

## Sandians Busy Arranging For May Telemetering Meeting

Sandians are playing an important role in arrangements for the National Telemetering Conference to be held in Albuquerque May 20-22, 1963.

Arnold E. Bentz, supervisor of Aerospace Nuclear Safety Division III (7113), has been named chairman of the conference. Working with him will be the following Corporation employees: Thomas Hoban (7212), program chairman; John E. Hinde (7213-2), program co-chairman; A. P. Gruer (7530), publicity; Burt Dieruf (3431), equipment; and Richard Osner (3431), education.

The first National Telemetering Conference was held in 1949 at Patrick AFB, Fla., under government sponsorship, as a means for technical exchange in view of the role of telemetering in space and missile programs. Subsequent conferences have been sponsored by five leading technical societies: Institute of Radio Engineers, American Institute of Electrical Engineers, Institute of Aerospace Sciences, American Rocket Society, and Instrument Society of America.

The most recent conferences have been held in Washington, D.C., Chicago, and Santa Monica, Calif.

Mr. Bentz noted that selection of Albuquerque for the 1963 conference was essentially a recognition of the high level of scientific activity in this area.

The technical sessions, to be held at the Hilton Hotel, will feature some 50 to 60 papers relating to all areas of telemetry, including industrial uses, oceanography, bio-medical, space, missile, and aircraft applications.

In addition, an exhibit at the Albuquerque National Bank Bldg. will include specialized telemetry equipment produced by some 60 manufacturers.



A. E. Bentz



VISITING SANDIA LABORATORY last week for a general briefing was Ray M. Herrick, Comptroller, Defense Activities Division, Western Electric Company, second from left. He is shown with (l to r) K. A. Smith (3400), R. B. Powell (3000), and M. K. Linn (3420).

## NORAD Band Will Play at Coronado Club

The Coronado Club has announced an engagement of The Commanders, a 20-piece orchestra made up of members of the NORAD (North American Air Defense) band. The orchestra will play at the Coronado Club Aug. 2 and 4.

Tomorrow evening, July 21, the Club will offer its annual Hawaiian Luau. This year's Luau will feature Prince Pokii and His Royal Polynesians, who will play danceable American and Latin rhythms. Floor shows featuring Hawaiian singers and dancers will be featured.

The buffet (6-8 p.m.) will include Hawaiian-style barbecued spare-ribs, baked salmon, chuck wagon roast beef, and a Hawaiian fresh fruit bowl.



NEW ONE-YEAR agreements were signed last week by representatives of Sandia Corporation and two unions. From left are Merle W. Alexander, president of the Atomic Projects and Production Workers, Metal Trades Council, AFL-CIO; Ernest C. Peterson, manager of Labor Relations Department 3220; David S. Tarbox, Director of Security and Industrial Relations; and Paul Cruz, president of the Office Employees International Union, Local 251, AFL-CIO. Agreements provide a two and one half per cent increase as of July 6.

## U. of Arkansas Awards PhD Degrees to Sandia Employees



J. O. Wear

James O. Wear (5133) was awarded his PhD degree in physical chemistry during the University of Arkansas mid-year commencement exercises.

His doctorate dissertation was entitled "A Study of Transference and Solvation Phenomena of Hydrochloric Acid, Lithium Chloride, Sodium Chloride, and Potassium Chloride in Water, Water Ethanol, and Ethanol Solvents."

His Master's and Bachelor's degrees were also earned at the University of Arkansas.



B. T. Kenna

A doctorate degree was conferred upon B. T. Kenna (1122) during the mid-term commencement at the University of Arkansas.

His dissertation was entitled "On the Terrestrial Occurrence of Element 43: Technetium."

Previously he received his Master's degree in chemistry from the University of Mississippi and his Bachelor's degree from Arizona State College.

Mr. Kenna has been with Sandia since last November.

# Security Is No Greater Than Weapon Reliability

In the history of weapons, reliability has always been of prime importance. The weapon maker, working on a stone axe or a sling-shot, a catapult or a crossbow, a matchlock or a mortar, was obliged, somewhere in the process, to test it to see if his weapon was reliable. In the early days, he could put it to use to see if it would work.

In weapons, as in everything else, changes come with time. Today, our nuclear arsenal is enormously powerful and expensive. Our survival may depend on it. Security can be no greater than our knowledge that it's reliable. But to get that knowledge we must test.

Product Test Equipment Development Organization 2400, directed by L. J. Paddison, is concerned with the vital need for reliability—for ever-more-accurate and sophisticated ways of obtaining test data on nuclear weapons. "In the early days of the nuclear weapon business," Mr. Paddison said, "the tester was the last thing to be devised in the laboratory and the first thing to be needed in the factory or the field. Under these conditions, it was extremely difficult to provide good equipment. Although the problem is still with us, procedures have been developed which have significantly improved our situation."

Even the underlying concept for

weapon testing has changed as a result of weaponry design and manufacturing advances. No longer is it necessary for vast amounts of field test equipment to be placed in the hands of the weapon user. Instead, more extensive weapon component and systems testing within the AEC complex can today provide necessary assurance of weapon reliability.

"There has been a growing emphasis on the testing of individual weapon components during production," W. C. Kraft, manager of Component Test Equipment Development Department 2450, commented.

"In the early 1950's, the need for these test devices came to the fore and Sandia Corporation formed an organization whose prime function was the development of product testers or PT's," Mr. Kraft said.

As another innovation, in 1958-59 the mechanical counterpart of electrical testing—tool and gage design—was incorporated in the function of Department 2450. Today, both gages and electrical test equipment comprise acceptance test data for Sandia Corporation designed product, and also support weapon development work. In addition the department provides technical service data to Military Liaison Organization 2300 for preparation of tester manuals and

(Continued on Page Four)



RELIABILITY conference is a part of System Test Equipment Development Department 2440's method of insuring reliability. Attending are members of

Reliability Analysis Section 2441-2, (l to r) Arthur C. Littleford, Bobby O. Allen, Willis E. Johnston, Purdy F. Meigs, and Bill E. Emrick.

Editorial Comment

Awful Uncertainty of the Future

"It is a gloomy moment in history. Not in the lifetime of any man who reads this paper has there been so much grave and deep apprehension; never has the future seemed so dark and incalculable.

"In France, the political cauldron seethes and bubbles with uncertainty.

"England and the English Empire is being sorely tried and exhausted in a social and economic struggle, both turmoil at home and uprising of her teeming millions in her far-flung Indian Empire.

"The United States is beset with racial, industrial and commercial chaos — drifting, we know not where.

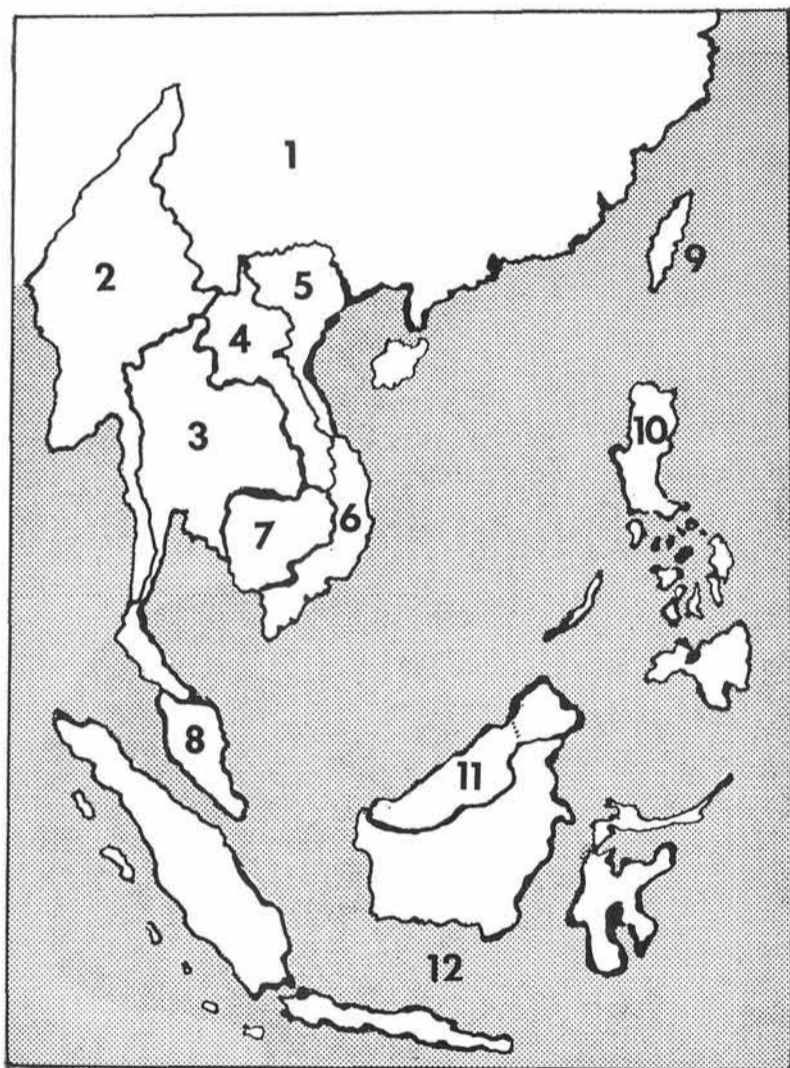
"Russia hangs like a storm cloud on the horizon of Europe — dark and silent. It is a solemn moment, and no man can feel indifference, which happily no man pretends to feel in the issue of events. Of our own troubles, no one can see the end."

These words appeared in Harper's Magazine, Oct. 10, 1847. One hundred years later (1947) tensions were again great. America's Marshall Plan was termed imperialistic. Turmoil was great in the Balkans. There was starvation in Lebanon. Civil war threatened in Greece and the Austrian peace parley collapsed.

The world survived the crises of 1847 and 1947 and it will survive the tensions of 1962.

Do you know?

Where News Is Happening



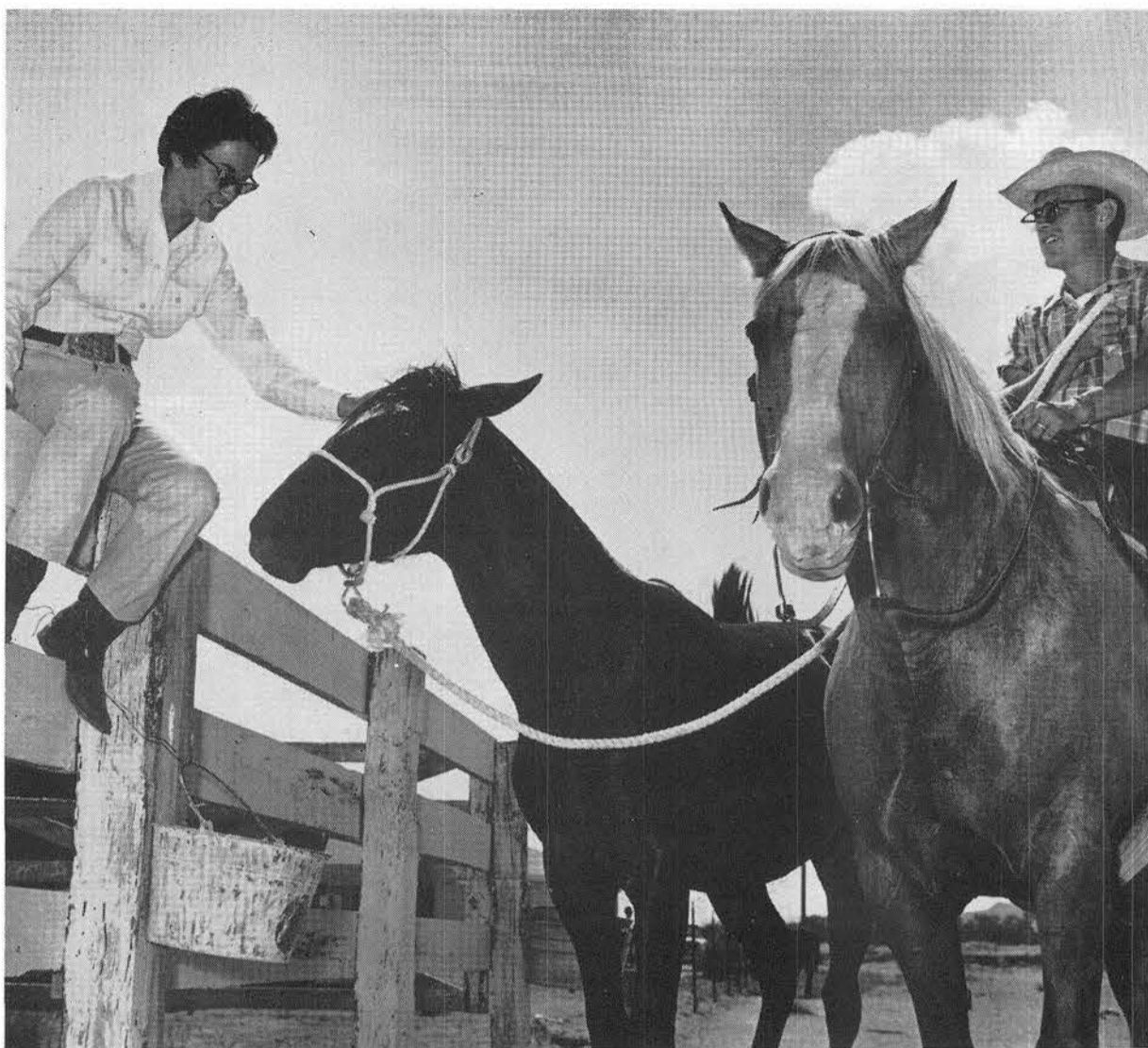
HOW'S YOUR SOUTHEAST ASIA GEOGRAPHY? With that part of the world very much in the news, countries in the area are commonly discussed. But not so commonly known are their locations. Test your knowledge of geography by identifying the countries on the above map.

- |           |       |                     |       |
|-----------|-------|---------------------|-------|
| Burma     | ..... | N. Vietnam          | ..... |
| Cambodia  | ..... | Philippine Republic | ..... |
| China     | ..... | Sarawak             | ..... |
| Indonesia | ..... | S. Vietnam          | ..... |
| Laos      | ..... | Taiwan              | ..... |
| Malaya    | ..... | Thailand            | ..... |

Now check on Page 8 and see how accurate are your answers. If they were all correct, your knowledge of geography is pretty good. If you correctly identified all but two, you are better than average. But if you missed any of them it's time to brush up.



DICK ZALUGA (1323-1), left, shows a Henry Rifle, circa 1860, to John Morgan (2544-2) and Victor Pajunen (2563-2), right, during the recent New Mexico Gun Collector's Association annual show. Rifle was part of Winchester display that took top prize for Zaluga.



DARK CROSS, pride and joy of the McKelvey during one of his training lessons. Husband Don stable, receives encouragement from Dody (5413) is riding their neighbor's lead pony, Stormy.

Great Hopes For 'Dark Cross' In '63 Quarter Horse Futurity

A pretty girl and a handsome horse are part of every Easterner's idea of the Southwest. In Dody McKelvey's case it's more than just a picture setting.

Dody, who is secretary for Radiation Physics Division 5413, lives on a 10-acre ranch near Los Lunas with her husband, Don. Their hobby is raising quarterhorses—hopefully for racing.

They currently have a stallion, "Top Cross," a mare with six-week-old colt, and two yearling colts. Top Cross was bred for the track but was injured as a colt so has never run for money. He was sired by "Gus Dusted," the full brother to one of the world's leading sires of quarterhorses for racing, and on his mare's side has the bloodlines of the foundation sire of quarterhorses.

With this kind of background the McKelveys expect a fine rac-

er in their yearling, "Dark Cross," whose mare also has racing bloodlines.

Dody draws the chores of currying, watering and feeding. Her charm with a feed bucket is readily obvious.

Don has started teaching Dark Cross to "pony up"—to be led from another horse so that a rider can exercise several horses at once. Dody will share in this duty a little later. When the yearling is 18 months old, Don will break him and start getting the colt in top condition. If all goes well, the McKelveys plan to send the horse to a professional trainer in Ruidoso next summer. Dark Cross has already been entered in the 1963 New Mexico Futurity at the State Fair.

Dody is a native of Belen. Don was raised on a stock farm near Sweetwater, Texas.



Linda Bureau (3126)

Take a Memo, Please

Safety glasses and safety shoes are made with one prime purpose: to make working and recreational hours safer for you.

Sympathy

To Robert J. Bayette (7241-3) for the death of his mother recently.

To F. H. Long (4254-4) for the death of his father, July 11 in Wellston, O.

To Leonard Best (4151) for the recent death of his father in Orlando, Fla.

John Larned Heads Alameda County Education Board

John Larned, AEC/ALO representative at Livermore, was elected president of the Alameda County Board of Education at its recent annual meeting.

John has been on the board since 1959, serving as vice president last year. Members of the board, which administers public education throughout the county, are elected by the voters according to trustee areas. In 1961, their jurisdiction covered an enrollment of 142,538 elementary school pupils, 122,762 high school students, and 35,134 junior college, special, and adult students.

F. W. Thomason Retired Employee Died July 12

Franklin W. Thomason, a retired Corporation employee, died in Albuquerque July 12. He was 74.

Mr. Thomason was supervisor of the night shift janitor service section when he retired in December 1956. He had been at Sandia since 1947.

Burial was in Eldorado, Kan. Survivors include his widow and two daughters.

Congratulations

Mr. and Mrs. Ronald L. Johnson (7244) a son, David Lynn, on June 25.

Mr. and Mrs. Joseph Ashcraft (7242) a daughter, Rachel Marie, on June 29.

Mr. and Mrs. R. G. Husa (1423-2) a son, Scott Michael, on June 18.

Mr. and Mrs. D. E. Bishop (7324) a son, Daniel Edward, on June 19.

Mr. and Mrs. Dale McLachlan (5132) a son, Robert James, on June 30.

Mr. and Mrs. Jack Davis (3423-4) a son, Bret, on June 10.

Mr. and Mrs. Amos D. Alire (4512-1) a son on July 7.

Mr. and Mrs. S. C. Levy (1323-2) a daughter, June Hope, on July 2.



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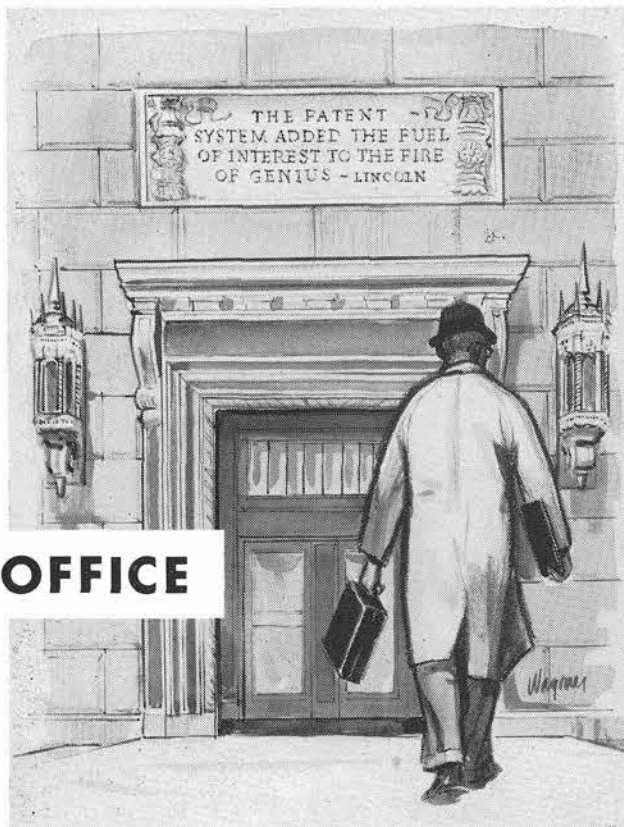
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*Has old age hardened its arteries and made the system obsolete, or does it continue to meet the real needs of progress and invention? Here are the provocative answers.*

## INSIDE THE PATENT OFFICE

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Albert Einstein, who once clerked in the Swiss patent office, could not have patented his special theory of relativity in the United States. In 1930, however, Einstein and a co-inventor did earn a U. S. patent—for "An Apparatus for Producing Refrigeration."

Antibiotics, asexually reproduced roses, atomic reactors, diapers, better mousetraps, spacecraft, and soda-pop bottle designs can be patented. Theories and facts cannot.

What can and cannot be patented is determined by law. The law is definite; patents are granted for "any new and useful process; machine, manufacture, or composition of matter, or any new and useful improvements thereof . . ."

In drafting the patent laws, the Congress has historically linked patentability to utility. Theories and facts, as such, have little usefulness as commodities. On the other hand, those inventions that embody theories and facts are patentable. You can patent atomic reactors, but not atomic theory; you can patent earth satellites, but not the fact that the moon orbits the earth.

This is the United States patent system — vague to most, venerable to many, vexatious to some, and valueless to a few.

In October 1961, the Patent Office of the Department of Commerce celebrated its 125th anniversary. Before this happened, however, the Office paused on Sept. 12 to grant its 3,000,000th patent.

Mark Twain, sometime inventor and sometime inventor's angel, once wrote that "a country without a patent office and good patent laws is just a crab and can't travel anyway but sideways and backwards."

Abraham Lincoln said, "The patent system added the fuel of interest to the fire of genius."

In 1900, a member of a Japanese commission sent to study the American patent system declared, "What is it that makes the United States such a great nation? We investigated and found that it was patents, and we will have patents."

Now, despite the impressive twin milestones passed by the Patent Office last year, and the happy fact that East and West and Twain meet, there is a question whether this curious, old U. S. institution works well in the modern world. Has it been of any value to the nation?

"No one really knows," was the opinion of the late Judge Learned Hand, who adjudicated patent cases for more than fifty years. No one really knows, he said, because the facts are hard to come by. "There are two schools," Judge Hand explained, "and the one school beats the air and says without the patent system the whole of American industry would never have been developed. It is this stimulus which has brought us to the top, and the other says it is nothing but a beastly method and they (large industrial firms) get hold of it (an invention) and they get a lot of smart lawyers and the little man who has really made it never gets anywhere. And he is scared to death." Nonetheless, Judge Hand endorsed the system and said that it serves a great useful

purpose. In this the majority of observers agree. The patent system can: promote science and the arts; induce invention; cause discovery to be disclosed for the benefit of all; encourage investment; trigger further research, refinement and development.

### The Inventor's Best Friend

Listen to the views of one successful inventor, Dr. Edward H. Land, whose inventive genius has brought him fame and fortune. Dr. Land was a 20-year-old Harvard student when he began work on the light polarizer. In 1934, he won a patent for the first commercially practical, cheap, synthetic light-polarizing material. Three years later, he was able to found the Polaroid Corporation. Today, Dr. Land holds more than 200 patents in his name, and the corporation is a leader in optics and photography.

To a large extent, Dr. Land said a few years ago, his success in commercializing and developing his inventions was due to the patents obtained on those inventions. He said further that the strength of the patent picture was largely instrumental in securing adequate capital to finance the Polaroid Corporation, and to permit the company to develop its photographic interests and safely spend large sums on research and engineering.

Dr. Land's experience is not unique. During the last 20 years, in particular, patents have made possible the incubation of countless new growth industries, especially those whose primary product is scientific or technological.

Professor Robert Van de Graaff's basic patents for his static generators, for example, made possible the formation of the High Voltage Engineering Corporation. This is revealed in a recent study by the Patent, Trademark and Copyright Foundation of George Washington University, a seven-year-old, non-profit organization established to illuminate the significance of the patent to the American enterprise system.

The Foundation's study suggests that the existence and validity of patents is often the only way small groups of researchers who want to form a new company can barter their "mental capital" for the financial capital of others. "Raytheon," the study says, "was established largely to utilize patents on gas rectifier tubes. Electronics Corporation of America and some other companies were founded because the existence of patents interested investors of risk capital."

Concomitant with the development of these growth companies during the last two decades has been the rise of the research and development firm. Today, belts of these firms girdle science centers such as Boston and Washington, D. C. These firms, too, often value the patent as their best collateral and, in many cases, their only security.

Jacob Rabinow is the president of one such firm — Rabinow Engineering Co., Inc., of Takoma Park, Maryland. For many years, Rabinow was an individual or lone inventor. The

individual inventor — a collective description — deserves mention. The much-debated plight of the individual inventor, who must compete today against heavily financed research teams, has won him a host of well-meaning friends who work to protect him with the zeal of conservationists out to protect the whooping crane. Still, it becomes apparent that the individual inventor's view of the patent system is directly related to his own success, however he wishes to measure it. The most successful inventor readily confesses that the patent is his best friend.

Rabinow is a successful inventor. Every clock put into an American automobile today is a Rabinow self-regulating clock. His automatic letter-sorter is being installed in U. S. post offices. And his magnetic clutch, which earned him \$100,000 cash for the foreign rights alone, is considered a classic invention.

"Without a patent," Rabinow says, "I would be dead. I would not invent because I could not afford to invent. It took me nine years and several thousands of dollars to develop the self-regulating clock. Without the protection afforded by a patent, I could not have done it. No one wants a free invention. A free patent is a useless patent because anyone can copy it."

Rabinow applies the same principle of patent protection to the inventions made by his firm. If there is no possibility of a patent, even the most promising project is scrapped.

### How They Help Small Firms

There is another patent value that should be noted. In the past, many persons have suggested that large corporations, which are traditionally patent-rich, force smaller companies, which are often patent-poor, out of

competition. It now appears, from a second recent study by the George Washington Patent Foundation that the opposite may be true — that patent licensing as practiced by large firms is fostering a symbolic relationship between these and smaller firms.

These, then, are some indicators of the patent system's value. If the patent system fails to work henceforth, it will not be because it is conceptually weak, but because its working parts are old and worn and tired and perhaps irreparable. And here is a real danger.

A visit to the Patent Office might prove disappointing. The "Office" is housed in a wing of the Department of Commerce Building in Washington, D. C. The building itself is fashioned in an architectural style in which Washington abounds: neo-Government, a nondescript mass of stone. The street floor search room where lawyers and non-lawyers sift through prior patents is library quiet and suggests a Dickensian air as row upon row of searchers pore through row upon row of patents arranged in bundles called "shoes."

Just outside the search room is a cashier's office where anyone — including spies — can buy a published patent for 25 cents. This probably represents the cheapest scientific and technical textbook price in the world. A good buy, for example, is Patent No. 2,708,655, issued to Enrico Fermi and Leo Szilard for the first atomic reactor. The bulky patent, with drawings, is still a first-rate primer for atomic energy.

On floor upon floor over the search room and cashier's office are the patent examiners, quasi-judges who determine patentability. If the patent system continues to work well it will be because of these examiners. Conversely, if the system begins to falter, as well it may, the examination system will be at the root of the challenge.

The new and young Commissioner of Patents, David L. Ladd, a 34-year-old former patent attorney, has already sounded a warning. In recent months, Commissioner Ladd has repeatedly said that the examination system "as we now have it and would like to keep it is entering a period of crisis." He cites three factors that weigh heavily upon the already over-taxed system: the increasing burden of the search load; the increasing complexity of disclosures in applications; and an unprecedented level of personnel turnover.

Statistics tell a part of the story. Thirty years ago, a patent examiner disposed of 160 applications yearly. Today, the rate is 80. Six years ago, the Patent Office was losing its examiners to more lucrative private practice at the rate of seven a month. Now, 16 a month are leaving. From 1836 to 1935 the Patent Office issued 2,000,000 patents. It reached the 3,000,000 mark after 26 more years, and conceivably, the 4,000,000 patent milestone will be reached in less time.



DICKENSIAN AIR is found in patent office where lawyers and non-lawyers pore over packets of patents known as "shoes."

The role of the examiner tells more of the story. Before an examiner determines whether an application for a patent is novel and otherwise complies with the law, he must, in theory at least, compare any individual claim with each of the 3,000,000 U. S. patents and all foreign patents and with all the technological literature published in the U. S. and abroad. In reality, therefore, the examiner must know more than the inventor, a task made exceedingly difficult today by the nature of new technologies such as information theory, cybernetics, solid state physics, space science and biochemistry.

"A device useful in radio receivers," notes one observer, "was once quoted against a claim for a clutch. Even the Bible has been quoted against the novelty of a claim."

Clearly, even the most experienced examiner cannot hope to stay abreast of the information explosion in science and technology. It is for this reason that Commissioner Ladd has "grave doubts about the future of the examining system in this country."

The Patent Office is acutely aware of its problems. It has been successful in automating the search procedures for its steroid chemistry file, for example. This achievement has given rise to an optimism that within the next few years a full-fledged information retrieval system can be built which will substantially reduce patent application processing time and relieve the examiner of his heavy burden. Two recent reports prepared for the Commissioner of Patents, however, say this "optimism is not justified by the facts." Both reports concur that an information retrieval system of the scope needed by the Patent Office will not be available for many years to come.

Commissioner Ladd remains intrepidly optimistic. He thinks mechanical research methods will be indispensable to the system and wants the Patent Office to undertake more research in this area. Ladd's program calls for "intensified efforts to develop a program of research and information retrieval which hopefully at some time in the future will produce general mechanized searching in the Office; and stabilization of the examining corps so that it is composed primarily of lifetime employees and characterized by relatively little turnover."

At the heart of these efforts is the patent itself, a Government document that gives an inventor the exclusive right to his invention for 17 years. At the end of this period anyone may use the invention freely.

### International Patent Protection

U. S. patent rights have no effect in a foreign nation. A U. S. inventor who wants protection in a foreign nation must apply for a patent in that nation. The laws in many of these countries differ from those of the United States and from one another. Under the terms of an international convention, more than 40 nations have agreed to grant a foreign inventor the same national patent rights as are granted to a citizen of those countries. There are countries outside this agreement, most notably the Soviet Union and other Communist bloc nations and a few South American countries.

Briefly, a U. S. patent is generally divided into three parts: drawings, specifications and claims. The specifications describe the invention. The claims of novelty, as they are called, are intended to tell what sets a particular invention apart from all other such inventions described in all other patents or in the world literature.

Complicated? Yes. But the system works.

"It is almost impossible to conceive of any existing social institution so faulty in so many ways. It survives only because there seems to be nothing better," say John Jewkes, David Sawers and Richard Stillerman in their absorbing book, **The Sources of Invention**.

"And yet for the individual inventor or the small producer struggling to market a new idea," concludes these authors, "the patent right is crucially important. It is the only resource he possesses and, fragile and precarious though his rights may be, without them he would have nothing by which to establish a claim to a reward for his work. The sale of his ideas directly or the raising of capital for exploiting the ideas would be hopeless without a patent."

Continued from Page 1

# Reliability Goal: To Provide Stockpile Evaluation

installation of equipment at supplier plants.

A number of the present Department 2450 personnel have been concerned with various phases of equipment almost since the beginning of the activity: Mr. Kraft, Harold Houts (2451-1); Herschel Rogers, supervisor of Production Tester Section 2452-3; Ross Sinkey (2452-2); Glenn Elliott (2452-3); Jack Hammerstran, supervisor of Tool and Gage Design Section 2452-4; and Fred Williams (2452-4). These men worked on early tester and gage prototypes and had a hand in later developments.

"Early testers were not automated in today's sense," according to Paul Callies, supervisor of Division 2451. But gradually new concepts of tester automation came into being.

## Testers Are Compact

Today, testers are compact, highly versatile, extremely accurate pieces of equipment. "Automation has had a profound effect on the whole range of test equipment," commented Art Roth, supervisor of 2452, "but it's only one of several innovations."

Currently, some test equipment development is "farmed out" to contractors under the direction of Department 2450. This practice places tester development in the hands of people working on components which ultimately will be tested. The approval of the design, however, is handled through the same type of review activity that controls those designed internally.

Throughout organization 2400, a professional approach to test equipment development is emphasized. "Publication of technical information is encouraged," Mr. Kraft continued. "We find that active communication discourages duplication of effort and stimulates our entire activity."

Systems Test Equipment Development Department 2440, supervised by E. L. Deeter, designs, develops, tests and evaluates prototype test equipment for Quality Evaluation System Testing of stockpile weapons, and a modest

amount of equipment for military field use. The responsibility for providing this equipment to high standards of reliability is divided between J. A. Southwick, Division 2444, and R. A. Hayenga, 2441. Another division, under W. W. Westman, is responsible for reliability analysis, standard and uniform practices, not only as an aid for Department 2440, but all other 2400 departments.

## Drawing Design Review

Procedures to insure high reliability include a drawing design review, from a human engineering viewpoint as well as a technical aspect. Tested or previously evaluated components are used wherever possible and production guidance is also furnished for the fabricator or manufacturer.

A "reliability awareness" program is used to promote the success of the many aids made available by Mr. Westman's groups. The aids include several manuals on standards and uniform practices, as well as a list of preferred parts. Other guides are furnished for the benefit of the suppliers and inspectors.

Failure information, fed back from the test locations, furnishes useful data for improving tester reliability.

"Through automation of test equipment, we overcome human error on many of the more complicated testers," Mr. Deeter commented. "But we must have a means of assuring that test equipment components do not change with time and use. We maintain a continuing check system to assure correct calibration of the testers."

Accordingly, Physical and Electrical Standards Department 2410, managed by H. C. Biggs, maintains both a primary and secondary standards laboratory. The department provides vital services not only to the test equipment organization but to all other organizations in the nuclear weapons program.

"The Primary Standards Laboratory is part of the ALO Standardization Program," Mr. Biggs explained, "and as such provides the necessary link between the National Bureau of Standards and the standards laboratories maintained at all the AEC integrated contractors. The Primary Laboratory sets and maintains standards of length, mass, time and temperature, along with derivatives of these, required for the research, development, fabrication, assembly, test inspection, and quality assurance agencies."

Department 2410 also administers a Secondary Standards Laboratory which maintains secondary reference standards; performs the initial calibration on acceptance gages and commercial dimensional equipment; and calibrates the standards used by Sandia Suppliers. It also provides source data, equipment, and consultation for the training of standards personnel in Sandia Corporation field offices.

The Standards Department was established at Sandia in 1953 under Mr. Biggs. "There are several

other 'old-timers in standards' who are in the department," he commented. "These include J. C. Moody, supervisor of Length and Mass Standards Section 2411-1; J. M. Bunch (2411-1); M. C. Jones, supervisor of Nuclear Radiation Standards Section 2411-3; D. E. Fossum, supervisor of Microwave Standards Section 2412-3; L. H. Bressan (2412-3); N. L. Hensinger (2412-3); A. B. Draper, supervisor of Electrical Secondary Standards Section 2413-3; and W. H. Blair (2413-3)."

The first major customer of Department 2410's services was the Military. Shortly, standards calibration activities were made available to Sandia organizations where standards had been individually maintained, as well as to AEC integrated contractors. "Since the beginning, derivation of microwave, leak, humidity, radiation and other standards, has been a function of Department 2410. We push the limits of measurement accuracy in these areas," Mr. Biggs stated.

## Pushing Frontiers

Pushing new technological frontiers is also characteristic of other 2400 organizations, especially Automated Data Systems Development Department 2420, managed by T. F. Marker.

"There sometimes is a great deal of creative activity in deriving new data systems concepts," Mr. Marker commented. Bill Paulus and Jack Marceau, 2421-1, have a great deal of experience in developing new systems and system methodologies and as a result serve as consultants for the department.

Because of the many unexplored areas in this field, the number of patent disclosures made by Department 2420 is high, as typified by the work of R. H. Braasch (2421-1), J. B. Szymanski (2421-2), and A. C. Wilken (2421-1).

The work done by Department 2420 is aimed at solving problems predicted for the next ten years. "In general, our work consists of seeking the dimensions of problems," G. R. Bachand, supervisor of Automated Data Systems Division 2421, commented. "Once the problem has been clearly defined, solving it is relatively simple."

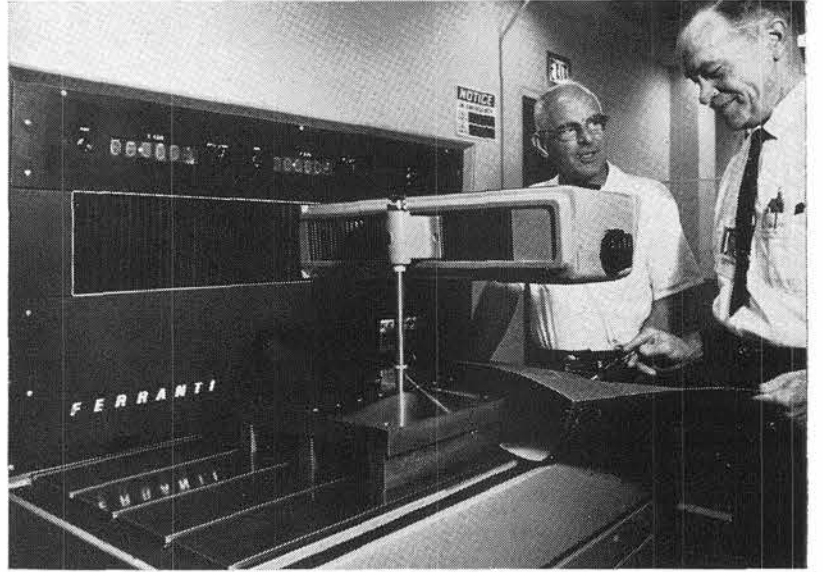
Currently, Department 2420 stresses generalized solutions of the largest classes of automation problems. "Broadly, we work with new methods of automatically acquiring, processing, and displaying technical and administrative data concerned with atomic weapons," Mr. Bachand continued. "We also do applied research in instrumentation, test and control areas providing new technology where the need exists."

Apparatus Development Division 2422, supervised by R. A. Richards, develops the apparatus for those systems defined and proven feasible by Division 2421. Department 2450 then engineers the applications of these new apparatus systems.

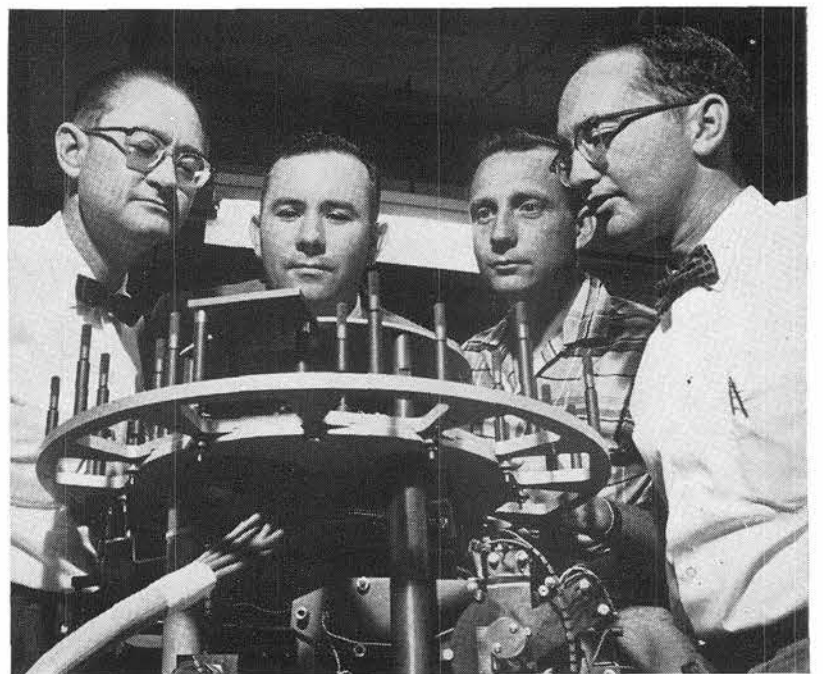
A system which typified Department 2420's concern with classes of problems is APAR (Automatic Programmer and Recorder). APAR consists of a number of modules which can be combined

and recombined to perform a variety of functions. "The APAR system is typical of the work of the 2420 organization," Mr. Richards said. "It is able to meet the needs required by constant changes to the product being tested."

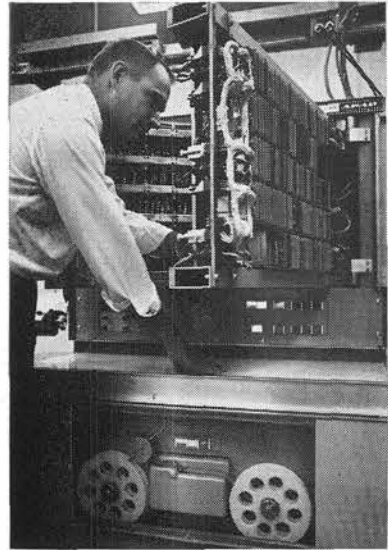
In summary, the goal of the 2400 organization is to provide the tools to acquire accurate data economically, but rapidly, that can be used to assess the reliability of our stockpile.



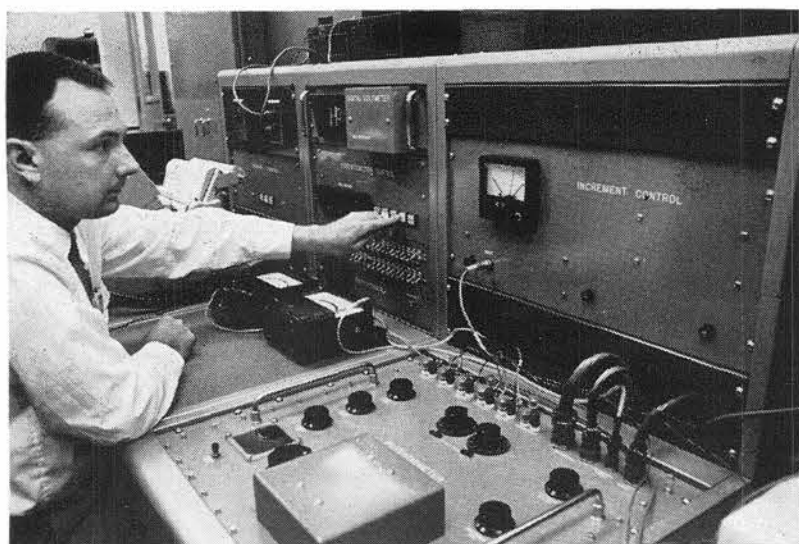
ACCURATE dimensional measurements on two axes are made with this instrument by Fred S. Williams, left, and Jack F. Hammerstran (both 2452-4). The instrument, capable of measuring to within .0001 in., is being evaluated for possible use at Sandia Laboratory.



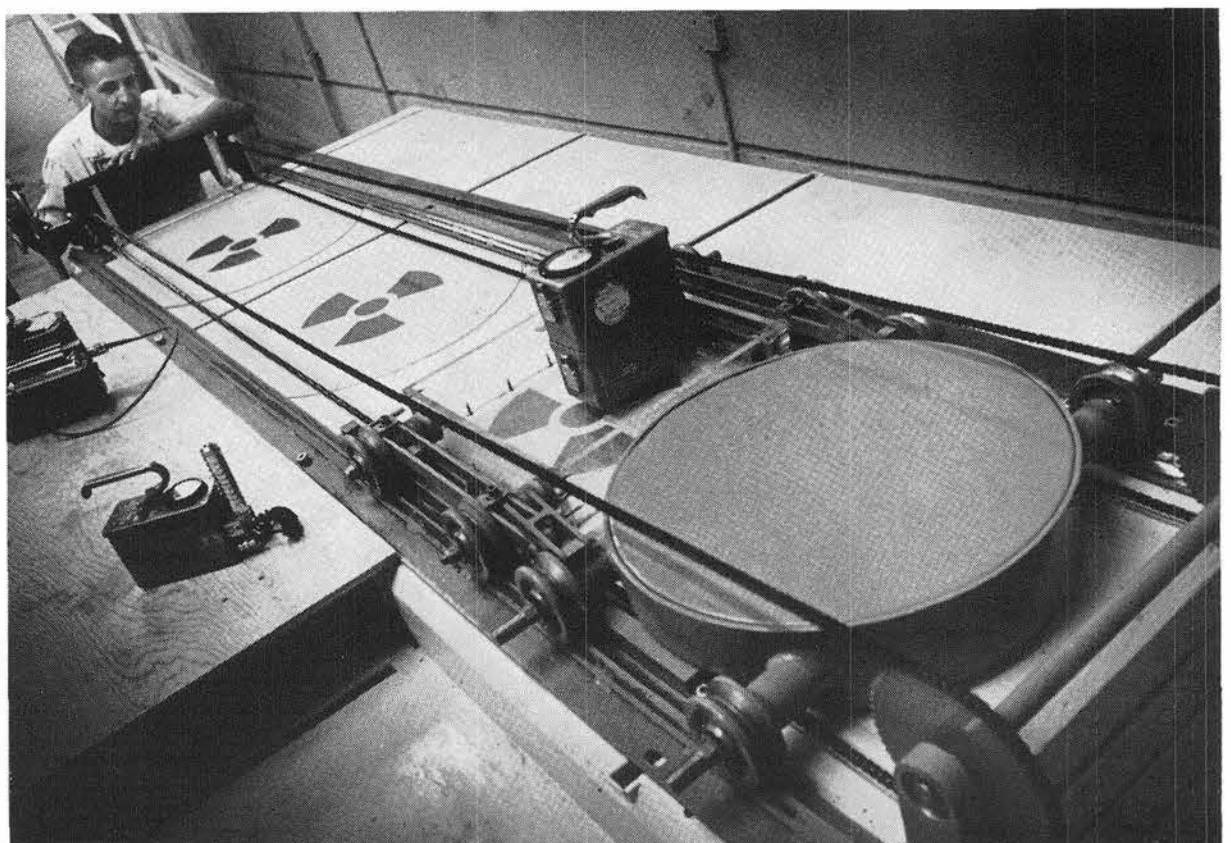
TESTING sequence actuator in foreground is examined by four members of Component Test Equipment Development Department 2450. The men are long-time 2450 personnel (l to r) Harold E. Houts (2451-1), Aug. 1951; Herschel W. Rogers (2452-3), May 1951; Ross A. Sinkey (2452-2), May 1953; Glenn R. Elliott (2452-3), June 1953.



APAR's internal workings are inspected by D. Raymond Hines (2422-1). Small circuit boards in front of panel can be changed to vary the function.



AUTOMATIC cell comparator, developed by David W. Braudaway (2412-3), who operates it above, measures difference of voltages between a standard cell and a sample cell whose voltage is suspect.



CALIBRATION of radiation meters is accomplished with vertical gamma range, operated by Richard W. Eifert (2411-3). Radiation signs are on cover plates of three vertical 24' shafts housing radiation sources.

## Sandians Reach Half-Way Mark Of '62 ECP Funds

Half-way mark in 1962 for the Employees' Contribution Plan was reached last month. To date, a total of \$77,640.26 has been contributed by Sandia Laboratory employees to the plan. The funds are distributed to the United Community Fund, which includes 25 local charity agencies, and nine national health and welfare agencies.

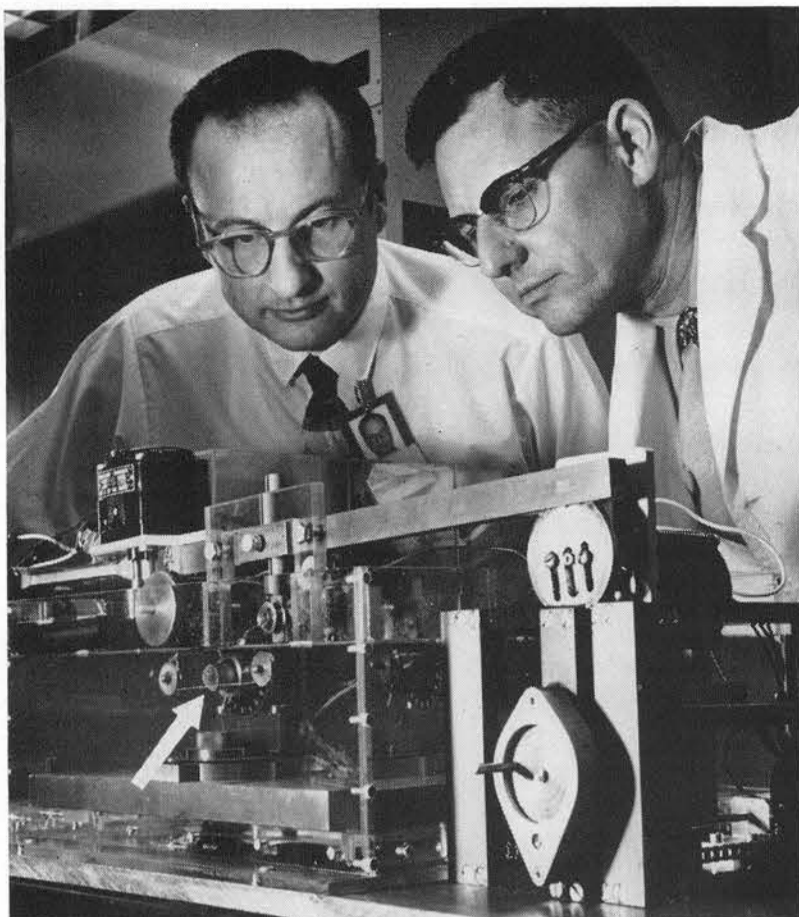
As the June checks were mailed, the following distribution had been made:

	June	Total to date
United Community Fund	\$ 8,520.39	\$59,602.63
American Cancer Society	650	4,548.62
Bernalillo County Heart Assn.	504.50	3,529.10
Arthritis and Rheumatism Foundation	190.59	1,333.21
Albuquerque Assn. for Mental Health	112.11	784.24
N. M. Soc. for Crippled Children and Adults, Inc.	482.08	3,372.27
Natl. Multiple Sclerosis Society	78.48	548.97
Albuq. Assn. for Retarded Children	179.38	1,254.78
Cerebral Palsy Assn. of Bernalillo County	269.07	1,882.20
Muscular Dystrophy Assn. of America	112.11	784.24

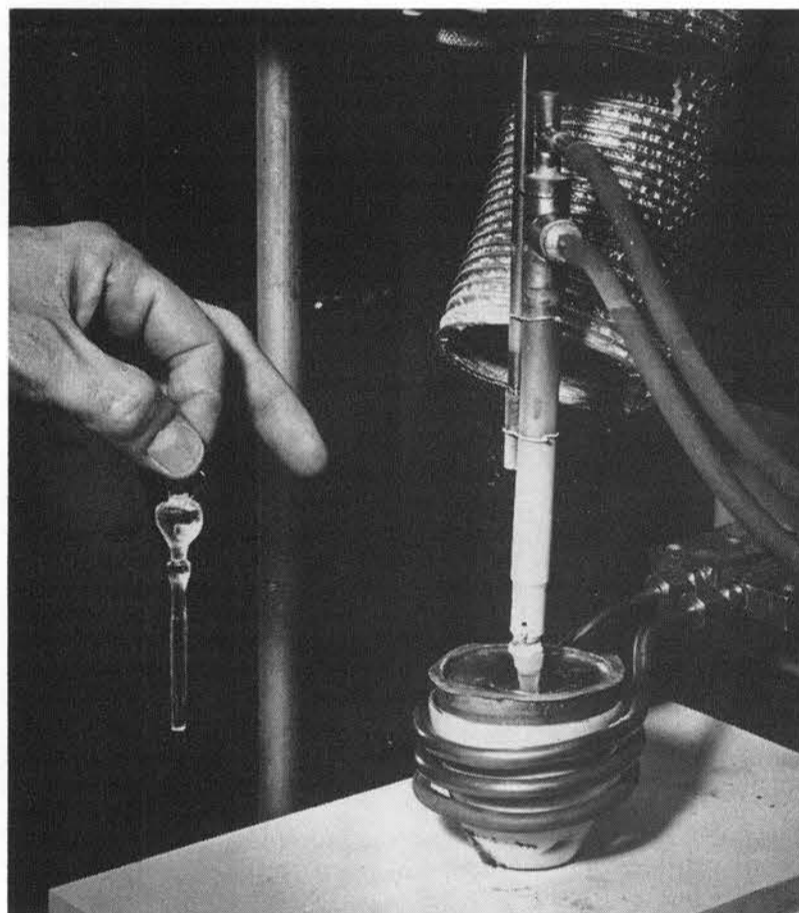
## Welcome Newcomers

July 2-13

<b>Albuquerque</b>		
*Kenneth V. Atkisson	4412	
Phillip K. Beasley	4574	
Katherine P. Foster	3126	
Dorothy B. Hoob	4613	
Howard L. Hudson	4233	
Joye Elise Hughes	3126	
Cecilia R. Martinez	3126	
Judith L. Millican	3126	
Ida Nelson	3126	
James C. O'Neal	2411	
Lupe E. Sanchez	3446	
Jose M. F. Sena	3446	
*Betty L. Turman	4135	
Virginia Weirauch	4333	
<b>Colorado</b>		
George B. Miller, Littleton	9130	
<b>Connecticut</b>		
George E. Clark, Orange	1331	
<b>District of Columbia</b>		
Larry L. Stephenson, Washington	5311	
<b>Kansas</b>		
Roger W. Berger, Manhattan	2561	
George H. Honnold, Lawrence	2421	
Everett L. Johnson, Lawrence	7243	
<b>Kentucky</b>		
Samuel C. Berry III, Lexington	2541	
Wesley W. Roberts, Lexington	2561	
<b>Massachusetts</b>		
Raymond E. Rink, Cambridge	1413	
<b>Maryland</b>		
Lawrence R. Gallo, Rockville	5322	
<b>Michigan</b>		
Richard C. Jones, Reed City	4113	
<b>Minnesota</b>		
Ronald W. Madsen, Minneapolis	7223	
<b>Montana</b>		
Frank E. Perusich, Bozeman	7222	
<b>New Mexico</b>		
Robert H. Baxter, Los Alamos	5314	
Eugene A. Igel, Los Alamos	7224	
<b>New York</b>		
Frank C. Cheston, Jr., New York City	6000	
Thomas H. Knowles, Canton	4411	
Frank V. Pazel, Greene	7184	
Patrick Sullivan, Peru	7325	
<b>North Carolina</b>		
Larry S. Waddell, Raleigh	5134	
<b>Oklahoma</b>		
Jack W. Hickman, Ponca City	7146	
<b>Pennsylvania</b>		
Richard E. Hughes, Bethlehem	5421	
Dale R. Leonard, Le Contes Mills	4413	
Donald E. Rothwell, Irwin	7145	
David L. Shirey, Woodland	4412	
R. Keith Treese, Pittsburgh	2451	
<b>South Carolina</b>		
Roger N. Everett, Spartanburg	7132	
<b>Texas</b>		
W. Lionel Craver, Jr., Austin	7182	
Thomas S. Oglesby, Austin	2323	
Kenneth E. Buita, Austin	7122	
<b>Utah</b>		
Clarence A. Calder, Provo	7112	
Kenneth B. Kimball, Salt Lake City	2564	
<b>Virginia</b>		
C. David Bedford, Richmond	2451	
<b>Wisconsin</b>		
Paul F. Becht, Wausau	4332	
Eyrlie T. Carriere, Milwaukee	7243	
<b>Wyoming</b>		
Duane L. Smith, Laramie	1442	
* Denotes rehired		
<b>Returned from Leave</b>		
Yolanda M. L. Adent	3126	
Carol Ann Harger	3446	
Robert W. Wesnak	4413	
Donald C. Wunsch	2412	
<b>Temporary Summer Staff</b>		
John W. Kauffman, Evanston, Ill.	5314	
Leroy C. Meyer, Albuquerque	7222	
George A. Young, Albuquerque	5412	



OPERATION OF SPARK CUTTING SAW, which actually vaporizes the metal as it cuts through a tin crystal at desired plane, is observed by Albert Goodman and F. A. Philgreen (both 1124-3). Arrow points to moving wire which transmits electric spark.



SALT SINGLE CRYSTAL is being "pulled" from molten salt by this mechanism. High frequency induction coils around platinum crucible keep the salt above its melting point (801°C.). Tubing contains room-temperature water to remove heat from growing crystal. At left is single crystal grown at Sandia Lab by this method.

## Sandians Receive AEC Safety Man Service Awards For '61 Rescue

Nine Sandia Corporation employees have received public service awards from the American Radio Relay League for their work in a 1961 rescue operation.

Recipients include Duane Arlowe (7212), K5DLE; L. V. Day (7211), W5LQM; Robert Dawirs (7162), W5UAF; Carl Franz (1321), W5ZHN; Kenneth Johnson (4232), K5Z6H; Robert Lindsey (1422), K5IVR; Thomas Martin (1322), K5SFU; Willie E. Petty (4632), W5LEF; and Jim Stueber (7232), W5UOZ.

Former Sandians who received awards for their part in the operation include Charles Butler, W5WNU; and John Courtney, W5ONK.

The amateur radio operators aided in the rescue of Charles K. Lee (1443) and his family who were stranded in March 1961 in the remote Tent Rock area north of Albuquerque.

The rescuers are members of The Caravan Club, The Amateur Radio Emergency Corps (AREC), or the Radio Amateur Civil Emergency Service (RACES).

## AEC Safety Man Completes Reactor Hazards Course

David W. Persons, a reactor safeguards engineer in the Atomic Energy Commission's Albuquerque Operations, has completed three months of specialized advanced training at Oak Ridge (Tenn.) School of Reactor Technology.

The Oak Ridge school is attended by students with nuclear training or a Master's degree in science. This international training program prepares engineers and scientists for responsible roles as nuclear reactor hazards evaluators and nuclear reactor operations supervisors.

As a staff member of ALO's Operational Safety Division, Mr. Persons will be working with Sandia Corporation, Los Alamos Scientific Laboratory, and the Commission's Nevada Test Site organization in safety aspects of nuclear reactor operations.



## Study of Crystal Growth May Give Clues to Solid Properties

Several methods of growing single crystals of individual elements and compounds are being used by Thin Films and Solid State Section 1124-3.

Most crystalline solids are composed of millions of tiny single crystals (or grains). Atoms or molecules are arranged in regularly-repeated patterns in each of these single crystals. Knowledge of this arrangement may provide clues to the electrical or magnetic properties of solids.

F. A. Philgreen of 1124-3 is concerned with methods of growing large single crystals, the nature of crystal growth, and the properties of materials as related to crystal structure.

Single crystals are grown in several different ways. In a procedure based on the Czochralski method, the crystal is actually "pulled" from molten material at a rate of from 1/3 to 2 in. an hour. Irregularities in size will occur due to variations in temperature. This method is suitable for many crystals, for instance sodium chloride (salt). The advantages of this method are that the crystal is grown from pure material, and materials which are insoluble in water or which will react with a molten solvent can sometimes be grown into a crystal by this method.

### Crystals of Tin

Extremely pure single crystals of tin have been successfully grown in a zone smelter by Mr. Philgreen. An oriented "seed" crystal, to induce proper formation of the crystal, is placed in a graphite or pyrex mold in contact with pure tin metal. The mold is placed in a quartz tube which is surrounded by a small circular furnace heated to about 240°C. and which moves along the tube. The tin is melted and as it solidifies on the "seed" crystal, impurities which may be present are

pushed ahead of the moving heat zone. Boundaries between the tiny crystals are "erased" so as to produce one large crystal.

The most satisfactory method for growing barium titanate crystals has been from barium titanate powder dissolved in a potassium fluoride flux at 1200°C. The temperature of the muffle (hooded) furnace is gradually lowered to 900°C. during a normal 24 hour run. Most of the crystals form an intergrown mass but a few are in the form of individual twinned platelets called "butterfly wings." These platelets are suitable for use in experiments. Ruby crystals have also been produced by this method.

Crystals are also grown in a supersaturated water solution. As the water evaporates over a period of several weeks, the crystals grow to the desired size.

### Spark-Cutting Saw

In studying single crystals it is often desirable to cut the piece on a certain crystallographic plane so as to expose a particular layer of atoms. Mr. Philgreen is presently investigating a spark-cutting saw for cutting tin crystals. With this mechanism a spark from a nichrome (nickel-chrome) or copper cutting wire actually vaporizes tiny particles of the tin with minimum disarrangement of the regularly-repeated pattern of atoms in the body of the crystal.

Before the "cutting" begins, the orientation of the atomic layers of the sample is determined by X-ray diffraction. A part of the saw mechanism is a goniometer sample holder, patterned after one designed by J. J. Clemons (5134), for use in X-ray orientation.

This can be adjusted to orient the single crystal to a predetermined position for cutting. The saw being used in Section 1124-3 was designed by R. T. Baff (5134-1) with modifications suggested by Mr. Philgreen.



SINGLE CRYSTALS of triglycine sulfate, which have been grown in Section 1124-3's laboratory, are shown in this photograph.

## Drafting Articles By Livermore Authors Published in June

The first two articles of a series on drafting technology by drafting supervisors C. S. Wolowicz (8117), C. F. Rindone (8114-3), and R. J. Wilcox (8114-1) appear in the June issue of *American Machinist* magazine.

The series is entitled "Axioms of Drafting Technology." It is based on proposals set forth in their recently-published Sandia Corporation monograph, "Technical Analysis and Definition; A Field of Engineering Study."

The monograph, a culmination of several years work by its authors, is aimed at eliminating the ambiguity, incompleteness, and misleading information frequently found in today's technical drawings. Few drawings are universally interpretable, according to the authors. Their aim is to offer a basis for a new field of study which would provide a "common engineering language."

## Promotions

Edito O. Trujillo (4574) to Janitor  
 A. Morris MacGibbon (4512) to Machinist  
 Bruce E. Affeldt (8232) to Document Clerk  
 Alfred F. Fields (2644) to Staff Assistant—Administrative  
 William M. Coelho (8114) to Staff Assistant, Sr. Draftsman  
 Michael T. Ferrario (8114) to Staff Assistant, Sr. Draftsman  
 Laura E. Hill (5152) to Staff Member, Technical  
 Janice L. Patrick (5152) to Staff Member, Technical  
 Harvey D. Kubiak (2631) to Staff Associate, Administrative  
 Bernard A. Clouse (2632) to Staff Associate, Administrative  
 Sylvester DeLuca (4613) to Stockkeeper  
 Oscar H. Berlier (4514) to Jr. Tradesman  
 Juan R. Montoya (3444) to File Clerk  
 Linda D. Gill (3126) to Secretarial Typist  
 Corine M. Madrid (3126) to Report Clerk  
 Lloyd A. Morrow, Jr. (3446) to Document Clerk  
 Lucy R. Metzgar (4135) to Invoice Clerk  
 Polly P. Horne (4135) to Sr. Clerk  
 Harley Boling (3463) to Technical Illustrator  
 Vurles C. Looney (4234) to Technician  
 Charles V. Ladig, Jr. (4253) to Machinist  
 John I. Malpas, Jr. (4253) to Machinist  
 Jake F. Gonzales (4253) to Machinist  
 Sharon L. Daniel (5425) to Calculating Machine Operator  
 Ernestina M. Romero (3451) to Service Clerk  
 Albert M. Celoni (8242) to Special Handler  
 Anna B. Pearce (5000) to Secretary  
 Charles A. Bennett (8115) to Staff Assistant, Technical  
 Robert E. Strout (8124) to Staff Assistant, Technical  
 Rafael T. Garcia (4614) to Utility Operator  
 Dorothy K. Krause (4135) to Invoice Clerk  
 Bertha N. Armijo (4423) to Typist  
 Clifford M. Elson (7241) to Data Reduction Clerk  
 Dallas H. Jensen (1414) to Laboratory Assistant  
 Gladys M. Collins (7160) to Secretary  
**Supervisory Lateral Transfers**  
 W. M. Sundt from 1443-1 to 1442-3  
 J. Stein from 1312-1 to 1314-2  
 W. H. Everhart from 7246-2 to 7113-1



**TONSORIAL TRIM** (a haircut), usually an occasion for a tear or two, is endured with hint of a smile by resident of St. Anthony's.

## They See What Their Dollars Do

The following articles are the first of a series of accounts of activities of ECP participating agencies observed by Sandia employees. Recently, William O. Bramlett (3242) and N. J. Eich (1111) visited the New Mexico Rehabilitation Center and St. Anthony's Home for Boys. Here are their first-hand observations, as told to a Lab News reporter.



**GAIT TRAINING** by a little girl, three years old, doll in hand, is part of therapy available to her at New Mexico Rehabilitation Center. Training is supervised by Joan Hamilton, Physical Therapist. Inspector Bramlett watches procedure and provides encouragement.

## I Found Healthy, Happy Youngsters . . .

As told by N. J. Eich

Have you ever been to a boys' home? I recently had the opportunity to inspect the work being done at St. Anthony's Home for Boys, and the uses to which ECP funds are being put there. My visit was sponsored by the ECP Committee. We all probably have preconceived ideas as to the life in a boys' home, based on descriptions in books and magazines. Let me give you a first-hand account.

St. Anthony's was founded in 1913 to take care of children who could not get proper care elsewhere. Although it's operated by the Sisters of the Franciscan Order, it is non-sectarian. Children are accepted from infancy through age 15. Upon reaching age 15, they are placed in other locations.

I'd like to state at the beginning that I was impressed by what I saw in the afternoon I spent at St. Anthony's. I was impressed by the cleanliness of the home, by the healthful, happy appearance of the youngsters I saw, and by the guidance being offered to them. I was also impressed by the efforts of the staff to combine the discipline required in a home housing 132 children whose ages extend from two weeks up through age 15 with the loving care a youngster requires if he is to grow into a normal adult.

The home is managed by Sister Pauline with the assistance of a staff of 18 Sisters from the Fran-

ciscan Order. One sister is resident in each of the dormitories as an adult advisor. They also take care of other matters, such as hair cutting. Food is prepared in a large, immaculate kitchen adjoining a large dining room. Clothes are repaired by sisters and by women volunteer workers.

Sister Pauline taught at St. Anthony's for a number of years. She told us that the sisters who form the permanent staff are required to go back to school each summer for further education. Additional sisters are sent in to replace them for this three-month period.

In regard to the school, during the school year, children attend classes from 9 to 12 and from 1 to 3. Subjects studied are those specified by the State Board of Education. Upon leaving the home, children are given full credit for the education they have received, regardless of where they go.

Sister Pauline believes fervently in the 4H, the Boy Scouts, and other youth activities that teach self-reliance, individual initiative, and self-development. She is building the program for boys who show interest and aptitude.

The Scouting program is going full blast with the aid of a local scoutmaster. The scout troop follows the same pattern as those made up of boys living with their parents. They have their projects, their camporees and the like. In

this, they enjoy the same type of environment experienced by boys who do not live in homes such as St. Anthony's.

Although Sister Pauline heads a large organization, she seems available to any who care to talk with her. During our brief stay in her office, one of the young women who work with the infants stopped by. One of the boys — I would guess he was about 10 — came to her with a personal problem.

The school facilities are located in a building which was constructed in 1913. Because of age, its use is restricted to school facilities, cooking and dining areas, auditorium, rooms for the sisters, and a chapel. The school rooms are quite old, but have had beautiful care by both students and faculty.

On the blackboard of one is a colored-chalk painting of a woods scene done by one of the sisters 17 years ago. It's been coated with a fixative from time to time, but it remains, notwithstanding its age, in as good condition as the day it was created.

There are several other observations worthy of being passed on by a visitor to the home. One fifth of the operating revenues come from the United Community Fund; the remainder, from private donations. Donations of food and clothing are always welcome. Plenty of thought has gone into programming the day-to-day life of the children and the maintenance of the home. The equipment is kept in tiptop condition and proper care in using it is emphasized.

These are one man's impressions, but I'm certain anyone would be welcome to visit and see for oneself. One visit would convince anyone of the worthiness of this effort.

Service  
Is A  
Privilege  
Give to Your ECP

## I Found Struggle for Health

As told by W. O. Bramlett

Recently I visited the New Mexico Rehabilitation Center to see some of the good works being done there, and to watch first-hand the uses to which ECP funds are being put. I'd like to say at the beginning that I was certainly impressed by the facilities of the Center, and by the people who make up the staff.

But I think I was more impressed by the people who come to the Center for help. Some are very young. Others are much older. But young and old, they are all courageous people, working with the therapists at the Center to overcome a number of handicaps and disabilities.

The chief administrator, Arthur Osterholm, toured the Center with me. We observed some of the therapy work being done, and we talked about the facilities and administration. He told me that the Center was built with donations and federal funds, and operates on funds from such programs as the UCF and ECP. In addition, patients who are treated at the Center are asked to contribute what they can to the Center's operation.

Volunteers who work at the Center do so without fixed charge. Mr. Osterholm said that there was a great need for more trainees to do therapy work at the Center.

We talked about some of the equipment used for treatment. He

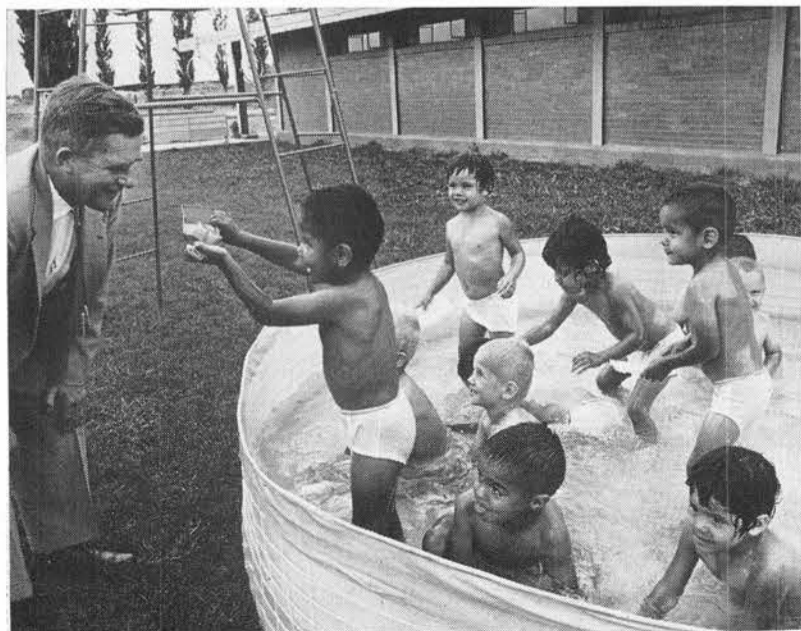
told me that a stretcher and wheelchair were purchased for the Center this year with ECP funds. Funds also are used for a variety of other purposes.

The Center is housed in a modern building which is the ultimate in convenience. It is spacious, cheerfully decorated, and very well-equipped. The pleasant surroundings surely make a difference to everyone, especially to those being treated there.

We watched therapists working with three young patients, two boys and a girl. I found the patience and kindness of the therapists very impressive. In spite of their handicaps, the children, and the therapists, too, seemed to be enjoying themselves. It was heartwarming to watch them.

New types of therapy are being done at the Center with the aid of new facilities. But the need for more support in the form of funds, equipment, and trained personnel is always present. The battle they are fighting against handicaps at the Center is far from won.

A trip through an organization like the Rehabilitation Center helps one realize the funds contributed through the ECP are doing an important job. It's too bad that everyone can't see, first-hand, the good being done by the program.



**TODDLERS** enjoy a dip in the wading pool at St. Anthony's Home for Boys. At left is N. J. Eich (1111), on recent visit to Home.



**SECURITY INSPECTOR** William O. Bramlett (3242) helps a young patient at New Mexico Rehabilitation Center enjoy a snack, along with Mrs. Helen Langdon, Center Occupational Therapist.

# A. P. Gruer Vice Chairman of Intl. Telemetry Conference

Allen P. Gruer has been named vice chairman of the First International Telemetry Conference, slated to be held in London during September 1963.

Mr. Gruer, who is manager of QA Operations Department 7530, will be in charge of North American participation in the meeting.

Co-sponsors are the National Telemetry Conference (comprised of five technical societies in related fields) and the Institution of Electrical Engineers, London. The latter will invite participation of various European technical societies.

A. E. Bentz (7113) and Mr. Gruer are both members of the NTC executive committee which plans three meetings during the current year to work out plans for both the international conference and the National Telemetry Conference, to be held in Albuquerque in May 1963.

Technical papers will be solicited

for both meetings as well as exhibits of telemetry nature.



A. P. Gruer



CENTRIFUGE in Area III was explained by R. E. Howell (7323), right, to 37 students from El Paso who toured Sandia Laboratory last week. The group visited the exhibits in the Sphere of Science, saw "The Sandia Story," and toured Area III facilities.

# Jim Leonard And Gary Willingham Low In Golf Tournament

Sandia Employees' Golf Association has announced results of the SEGGA Invitational Tourney, played at the UNM Golf Course on July 7:

Low Gross was awarded to Jim Leonard (7147), a 73 with nine balls; and Gary Willingham (7147), a 79 with six balls.

Best Poker Hands (Holes 8, 13, 14, 16, 18 Drawn) were awarded to Jim Kelly (2632), 44454, three balls; and Cleo Hughes (2442), 35555, three balls.

Blind Bogey (Net 80 Drawn) went to Charles Runyan (4220), six balls.

Low Net was awarded W. P. Brooks (5133), with a 79 gross and 63 net; and R. W. Foster (4352), with an 86 gross and 65 net.

# Art Shows Include Work by Sandians

Two forthcoming art shows will include canvases by Sandia artists.

Terrence Clark, Gene Lloyd (both 3463), and Robert G. Burgess (7213) will have paintings hung in the annual Santa Fe Fiesta Art Show, which opens Aug. 5 at the New Mexico Museum of Art.

Bob Burgess will also show examples of his mosaic work, oil paintings, and watercolors at the sidewalk art show during the New Mexico Arts and Crafts Fair at Albuquerque's Old Town Plaza July 26-29. He will demonstrate artistic uses of Venetian glass.

**No job is so important and no service is so urgent that we cannot take time to perform our work safely.**



ARRANGEMENTS for the annual symposium, sponsored by the New Mexico Section of the American Society of Mechanical Engineers, are made by committee members (l to r) Wayne Sebrell (7182), Dave Schultz (2541), Jack Cyrus (1332), Heinz Schmitt (1432) and John Engelland (7184). The symposium will be held Nov. 2-3 at the University of New Mexico campus.

# Golf Association Standings Given

The Sandia Employees Golf Association has announced the following league standings as of July 1:

Team	Weekend				Evening			
	W	L	W	L	W	L	W	L
1	8 1/2	3 1/2	6 1/2	5 1/2	11	1	8	4
2	11 1/2	1/2	5	7 1/2	13	8	8	4
3	2	10	10	11 1/2	5 1/2	6 1/2	10	10
4	6 1/2	5 1/2	9	3	2	2	10	10
5	6	3	7	2	7	2	2	2
6	5 1/2	3 1/2	4	5	6	3	7 1/2	7 1/2
7	3	6	7	2	1 1/2	7 1/2	11	11
8	1	8	3	6	2	7	7	7
9	4	8	6	6	5	7	7	7

# Members Named For ASME Symposium

Committee members have been named for the third annual symposium sponsored by the New Mexico Section of the American Society of Mechanical Engineers. The meetings will be held Nov. 2 and 3 at the University of New Mexico.

The symposium will be concerned with advanced technology. Jack Cyrus (1332) will serve as chairman assisted by committee members: C. E. Runyan (4220), speakers; James Jacobs (7112) and Heinz Schmitt (1432), finances and arrangements; Dave Schultz (2541), facilities; Wayne Sebrell (7182) and John Engelland (7184), publicity and printing.

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 7. Include name and organization

- 3-BDR brick home, carpeted, drapes, fireplace, landscaped, patio, disposal, a/c, 1 1/4 bath, \$15,800. Fleming, AX 9-3929.
- POWER MOWER, reel type, self-propelled, \$15; hand mower w/grass catcher, \$10. Shew, AL 5-0263.
- UNDER-COUNTER '59 Whirlpool dishwasher, \$70; new lined drapes, 21' x 7', white background, black, lavender and gold pattern, \$50. Dickason, 299-8125.
- BOAT, 14' alum. 130 lb., 12 HP rated, 4 seats, carktop or trailer. Windham, AL 6-9455.
- STEEL CASEMENT WINDOWS w/two screens and glass, \$15. Belden, AX 9-3867.
- '60 VOLKSWAGEN, windshield washer, travelounger reclining seat, blue exterior, blue and gray interior. Kotoski, AX 8-1732.
- CAR COOLER, 12 volt, Travel Aire, \$20. Deller, 298-3260.
- ALL METAL CAR TOP carrier and fitted canvas cover, \$20; refrigeration unit from small refrigerator, \$10. Cannon, AX 9-4592.
- GIBSON 5-string banjo with Scruggs pegs. Ezell, AL 6-4220.
- KENMORE ELECTRIC STOVE, \$150; Cold-spot 16 cu. ft. refrigerator with 168 lb. freezer, \$250. Perdew, AL 6-1478.
- BICYCLE, 10" wheels with helper wheels, \$12.50. Ligouri, AL 6-3613.
- 4-RM, bath, screened front and back porch, garage w/storage rm., 2 buildings 20'x70' sell Gl oppr. \$9050, 1008 Ann Ave. SW, Smith, TR 7-9133.
- WINDOW-MOUNTED Fedders refrigerative air conditioner, 110 v, 7.5 amps, 8800 BTU, almost new, \$90. Nix, 298-4282.
- 3-BDR, 1 1/2 bath, carpet, drapes, built-in stove, disposal, a/c, \$14,800 total, no qualifying, 4 3/4%, \$91 per mo. Stripling, AX 9-3336.
- ROBERSON, 3-bdr, 1 1/2 bath, built-in oven, range, a/c, pitched roof, patio, large trees, landscaping, sprinklers, available in Sept. Judd, AX 9-6536.
- 2-BDR HOUSE, a/c, walled yards, 4 1/2% G.I. at \$52/mo., reasonable offer accepted. Qualle, AM 8-2827.
- WEIMARANER PUPS, sired by champion chosen best local dog at Weimaraner Specialty Show, good hunting stock. Zimmer, AM 8-8262.
- BUFFET, blond, solid oak w/magnetic doors, like new, \$49.50. Padilla, AX 9-0460.
- DUPLEX, 2-bdr units each side, deluxe kitchens, a/c, private yards, \$18,500, 3514 Crest SE, Petrone, AL 5-3633.
- 3-BDR, glassed-in den, hw/floors, a/c, fireplace, 1 1/2 bath, private patio, schools 1/2 block, \$500 below FHA, \$14,200 total. Boaling, AX 9-1346.
- TRAILER HITCH, universal type. Dodd, AX 9-6330.
- '55 CHEVROLET 210 station wagon, R&H, PB, new tires, \$500. Culverson, 6901 Zuni SE, 265-0992.
- MAPLE kitchen table w/4 chairs, \$25. Sherwood, 2326 Hoffman Dr., NE, AX 9-2169.
- HEATH KIT ignition analyzer. Reid, AX 9-1608.

**NEXT DEADLINE**  
 FOR SHOPPING CENTER ADS  
 Friday Noon, July 27

- SNOW 3-bdr, separate den, 1 1/4 bath, walled corner lot, fireplace, 2 1/2 yrs. old. 1600 sq. ft., \$16,500, FHA or G.I. Ray, 11017 Phoenix NE, AX 8-0408.
- 22 REMINGTON bolt action rifle; new well pump w/tank, \$75; steel windows, \$3. Villetta, 9204 Susan, SE.
- \$450 DOWN to new loan or \$1500 down to 4 1/2% G.I. large 3-bdr. home, \$14,200. Stixrud, DI 4-7873.
- '60 MGA, R&H, new wsw tires, low mileage, wire wheels. Nokes, 299-8753.
- ROLL-AWAY BED; yellow dinette with 4 chairs. Griego, AX 8-1144.
- POODLE, French Mina Toy, white, AKC registered, female, \$75. Sanchez, CH 7-2114.
- LAMBRETTA SCOOTER, '57, licensed, new tires, \$100. Bowers, AX 8-2542.
- AKC 7-wks-old Collie pups, see at 3212 LaVeta Dr., NE, Kurowski.
- MATRRESS for twin bed, \$20. Chapman, 268-1003.
- '55 CHEV, std. shift, 6-cyl, R&H, prefer trade for pickup equal value. Williams, AL 6-4214.
- AUTO COOLER, window type, used two trips, available after Aug. 13, \$8. Hueter, CH 2-1620.
- BASSINET, extra large, w/pad and liner; Infantseat; bathinette; sterilizer; parakeet w/cage. Palkovic, AL 6-4196.
- RCA portable record player, \$8; new Relax-a-Cizor, \$50; crib, mattress needs covering, \$7; 5-pc. chrome dinette, \$10. Finn, AX 9-7535.
- 3-BDR PUEBLO, \$15,500, large patio, carpeting, drapes, stove, Johnson, 4022 Anderson, SE, 255-5358.
- COLDSPOT refrigerator, \$20. Bouchard, AL 6-1495.
- BABY CRIB, \$12. Barney, 345-1584.
- PORTABLE screened summer-house, 12'x12', cost \$50, sell for half, ideal for outdoor picnics without gnats, flies and mosquitoes. Roberts 282-3496.
- 30" KENMORE gas range 5-burner griddle top \$50. Hampy, AX 8-2382.
- SMITH & WESSON K-22 Masterpiece, \$50; J. C. Higgins model 20, 12 ga. pump shotgun w/rib and choke device, \$50. Holck, 298-0361.
- 3-BDR, 1 1/2 bath, fireplace, carpeting, drapes, sprinklers, disposal, inter-com, private patio, 4 1/2% loan, \$14,600. Martin, 112-865-9555 Los Lunas.
- ANTENNA rotator, \$20; Knight SWR bridge, \$4. Lathrop, AL 5-1901.
- '58 THUNDERBIRD, a/c, power, \$1985. Myers, 10203 Blume NE, AX 9-8727 after 5 p.m.
- HEATHKIT FM tuner and amplifier, two matching cases and 8" speaker. Hansen, AM 8-8352.
- 3-BDR, 1 1/2 bath, separate utility room, flagstone patio, landscaped corner lot, near schools, \$13,200. Benderman, AX 9-5831.
- AUTO AIR COOLER, used one season, for 12-volt system, original price, \$44, sell \$20. Pearty, 242-6959.
- BOAT, 14' Smith-Craft, wooden, 35HP Johnson motor, trailer, suitable for water skiing and fishing, \$700 sell or trade. Schowers, AL 5-9279.

- '51 FORD convertible, 6000 miles on rebuilt engine. Monroe, 9722 Salem NE, AX 9-3041.
- WADING POOL, steel wall, 10' dia. x 24" high, \$8; 26" men's English bicycle, \$8; 6 sacks Richmond, \$5. Toya, 125 El Pueblo Rd., NW, DI 4-2775.
- CORNER LOT, R-1, 60x150', curb, gutter, paving paid, Columbia and Thaxton SE. Burns, CH 2-2407.
- ROBERSON 3 BDR, den, 1 1/2 baths, attached dbl. garage, corner lot, sprinklers, walled, pitched roof. Green, Indian School and Gretta NE, AX 9-5433.
- FOR RENT**  
 STUDIO APT., 1-bdr, fireplace, unfurnished, tile bath, located in Corrales. Norton, DI 4-4973.  
 TWO ROOM furnished house, \$40. Chapman, 268-1003.  
 UNFURNISHED HOUSE, 832 Quincy NE, available Aug. 1, 3-bdr, 1 1/2 bath, carpets, drapes, water and garbage paid, a/c, \$125/mo. Wright, AL 5-4038.
- WANTED**  
 NICE HOMES for three kittens, all long haired, black and white. Norvill, AL 5-2787 or pick up at 5000 Sunningdale Ave., NE.  
 COSCO nylon playpen. Foor, AX 8-4980.  
 OLD NAVAJO BLANKETS and other old Indian items, will pay cash. Smitha, 8607 Menaul NE, AX 9-1096.  
 PLAYER PIANO ROLLS. Huddleston, AL 5-1312.  
 RIDE from 12th and Mildred, NW, to Bldg. 802. Silva, ext. 28155.  
 RIDERS to Los Angeles, share expenses, leaving July 27, returning Aug. 11. Kees, 256-3754.  
 WILL THE YOUNG LADY who borrowed the instruction booklets on my tape recorder please return same? Capt. Braun, ext. 31285.  
 HOME for 2 gold and white kittens. Beattie, AL 6-6247.  
 RIDE 56th and Central West to Bldg. 860. Ortega, CH 2-9424.  
 RIDE from 1200 Wilmore SE, 1 blk. from Yale. Davis, 243-2315.  
 BOY'S BICYCLE, 26" or 24". Hurley, AX 8-5250.  
 WOMAN TO CARE for 2 school girls in vicinity Emerson School, beginning school term, ages 7 and 9. Smith, AM 8-6000.  
 METAL-TURNING lathe. Holck, 298-0361.  
 RIDERS from Belen to 860 lot. Skender, ext. 37273.  
 '54 to '57 CAR for dependable economical transportation, prefer good foreign car or small standard make. Adams, AL 6-7265.  
 RIDE from Princess Jeanne area to vicinity of gate 4. Grimes, 299-5277.  
 DAILY CARE for 3 children Mondays thru Fridays, hours 7 to 5. Aug. 27 thru Sept. 14. Anderson, AX 9-2232.  
 TO JOIN car pool from vicinity 10324 Paseo Del Norte N.W. (Rio Vista) to vicinity Bldg. 610. Dehon, 898-2219.  
 RIDE FROM vicinity of Chama and Louisiana to Bldg. 880. Rogers, ext. 23235.

**Meet Your Reporter**



Mary Campbell

Mary M. Campbell has served as Lab News volunteer reporter for Aero- and Thermodynamics Department 7130 for the past two years. Her stories have ranged from hunting in the Yukon to those of more technical nature.

A Corporation employee for five years, Mary has been secretary to Department Manager A. Y. Pope for two and a half years.

Mary's "special interests" are her two daughters, aged 10 and 13. "Their hobbies are mine," she notes.

**Mountain Club Will Hike Santa Barbara Creek Next Weekend**

Frances Strachwitz (3421-1) will lead a New Mexico Mountain Club trip along the west fork of the Santa Barbara creek on Sunday, June 29.

The Santa Barbara campground, where the trail starts, is reached via State Highways 75 or 76 to Penasco (northeast of Espanola), then southeast to Rodarte. The trail passes through meadows and woods for a distance of five or six miles.

For further information or transportation arrangements call Frances at AX 9-4183. All hikers are invited whether members or not.

**The Correct Answers**

Identification of countries on map shown on Page 2.

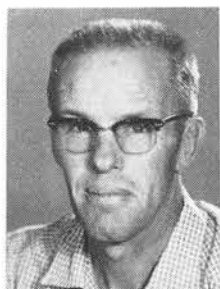
1. China; 2. Burma; 3. Thailand;
4. Laos; 5. North Vietnam; 6. South Vietnam;
7. Cambodia; 8. Malaya; 9. Taiwan; 10. Philippines;
11. Sarawak; 12. Indonesia.

**Service Awards**

**15 Year Pins**



C. W. Campbell  
4000  
July 28, 1947



William H. Hess  
7212  
July 24, 1947

**Sandia Trailer Toters Taking to Road for World's Fair Look-See**

A trailer caravan of Sandians will leave Albuquerque July 28 enroute to the Fair in Seattle. All are members of the Thunderbird Travel Trailer Club.

Making the trip will be E. V. Forsman (1323), John Erne (1423), his brother Paul, Lou Mecklenberg (7124), Vi Fogelman (1423), Bob Sylvester (2542) and their respective families. The caravan will be comprised of five trailers and one pickup camper.

Their route will take them through Arches National Monument near Moab, Salt Lake City, and other points of interest. At Seattle the group will split up since some will be going on to Canada. Several will remain in the Seattle area to see the Gold Cup Hydroplane races on Lake Washington. Most will be gone three weeks.

**Technical Paper Presented in Paris By Two Sandia Men**

W. H. Brooks and G. E. Reis (both 7131) were co-authors of a technical paper which they presented at the Third International Symposium on Rarefied Gas Dynamics in Paris, France, June 25-29.

The paper was entitled, "Drag on Right Circular Cylinder in Rarefied Flow at Low Speed Ratio."

**M. W. Alexander Elected President Metal Trades Council**

M. W. Alexander (4224) was elected president of the Atomic Projects & Production Workers, Metal Trades Council, AFL-CIO at a recent special election. W. E. Seaburn (4254) was elected vice-president at the same meeting.

The Metal Trades Council represents approximately 1250 Sandia Corporation employees.

**4100 Pair Wins Bridge Tourney**

In a closely-contested game, W. D. Parsons (4112) and G. E. Wallace (4111) won the Sandia Corporation Open Pair Bridge Tournament July 9 at the Coronado Club.

Second place went to R. F. Jennings (4121) and W. L. Dye (4123). The winners will receive trophies and have their names engraved on the permanent trophy displayed in the lobby of Bldg. 802.

**UNM Fall Schedule in Tech Library, Branches**

The Sandia Laboratory Technical Library and its branches now has on hand the schedule for fall semester courses at the University of New Mexico, according to Staff Training and Education Division 3131.



SANDIA'S CDC 1604 COMPUTER and a program developed by Jim Allensworth (7242), above, have been used more than 1000 times to solve problems for Sandia Field Test and Development engineers.

**Computer Program Simulates Flight Tests; Data Produced Comes Close to Real Thing**

Sitting at a desk with pencil and paper, Jim Allensworth has dropped bombs, flown rockets, launched missiles, and orbited satellites. Jim is a mathematician in Mathematical Services Division 7242.

The "flights" have all taken place inside Sandia's high-speed, high-capacity CDC 1604 computer. Data produced has complemented actual flight test data, and in some cases has filled in gaps where instrumentation failures have occurred. Delivery plans for actual tests, including some of the recent Pacific tests, have been made with the use of Jim's program.

Jim developed one flexible general purpose trajectory program to handle these various jobs. Concepts for the trajectory program evolved over an eight-year period as Jim worked on various trajectory problems for Field Test and Development organizations. Work on the current program started in October 1959. It was first developed for use on the IBM 704 computer.

**Two-Part Program**

When Sandia obtained the CDC 1604 computer, Jim reworked and expanded the program for use on this computer. Actually, there are two parts to the trajectory program. The first part of the program is designed for communication with the second part. Involved are more than 8000 coded instructions which translate normal engineering words into commands and quantities that the second part of the program can use to compute the trajectory.

"The program itself takes care of adapting plain English text into a form which the computer uses," Jim says. "Furthermore, the program monitors the commands throughout computation in order to execute any condition commands which may have been given."

Because the program is flexible, the detailed specifications of conditions can become quite involved in setting up a problem. For instance, the program would be told that a two-stage rocket is going to be launched at an angle of 85° through an eight-knot wind. One stage would burn for 20 seconds, another stage would fire 10 seconds later, and on the way down at a certain barometric pressure, a parachute with a certain area

would open and deploy within two and a half seconds.

With these aerodynamic and thrust characteristics of the rocket fed into the program, it would compute the trajectory. The program would take into account gravitational attraction, Coriolis acceleration of the spinning earth, drag effects of the atmosphere, the oblate spheroidal shape of the earth, and centrifugal acceleration. It is designed to be accurate from the surface of the earth upwards to where the moon's gravitational field becomes significant.

**Output Is Flexible**

"Output is flexible also," Jim says. "Accelerations may be obtained in several reference systems. Predicted accelerometer readings, slant range, azimuth, elevation, latitude, longitude, coordi-

nate data, and many other quantities may be printed as output. In addition, output on magnetic tape is available for plotting or other uses."

A separate program, available in the Division, can use this magnetic tape output of trajectory data for computing re-entry heating of missiles.

More than 1000 trajectories have been computed by Jim's program. These have been point-mass calculations which treat the body in space as a single point. A full six-degree-of-freedom phase of the program is currently being checked out.

"This new part of the program," Jim says, "will not only consider point-mass but also provide data on pitch, roll, and yaw. It will come about as close to simulating the real thing as possible."

**Base Kindergarten Registration Aug. 2**

Registration for Sandia Base Kindergarten will be held Aug. 2. Sandia Laboratory employees may enroll children who will reach their fifth birthday before Jan. 1, 1963.

It is requested that parents bring the child's birth certificate and immunization record when registering. Use the parking lot behind the old Base Chapel and the rear entrance to the Kindergarten, Bldg. 1851.

Kindergarten classes will start Sept. 4. Morning session will be held from 9:15 a.m. to 11:45. Afternoon session will be held from 1:15 p.m. to 3:30 p.m. Fee is \$15 monthly. For further information contact Sandia Base Kindergarten, ext. 30113.

**Sandians Take Trout Limit From Lake In Pecos Wilderness**

A nine-mile climb in the Pecos wilderness near Cowles, N. M., to Pecos Baldy Lake (elevation 11,742 ft.) rewarded six Sandians with their limit of foot-long trout.

The group packed in with gear and provisions for five days strapped to their backs. No refrigeration problems were encountered since the area still contained large snowdrifts. The group saw grouse, deer, elk, and bear during their stay at the lake.

Making the rugged trip were Bill Caldwell and Bill Dobbins (both 2451), Frank Casey, Gary Daniels, Joe Ruggles, and Billy Womack (all 4411).

Sandia's Safety Record

<p style="margin: 0;"><b>Sandia Laboratory</b></p> <p style="margin: 0;">HAS WORKED</p> <p style="margin: 0;">2,050,000 MAN HOURS</p> <p style="margin: 0;">OR 57 DAYS</p> <p style="margin: 0;">WITHOUT A</p> <p style="margin: 0;">DISABLING INJURY</p>	<p style="margin: 0;"><b>Livermore Laboratory</b></p> <p style="margin: 0;">HAS WORKED</p> <p style="margin: 0;">130,000 MAN HOURS</p> <p style="margin: 0;">OR 26 DAYS</p> <p style="margin: 0;">WITHOUT A</p> <p style="margin: 0;">DISABLING INJURY</p>
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