posts up to 12 hours a day. Maintenance crews worked around the clock to keep the 14 instrumentation pods calibrated and operational at all times.



J. J. MILLER (9222), left, Sandia's JTF-2 Field Test Manager, discusses instrumentation pod maintenance with R. V. Tuller (9228) and L. T. James (9211), in background. The men had 14 instrumentation pods calibrated and operational each day of test operations.

Also correlated with the data collected during the flights was information gathered by Sandia interviewers in "debriefing" sessions with pilots of the test aircraft. Led by Brian Finley (2152), the team of Sandians conducted more than 350 interviews. The interviewers were seeking to obtain pilot opinions about their performance in the tests and their ability to acquire targets while flying low-level missions at high speeds.

JTF-2 officials praised Sandia's efforts in the test series, calling the Laboratory's contributions "outstanding in all respects."

"Operations went smoothly," J. J. Miller says. "There was not a single instrumentation failure in the C-130s or the ground stations; Sandians R. A. Case (9216), R. L. Peabody (9212), A. L. Johnson (9216) each logged more than 800 hours of flight time in the C-130s. One series of 94 consecutive test aircraft flights was flown without a single instrumentation failure in the pods. Considering the complexity of the equipment and the tight schedules, this was an outstanding accomplishment."

Welcome . . . Newcomers

Oct. 2-13

Albuquerque
**Mary L. Anderholm 3321
**Aurora F. Romero 3252
Maryland
*Clyde J. Northrup, Jr., Forestville 9311
Montana
David L. Cowan, Troy 5211
Oklahoma
*Walton J. Errickson, Oklahoma City 2212
Texas
William H. McCulloch, Lubbock 9333
Virginia
John W. Reichardt, Charlottesville 1413

* Denotes rehired
** Denotes temporary

ECP Drive 99% Complete; Total Now $275,545

With the tabulation about 99 percent complete, Sandia Laboratory employees have contributed a total of $275,545 to the current Employees Contribution Plan drive.

Average gift of those who have contributed is $45.50.

Last year, Sandians pledged a total of $261,757 to ECP. The average gift of those who contributed was $42.

ECP benefits a total of 37 agencies, 29 of which are members of the Albuquerque United Community Fund.

R. W. Harris Serves as Chairman of City's UN Week Observance

Local programs highlighting United Nations Week, Oct. 22-28, are being coordinated by Robert W. Harris (5235).

Bob, who is UN Week chairman of the Albuquerque Chapter of the United Nations Association, was also appointed Albuquerque's UN Week chairman by former City Commission Chairman Ralph Trigg.

The city, like many others throughout the world, will be observing the 22nd anniversary of the adoption of the United Nations charter.

A highlight of the local activities is an annual dinner Tuesday at UNM's Student Union Building. U. S. Representative George Brown, Jr., of California will be the featured speaker.

UN Week posters will be placed on library bulletin boards throughout the city by the Greater Albuquerque Library Association. Books relating to the United Nations will be prominently displayed in some of the libraries during the week.

A poster contest will be conducted in the Albuquerque Public Schools. Students submitting the three best entries will be awarded prizes at the dinner Tuesday.

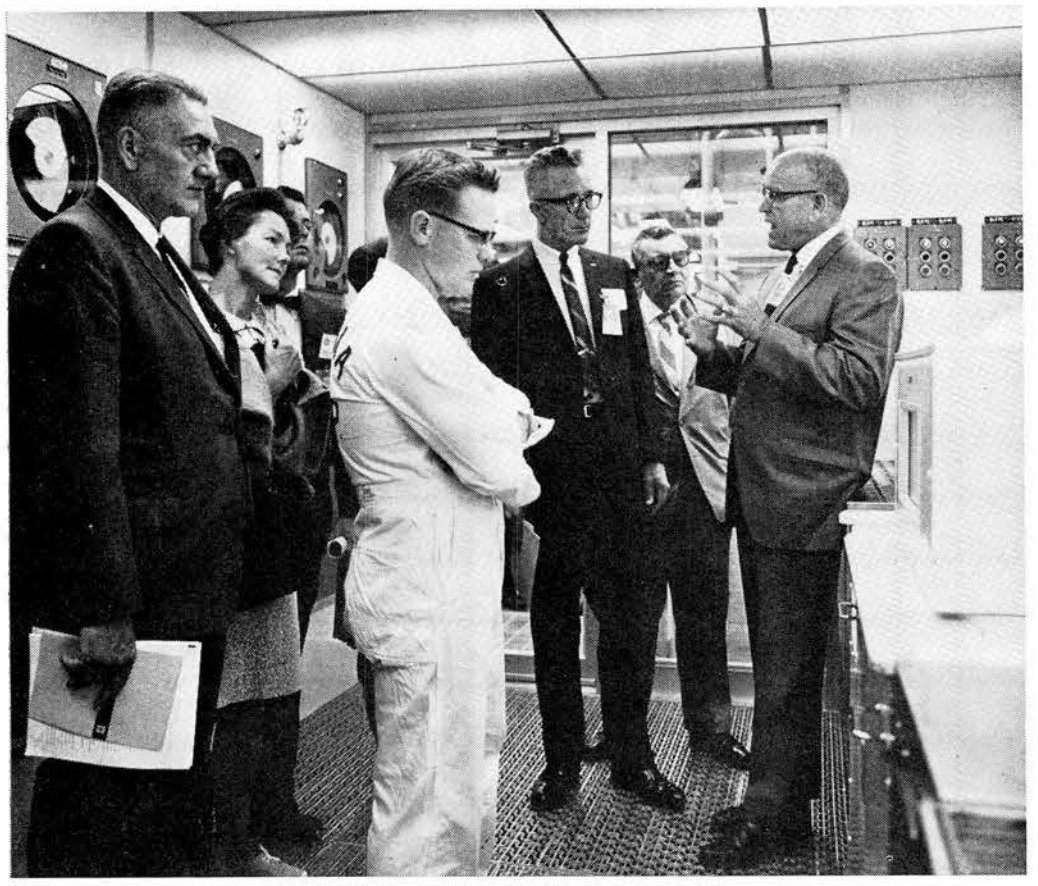
New UN films are available from the UN Association's Information and Gift Center (behind La Hacienda in Old Town) for showings to schools, churches and organizations.

A number of churches in the area will have special programs and speakers in observance of United Nations Week.

SANDIA'S GET-TOGETHER for retired employees attracted some 175 persons recently. Guests at the Coronado Club event included (l to r) former Sandia President S. P. Schwartz, Mr. and Mrs. A. I. Montoya, and Mr. and Mrs. Raphael Pena. The main speaker was Mrs. Barbara Menzie, director, Coordinated Action for Senior Adults.

ME16 TRACKING TELESCOPE was discussed and demonstrated for visitors to Tonopah Test Range Oct. 7. More than 500 invited guests and families of Range personnel toured TTR which is now in its tenth year of operation. Manning the demonstration are (l to r) Don Anderson (7231), Dennis Adkins (7232) and Jerry Witt (7232).

* * *



AEC-NASA Contamination Control Symposium attendees toured Sandia clean room facilities and the Sphere of Science on Sept. 14. J. A. Kenagy (4224) is explaining features of this clean room in the plastic shop. The purity meter demonstration outside the room was of particular interest to the visitors.

Take Note

Richard A. Bice, Vice President 7000, was named chairman of trustees of the Museum of Albuquerque last week. Mr. Bice has served as chairman of the Museum Advisory Board since his appointment by the city commission late last year.

* * *

J. A. (Andy) Chacon (9426) will participate next week in Cabinet Committee Hearings on Mexican American Affairs in El Paso, Texas. The Committee was established by President Johnson last June "to assure that Federal programs are reaching the Mexican Americans and providing the assistance they need, and to seek out new programs that may be necessary to handle problems that are unique to the Mexican American community."

Andy will participate in a seminar dealing with health, education and welfare programs and one on social and cultural programs. He has served on the New Mexico State Welfare Board and with the Peace Corps in Peru.

* * *

R. A. Quelle (3122) will participate in a panel discussion on work and retirement during the 16th annual New Mexico Conference of Social Welfare at Western Skies Motor Hotel Nov. 2-3. The two-day meeting is expected to attract about 400 New Mexicans interested in developments in areas which constitute the broader aspects of social welfare activity. Harry E. Kinney (5637) and Nigel S. Hey (3431) are members of the Conference's executive committee.

* * *

Donald K. Robbins (9424) was recently elected to serve a two-year term as vice chairman of the Rio Grande Chapter of the Association for Computing Machinery. Jack L. Tischhauser (9420) is the outgoing chairman of the group which consists of some 100 members from New Mexico, Arizona and El Paso. Don has been a member since 1958.

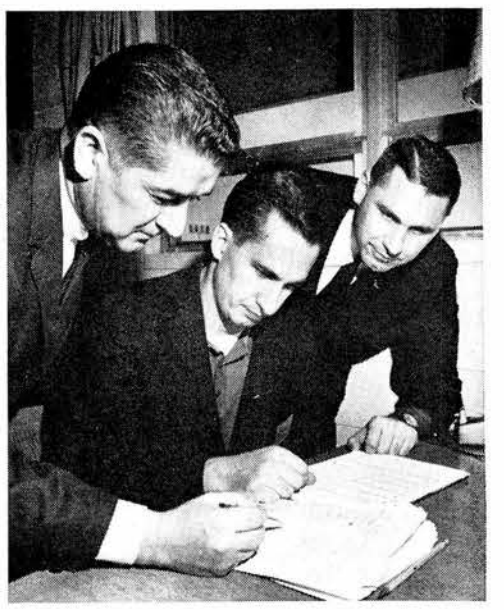
* * *

"Animal Farm," a play based on the book by George Orwell, will be presented in Bldg. 204 by the Sandia Base Special Services Entertainment Center, 8 p.m., Oct. 25, 26, 27 and 28. Theater productions are open to all Sandia employees and their families. There is no admission charge.

* * *

A new edition of the Directory of Libraries of New Mexico was edited by Gladys Rowe of Sandia's Technical Libraries Division.

The directory is published by the Rio Grande Chapter of the Special Libraries Association and lists the resources and facilities of 97 libraries in the state. The subject index includes special subject collections in various libraries.



DETAILS OF AT&T COLLEGE RECRUITING workshop are rechecked by (l to r) J. L. Wheeler (3251), workshop coordinator; Neal Greenhalgh, personnel supervisor of college employment, AT&T headquarters; and Don Liebers, personnel manager of college placement, AT&T. Two three-day sessions with 12 partcipants in each were held at Western Skies Motor Hotel last week to train recruiters in the Bell System approach to college recruiting. The participants were from Western Electric, Bell Telephone Laboratories, various AT&T operating companies and Sandia Laboratories.

* * *

CHAMPIONSHIP TROPHY for the Sandia Employees Golf Association — Ladies was presented to Pat Anderson (7216) by President Hornbeck at a recent dinner. Pat won the trophy by scoring the low gross in the four major ladies' tournaments. Low net honors went to Eileen Zemka (2213).

Speakers

H. O. Jeske (7211), "Graphical Determination of Third Order Intermodulation Frequencies in RF Systems," 1967 International Telemetering Conference, Oct. 2-4, Washington, D.C.

W. B. Goldrick (9231), "Vela Satellite Program," American Society of Certified Engineering Technicians, Oct. 2.

T. B. Sherwin (3430), "PR Today," Highland High School General Business Class, Oct. 2; "Public Relations Today," Albuquerque T-VI, Oct. 18.

O. L. Wright (4610), "History of Sandia Base," Manzano High School Science Club, Oct. 3.

C. W. Harrison, Jr. (1425), "Transient Response of Shields and Antennas," UNM Electrical Engineering Department, Oct. 10; "On the Radar Cross Section of a Stratified Sphere," National Academy of Sciences, U. S. National Committee, International Scientific Radio Union, Oct. 16, Ann Arbor, Mich.

H. G. Baerwald (5143), "The Invariant Representation of Twin-Property Thermodynamics with Application to Piezoelectricity," 1967 Ultrasonics Symposium, Oct. 4-6, Vancouver, B.C., Canada.

Richard Holland (5142) "Resonant Properties of 3-Dimensional Rectilinear Piezoelectric Structures," 1967 Ultrasonics Symposium, Oct. 4-6, Vancouver, B.C., Canada.

N. C. Fawcett (1341), "A Novel Ferrocene Polyurethane," American Chemical Society meeting, Sept. 13, Chicago.

D. R. Anderson (1111), N. C. Fawcett (1341) and P. E. Cassidy (former Sandian), "A Novel Ferrocene-Urethane Foam," American Chemical Society meeting, Sept. 13, Chicago.

V. L. Duke (4544), "A Self-Contained Fire Extinguishing System for Mobile Electronic Facilities," AEC and Contractors Industrial Safety Meeting, Sept. 19-20, Argonne National Laboratory, Ill.

W. N. Caudle (9327), A. Y. Pope (9300), R. L. MacNeill and B. E. Margason (Woodward-Clyde-Sherard & Associates), "The Feasibility of Rapid Soil Investigations Using High-Speed, Earth-Penetrating Projectiles," International Symposium on Wave Propagation and Dynamic Properties of Earth Materials, Aug. 23-25, Albuquerque.

F. G. Blottner (9321), "Finite Difference Solution of the First Order Boundary Layer Equations" and "Viscous Shock Layer Problem for the Stagnation Point of a Blunt Body," AGARD Seminar on Numerical Methods for Viscous Flows at the National Physical Laboratory, Sept. 18-21, Teddington, England.

J. F. Muir (9326) and R. Eichborn (University of Kentucky), "Further Studies of the Compressible Flow of an Air-Water Mixture Through a Vertical Two - Dimensional Converging - Diverging Nozzle," JSME Semi-International Symposium, Sept. 4-8, Tokyo, Japan.

R. S. Printiss, Jr. (5612), "The Estimation of Unknown Probability Density Functions from Observed Data," Association for Computing Machinery, Oct. 5, Albuquerque.

G. D. Horne, Jr. (9414), "A Mass Storage Information Retrieval System," Association for Computing Machinery, Oct. 5, Albuquerque.

A. T. Steele (9423), "The Probability that a Falling Missile Will Hit People in a Polygon-Shaped Region," Association for Computing Machinery, Oct. 5, Albuquerque.

W. D. Jones (2566), "Control of Vendor Quality," American Management Association Quality Control Conference, Sept. 21, Chicago.

H. S. Levine (5234), "High-Temperature Metallic Oxidation," Third International Symposium on High Temperature Technology, Sept. 17-20, Asilomar, Calif.

J. M. Freese (5234), "An Improved Reaction Vessel for Gas Phase Flash Photolysis Studies," Ninth Annual Time-of-Flight Mass Spectrometer Training School Symposium, Sept. 26-28, Cincinnati.

R. P. Stromberg (9333), "Space Use of Energy Conversion Principles," American Institute of Aeronautics, Sept. 21, Oklahoma City.

L. W. Davison (5261), "Linear Theory of Mechanical Equilibrium of Liquid Crystals of the Nematic Type," Solid Mechanics Seminar, Oct. 17, Pasadena, Calif.

J. G. Eberhart (1123), "Zisman's Relationship in the Wettability of Metal Oxides by Liquid Metals," Fall Meeting of the Metallurgical Society, Oct. 16-19, Cleveland.

W. D. Gutscher (9211), "JTF-2 Sandia Instrumentation Systems," Instrument Society of America, Oct. 10, Albuquerque.

G. C. Newlin (6011), "What's Patentable in Electronics?" IEEE Electron Devices Group, Oct. 1, Albuquerque.

D. M. Schuster (1131), "Fiber Reinforced Composites," American Society for Metals, Oct. 19, Albuquerque.

M. J. Landry (7226), "GB-Lidar System," SPIE Seminar-in-Depth on Laser Range Instrumentation, Oct. 16-17, El Paso; "Laser Radar" and "Holography," New Mexico State University Electrical Engineering and Physics Departments, Oct. 18, Las Cruces; "Fundamentals of Holography," IMOG Meeting, Oct. 4, Amarillo.

D. M. Fenstermacher (7724), "Popular Astronomy," Sunrise Optimist Club, Oct. 10.

Albert Goodman (5637), "Some Things That the Future May Bring," South Valley Optimist Club, Oct. 11, and Downtown Lions Club, Oct. 17; "Think Small," Albuquerque Board of Realtors, Oct. 18.

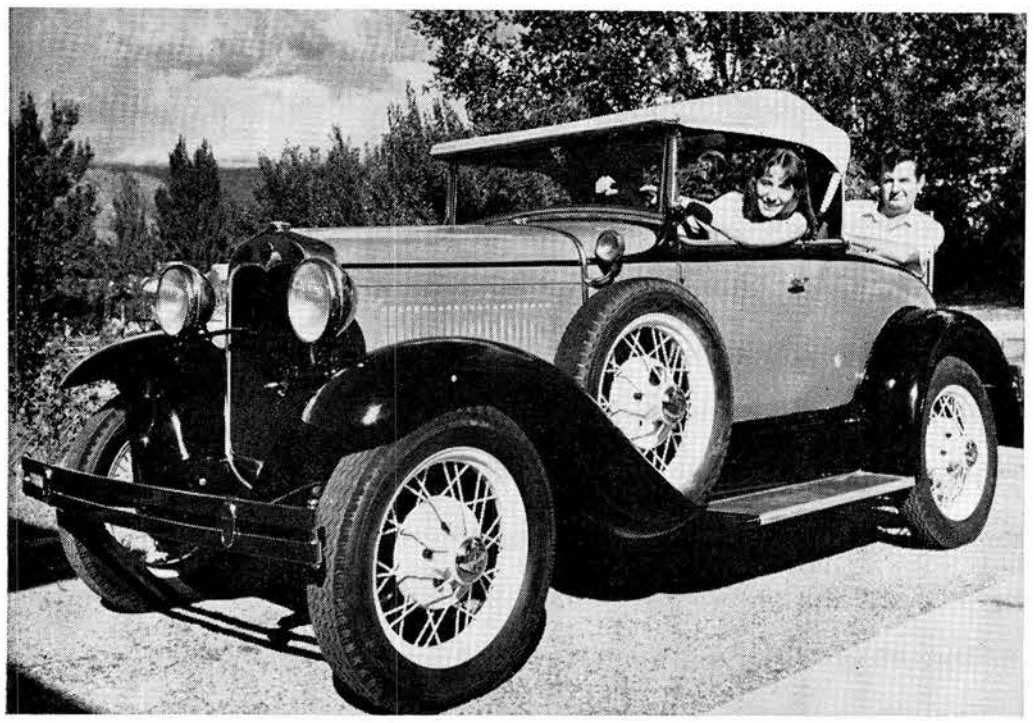
M. I. Weinreich (3421), "Sociology of Language," Albuquerque T-VI, Oct. 12.

B. H. Van Domelen (5530), "Project Gas Buggy," Manzano Sunrise Kiwanis Club, Oct. 16.

J. W. Reed (7111), "Interoceanic Canal Feasibility Studies," Heights Optimist Club, Oct. 18.

J. R. Banister (5120), "Plasma Physics," Utah State University, Oct. 18, Logan, Utah.

F. F. Eichert (2210), "Opportunities in the Field of Drafting," Albuquerque T-VI, Oct. 20.



GLISTENING 1930 FORD Deluxe Roadster is checked by Janette Gay as her father, Holt (9333), is relegated to the rumble seat. Starting with shell shown in the picture below, Holt restored the award-winning car in three years.

Model A Enthusiast Converts Shell Into Prize-Winning Antique

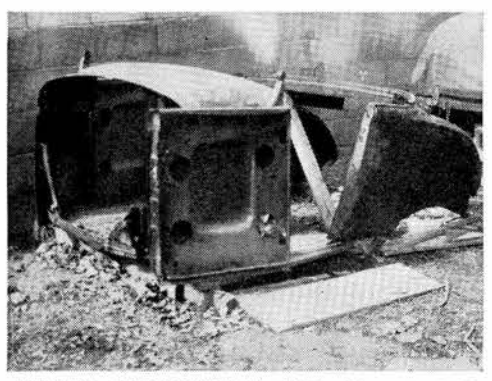
After three years of labor and searching for authentic parts, Holt J. Gay (9333) has converted a partial shell of a 1930 Ford Deluxe Roadster into a prize-winning antique car.

To make the investment of time and money worthwhile, Holt is giving the Model A to his 15-year-old daughter, Janette. His other two children have each selected one of the other six Model A Fords the family is restoring. Jim, age 12, selected a 1931 four-door sedan. Susan, age 9, has a 1930 Ford Sport Coupe, which has been restored and is currently stored in Lexington, Ky. The children are given the cars under the provision that they maintain them in good condition and pass them on to any of their offspring. Holt plans to keep at least one for himself.

Holt, a mechanical engineer, looks for Model A cars while on hunting and vacation trips. The prize-winning car was a particular challenge. He scoured remote areas for all the parts except original portion of the body.

He found the radiator housing and core in Florida. He bought the fenders locally from two different persons. Then most of the parts had to be rebuilt or refinished. After it was assembled, the car was refinished with some 15 coats of lacquer. Holt went over each coat with fine sandpaper and rubbing compound.

A stickler for authenticity, Holt spends considerable time researching original design details. Once when in Washington, D.C., he hurriedly sketched the placement of the windshield wiper motor and vacuum



BEFORE RESTORATION—Holt Gay started the project with this Model A body.

tube from a Model A parked in the street.

Holt was gratified that the 1930 Ford Roadster won the award of best restored car of all classes at the State Fair antique car show. He built a $10 portion of a car body into a vehicle he values at $4000. However, neither Holt nor Janette would consider selling the well-lacquered antique.

Shock-Vibration Meet Attracts Local Papers

A number of Sandians will participate in the DOD's 37th Shock and Vibration Symposium to be held in Orlando, Fla., Oct. 24-26.

The symposium is hosted by the Navy, Army, Air Force, and National Space and Aeronautics Administration on a rotating basis. The meeting this year will include conferees from Australia, England and Scotland as well as representatives of American industries.

The featured speaker will be John Philip Salter, senior engineer, Royal Armament Research and Development Establishment of the United Kingdom Ministry of Defense.

Sandia technical papers to be presented are:

"Random-Force Vibration Testing" by J. V. Otts and N. F. Hunter, Jr. (both 7324).

"Elastic-Plastic Collapse of Structures Subjected to a Blast Pulse" by W. R. Murfin (1541).

"Control Stabilization for Multiple Shaker Tests" by J. G. Helmuth of Chadwick-Helmuth Co., Monrovia, Calif., and N. F. Hunter, Jr. (7324).

"Development of Simulated Aircraft Delivery Using a Rocket Sled" by W. R. Kampfe (7344).

"Dynamic Phase Plotting" by T. E. Smart (7335).

Congratulations

Mr. and Mrs. Willard H. Schmidt (1548), a daughter, Cynthia Ann, Sept. 21.

Mr. and Mrs. Carlton R. Pennington (4574), a daughter, Marlo Marie, Oct. 3.

Mr. and Mrs. T. G. Maull (2566), a daughter, Julie Ann, Oct. 5.

Mr. and Mrs. H. W. Schmitt (1541), a daughter, Karen Christie, Oct. 8.

Sandia Cost Improvement Cases Included in AEC Report to President Johnson

Four cost improvement actions by Sandia Laboratory were included as examples in a cost reduction report by the Atomic Energy Commission to the President. They were part of a consolidated report by all AEC contractors.

The cases fit specific categories of the report—"specifying or utilizing less expensive materials and components," "buying at minimum cost consistent with program needs" and "accelerating installations of technological and process improvements designed to reduce operating costs."

Total savings represented by the four cases was $17,000 which is only a fraction of the total cost reduction actions accomplished by Sandia this year. Since Jan. 1, Value Engineering and Cost Improvement Division has reported to the AEC a total savings of $3,087,300 in 11 cost improvement actions.

Engineering Review Course Set at UNM

An engineer-in-training review is being offered by the University of New Mexico and the Albuquerque Chapter of the New Mexico Society of Professional Engineers.

The 33-week course will be climaxed by the Engineer-In-Training examination, a prerequisite to the Professional Engineers examination.

The class will meet Monday and Wednesday evenings beginning Oct. 30 from 7:30 to 9:30 p.m. in Rm. 235 of the Civil Engineering Bldg.

The review will include mathematics and the fundamentals of engineering including engineering physics, statics, strength of materials, dynamics, thermodynamics, fluid mechanics, engineering economics, electricity and chemistry. Instruction will be provided by UNM professors of engineering and professional engineers in private industry.

To register, contact Dr. M. H. McMichael, UNM Division of Extension, tel. 277-2931. Fee for the course is $50, which includes the examination.

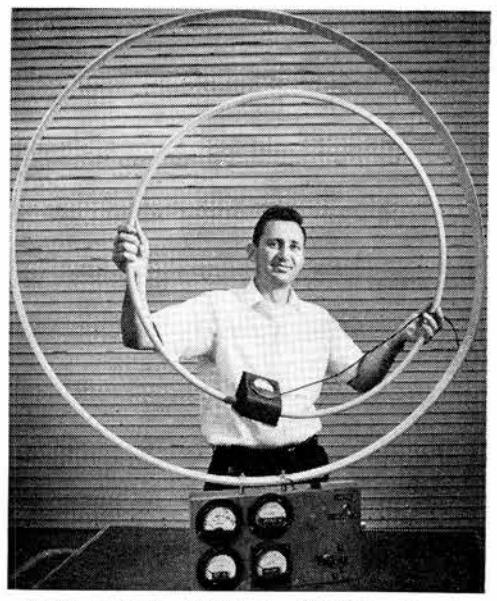
Is That Wild-Looking Pink Antenna Really a Hula Hoop? Yes!

What a funny looking transmitting antenna! The color is a wild pink and it looks like a hula hoop. Well, let's admit it, one of the components is most of a hula hoop.

Electromagnetic Radiation Division 7333 recently was asked to establish a high magnetic field using a transmitting antenna. A loop configuration was the best solution, but the covering for the wires would have to be of a nonconductive material yet fairly rigid. A special plastic form sounded expensive.

Amado Chavez watched his daughter play with a hula hoop one evening and realized that the colorful plastic toy might be the solution. It was. A piece about six inches long was cut out of the circle, the wires were strung through the rest of the hoop, and the ends were fastened on opposite sides of a control box. It worked fine.

The division's function is to produce and to measure electric and magnetic fields of varying magnitudes and to determine their effects on circuits and components. The problems don't always have such colorful solutions.



HULA HOOP WITH A FUTURE: Amado Chavez (7333) decided a hula hoop would meet specifications for a semi-rigid, nonconductive covering for the wires of a transmitting antenna. The more conventional prototype is in the foreground.

Events Calendar

Oct. 20-22, 27-29—"The Little Foxes," UNM Rodey Theater, tel. 277-4402.

Oct. 21—Guitarist Carlos Montoya, UNM Concert Hall, tel. 277-3121.

Oct. 22—Exploratory rock climb in Rio Puerco Valley. N. M. Mountain Club, leader Jack Kuts, tel. 255-9781.

Oct. 27—Football, UNM vs. Texas Western, UNM stadium 8 p.m.

Oct. 27—"Hollywood Spectacular," Civic Auditorium.

Oct. 30—"An Evening with Nancy Ames," UNM Concert Hall, tel. 277-3121.

Nov. 1—YWCA tour to Grants and El Morro National Monument, non-members welcome. For information, tel. 247-8841.

SANDIANS W. L. Dodd (3252), left, and G. O. Lawrence (4151) discussed education and job opportunities at the recent state convention of the NAACP in Roswell.

Jobs and Education Discussed By Sandians at NAACP Meet

Employment opportunities and the values of education were among the topics discussed by W. L. Dodd (3252), Plans for Progress coordinator for Sandia, and George O. Lawrence (4151) during the 16th annual convention of the New Mexico State Conference of Branches of the National Association for the Advancement of Colored People.

Featured speaker at the opening session, Oct. 13 in Roswell, was Samuel C. Jackson, U. S. Equal Employment Opportunity commissioner, Washington, D. C.

On Saturday, Mr. Dodd was a panel member at three workshops. The subjects of these sessions were "How to Apply for a Job," "Job Opportunities," and "EEO and the Job."

Mr. Lawrence counseled youths on the benefits derived from staying in school. An Illinois Bell Telephone Company film, "The Winners," was also shown.

Richard L. Dockery, southwest regional director for the NAACP, Dallas, was the banquet speaker. The convention concluded Sunday with business meetings.

Retiring

Paul H. Kolb retired Sept. 30 with more than 18 years at Sandia Laboratory. He joined the Company in January 1949. His first assignment was to help organize the instrument repair service. He worked in the job planning department and in 1955 transferred to his present position in Electromechanical Division II 1325. His work has been in R&D engineering—designing special instrumentation.

Before coming to Sandia, Paul worked for two aviation companies, taught at the Williamsport (Pa.) Technical Institute, and had his own jewelry business for 18 years.

Mr. and Mrs. Kolb have a daughter living in Washington and two grandchildren —"one for each knee," Paul says. His retirement plans include traveling, hunting and fishing; however, his main interest will be his workshop, soon to be completely outfitted. He will build custom furniture and custom-design grandfather clocks.

"I may have time to read the morning paper," Paul says. "My new projects will keep me busy and happy."

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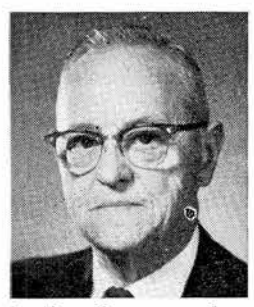


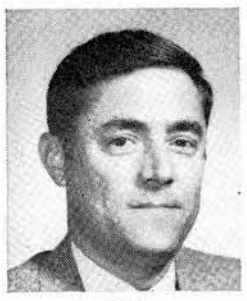
Robert E. Quinlan, a staff engineer in Sandia's Electrical Standards Division 2412, will retire the end of this month. He came to the Laboratory in January 1955 and worked with the electromechanical development organization for several years. He has been in his current job for about five years. Before joining Sandia, he was an electrical engineer with Minneapolis-Honeywell in Boston.

Mr. Quinlan has two children, both married — a daughter in Albuquerque and a son in Boston — and six grandchildren.

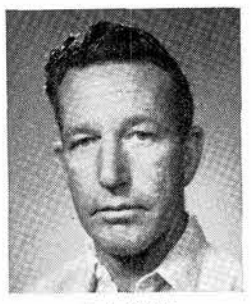
Immediate plans following his retirement include a few weeks vacation and then he intends to work in some phase of the investment and insurance field. Mr. Quinlan's hobby is playing the piano, and he is a member of the Sandia Toastmasters Club where he has held a number of local and state offices.

Service Awards

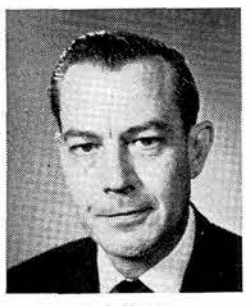
20 Years



Leo Gutierrez
8100



L. A. Kelton
4573



R. O. Morrow
1623

15 Years

Ina Alexander
2234

J. M. Caller
1434

G. H. Donaldson
2453

D. B. Farmer
8163

R. C. Gauerke
2442

Alex Griego
2551

J. D. Griego
2555

E. L. Jolly
4600

B. J. Liston
7322

V. H. Osterby
2213

10 Years

E. R. Phillips
2221

J. O. Phillips
1521

H. R. Shelton
3134

C. Z. Stuart
2134

F. J. Wettin
4224

Martha Whitford
1000

Oct. 20 - Nov. 2

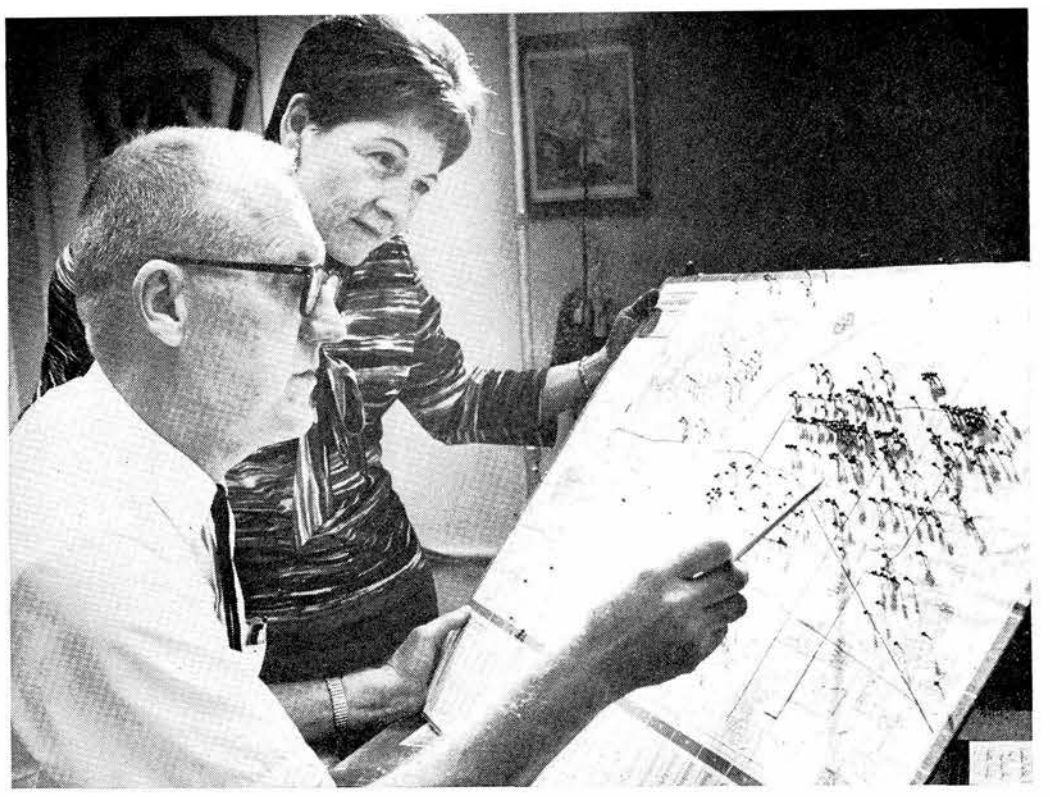
E. J. Hart 1341, J. P. Spacer, Jr. 1546, R. G. Allison 2431, Mary Jo McClellan 2431, W. J. Granfield 2552, Loretta B. Marmon 3321, A. A. Raroczy 1525.

C. B. Olson 2212, C. M. Furnberg 8132, P. A. Abrams 4113, E. J. Vavro 7344, R. L. Helm 9413, W. D. Zinke 8147, W. L. Dye, Jr. 4136.

Sympathy

To Alfredo Chavez (4574) for the death of his mother (age 108) in Willard, N. M,. Oct. 10.

To F. H. Johnson (3341) for the deaths of his father and two uncles in an auto accident near Hutchinson, Kans., Oct. 6. The men and their wives (who were critically injured) were en route to the funeral of a third uncle in Newton, Kans.



CITY MAP with pins designating employees interested in special bus service to the Laboratory is studied by Noble Johnson (3433) and Ann Pearce (3126). A total of 421 employees participated in a survey to determine the feasibility of additional routes.

Recent Survey Shows Large Number Of Sandians Interested in Bus Pool

A survey to determine employee interest in expanding the Albuquerque Transit System's daily "bus pool" service for Sandia Laboratory employees resulted in 421 replies.

Questionnaires seeking information to be used in studying the possibility of other bus routes were distributed last month.

Noble Johnson, supervisor of Community Relations Division 3433, reports that the survey shows the present bus routes serve the largest number of people to the best advantage, and any changes in routing or the addition of other routes is not feasible.

"Locations of persons interested in using the bus pool were plotted by placing pins on a city map. The resulting clusters of employees are in the areas currently being served by the two special buses."

Of the 421 replies received, 353 of the respondents live in the northeast heights in the general area of the present routes. Over 130 of these employees reported that they are using the two bus pools serving that area on either a regular, part-time or occasional basis. Noble reports that an average of 35 Sandians use each of the special buses daily.

Of the remaining employees expressing interest in bus pools, 30 live in the southeast quadrant, with only 18 reporting they would use the bus on a regular basis; 28 live in scattered locations throughout the northwest quadrant; and eight live in the southwest quadrant.

Advantages of the special buses were cited by many employees. "Each bus load of passengers accounts for about 25 more spaces for parking in Sandia parking lots," one employee commented.

Another employee pointed out, "The use of the bus as a backup means we [my family] only need one car." Others commented on the convenience of the service.

A number of employees suggested that the schedules of the two special buses be posted on the bulletin boards. In response to this suggestion, the schedules and routes will be posted throughout the Laboratory. One-way fare on the special buses is 25 cents, or a bus token and five cents.

SHOPPING CENTER • SHOPPING CENTER • SHOPPING CENTER • SHOPPING CENTER • SHOPPING CENTER •

CLASSIFIED ADVERTISING

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

RULES

1. **Limit: 20 words**
2. **One ad per issue per person**
3. **Must be submitted in writing**
4. **Use home telephone numbers**
5. **For Sandia 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

CARS & TRUCKS

'63 CHEVROLET 4-dr, 327 V-8. Gallegos, 154 Chama NE, 268-0271.

'53 CHEVROLET pickup, ½-ton, 4-speed, 6-cyl., $300. Treon, 256-0515.

'59 BMW sports car, needs repair, $40 as is. Cowham, 298-4249 after 5:30.

'64 FORD pickup, V-8, 4-speed, long wide bed, R&H. Riggle, 268-6578.

'60 JEEP, CJ5, heater, tow bar, no top, $795. Stark, 298-6139.

'57 OLDSMOBILE, no slippage in transmission, $125. Seamons, 298-5683.

'60 DODGE station wagon, $350. Arquette, 842-8695.

ORIGINAL OWNER, '59 *Mercury Montclair*, 2-dr. hardtop, AC, all power, AT. Crumley, 299-5293.

STATION WAGON, Mercury 1966 9-pass., AC, power steering, $2275, 26,000 miles. Van Horn, 243-6055.

'62 FORD Galaxie, V-8, R&H, std. trans., red and white, $550. Williams, 268-1958 after 5:30.

'66 BEL AIR Chevrolet, AC, PB, PS, auto. trans., R&H, $1995. Jarrell, 636-2834 after 6.

'59 DODGE Sierra wagon, 383 engine, good for parts, $40. Shock, 877-3728.

'61 AMBASSADOR Custom, AC, PS, PB, AT, new tire, $550; with trailer hitch, $600. Miller, 247-4522.

'59 VOLKSWAGEN sedan, 50,000 miles; '58 English Ford. Opperman, 298-8317.

'62 RENAULT Dauphine, sunroof, new tires, $295. Olson, 298-3795.

'64 FORD pickup ½-ton, long wide bed, V8, 4-spd., R&H, 16" 6 ply. Rohrer, 312 Solano Dr. NE.

'58 MORRIS MINOR 1000, $175, *no Sunday calls, please.* Huddle, 265-6248, 3006 Dakota NE.

'59 CORVETTE, cu. in. roller cam fuel injection, $1125. Uhl, 298-6391 after 5:30.

'60 AUSTIN HEALY 3000, new upholstery & transmission, sell with or without hardtop. Melvin, 298-6402.

'65 CHEVROLET IMPALA, 4-dr., PS, AT, R&H, 35,000 miles. Johnson, 265-4872 after 5.

'60 MERCURY Monterey 4-dr. sedan, R&H, air $300. Richardson, 299-1453 after 6.

'57 CHEVROLET 210 4-dr. HT, 283 V8, AT, PB, or trade for smaller auto. Entwisle, 296-3379.

'63 PONTIAC Tempest station wagon, book at $735, sell for $585. Runyan, 255-6719.

REAL ESTATE

3.1 ACRES in Ranchos de Placitas, $5000 cash or $500 down and $50 per month, water and power available. Rudolph, 298-0941.

5 ACRES mountain land, borders highway, close-in, electricity, clear title. Crosby, 898-0705.

UNUSUAL: exposed beams, flagstone family room, fireplaces, large recreation room, 3-bdr., 1¾ baths, extras, Zia Fatima schools. Hill, 268-1420.

2 ACRES in Bosque Farms, utilities in, will consider late model pickup in trade for my equity. Gay, 636-2781.

TWO ADJOINING lots West Mesa between freeway and St. Joseph's, Atrisco Drive and Highway 48, $1500 cash. McKinley, 268-4779.

CORRALES, sell or trade 3-bdr., den, double garage, 3 fireplaces, separate studio apt., corrals, 3 adobe-walled paved patios. Swiss, 898-2083.

3-BDR., redecorated, new carpet, pitched roof, AC, large patio, new park in block, 10 mins. from Bases, 11709 Clifford NE. Deller, 298-3260.

MOSSMAN 3-bdr., 1½ baths, hw floors, carpet, covered patio, sprinklers, dbl. garage, fp, built-ins, near schools — shopping. Dalton, 299-3024.

2½ ACRES in Edgewood, water line in front of property, $850 per acre, $200 down, $30/mo. Browne, 344-9675.

CUSTOM BUILT, tri-level, 4-bdr., den, fp, 2½ baths, carpeted, oversize dbl. garage, Reynolds, 299-0709 after 6.

2½ ACRE PLOTS in secluded Gutierrez Canyon (NE of Hiway 10 North turnoff), located about 1 *mile from the village of Zamora.* Hoagland, 282-3825.

BOSQUE PARK, 4-bdr., 1¾ baths, dbl. fp, many extras, yr. old, 1 acre, all fenced, $23,500. Downs, 296-4710.

MISCELLANEOUS

12 GAUGE automatic Remington shotgun, full choke 30" barrel; 24" boy's English racer bicycle. Dick, 299-4878.

TRAIL BIKE, Cushman Trailster, $150; Crosley refrigerator, $25; 10,000 BTU 12 volt gasoline heater; 12 volt radio. Pardo, 299-7214.

CONTEMPORARY beige lounge chair w/ottoman, $25; floor lamp w/beige shade, $7.50. Bishop, 299-6757.

DESK, $12.50. Forsman, 299-5570.

RECLINER CHAIR, light green naugahyde, new, $80; dinette table, 36" x 54", Formica top, wrought iron legs, $30. Freyermuth, 299-2053.

BOY'S winter outfit: coat, hat, pants, camel tan wool, size 30 months, used three months, cost $15, sell for the $10. Fisher, 298-0526.

MAPLE end table, $10; maple table lamp, $20; *ping pong table, $25. Johnson,* 255-5427.

RIFLE, .303 Enfield Sporterized, sling, $30. Quant, 256-9287.

BOY'S 3-speed 26" English racer-type Schwinn bicycle, $30. Smith, 299-6873.

UPRIGHT piano, antique white and gold trim. *Costello, 299-0563.*

GAS TANK, Jeep Wagoneer, 20 gal., soap patched pin hole leak. Erickson, 299-6824.

'61 CESSNA 172, 1600 TT, 450 SMOH, full panel, new King KX-150B radio, $6950. Beasley, 268-7386 or Goettsche, 298-0902.

HARMONY electric guitar (H 39) w/case, Epiphone amplifier, $150. Ryan, 299-3318 after 5 or weekends.

TWO television sets, neither works; upholstered wing-back chair. Colp, 268-8035.

STRING BASS with bow and cover, $200. Ray, 299-1253.

ROTISSERIE w/shish kabobs (Sunbeam), $12.50; violet formal size 14 tall with hoop, $3.50; Clubster golf cart, $10.50. Gauerke, 299-5806.

IRONRITE *ironer.* Webb, 298-8139.

SLOT CAR set, $55 value, sell for $45, fine Christmas gift (we wrap). Yuhas, 268-5380.

TWO SNOW and mud tires, 7.75x14 Allstate first line, not retreads, $10 each. Langston, 268-6933.

LIVING ROOM sectional 3-pc.; Frigidaire electric range, dbl. oven; dinette table w/4 padded plastic upholstered chairs; 2-piece. sectional, matching chairs. Garcia, 256-6609.

TENT: Genie 10'x13' w/2 double screen doors and windows, no center pole. Stoner, 299-6892.

"FOLDA-ROLA" folding stroller, $5; hardwood folding playpen w/pad, $2; folding carbed w/pad, $2. Daut, 255-2529.

500 GALLON propane tank, $150. Patterson, 877-3158.

UNUSUAL Henredon triangular dining table; lamp; floor polisher; pictures; misc. small items including antiques. Southwick, 282-3782.

COSCO baby crib and mattress. Workman, 298-3604.

MEDIUM BROWN 100% human hair wig, $75. Skelton, 268-7759.

100 FLOWER pots ranging in size from 2-8" diameter, $5 lot. Hill, 243-3493.

SPRINGER spaniel, excellent coloring and temperament, good hunter, very active. Drake, 299-0544.

SKIS: 2 pair Northland, wood, plastic bottoms, 58" and 62"; 2 pair ski boots, sizes 6½ and 7. Griscom, 299-3755.

KITTENS, long-haired black and brown, free to good home. Roeschke, 243-2463.

MAPLE corner desk; swing set; bar for den; ice skates, sizes 1, 2½ and 3½. Kutarnia, 298-6660.

ANGLE iron, 4x4x3/8, 30 ft. long; 8 and 9 inch channel iron, 17 ft. long, 5 cents/lb. Houghton, 299-3386.

BANJO, 4-string tenor, long neck; girl's bicycle, small. Young, 255-9022.

MAPLE pedestal game table, 4 captain's chairs, naugahyde antique white upholstery, original price, $275, sell for $150. Selph, 299-6833.

WAHL deluxe pet-clip set, cost $17.95, will take $12. White, 256-3077 after 5:30.

15' FIBERGLASS boat, 35 hp electric starting Johnson motor, canvas canopy, tip-off trailer, $600. Maes, 299-0153.

SPORTSLINER camper, fits long wide box pickup, $150. Leeman, 344-9812.

GREEN CHROME table w/3 extensions, $10; dark green occasional chair, $15; brown tweed Simmons *hide-a-bed sofa, $80. Perkins,* 296-4414.

STANDARD brand bathroom set: lavatory w/fixtures and toilet, both $25. Wahlenmaier, 255-9953.

OVEN, Chambers electric, built-in type, automatic, coppertone, window door, 22½w-29h-22½d, $75. Rainhart, 299-2887 after 5:30.

ENGLISH springer spaniel puppy, pick of the litter, Registered AKC liver and white male. Barth, 345-0172.

DISK JOCKEY indexing 120 record rack with jacket punch. Williams, 298-2671.

FENDER Mustang electric guitar w/cord and case, $130; Leonard refrigerator, $20; Leonard electric range, $30. Davis, 256-6498.

PROSIZOR, electronic exerciser, half original price; Admiral refrigerator, freezer, 12 cu. ft., $50. Risk, 299-7205.

ROTO-BROIL rotisserie, cover, cookbook; GE heat n'serve baby dish; Vogue white laundry hamper w/matching wastebasket. Tuler, 298-2685.

BUNDY clarinet, $120; mattress and box springs, $40; stereo, $50. Yoakum, 296-1964 after 4.

POOL TABLE, fascination type with balls and two cue sticks, $40. Robertson, 298-1048.

NEWLY upholstered sofa, blue floral design; formica top table, six chairs; bedroom suite. Bischoff, 298-1994.

4 NEW 5:60x15 Continental blackwall tires, 2 wks. old, cost new $25 ea., sell for $18 ea. Campbell, 268-8445.

GARAGE SALE, Sat., Oct. 21: Misc. furniture and household items, 3415 Aspen Ave. NE, Daniel, 268-8335.

SADDLE, medium size, tan, $45. Bascom, 299-1662 or 299-7568.

CHROME-formica dinette set, 2 leaves, 8 chairs, $35. Wade, 299-2050.

7 HP, 4-cycle Wisconsin engine. Cave, 299-5066.

COLT Gold Cup .45 auto, $110; S&W K38 *Masterpiece*, $60; S&W K22 *Masterpiece*, $60; Packmyer 3-gun case, $20. Spickler, 298-1389.

WEDDING GOWN, full floor length w/train and veil, best offer. King, 255-1437.

CATTLE RACK for 54" wide x8' long truck bed, all metal, $85. Romesberg, 255-1177.

KNIGHT photoelectronic relay w/light source, $15; Heath Apache 180 watt transmitter, $95. Lathrop, 255-1901.

HUNTING BOOTS, size 10½, 6" tops, $13; FM tuner, Granger 12 volt, under dash assem., $35. Buck, 265-4863.

TOY POODLES, silver and silver beige, very tiny, 6 wks. old, AKC registered. Shipley, 298-2433.

HOUSETRAILER frame, chasis, partly burned, no wheels, first $15 takes it. Chavez, 298-5091.

EXTRA sturdy ranch oak trundle beds, 6" thick mattresses, paid $200, sell for $95. Gray, 299-7349 after 6.

DISHWASHER-sink-disposal combination, old but still working, $25. Corll, 255-5683.

SHOTGUN: Winchester model 1200, 12 gauge pump, 28" barrel, modified choke, case, new, $89. *Reed,* 299-1684.

STEREO CABINETS, 2 speaker enclosures, 1 equipment cabinet, mahogany, $80; 21" TV w/AM radio & space for record changer, $40. Longfellow, 299-7062.

FINE ART CHINA, Tranquility pattern, service for 6, never used, $125; 6 crystal water goblets, Romance of the Stars pattern, $30. Way, 264-5993.

.22 CAL. repeating rifle, Remington 511; 12 ga. shotgun, Stevens single shot w/polychoke. Toya, 898-0491, 125 El Pueblo Rd. NW.

OR TRADE: go-cart, all metal construction, precision front end, 4-horse, 4-cycle engine, $75 or trade for mini bike. Everett, 636-2544.

WANTED

CARPOOL rider from vicinity of Comanche and Pennsylvania NE to gates 4 and 7. Bemis, 296-1305.

TO TRADE 14' aluminum boat, 35hp electric start motor, trailer and extras for tractor with loader and blade. Flowers, 282-3458.

LARGE DOG for country home, should be good watchdog and accustomed to children. Miller, 282-3189 after 6.

110 LB. barbell set with graduated weights. Devor, 298-9743.

SCOUTMASTER: 15 boys need leader to keep program going. Outstanding boys and good committee needs your help. Arning, 256-9229.

RIDE from 2100 block on Isleta Blvd. SW to Gate 5 or 6. Weitzel, 855-9454.

USED Craftsman lawnmower, 3hp rotary type. Arning, 256-9229.

BANDSAW and small wooden rocking chair. Colp, 268-8035.

MINI-BIKE or mini-bike frame, need not be complete. Peterson, 256-7514.

FREEZER, *not particular about make or size;* 90 feet of fence for enclosure of yard. Ross, 296-5720.

MATURE LADY desires baby sitting and light housework, part or full time in good home, own transportation, SE Heights if possible. McMillin, 247-4436.

TRADE S&W .22 cal. auto. pistol model No. 46 for S&W 357 Magnum, model No. 28. Long, 265-6360.

BABY SITTING in my home, hot lunch furnished, $1.50 per day. Workman, 298-3604.

TRANSIT-level, 22-power focus, 3 feet to infinity w/ or wo/tripod. Pena, 898-0197.

RIDER for car pool from area of Copper and Juan Tabo or Mankin homes to 860/880 parking lot. Bartlett, 299-4861.

SKIS, 6'9" long, preferably Heads. Robert, 898-0491.

TRUMPET and/or alto saxophone at a price reasonable w/condition. Hoagland, 282-3825.

BOOK "1301 Review Problems for E.I.T. and P.E. Tests." Also need info on past N.M.P.E. exams. Kotoski, 298-1732.

FOR RENT

ONE ROOM or bath and two *rooms to lady or couple, near airport,* possible arrangements for meals. Bradshaw, 242-8072.

LOST AND FOUND

LOST—Blue Teflon spatula, raincoat, prescription glasses, radio, prescription sunglasses, shoes and shoe bag, silver squash blossom earring, glass case. LOST AND FOUND, tel. 264-2757, Bldg. 610.

FOUND—Gold tie clasp, bolo tie, tan scarf, prescription glasses w/black frames. LOST AND FOUND, tel. 264-2757, Bldg. 610.

THE RED BARON and other assorted characters may take-off at the Octoberfest Hofbrau tomorrow night at the Coronado Club. Joni Buccheri (3126) reminds you that free refreshments go with the fabulous German food menu.

Annual Octoberfest Hofbrau Set Tomorrow Night at Coronado Club

Tomorrow night the annual Octoberfest Hofbrau gets underway at the Coronado Club at 7 p.m. with a German food spread and free beer during the meal. For the Octoberfest, the Coronado Club kitchen staff outdoes itself. The event is one of the most popular of the year.

After dinner, the UNM International Folk Dancers will perform German, Polish and Austrian dances.

Phil Graham's orchestra will play for dancing starting at 9:30 p.m. Cost to members is $3.25, guests $3.75. Call the Club office, tel. 264-4561, to reserve your table now.

* * *

Teenage Go-Go

Next Saturday, the monthly teenage go-go will be something out of the funny papers. The Kartune Kapers will be on the bandstand from 7:30 until 10:30 p.m. Member parents should purchase tickets at the Club office by 5 p.m. Oct. 28.

* * *

Social Hours

New times are now in effect for Friday evening social hours. The Board of Directors has ruled that social hour will start at 5 p.m. and continue with special prices until 8 p.m. Music will start at 6 p.m. and continue until 9 p.m. During the last hour, the portable bar will remain in the ballroom, but regular prices will be in effect. The social hour buffets will be served from 6-8 p.m.

Tonight, the TGIF crowd will celebrate with the chuckwagon beef buffet and music by Elton Travis. The buffet costs $1.75 for adults, $1.50 for kids.

On Friday, Oct. 27, the chicken buffet will be served and Bud Fisher will play for dancing. The buffet cost $1.25 for adults, $1 for children.

The chuckwagon beef will top the menu for Friday, Nov. 3. Tommy Kelly will make the happy music.

* * *

Football Bus

The special Coronado Club bus to the Lobo game Friday, Oct. 27, will leave at 7:30 p.m. The Lobos will face Texas Western. Join the celebration (or analysis) after the game in the main lounge.

Coronado Ski Club Will Meet Oct. 24; Annual Swap Night Set Nov. 2

First meeting of the Coronado Ski Club to organize for the new season is set Tuesday, Oct. 24, at 8 p.m. at the Coronado Club. Dean Thornbrough (7135) will take office as president of the group .

The club is open to all members of the Coronado Club. It arranges group rates at ski areas, organizes trips at substantial savings, and encourages safe and expert skiing. It subsidizes member's ski lessons. An extensive junior program is planned for children of members.

Annual swap night, open to anyone interested in buying or selling ski equipment, will be held Thursday, Nov. 2, 7:30-9 p.m. Those interested in selling equipment should bring it to the Coronado Club between 6 and 7 p.m. For additional information call Ron Syler (9215), tel. 299-2941.

W. F. Carstens Is Co-Author of New Practical Writing Textbook

Careers in both writing and teaching helped produce the contents of a new textbook recently published by Scott, Foresman and Company. Title of the book is "A Practical Approach to Writing." Its authors are known to more than 1000 Sandians who have been students in their in-hours technical writing courses.

W. F. Carstens, manager of Technical Information Department 3410, wrote the book with Jim Fife, a former Sandia technical writer and supervisor who is now an associate professor of English at the University of Utah.

The book grew out of an earlier association of the authors when they were on the teaching staff of the University of Iowa. Their approach to the teaching of writing was developed at that time.

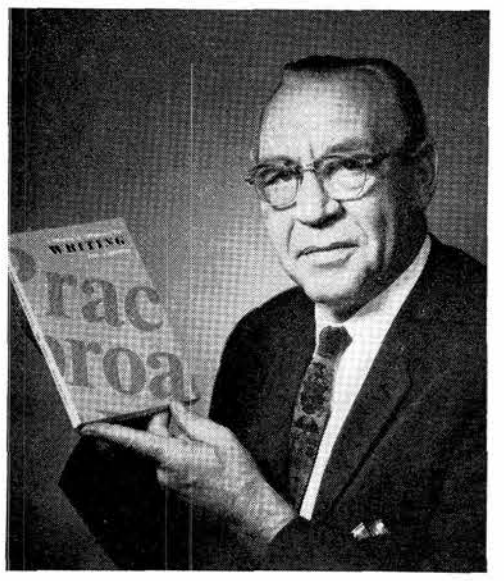
The book's preface defines its purpose this way:

". . . we have chosen to concentrate on the practical bread-and-butter kind (of writing) and leave the treatment of literary writing to others . . . we have emphasized those aspects of writing which are of most use to the person who writes primarily to communicate information — to answer questions on an examination, to report on a study, to apply for a job, to explain a situation, to instruct a helper . . .

"We believe that many generally competent people have failed to develop reasonable skill in writing because they have failed to recognize that the most important requirement for clear writing is clear thinking.

"Because of the confusion between writing as an art and writing as a skill, many adults simply resign themselves fatalistically to the idea that they are not and cannot be good at it.

"It is our conviction, on the other hand, that a person's ability to learn how to communicate is likely to parallel his communications needs. That is to say, the person who advances in any field to the point where his communications needs are complex has the intellect to cope with this complexity if he will train himself to approach the writing job as he does any other job — intellectually."



NEW TEXTBOOK, "A Practical Approach to Writing," recently published by Scott, Foresman and Company is displayed by W. F. Carstens (3410). Co-author was Jim Fife, a former Sandian now at the Univ. of Utah.

Mr. Carstens taught at the University of Iowa nine years before joining Sandia in February 1955. Since coming to Albuquerque, he has taught English courses part time at the University of New Mexico.

Authors

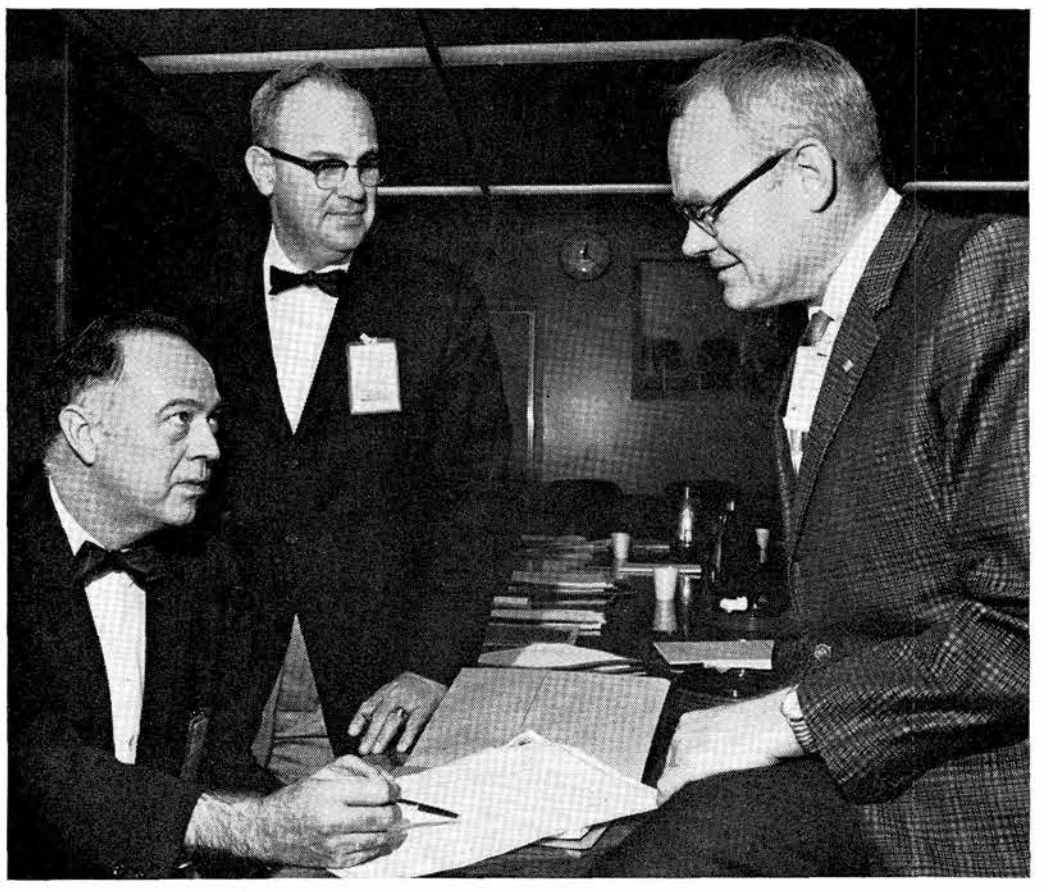
E. D. Jones (5151), "Phosphorus NMR in Transition Metal Monophosphides: MnP, $Co_yMn_{1-y}P$, RuP and WP," Vol. 158, page 295, PHYSICAL REVIEW; "Strength of the s-f Exchange Interaction in Rare-Earth Intermetallics," Vol. 5, page 285, SOLID STATE COMMUNICATIONS; "Nuclear Magnetism," Chapter 14, pages 207-222, 1967 MAGNETISM AND MAGNETIC MATERIALS DIGEST (published by Academic Press, New York); "Phosphorus NMR in the Paramagnetic State of U_3P_4," Vol. 25A, page 111, PHYSICS LETTERS; "Observation of the Pr^{141} and Tm^{169} Nuclear Magnetic Resonance in the Paramagnetic States of Rare Earth Intermetallic Compounds," Vol. 19, page 432, PHYSICAL REVIEW LETTERS.

T. A. Green (5121), "On the Use of Inelastic Electron Scattering Data to Obtain Accurate Born Cross Sections for Atom-Atom and Other Heavy Particle Collisions, I. Proton Excitation of the Schumann-Runge Continuum in O_2," Vol. 157, age 103, PHYSICAL REVIEW.

R. E. Cuthrell (1133), "Environment-Influenced Surface Layer in Polymers," Vol. 11, pages 1495-1507, JOURNAL OF APPLIED POLYMER SCIENCE.

J. A. Corll (9332), "Experimental Verification of Pressure Enhancement by Encapsulation," Vol. 38, No. 6, JOURNAL OF APPLIED PHYSICS.

L. D. Bertholf (1142), "Numerical Solution for Two-Dimensional Elastic Wave Propagation in Finite Bars," September issue, JOURNAL OF APPLIED MECHANICS.



AEC PLOWSHARE ADVISORY COMMITTEE met at Sandia Laboratory last week. Shown between sessions are (l to r) S. G. English, Chairman of the Committee and Assistant General Manager for Research and Development, AEC; J. S. Kelly, Director, Division of Peaceful Nuclear Explosives, AEC; and R. A. Bice, Vice President 7000. Mr. Kelly and Mr. Bice are not committee members, but attended some of the sessions.

Sandia Safety Signals

To Be Seen

Turn on headlights, not parking lights, at dusk . . . check your taillights frequently to make sure they are working . . . use your turn signals at least 100 feet before making a turn or changing lanes . . . use reflector tape on bumpers.

Traction Tricks

To get going on ice and snow you need traction. Sand, a metal mat or a piece of carpeting under the rear wheels can help. Letting air out of tires does no good, and it increases wear. Extra weight in the trunk helps some, but it increases the possibility of side skids.

Green Tail Lights?

Automobile manufacturers are considering an idea to end confusion between a car's red tail-lights and red stop-lights. One proposal: green for tail-lights, amber for turn signals, bright red for stop lights.