

S. C. Rogers Returns to BTL To Head ZEUS Dep't



S. C. Rogers is returning to Bell Telephone Laboratories in Whippany, N.J., next week as head of the ZEUS Missile Department.

He has been on loan to Sandia Corporation for the past four years and has served as supervisor of Radiation Effects in Electronics Division 5221. That division has now been combined with Materials and Device Physics Division 5212 and will carry the title: Components and Systems Division 5212. J. L. Wirth has been promoted to supervisor to head the re-named division.

Mr. Rogers has been with BTL in Whippany since 1953 and has worked on the NIKE AJAX, HERCULES, and ZEUS systems. At the time of his transfer to Sandia, he was a supervisor in the ZEUS Missile Department.

He received a BS degree in electrical engineering from Louisiana State University in 1948 and his MS degree from Purdue University two years later.

Scientists Present Tech Papers At Canadian Conference

Technical papers will be presented by two Sandia scientists during the Fourth International Conference on the Physics of Electronic and Atomic Collisions to be held Aug. 2-6 in Quebec, Canada.

J. M. Peek will present "The Proton-Hydrogen Atom System at Large Distances. Charge Transfer and the $1s\sigma_g - 2p\sigma_u$ Eigenenergies."

T. A. Green will present "Detailed Balancing and Probability Conservation for the Impact Parameter Method."

The two men were co-authors with W. H. Weihofen, a summer employee, of "The $1s\sigma_g - 2p\sigma_u$ Transition Induced in the Hydrogen Molecule Ion on Collision with the Hydrogen Molecule."

All three work in Atomic Interactions Research Division 5121.

Technical Library Representatives Discuss Exchange of Information

Representatives from a number of national laboratories met at Sandia Laboratory last week to discuss ways that computer systems used by technical libraries could be designed (or existing systems changed) to permit exchange of computer tapes.

"With a standardized tape format, information could easily be exchanged between the libraries in a machine language," L. F. Parman, manager of Technical Libraries Department 3420, explained.

Libraries represented at the three-day meeting included Naval Ordnance Laboratory, Picatinny Arsenal, Argonne National Laboratory, Battelle-Northwest, AEC's Division of Technical Information at Oak Ridge, Tenn., Aerospace Medical Library at Lovelace Foundation, and Sandia's Livermore Laboratory. Lawrence Radiation Laboratory and Brookhaven National Laboratory had also been invited to participate in the discussions.

Since a standardized tape format should provide for the smallest unit of information any participating group needs to identify, most of the meeting time was allotted to taking bibliographic units, one at a time, and comparing the definition and format used by each agency. "The purpose of this meeting," Mr. Parman said, "was to define the problem, certainly not to settle it. We found, rather to our surprise, that the problems of communicating bibliographic information in machine language were not overwhelming. We were certain by the end of the meeting that the task was feasible, even though all of us had developed systems independently."

The meeting was limited to discussion of report literature, rather than ordering or circulation information.



SANDIA CORPORATION

PRIME CONTRACTOR TO THE ATOMIC ENERGY COMMISSION

ALBUQUERQUE, NEW MEXICO • LIVERMORE, CALIFORNIA

LAB NEWS

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With Sandia Logics Systems

Two More Vela Satellites Orbit Earth

An Atlas-Agena space booster lifted off the pad at Cape Kennedy last week to put the third set of Vela detection research satellites into an orbit some 60,000 miles in space.

Aboard the twin detection satellites and functioning as planned are improved types of detectors designed by Los Alamos Scientific Laboratory and new integrated circuits for the logics systems designed by Sandia's Satellite Systems Division 9231.

The Advanced Research Projects Agency of the Department of Defense has over-all responsibility for the program which is designed to develop a satellite-based system for detecting nuclear explosions in space.

Establish Orbits

Like the first two sets, some tricky space maneuvers were necessary to place the satellites in orbit. The launch placed them in a long elliptical "transfer" orbit with the apogee about 60,000 miles above the earth, the perigee 200 miles. After some 18 hours in this orbit, the first satellite of the pair was injected by a small rocket into circular orbit from apogee. The second satellite of the pair continued in the transfer orbit for another 42 hours and then it was also injected into the same 60,000-mile orbit, following the first one by about 140 degrees. In this manner, the second satellite "sees" the same conditions as the first one thus enabling comparison of data.

The first set of Vela research satellites has been orbiting for 21 months now. The second set went up in July of last year. Each of the four satellites orbits the earth about every 100 hours. Their sensors and logics systems are still functioning, still relaying measurements of the x-rays, gamma, and neutron radiation in space. The Sandia logics systems, functioning as small pre-programmed computers, analyze the data from the sensors and relay only significant information—that which varies from background levels.

Should a nuclear device be detonated in space, the detection satellites would pick up the x-ray, gamma, or neutron fluxes and report them. More than 1500 reels of data tape from the four orbiting satellites have been recorded by a world-wide tracking network. Each reel contains 7200 feet of tape with millions of bits of data. The tapes are processed by Sandia's Computing Organization and the reduced data are sent to LASL for final analysis.

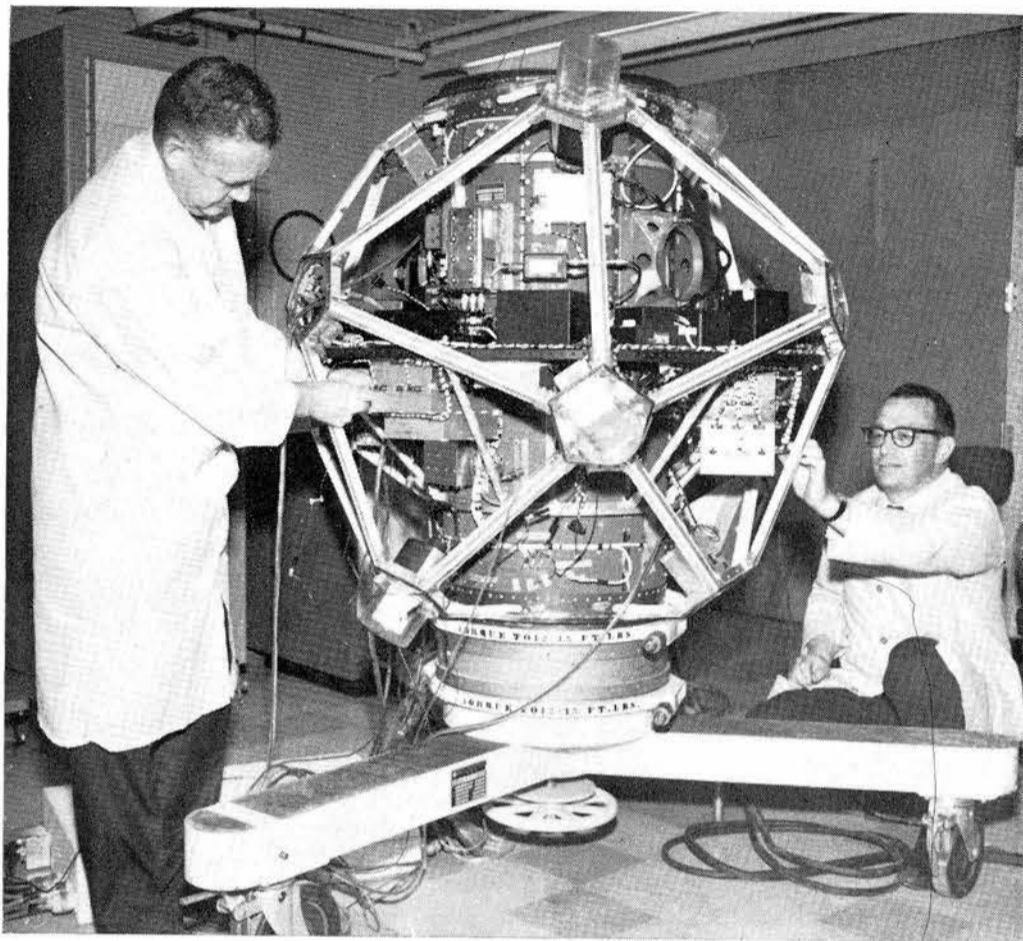
14,000 Modules

Logics systems for the first satellites, launched in October 1963, contained 1067 modules including 2640 transistors. The second set of satellites, launched in July 1964, contained 1214 modules including 3105 transistors. These systems set unprecedented records in reliability. They are still functioning as designed after more than a year in the environment of space.

For the satellites launched last week, Satellite Systems Division 9231 under William C. Myre, designed integrated circuits for some of the logics modules, reducing their size by a factor of 10. The new logics systems are composed of a total of 1400 modules with 3511 transistors and a total of 291 integrated circuits.

Each of the modules receives extensive testing in a Sandia-designed AGE (Aerospace Ground Equipment) testing device before assembly into the satellites. The AGE is a computer-like device which performs as many as 30,000 individual signal tests per second.

Sandia Reliability, Quality Assurance, and Manufacturing Development organiza-



INSTALLING Sandia-designed logics systems in a Vela detection satellite are R. D. House (left) and S. C. Steely, both of Satellite Systems Division 9231. The satellites were assembled for final testing prior to launch.

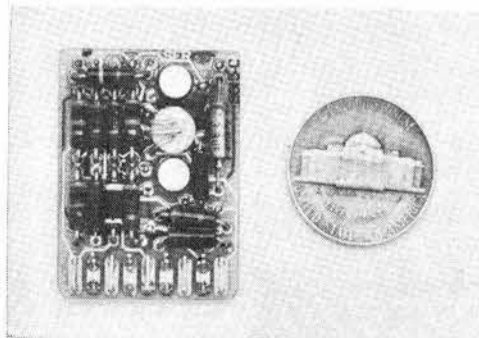
tions contributed to the quality production of the modules.

The spacecraft measures 54 inches in diameter, weighs about 500 pounds, and is icosahedron (20 sides) shaped. Each of the triangular sides is covered with solar cells which draw energy from the sun for operation of all internal electronic equipment. A central cylinder houses the orbit injection rocket and provides structural rigidity.

X-ray detectors are at the corners of the spacecraft. Neutron and gamma radiation detectors are located inside the satellites. It is believed that the sensors will allow detection of nuclear tests conducted in space more than 10 million miles from earth.

Sandians at Launch

Satellite Systems Division 9231 personnel at Cape Kennedy for the launch included W. C. Myre, supervisor; F. E. Thompson; J. C. Rehberg; R. E. Spalding; S. C. Steely; W. K. McCoy; and T. R. Zeller. Wayne Sherwood represented the AEC.

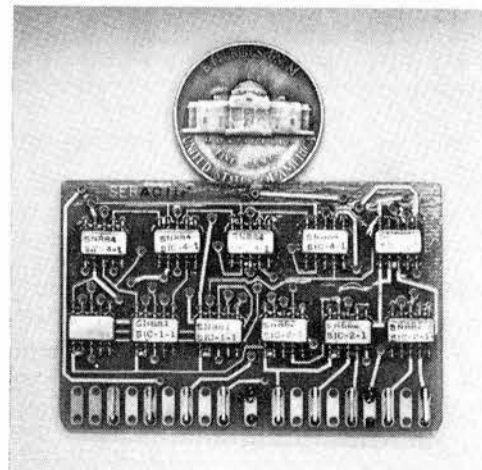


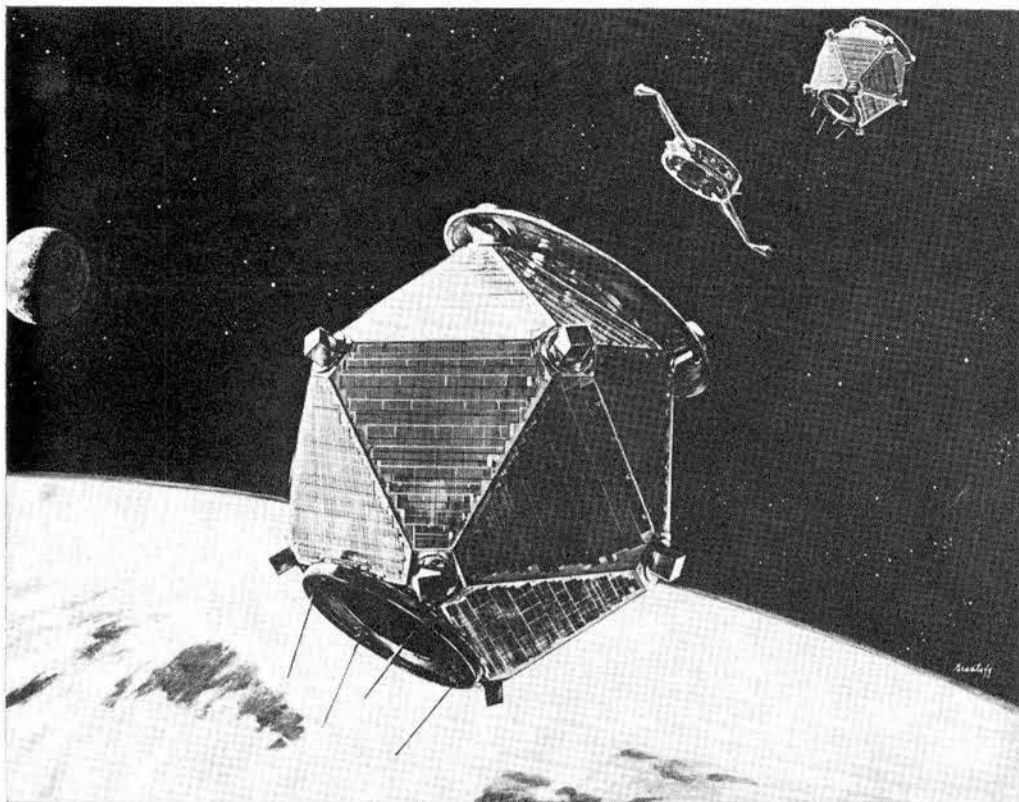
MODULE of the type used in the logics systems of the first two sets of Vela detection satellites is shown in the photo at left. New integrated circuit at right contains the equivalent of 10 of the former modules. Each of the numbered rectangles in the integrated circuits performs the same function as the earlier module. The logics systems in the satellites perform logical data handling functions from signals of the radiation detecting sensors. Size is indicated by the five-cent coin at right and top.

W. B. Goldrick was a monitor at the Air Force Systems Command's Space Systems Division in Los Angeles, and C. H. Stockley was at the Air Force Satellite Control Facility at Sunnyvale, Calif. G. A. Fowler (9000), D. B. Shuster (9200), and H. H. Patterson (9230) were at the Sunnyvale facility for the first orbital injection.

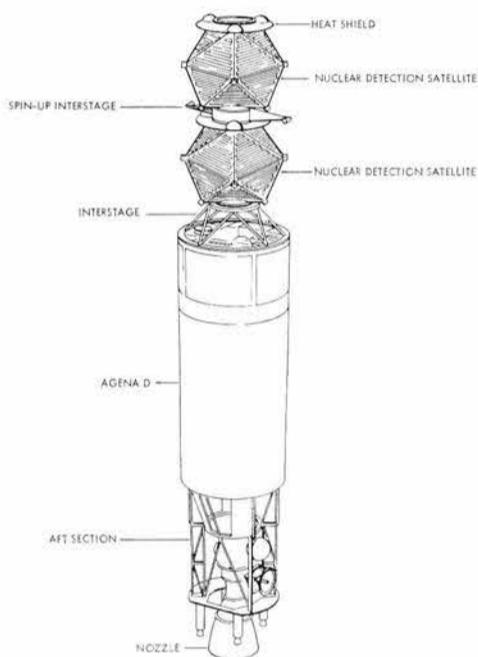
The detection program is a tripartite research and development effort under the over-all direction of the Advanced Research Projects Agency. Air Force participation in the program is concerned with the development of spacecraft launch operations and control of the satellites in orbit. Management of the Air Force effort is under the Air Force Systems Command's Space Systems Division. The Atomic Energy Commission is responsible for data handling and detection equipment.

(additional pictures on Page Two)





AFTER SEPARATION IN SPACE the Vela research satellites will follow elliptical orbits around the earth. The heat shields atop the satellites will be blown free. Sandia designed the logics systems for the satellites.



VELA DETECTION SATELLITES are shown as positioned aboard the Agena upper stage after being launched by Atlas booster.

Patent Issued for Kindley-Designed Shockproof Caster

A patent for a "Shock Absorbing Caster Wheel," issued in the name of R. J. Kindley of H-Equipment Division 1543, has been assigned to the Atomic Energy Commission.

Commercially-available shock absorbing caster wheels normally employ spring arrangements, washers, or rubber compression assemblies. As a result, these casters are relatively more complex, somewhat heavier than conventional non-shock absorbing casters of the same size and capacity, and larger than conventional casters to accommodate the shock absorbing or shock mitigating system.

A principal object of the invention is to provide a compact caster wheel assembly with shock mitigating capabilities without relying on a tension or compression spring arrangement.

In general, this wheel utilizes a rubber-like tire capable of stretching and deforming in shear to provide shock mitigation or shock absorption. A cavity between the rubber-like wheel and a wheel hub receives the shock-deformed portions of the tire, and an annular ring of metal or other relatively rigid material distributes the loads more uniformly throughout the wheel and tire.

In testing, caster wheels of this type have protected a dolly and its contents from impact loads developed by a free-fall of 12 inches to a hard surface such as concrete, blacktop, or wooden floors.

The patent is number 3,194,293 and was issued July 13, 1965.

Tech Library Features Shelves for Books On Equal Employment

The current display in the entrance of Bldg. 804 focuses attention on a unique feature of Sandia Laboratory's technical library; shelves in a special section containing non-fiction books dealing with various aspects of equal employment opportunities.

Contents of the showcase, arranged by John Gardner (3421), include a copy of the Plan for Progress signed by Sandia Corporation management, a copy of the Federal Government contractors' pledge for Equal Employment Opportunity, selected pamphlets and programs, and jackets from a number of books dealing with minorities, labor, and equality.

The special section of shelves contains books and a catalog of pamphlets, articles, and records. The books may be charged out at the library's circulation desk. Most of the other material is available from Fred Leckman at Personnel Processing and Reports Division 3153.

"We feel it is important to make information of general interest on the subject available to our employees to supplement what's available from daily newspapers or magazines," Mr. Leckman explained.

The selected books include discussions of employment opportunities; Civil Rights problems; a full-scale sociological survey of assimilation of minority groups in America; levels of achievement in education, business, and politics attained by five ethnic groups in New York City; and comprehensive programs of special effort in the areas of employment, education, housing, welfare, and leadership with regard to Negroes.

Some of the titles are "The New Equality" by Nat Henthoff, "Minorities in the New World" by Charles Wagley and Marvin Harris, and "Labor and the Public Interest" by U.S. Secretary of Labor W. Willard Wirtz.

The special bookshelf is one of the ways in which the broad scope of Sandia Corporation's commitment to Equal Opportunity is being communicated on a continuing basis to all company employees.

Sandia Paper Cited At IEEE Meeting

An award for one of the outstanding papers of the 1964 Radiation Effects Conference of the Institute of Electrical and Electronics Engineers was presented to C. A. Goben (5623).

Announcement of the award was made last month during the 1965 conference at the University of Michigan.

Co-author of the paper on "Anomalous Base Current Component in Neutron Irradiated Transistors" was F. M. Smits, former Sandia employee. The paper described a technique by which the several components of base current in transistors may be resolved and studied separately.

Selection of the paper was based on scientific value, originality, and clarity in organization and presentation.

Use of Nuclear Explosion Proposed To Increase Natural Gas Flow

An experimental underground nuclear explosion 55 miles east of Farmington, N. Mex., has been proposed by El Paso Natural Gas Company to the Atomic Energy Commission as a means to determine whether or not nuclear explosives can be used to increase natural gas production.

In the proposal submitted to Dr. Glenn T. Seaborg, Chairman of the Atomic Energy Commission, by Howard Boyd, Chairman of the Board of El Paso Natural Gas Company, the company offered to make available a site and to provide extensive technical information and assistance in preparing, conducting, and evaluating the experimental detonation.

The evaluation of the use of nuclear explosives to increase the amount of gas recovered from certain fields is called "Project Gasbuggy" and is a part of the Atomic Energy Commission's Plowshare Program to develop peaceful underground uses of atomic explosives.

A feasibility report represents 18 months of study by representatives of El Paso Natural Gas Company, the San Francisco Operations Office of the AEC, and the United States Bureau of Mines.

The report indicated that underground nuclear explosions in low permeability natural gas fields, principally in the Rocky Mountain area, may increase their total

gas production about seven times the amounts now attainable.

All information gained from the experiment would become public property.

Natural gas is contained in the pores of underground rock structures. When these structures are "tight," only limited amounts of gas can flow through the rock to the well bore.

To increase natural gas recovery and production it has been the procedure to fracture the rock by means of liquids pumped into the structure under high pressure or, in a practice now seldom used, to explode nitroglycerin in the stratum.

Many fields containing large quantities of gas are so tight that they do not respond to conventional treating methods. It is believed nuclear explosives would greatly increase the extent of fractures. A conventional nitroglycerin shot uses 1000 to 2500 quarts of nitroglycerin. The proposed nuclear explosion would be the equivalent of five million quarts of nitroglycerin.

It is anticipated that a 10 kiloton explosive—the equivalent of 10,000 tons of TNT—would be used. The program calls for drilling a 16-inch cased hole 4250 feet deep at the bottom of the Pictured Cliffs formation in the San Juan basin.

If authorized, the experiment would represent the first government-industry use of a nuclear explosive for industrial purposes anywhere in the world.

Information on Foreign Physicians Available Now

Planning to travel abroad this year? Worried about where to find a competent, English-speaking physician in a foreign country?

Dr. S. P. Bliss, Sandia's Medical Director, has received information about a new service offered by Intermed, Inc., which provides a directory of properly qualified, English-speaking physicians in nearly every important city in the world. Except in a few cities where customs or law prohibit fee agreements, every physician included in the plan has agreed to a set fee ceiling for the first visit whether in his office, or a house or hotel call.

Further information may be obtained from Dr. Bliss or by writing Intermed, Inc., 777 Third Ave., New York, N. Y. 10017.

H. G. Jeblick Marks 20th Anniversary With Western Electric



H. G. Jeblick will observe his 20th anniversary with Western Electric on Aug. 5.

He has been on loan to Sandia Corporation for 10 years and is supervisor of Field Quality Control and Extension Secondary Standards Laboratories 2511.

His WE career began in Kearny, N.J., where he was telephone apparatus shop superintendent. Later transfers were to Haverhill Shops in Massachusetts, 42nd St. Plant in New York City, and Teletype Corporation in Chicago.

Immediately prior to joining Sandia, Mr. Jeblick was with the supplies inspection organization in New York City.

His initial job with Sandia was to set up field inspection offices on the East Coast. Two years later, he moved to Albuquerque to head a division.

Mr. Jeblick is an associate fellow and former chairman of the local chapter of the American Institute of Aeronautics and Astronautics; a life member of the American Ordnance Association; and an active member of the American Society for Quality Control.

Sandia Corporation Payroll, Purchase Figures Released

Payroll for Sandia Laboratory in Fiscal Year 1965 amounted to approximately \$68.4 million, according to figures reported by Accounting Division 4151. During the year (July 1, 1964 to June 30, 1965), the number of employees on roll at Sandia Laboratory averaged slightly over 7100, which was also the average for FY '64.

Purchases by Sandia Corporation in the State of New Mexico amounted to more than \$20.3 million for FY '65. About 98 per cent of the amount, or more than \$19.9 million, went to Albuquerque firms.

Livermore Laboratory's payroll amounted to about \$9.2 million in FY '65 with an average of 977 employees on roll for the year. In FY '64, the payroll for an average of 985 employees was approximately \$8.9 million. Value of plant assets at Livermore Laboratory for '65 totaled \$20 million, an increase of \$2.7 million from the FY '64 total.

Plant assets at Sandia Laboratory were \$146 million at the end of FY '65, an increase of \$14.7 million from the year-end figure of FY '64.

Plant assets at Tonopah Test Range increased from \$8.6 million in '64 to \$9 million in '65.

These figures represent undepreciated values of buildings and facilities. All of the plant assets are the property of the Atomic Energy Commission but are used and operated by Sandia Corporation.

Congratulations

Mr. and Mrs. Harvey L. Turk (3242), a daughter, Leslie Morissa, July 6.

Mr. and Mrs. Edward H. Gallegos (4152), a son, Anthony Dominic, July 16.

SANDIA CORPORATION LAB NEWS



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LIVERMORE NEWS



LIVERMORE LABORATORY summer employees, under President Johnson's Youth Opportunity Campaign, are performing a variety of assignments. (Upper left) Linda Light of Chabot College is pictured receiving instructions from Ruth Sanen (8215) in keeping medical records. (Upper right) Gilbert Cruz of California Polytechnical Institute completes a mechanical drawing. (Below, l to r) Arnold Birr of Chabot College, Gregory Drummond of Livermore High School, and Ross Hoblitzell of Granada High School, cut ice plant in preparation for planting sections of Area 8. Students not shown are Loretta Bloome, Deanna Correa, Raymundo Lopez, Dan Wiggins, all of Chabot College, and Jill Roach of Fresno State College.



Air/Sea Tour to Hawaii Planned for October

An air/sea trip to Hawaii is being offered by the Lawrence Radiation Laboratory Recreation Association (RLRA) travel club for LRL or Sandia employees and members of their immediate families.

The tour departs from San Francisco Oct. 1 on United Airlines DC-8 jet for nine days on the Islands. On Oct. 10 the group leaves Honolulu for the West Coast via Matson Lines S. S. Lurline.

Originally scheduled to dock in San Francisco Friday morning Oct. 15, the Lurline will now follow a changed course which will give tour members a two-day vacation bonus at no extra charge. According to the change recently announced by Matson Lines, the Lurline will remain at Honolulu and proceed to Los Angeles, arriving there the morning of Oct. 15, rather than San Francisco. The ship will remain at dock, serving as a hotel overnight. Arrival time in San Francisco will be Sunday, Oct. 17, at 8 a. m.

Air and sea transportation, hotel accommodations at the Hawaiiana Hotel in Waikiki, all meals aboard ship, and transfers and tips are included in the \$485 tour rate. A sightseeing trip to the windward side of Oahu and a visit to the new Sea Life Park opened in 1964 are special features of the tour. One evening the group will board the huge catamaran, the Ale Ale Kai, for a dinner sail beyond Diamond Head to view Oahu at sunset.

For those who desire to visit the outer Hawaiian Islands, an optional six-day tour to Maui, Hawaii, and Kauai is available.

Further information may be obtained from Roy Moffitt, LRL ext. 7421, or Zelda Lassen, LRL ext. 11-251.

Livermore Notes . . .

Jessie H. Burns (8124) was elected recently to the board of directors of the Bethel Island Area Chamber of Commerce. Jess, who has lived at Bethel Island for the past four and one-half years, will serve a two-year term on the board.

Philip L. Mead (8233) recently played lead roles in two three-week productions by the Peninsula Religious Drama Guild at Palo Alto, Calif.

In Christopher Fry's Biblical drama, "The Firstborn," Phil portrayed Aaron, Moses' brother. The play depicts the struggle between Moses and the Egyptian Pharaoh.

He also appeared in the title role in the West Coast premiere of "Gideon," which ran successfully in New York City. This Guild presentation, written by Paddy Chayefsky, was a concert reading rather than a regular stage production.

Congratulations

Mr. and Mrs. Bernie Kraemer (8111), a daughter, Ann Marie, July 8.

Mr. and Mrs. Al Rowe (8122), a son, Russell Allen, June 30.

Sympathy

To Bob Eastburn (8112) for the death of his father in Danville, Calif., July 10.

PAGE THREE

LAB NEWS

JULY 30, 1965

New Force Testing Instrument Now Ready for Use at Livermore

A new force testing instrument has been installed in the metrology laboratory in Bldg. 913 by Standards, Calibration and Repair Section 8122-1. According to C. D. Holmes (8122-1), technician in the metrology laboratory, the instrument has been calibrated and is ready for use in various force measurement and testing applications.

Built by Martin and Decker Corporation of Long Beach, Calif., the instrument is a counterpoise type, unequal arm balance capable of applying a compression (push) or tension (pull) force up to 40,000 pounds. The mechanics, originally designed by Martin and Decker for calibrating large hook scales which they manufacture, will be used at SCLL to calibrate instruments used in material testing programs.

Resembling a huge balance scale, the instrument consists of a structural frame supporting a horizontally disposed beam resting on a knife-edge fulcrum. Based on the unequal-arm balance principle, established ratios can be used so that a small known weight at one end of the beam counterbalances a heavy desired weight at the other end.

In this particular instrument precise ratios of 10:1 and 20:1 are used. In other words, only 1/10 or 1/20 of the desired load is required to apply compression or tension loads up to 40,000 pounds, thereby reducing the need to handle many cumbersome weights.

Accuracy of the mechanism results from the use of known weights, which are cer-

tified by the National Bureau of Standards, and from the precise adjustment of the balance points which establish the proper ratios.

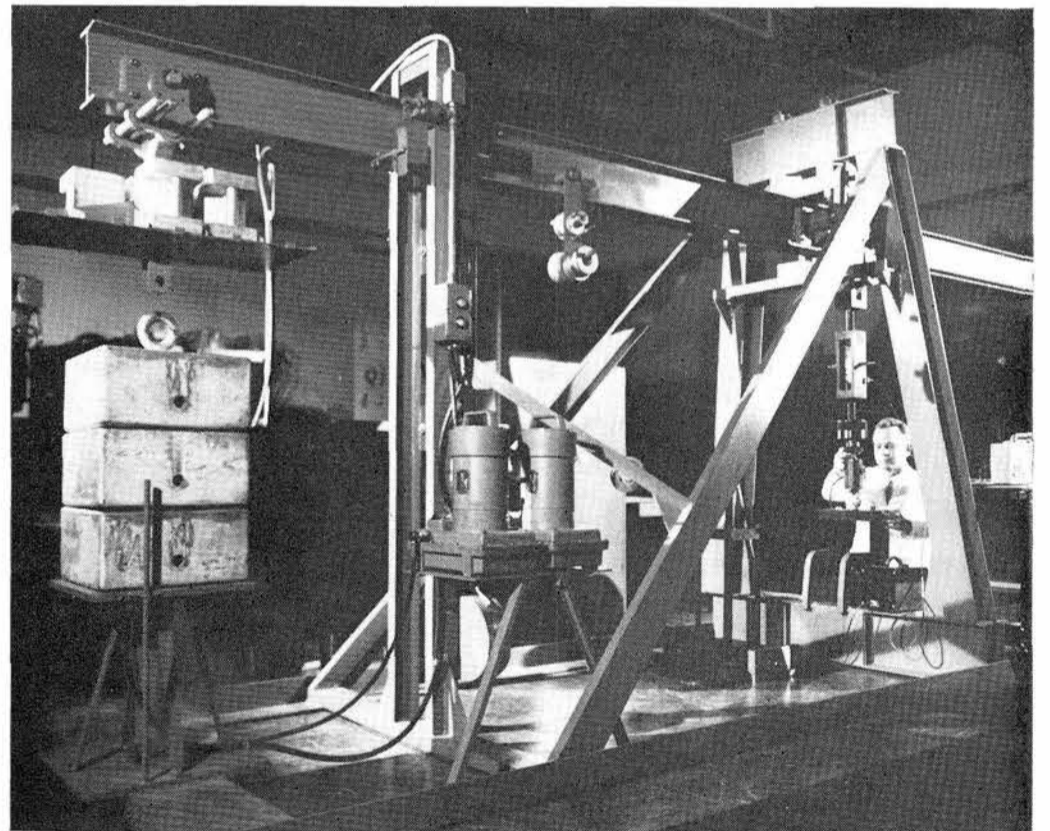
Although the instrument was considered very accurate when purchased, engineers at SCLL believed that more accuracy was desirable and possible. Mr. Holmes was given the task of refining the equipment and performing the final calibrations.

He worked with the mechanism for four months, designing new holding fixtures, precisely calibrating the balance points, and testing the equipment. "My goal was to improve the sensitivity and accuracy of the instrument," he said. Sensitivity is determined by the amount of excess weight required to upset the balance of the beam.

When the instrument was tested prior to its shipment to SCLL, it was certified to be sensitive to 1/16 ounce or 1.8 grams, with the beam in balance and no load applied. Following refinement, the balance was sensitive to .4 gram, which is equivalent to the weight of a five-grain aspirin tablet.

"The accuracy of the instrument has also been significantly improved," Mr. Holmes said. "During tests at the manufacturer's plant, the instrument was said to have a 1.5 pound error throughout its operating range per thousand pounds of force applied. After calibration and refinement, this error was reduced to .3 pound per thousand with corrections applied."

BENEATH THE POISED BEAM, C. D. Holmes (8122-1) makes final preparations before operating the new force testing instrument recently installed in metrology laboratory, Bldg. 913. The certified weights (left) are raised and lowered into position by a hydraulic lift. The main fulcrum is located in the A frame above Mr. Holmes.



British Schoolboy Requests Sandia Explosives 'Recipe'

Even at Livermore Laboratory, "recipes" for explosives are hard to come by.

Public Information Division recently received a letter from a schoolboy in England who had seen Sandia Corporation's advertisement in SCIENTIFIC AMERICAN. The youth wrote, "I am very interested in explosives, and I was wondering if you could send me literature on what you do at Livermore. I would also be very grateful if you could send me some 'recipes' of explosives I might be able to make in the school laboratory here."

George Damoulos sent the British student a copy of SANDIA SCIENCE AND ENGINEERING and referred him to the Atomic Weapons Research Establishment at Aldermaston, England.

Sandian Assists Fire Service School

Verne McNabney (8215) is serving as co-chairman in charge of housing, reception, entertainment, and transportation for the Staff and Command School for Command Officers of the Fire Service in California.

The school, a one-week workshop (July 26-31), is presented as a community service by Chabot College at the Santa Rita Rehabilitation Center, Pleasanton.

The workshop is designed to provide instruction in training and planning for combatting earthquakes, floods, bombings, and large-scale fires. Emphasis also is placed on coordinating the resources of adjoining communities.

The program is supported by various county and state organizations. Cooperating agencies include the AEC and LRL.

Coronado Club Sponsors Four Bowling Leagues

Four all-Coronado Club leagues are being organized for the fall season at four local bowling alleys.

They are the Jewelette Ladies League, the Coronado Men's League, the Coronado Mixed Doubles League, and the Coronado Junior League.

The Jewelettes will bowl Monday nights at 6:30 at Highland Lanes, the men's league at 6:30 Wednesday nights at the Eu Can Bowl alleys, the mixed doubles league on Wednesday nights at 8:45 at Lomas Bowl, and the juniors on Saturday mornings at Holiday Bowl.

Bowling shirts for all Coronado Club-sponsored teams will be provided by the Club, in addition to first-place team trophies. Captains may order shirts for their team weekdays at the Club office. All bowlers must be Club members in good standing, and a team roster must be provided.

Children from 10-18 years old, whose parents are Club members, are eligible for the junior league.

As in the past, annual Club bowling championship tournaments will be conducted during the winter, and both men's and women's teams will be selected to represent the Coronado Club in the city tournament.

The Coronado Club Board of Directors voted last May to close its alleys because of "a dwindling participation by the membership in our league and open bowling at the Club." Vacated space in the Club basement is being redecorated for joint use by the Club and Sandia's Employee Research Training and Education Department 3130.

Other Club Activities

Sanado Membership

Wives of Coronado Club members are invited to the Sanado Women's Club tea and punch party Aug. 10 at 1:30 p.m. in the Club.

The free party is associated with the annual Sanado Women's Club membership drive.

The club's 12 interest groups each will prepare booths depicting their activities, and members will be available to answer questions from potential members.

The groups include garden, social living, art, charm, Arte de Cocina, choral, golf, tennis, skiing, bowling, bridge, and horse-back riding.

Ladies interested in Sanado may call Mrs. Brooks, tel. 298-5133, for reservations or more information.

Charity Bridge

The Coronado Bridge Club recently turned over the proceeds of its July 12 Charity Event to the American Contract Bridge League Charity Foundation.

R. W. Mottern, bridge club president, said the funds would be used to benefit two selected charities—the American Cancer Society and the United Cerebral Palsy Association. About \$30 in playing fees were collected.

North-South winners of the event were Mary Lou Arnot and Phil Arnold. Rex and Betty Steele were the East-West winners.

The club's next championship event, open pairs, will be played Aug. 9. Play is restricted to Coronado Club members.

Social Hour - Buffet

A chuckwagon roast beef and shrimp buffet will be served following Social Hour at the Coronado Club next Friday. Tickets are \$1.50 for children and \$1.75 for adults.

The Elaine Harris Trio will play for dancing and listening enjoyment.

Social Hour tonight will feature the music of the Jess Sawaya Combo. The buffet will have Mexican food at \$1.25 for adults, \$1 for children.

La Cana Renaming

Since La Cana Room in the basement of the Coronado Club is being remodeled and refurbished in Spanish decor, the Club is seeking a more apropos name for it.

To spur interest, the Club is sponsoring a name-the-new-room contest. First prize is four tickets to the Evening in Paris Dinner-Dance and Fall Fashion Show on Sept. 11.

Contestants should submit their proposals, along with a few reasons why the suggestions should be used, to the Club office. The contest closes Aug. 31.



THAT'S THE DATE—Aug. 14—for the Coronado Club's August Moon Ball, reminds Susan McCann (3432). Reservations for the dinner dance are due by Aug. 11.

Clubgoers to Sample Vintner's Wares At August Moon Ball

A California winery will feature some of its products at the Coronado Club's August Moon Ball and Wine Taste Aug. 14.

Tickets, which should be picked up at the Club office by Aug. 11, include dinner and dancing to the music of the Sol Chavez Orchestra from 9 p. m.-1 a. m. Cost is \$3 for members; \$3.50 for guests.

The menu consists of roast prime rib, juice, salad, baked potato with sour cream and chives, and a vegetable.

Tomorrow night, the Club will take on the look of a remote tropical isle for a Shipwreck Costume Party. Prizes will be awarded for the most appropriate and the most original costumes.

The Phil Graham orchestra will play for dancing from 9 p. m.-1 a. m. Roast beef on French dip roll, as well as beef, ham, or turkey sandwiches will be served.

Admission is \$1 for members and \$1.50 for guests.

Coronado Club Membership Elects Six Directors Monday

Six directorships will be filled Monday night when members of the Coronado Club have their annual meeting in the Club at 8 p. m.

President G. D. Horne, Jr., said nominees for the six open positions are J. H. Hann (2531), E. D. Herrity (4342), M. M. Newsom (5611), D. M. Olson (1530), J. H. Shelby (4253), and Pearson Crosby (AEC/ALO). Additional nominations may be made from the floor.

Reports also will be made by present members of the board, and refreshments will be served.

Sandians 'Up to Hubcaps' Planning National Trailer Rally in N. Mex.

Making arrangements for a national rally involving 300-400 trailers from all over the U.S. and Canada is a big job. Just ask John Zimmerman (7256) and some other Sandians.

They are members of the New Mexico Division of the National Trailer Clubs of America. The big event will be Aug. 5-8 in Las Vegas, N. Mex.

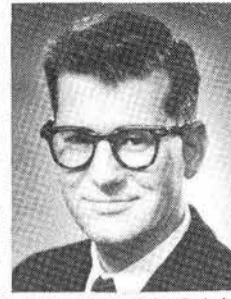
"In selecting a site, we had to consider relatively cool temperatures yet not too high an altitude, a large flat area, and reasonably close supplies of water and electricity," John said. "The 20-acre parade ground at Camp Luna was offered to us, and it met the requirements. The estimated \$15,000-\$20,000 expected to be spent locally by the visitors will no doubt be welcome in this area of the state."

John is governor of the New Mexico Division, which has members from both Albuquerque and Los Alamos.

Planned entertainment includes trailer and camper gymkhanas, horseshoe tournament, hobby show, an appearance by the Koshare Indian dancers of La Junta, Colo., and supervised activities for children and teenagers. Day-long side trips to Santa Fe, Taos, Cimarron, and Fort Union will be made, and after the rally caravans of longer duration will be organized to visit Carlsbad Caverns, the Indian Ceremonials in Gallup, and Navajo Lake. "We'd

Attorney Transferred from WE To Replace R. A. Ledogar

Robert Y. Peters, a patent attorney from Western Electric's Washington, D. C., office, has joined Sandia as a replacement for R. A. Ledogar, Attorney, 6030.



Mr. Ledogar came to Sandia four years ago from Bell Telephone Laboratories. He has transferred to Western Electric's General Attorney's Office at 195 Broadway, New York City.

Mr. Peters joined Michigan Bell Telephone company in 1955 as an electrical engineering trainee, and two years later received his BS degree in electrical engineering from the University of Detroit. He then transferred to Western Electric as a patent law clerk in Washington and began attending law school evenings.

In 1959 he began work as a patent agent, and in 1960 received his LLB degree from

Georgetown Law School. The following year Mr. Peters became a member of the District of Columbia Bar.

As a patent attorney he worked at several Western Electric locations in New York City and at the WE engineering research center in Princeton, N. J.

In 1962 Mr. Peters returned to Washington, where he worked as a patent attorney for WE both in Washington and Baltimore, and later resumed his law study. He will receive his LLM degree from George Washington Law School (in Washington) this September.

Service Awards 15 Years



Billy N. Yates
2211
July 17, 1950

Marvin D. Ozmun
2212
July 17, 1950



Paul Svyroid
7264
Aug. 2, 1950

Donald G. Lewis
2511
Aug. 3, 1950



Rudy L. Baca
2554
Aug. 4, 1950

Benny Anaya
3242
Aug. 7, 1950



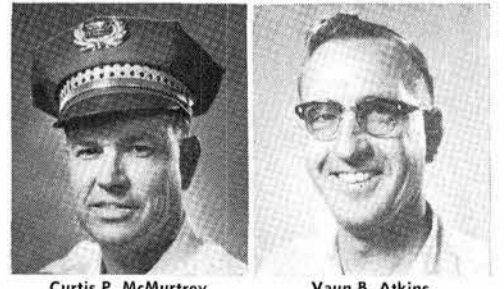
Tony Gabaldon
4516
Aug. 7, 1950

Jack T. Graham
3242
Aug. 7, 1950



Edward D. Sims
3242
Aug. 7, 1950

Walter L. Smith
4544
Aug. 7, 1950



Curtis P. McMurtrey
3242
Aug. 8, 1950

Vaun B. Atkins
4511
Aug. 9, 1950

10 Years

July 30 - Aug. 12
Mary W. Clay 2521, George Banos 3112, Jacob Sandoval 4233, James M. Haines 4254, T. J. Jorgensen 4343, Carl F. Lundboom, Jr. 8116, Helen P. Agats 4233, Christine Baca 4130.
Robert A. Stewart 4224, James Carmody III 4234, Marjorie E. Endres 5255, Geoffrey J. Lynch 2111, Patricio Garcia 4212, Pedro S. Ortega 4212, Charles D. Herndon 7532.

Bullet-Like Bolt Alarms Sandia Family

The family of Everett V. Breeden, Plant Modification Division 4513, narrowly missed being seriously injured recently.

While Mr. Breeden was mowing the lawn at his home, a 1/8- x 2-inch bolt sheared loose from his rotary power motor, fell into the whirling blades, and was hurled about 50 feet through the air. The bolt shot through the screen of an open bedroom window, just missing his wife and infant son.

The bolt, one of two which secure the machine's handle to the housing, knocked a hole in the ceiling of the room, then lodged in the opposite wall.

"If the window had been closed, my wife and baby would have been showered with broken glass," Mr. Breeden said. "The bolt passed within two feet of where they were sitting."

Mr. Breeden immediately took the two-year-old mower out of service. He plans to build a protective screen of heavy wire mesh cloth to be attached to the mower.

"Rotary power mowers are extremely dangerous," Mr. Breeden said. "The screen I'm building should provide a better guard against objects thrown by the machine."

He said the lawn mower also will undergo a thorough reconditioning.

The near-accident was brought to light in a recent 4510 department safety meeting. Plant maintenance employees have been encouraged to discuss their off-the-job safety problems along with those encountered during working hours.

like to keep the visitors in our state as long as possible," said John.

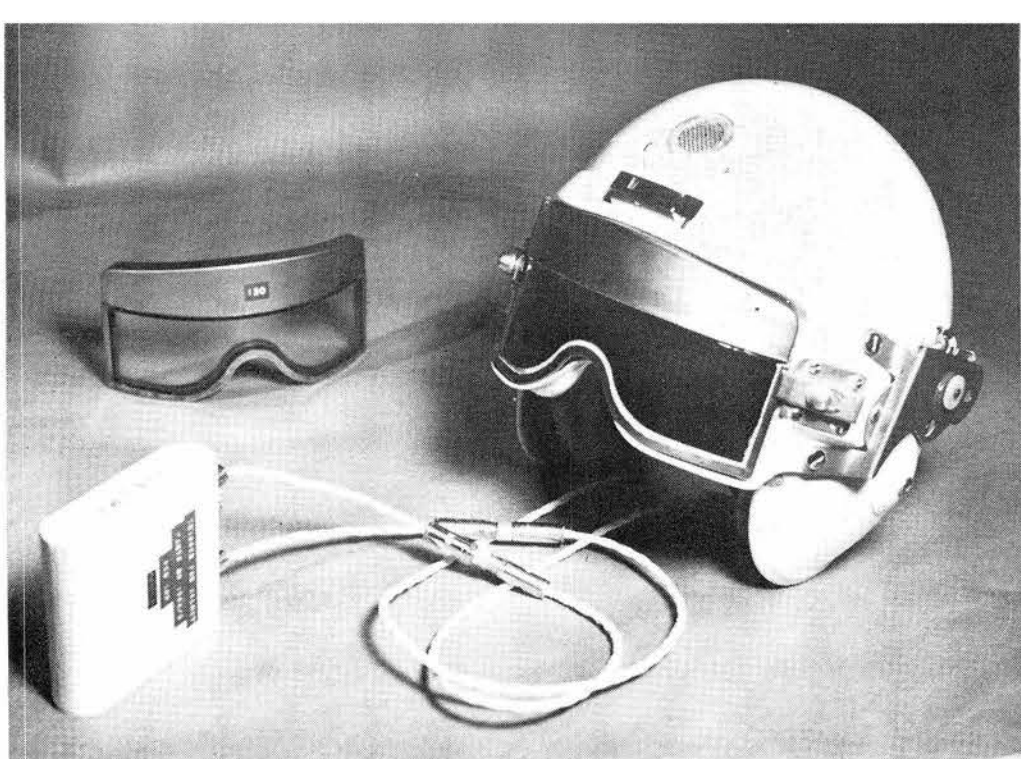
Sandians serving as committee chairmen include Margaret Fuller (1413), hospitality; M. George Baker (9321), communications; F. A. Goss, Jr. (1312), coordinator with Las Vegas Chamber of Commerce; Einar Forsman (1323), grounds; and W. A. Scranton (1411), reservations. They are being assisted by many other Sandia employees.

John pointed out that non-members are also invited to attend the rally; however, advance reservations are requested so that a parking plan can be established.

Sympathy

To Elmer Krafts (4253-3) for the death of his mother, June 14, in Madison, Wisc.

To Frank P. Hudson (5231) for the death of his mother, July 12, in Breerton, Wash.



THE SYSTEM for these goggles which can shut out the radiated light of a nuclear blast was designed and developed at Sandia. Clear goggles in center can be blacked-out by opa- quing shield as seen in goggles in helmet. Box, left foreground, carried electronics for the anti-flash system.

Sandia System Used in Flight Goggles

A system designed and developed at Sandia is being used in goggles recently produced for the U.S. Navy to protect fliers' eyes from light emitted by nuclear explosions.

The light blocking shield is a colloidal mixture of graphite in fluid suspension which is stored in a reservoir above the goggle lenses. A photo sensor in the pilot's helmet triggers a pencil size explosive which propels the opa- quing mixture into a narrow gap between the two lens plates of the goggles.

The graphite covers the lens in the few microseconds before the light from a nuclear detonation would have time to damage a pilot's eyes, and before the pilot has time to blink his eyes.

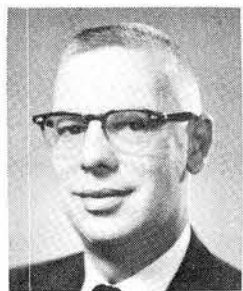
After the danger has passed, the blackened goggles can be easily replaced with clear flash goggles.

Other contractors developed the remaining key parts of the goggles—a light sensor to detect the nuclear burst, and an electronic trigger to actuate the opa- quing system.

Sandia was asked to work on the project because of experience in developing explosive devices. The goggles were developed for the U.S. Naval Bureau of Weapons, and production will be under the direction of the Naval Air Engineering Center, Philadelphia.

Feasibility of using the explosive fuse approach was determined by M. T. Abegg and W. B. Leslie (both now of 1311). J. R. Craig (1312) was the project engineer in charge of developing prototypes. The program was under the direction of F. A. Goss, Jr., supervisor of Component Development Division 1312.

F. O. Carleton Awarded Select ABEPP Diploma In Industrial Psychology



F. O. Carleton, staff psychologist in Clinical Psychology Division, was recently awarded a diploma from the American Board of Examiners in Professional Psychology (ABEPP).

The ABEPP diploma is awarded in recognition of professional excellence in either Clinical, Counseling, or Industrial Psychology. It is the only type of certificate of competence awarded by the American Psychological Association. Fred's diploma is in Industrial Psychology and is the only one ever awarded in the State of New Mexico in that field. Fred is in rather select company; less than 200 ABEPP diplomas in Industrial Psychology have been granted since the first ones in 1946.

Fred has been at Sandia since October 1961. He was an industrial psychologist in Employee Research & Testing Division until a year ago, when he assumed his present position. Before joining Sandia, he was southern region manager for a consultant firm to business and industry in the fields of psychology and management.

Fred has an AB degree from Union College (Schenectady, N.Y.); and a PhD in psychology from Syracuse University. He is a member of Sigma Xi, Phi Delta Kappa, and Psi Chi honoraries. He also belongs to the New Mexico, Rocky Mountain, and American Psychological Associations.

Supervisory Appointments

ROBERT J. THOMPSON to supervisor of Applied Mathematics Division II, 5254, Mathematical Research Department, effective Aug. 1.

Bob has been assigned to Mathematical Research Department since he came to Sandia in 1958. His area of interest is numerical analysis and applied math.

Immediately prior, he was an instructor at Ohio State University for a year.

Bob received his BS, MS, and PhD degrees in mathematics from Ohio State University. He is a member of Phi Beta Kappa and Sigma Xi, honorary societies, the American Mathematical Society, and Society for Industrial and Applied Mathematics.



JOHN L. WIRTH to supervisor of Components and Systems Division 5212, Radiation Physics Department, effective July 16.

He has worked in Radiation Effects in Electronics Division 5221 since coming to Sandia three years ago.

Immediately prior, John was at Michigan State University where he received BS, MS, and PhD degrees in electrical engineering. He was an assistant instructor there two school terms while doing graduate study.

His previous work experience includes almost a year and a half with Electro-Voice, Inc., Buchanan, Mich., as an engineer in the design of phonograph cartridges and loud speakers.

John is a member of Tau Beta Pi, Pi Mu Epsilon, and Phi Kappa Phi, honorary societies.



ROBERT H. JOHNSON to supervisor of Management Systems Programming Division 8143, at Livermore Laboratory, effective July 16.

Bob joined Livermore Laboratory in June 1957, after receiving his Bachelor's degree in engineering from the University of California at Los Angeles. He has been in production engineering, project group work, and most recently programming systems development.

From 1948-53 he served in the U.S. Air Force, assigned to the Armed Forces Special Weapons Project at Sandia Base.

Bob is a member of Tau Beta Pi, scholastic honorary society.



Two Drafting Supervisors Help Develop New American Standard



STANDARDIZED DRAFTING SYMBOLS receive a final look by F. F. Eichert (2210), left, and P. A. Nicovich (2212) prior to inclusion in a new American Standard of dimensioning and tolerancing for engineering drawings.

Acceptance in August of the final draft of a new American Standard of dimensioning and tolerancing for engineering drawings will culminate three years of work by P. A. Nicovich, F. F. Eichert, and others on Operation JIMS.

Mr. Nicovich, supervisor of Design Definition Division B 2212, and Mr. Eichert, manager of Design Definition Department 2210, were among the original 17 members of the Joint Industry-Military Standard Committee (JIMS) created to develop a single standard on dimensioning and tolerancing based on three existing standards: the Society of Automotive Engineers' (SAE) Aerospace-Automotive Standard A6-7-8; the American Standards Association's Y-14.5; and Military Standard MIL-STD-8, published by the Department of Defense. Each of these source-groups had representatives on the committee.

The need for a single American standard became evident during a meeting of the American-British-Canadian (ABC) Conference for Unification of Engineering Standards held in New York in September 1962.

After comparing the respective ABC standards, identifying and reviewing differences, and resolving them whenever possible, the U. S. delegation met to appraise the results. JIMS Committee was created to develop a single American standard even though the differences between the three existing standards were not of major consequence.

Members were divided into four teams to work on Symbols, True Position, Form Tolerancing, and General Dimensioning. Mr. Eichert was leader of the section on Form Tolerancing, and Mr. Nicovich was a member of the Symbols' team. P. G. Belittos of General Electric's Large Jet Engine Department, Cincinnati, was overall chairman.

To understand the significance of the project, a little knowledge of the history of the field is needed.

History

During the past 30 years, the practices used for defining the engineering requirements on drawings have evolved from very simple terms into a highly complicated language of communication between engineer, manufacturer, and inspector. This was brought about by mass production and interchangeable manufacture, and the need to define and control allowable variations in size, geometric form, and position of design elements.

The first American Standard on drawings (Drawings and Drafting Room Practice ASA Z14.1-1935) was published in 1935 and its code of standard practices for drafting required a mere 24 pages with only two short paragraphs devoted to dimensional tolerances. The preface noted: "Most of the larger drafting rooms have devised their own standard practices, and graphical symbols in unnecessary variety have been developed. Drawing has often been called 'the graphic language,' 'the language of industry,' etc. So, as a language, it should have a recognized and authoritative 'dictionary' in order that it

may be written and read with invariable accuracy."

With the rapid expansion of the aircraft engine industry in the days immediately preceding the United States' entry into World War II, the SAE issued its first Manual of Aircraft Engine Drafting Room Practice in 1941. Here an industry found it necessary to establish its own standards because of complications in controlling geometric and position requirements for design elements. This marked the introduction of several new practices: expanded dimensioning practices, the composite form tolerancing method of controlling the position and geometric form of multiple surfaces constructed around and at right angles to a common axis; and the complete system of decimal dimensioning.

The first important military manual (U.S. Army Ordnance Manual on Dimensioning and Tolerancing) appeared in 1945 and it included outstanding coverage on geometric and positional tolerancing, and among the new practices introduced was the use of symbols for geometric and positional tolerances. This manual was used by engineers attending early ABC Standardization Conferences and meetings of the Joint Army-Navy Standards Committee.

In the post-war years, both the British and Canadians issued drawing standards, and new concepts on dimensioning and tolerances continued to be introduced. In 1957 there was increasing concern for unification of drafting practices used in the English speaking (ABC) countries.

Drafts Prepared

JIMS committee has held several meetings so far. The two Sandians were responsible for preparation of the 185-page first integrated draft last summer. The second draft was circulated last January among industrial associations (Society of Automotive Engineers, Electronic Industries Association, American Ordnance Association, Aerospace Industries Association, American Standards Association), and the British and Canadian Standards Associations. Their comments have been reviewed and changes made where appropriate.

Final editing will be carried out Aug. 23-25 when JIMS meets, and then the American Society for Mechanical Engineers will prepare the material for publication.

Mr. Eichert wrote the text for the section entitled "Tolerances of Form." Mr. Nicovich was responsible for the text on "General Applications of Tolerances and Limits," and an appendix on "Datums—The Three-Plane Concept," which was developed at Sandia. Some of the illustrations are from the programmed drafting dimensioning textbook already used by more than 5000 Sandia, AEC, government contractors, and supplier personnel. Mr. Nicovich also prepared the chart which compares the proposed symbolization for positional and form tolerances with British and Canadian practices, and symbols adopted by the International Standards Organization.

Once the uniform standard appears, what then? It is expected to improve industrial efficiency by better understanding and uniform interpretation of dimensioning and geometric form and positional tolerancing requirements; the drawing standard will be applicable to military and commercial purposes; it will provide a single standard for use in education of draftsmen, designers, and engineers; and it will shorten the time required to redraw or translate drawings made in one industry or one country into the practices used by another.

Committee members may have thought their job was completed, but in April JIMS was renamed ASA Y-14.5 sub-committee and in June two of its members, serving as U.S. delegates, attended an ISO meeting in Budapest on drawing practices. The new sub-committee will no doubt continue to incorporate new ideas in the American standard, and, as the Sandia members point out, "We'll probably start working right away on the first revision."

Planck and the Quantum of Action

Max Carl Ernst Ludwig Planck, a quiet man known for consideration of ideas in the abstract, invented the quantum of action, and his name remains in science as the originator of one of the greatest ideas of man.

This is the first of two articles on Planck.

by C. C. Hudson

Part I

While Thomson and Rutherford were exploiting experimental techniques in England to pry apart the atom and deduce its structure, great men were also working in Germany, and elsewhere on the Continent, in theoretical physics. Max Karl Ernst Ludwig Planck was one of these. His invention of the quantum of action to explain an empirical formula ranks with the greatest ideas of man. At the time, it was a total break with tradition, and Planck as well as many others was uncertain about how much significance to attach to it. It is often reported that he did not have confidence in his result. However, evidence turned up since his death in 1947 indicates that he had total confidence in the formulation; he did not, could not, visualize the far-reaching effects it would have on all of physics and indeed on Western thought.

In contrast to Rutherford, Planck was a quiet man who conserved his physical force. His excitement came not from the analysis of data painstakingly collected in the laboratory, but from consideration of ideas in the abstract, allowing mathematics to smooth over places where knowledge was faulty.

Max Planck was born in Kiel, Germany, in the spring of 1858. Not much is recorded of Planck's early life, which must have been quiet and sedate. His father was professor in constitutional law at the University of Kiel. He was a respected man in a community that respected erudition and the honor of academic degrees. Young Planck finished high school at the Maximilian Gymnasium in Munich. He always attributed his interest in science to his math teacher at the Gymnasium, who with high humor endeavored to make his pupils visualize the laws and concepts of physics with homey anecdotes. In one of these stories, he described how, when a stone mason with enormous effort lifted a stone into place in the cornice of a building, its energy of position in the gravitational field remained stored there. Many years later it might come loose and tumble to the street, perhaps on some innocent passerby, thereby giving up its stored energy. Planck never forgot this example of the conservation of energy and in later years argued on the basis of imposing the simplest possible interpretations to the forms of energy.

Moves to Berlin

At the age of 17, he entered the University of Munich and spent three years studying physics and mathematics. There is little evidence that he studied anything else in these years. He then moved to Berlin and there life opened up to him. He became greatly influenced by Hermann von Helmholtz and Gustav Kirchhoff who were at the time the leading German theoretical thinkers in physics, renowned the world over. In one year Planck completed his dissertation for the PhD *summa cum laude* at the age of 21 years.

While he respected Helmholtz and Kirchhoff, the attraction was personal and not through the classes. Planck wrote: "I must confess the lectures of these men netted me no perceptible gain. It was obvious that Helmholtz never prepared his lectures properly. He spoke haltingly, and would interrupt his discourse to look for the necessary data in his small notebook; moreover, he repeatedly made mistakes in his calculations at the blackboard, and we had the unmistakable impression that the class bored him at least as much as it did us. Eventually his classes become more and more deserted, and finally they were attended by only three students; I was one of the three.

"Kirchhoff was the very opposite. He would always deliver a carefully prepared lecture, with every phrase well balanced and in its proper place. Not a word too few, not one too many. But it would sound like a memorized text, dry and mo-



Max Planck

notonous. We would admire him, but not what he was saying."

Under such circumstances, Planck turned to his own reading as a means of education. He found the works of Rudolph Clausius most appealing and undertook to understand thermodynamics completely.

He was annoyed at the complex way in which Clausius expressed the second law of thermodynamics, and set about to clarify the issue. This is the law which says that heat does not pass from a colder to a hotter body without an external compensation; it is the theoretical basis for heat pumps and the modern refrigerator. Out of the careful study of these ideas came the concept of reversibility of a thermodynamic process which is accepted today. This formed the basis of Planck's doctoral dissertation.

Results Disappointing

The result of the dissertation however, was disappointing to a young man eager to startle the world with his genius. He writes: "The effect of my dissertation on the physicists of those days was nil. None of my professors at the university had any understanding of its contents, as I learned for a fact in my conversations with them. . . . Helmholtz probably did not read my paper at all. Kirchhoff expressly disapproved of its contents. . . . I did not succeed in reaching Clausius. He did not answer my letters, and I did not find him at home when I tried to see him in person at Bonn."

His disappointment was made sharper when, years later, he learned that the American scientist Willard Gibbs, working in isolation, had obtained all Planck's theorems—some in even greater generality—before Planck "so that in this particular field no recognition was to be mine."

Young Planck was made instructor at Munich, but he chafed to escape from the quiet security of his father's house. In 1887 he submitted a paper for the prize to be awarded by the Philosophical Faculty of Göttingen. The subject was "The Nature of Energy." While writing the paper, he received an appointment to the University of Kiel, which elated him. The paper won only second prize and he attributed this to the fact that his thesis in the paper offended the Professor of Physics at Göttingen, W. Weber.

In 1889, Planck accepted the chair of physics at the University of Berlin, vacated by the death of Kirchhoff. This was the big break in his life for now he had the prestige to be heard among the great theorists of the Continent: Helmholtz, Nerust, Clausius, Ostwald, Mach, but most of all Boltzmann. Out of conflicts and disagreements with these men was eventually to come the spark of the idea that resulted in the quantum of action.

Studies Musical Scale

Before starting that serious analysis, however, let us note in passing a much lesser but singularly pleasant and seldom reported accomplishment of Planck. When he first arrived at Berlin, a large har-

monium or reed organ of unusual design and untempered tone was given to the university, and Planck was asked to use this instrument to study the natural or untempered scale. "I delved into this problem with keen interest, in particular with regard to the question concerning the part played by the 'natural' scale in our modern vocal music without instrumental accompaniment. These studies brought me the discovery, unsuspected to a certain degree, that the tempered scale was positively more pleasing to the human ear, under all circumstances, than the 'natural,' untempered scale. . . . Indubitably this fact can be ascribed ultimately to habituation through years and generations."

Theoreticians of this time, the 1890's, were deeply involved in discussions of the forms of energy. The principle of the conservation of energy was more or less accepted, but especially in the realm of atomic physics it was occasionally questioned. Planck had made himself expert in the theory of continuum thermodynamics, but he constantly ran head on into conflicts with Boltzmann and others over the laws that govern particles, charged or neutral. In the end, they became co-workers but only after harsh disagreement. Others, like Ostwald, preferred to see energy partitioned into arbitrary forms like Distance Energy, Surface Energy, and Space Energy. With these ideas, Planck could not compromise.

The idea that fired Planck's mind to its greatest achievement grew out of Kirchhoff's law about black body radiation. Strictly speaking, this law says that in a completely enclosed cavity having perfectly reflecting walls and containing emitting and absorbing bodies, the spectrum of the radiation contained will in time become independent of the nature of the bodies and depend only on their temperature. Planck writes, "Thus, this so-called normal spectral energy distribution represents something absolute, and since I had always regarded the search for the absolute as the loftiest goal of all scientific activity, I eagerly set to work." He imagined the cavity to be filled with resonators of various frequencies, and at first he expected the numbers of resonators in certain frequency intervals to change until a stationary state existed, corresponding to the normal spectral energy distribution. But nothing so simple happened. There was no stationary state. Boltzmann vigorously protested that he was making assumptions in the face of known facts.

The second part of the Max Planck story tells of the phase of his life in which he turned to his background in thermodynamics and derived his famous radiation formula.

G. W. McClure Attends International Institute in Sweden

G. W. McClure, supervisor of Atomic Interactions Research Division 5121, is attending the International Summer Institute in Quantum Chemistry, Solid-State Physics and Quantum Biology in Sweden.

The July 22-Aug. 7 session is held in Abisko, Lapland, north of the Arctic Circle. The second part of the institute is conducted at the University of Uppsala, which is near Stockholm. Each of the two sessions is comprised of 100 hours of lectures by senior scientists from Israel, Switzerland, France, Sweden, and the United States. English is the official language.

Director of the Summer Institute, as well as a similar Winter Institute held in Florida, is Professor Per-Olov Lowdin, head of the Quantum Chemistry Group at the University of Uppsala. He was a speaker at Sandia's Research Colloquium in February 1963.

The first such institute was held in Sweden in 1958, and since that time more than 700 scientists have participated or contributed.

Mr. McClure holds a Bachelor's degree in physics from the University of Illinois and a PhD degree from the University of Chicago. He has been at Sandia 10 years.

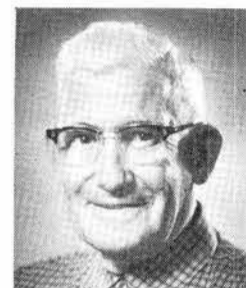
Retiring . . .



Martha Belmonte, a Sandia employee since January 1949, will retire the end of July. She has worked in Janitor Service Division 4574 the entire time.

Her husband is already retired and they plan to "really enjoy" their home at 415 Morningside Ave. SE. Their daughter and two granddaughters live only a block away.

Later they hope to visit friends in California and Illinois, their previous home. Meanwhile, gardening will occupy much of the new leisure time.

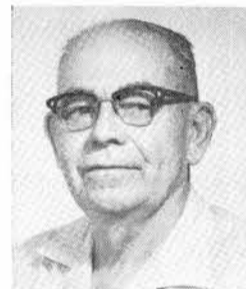


John M. Harper (4254), a machinist at Sandia for 14 and a half years, will retire the end of July.

He and his wife are both natives of Mount Vernon, Ky., and from now on they will live in this village of 1600 persons. They have relatives there, and their son, daughter, and seven grandchildren will be 160 miles away in Cincinnati.

Fishing will be a main activity. Cumberland Lake is 16 miles from Mount Vernon and offers some of the best bass fishing in the country.

Mr. Harper also hopes to see some major league baseball games in Cincinnati. In his younger days he played semi-pro baseball in Cincinnati and Detroit, and summer pro football in Cincinnati.



H. R. Kutzley has worked in Physical Standards Division 2411 in much the same job during nearly 17 years at Sandia. He will retire July 30.

Mr. and Mrs. Kutzley live at 217 Cardenas NE and their son, Thomas, an ex-Sandian, also lives in Albuquerque.

Due to recent health problems, Mr. Kutzley's plans are not definite, but he will continue a radio and TV repair business he established eight years ago.

His hobby is photography.



Ted A. Rosenwald (4544) will retire today after more than 14 years with Sandia. He joined the Company in 1951 to handle the Laboratory's fire prevention program. He was Fire Chief for Sandia Base at the time, a job he had held since March 1944.

Under Ted's guidance, Sandia Laboratory's fire prevention activities were judged among the top 25 in the nation in seven of the nine years that the Company entered the national contest, sponsored by the National Fire Protection Association. During these years, Sandia's fire loss averaged less than \$2700 annually. This average includes a single-fire loss of \$19,000 in 1956.

After a trip to visit relatives in Chicago, Ted will return to Albuquerque. His address is 213 Tulane Dr. SE.

NTS Construction Project Involves New Sandia Facility

A Las Vegas, Nev., company has submitted the apparent low bid on a project at the Atomic Energy Commission's Nevada Test Site involving construction of eight test structures and a receiving and recording facility for Sandia Corporation.

The apparent low bid of \$131,470 was made by Robert J. Gordon Construction Company. Bids were opened in the Nevada Operations Office of the AEC.

The Sandia facility will be situated in the Control Point area of the Test Site. The concrete frame and masonry structures to be used in ground measurement studies will be constructed in the Pahute Mesa and Yucca Flat forward test areas.

PAGE SIX

LAB NEWS

JULY 30, 1965



FORMS CONTROL TEAM—R. V. Eldredge, A. D. DeMattos, and G. E. Conner (l to r) are examining the six forms most used throughout Sandia Corporation. These six forms resulted in 3.6 million pieces of paperwork annually, yet the total printing and purchasing costs for the forms amounts to less than \$8000 annually. Controlling the costs of printing and purchasing forms was one aspect of a study recently completed by the team.

Forms Control Study Achieves New Efficiency, Economy at Sandia

"Make it out in triplicate" is a standard bit of irony surrounding most business forms. However, it's not funny.

Forms are a necessary and vital part of any modern business. They are the vehicles that carry the information of a company's activities, record its transactions, account for its finances, and provide the basic information for decision making.

But, without control, forms can create headaches for the people who use them and become expensive for the company—expensive in terms of the time required to process them plus the costs of printing and storing.

At Sandia Laboratory, Forms Management is one of the many functions of Systems and Procedures Department. Two years ago, the Department undertook a study to determine the effectiveness of Sandia's Forms Management activities and to make improvements in the program wherever possible.

The study was conducted by R. V. Eldredge with the assistance of G. E. Conner and A. D. DeMattos—all of Division 4112. At that time, Forms Management was handled by R. B. Barwick, also of Division 4112, who, in addition to maintaining Sandia's office supplies standards, processed requests for new forms and for reprinting old ones.

To put it mildly, Mr. Barwick was snowed with requests. He pointed out that the number and volume of Sandia Corporation forms were growing annually. Costs of printing and buying forms were rising. Capital investment in forms inventories was increasing and becoming a great burden. Processing costs were extensive, and "bootleg" forms were flourishing. (Bootleg forms are those whose design is not reviewed by the Systems and Procedures Department.)

It was time to initiate new controls and new economies.

Bottleneck Removed

The first thing Mr. Eldredge did was eliminate the "bottleneck" in the Forms Management area. His analysis resulted in assignment of a clerk to this area, implementation of new handling procedures and purchase of more efficient forms composition equipment. After this effort and subsequent analysis, he studied the purchasing and printing of forms and examined the warehousing and distribution of forms within the Company. Also, he was able to perform analysis of Sandia forms design.

During the two years of the forms study and implementation, these results were achieved:

The growth in number and volume of forms paperwork was reversed. From a total of 3100 forms, the number has decreased to 2900 and further reductions are expected as all forms requisitions and "low usage" forms are analyzed.

Buyers, Purchasing Division 4362, were furnished with more effective forms specifications and purchasing codes. These codes, assigned to all commercially printed forms, permit bulk contract purchasing of forms. This practice realized a savings of \$78,000 during 1964.

From January 1964 to March 1965, the combined effect of fewer forms and bulk purchasing reduced Sandia's capital investment in forms inventories by \$45,000. (The systems also reduced forms value on order by \$40,000.)

New standards for form printing and re-ordering halted rising Sandia print shop costs and resulted in savings of \$3000 for forms internally printed during 1964. Furthermore, with tighter control over re-ordering forms, revisions could be introduced when outdated stock was at a minimum.

To save in the costly area of forms processing (reading, completing, routing, filing, and destroying), a set of design standards covering instructions, spacing, zoning, sequence, margin, and tab stops for all forms was compiled in a manual for future guidance for Department 4110 by Mr. Connor.

Examples of Savings

The kind of savings achieved by this effort can be illustrated by using two examples. In analyzing and redesigning Forms SC 6891-JB (used by the 2500 organization to procure materials and services) and SC 7550-C (used to record inspection data in Department 2510 to determine sample sizes), \$4200 of computable processing savings resulted. It is estimated that overall savings in processing forms exceeds \$30,000.

Because of the close relationship between the design and reproduction of forms and office standards, an investigation of the purchasing costs in the office supplies area became part of the forms study. Other savings were achieved by adding the manufacturers of office supplies under contract to Western Electric Company to Sandia's list of possible sources of supply. Purchase of Western Electric Standard Office Supplies during 1964 realized savings of \$6000 in the purchase of portfolios, carbon papers, envelopes, and general purpose bond paper.

The Systems and Procedures Department emphasizes that the Forms Management effort has not been completed. It is a continuing activity of the organization, now expanded from previous levels.

Procedures have been established to expedite the review of all forms before reproduction. Design standards have been established for all forms. Forms users have voluntarily asked to have their forms analyzed and redesigned. The number of bootleg forms has been reduced. Current emphasis is to combine existing forms and further reduce the number of forms used by the Company, to reduce forms completion time, to dictate work flow, and to provide ease and accuracy in reading, using, filing, and finding of forms.

Recognition of Sandia's Forms Management study came recently when Mr. Eldredge was asked to present a summary of the study at a meeting of the Western Electric Office Standards Sub-Committee. The chairman of the conference requested reproduction of the study approach and results for the conference.

Take Note . . .

The Sandia Laboratory Recreation Association will organize a flag football league at a meeting next Friday. Representatives are invited to attend at 9:45 a.m. in the Bldg. 300 conference room.

J. G. Marsh, supervisor of Classification Division 3414, recently took part in a panel discussion at the First National Seminar of the National Classification Management Society in Washington, D.C. Participating with Mr. Marsh in the presentation on "Industry Looks at Classification Management" were Richard Healy of the Aerospace Corporation, Donald B. Woodbridge of Union Carbide Nuclear Company, and John B. Mackey of General Electric Company.

Heading the ticket of new officers elected by the International Guards Union of America, Local 27, is Robert L. Byrd, president. Serving with him during the 1965-66 year are William C. Huffman, vice president; Carl R. King, business agent; Lester G. Baumann, recording secretary; Vernon W. Moore, secretary-treasurer; Albert J. Angel, sergeant-at-arms; and Eugene Cox, L. C. Pearl, and Joseph Torres, trustees.

Persons wishing to form a Sandia Laboratory archery league are asked to contact Lou Sanders, tel. 264-5236. Mr. Sanders said the league may be formed either with or without dependents, as desired by the interested persons.

Appointments for a free pre-evaluation of speech or hearing therapy needed by children of any Sandia Corporation employee may be made by calling Mrs. Janis Whelan at tel. 264-2996.

Sandia employees and their families are invited to participate in the YWCA International Folk Dancing Group, which meets each Friday at 316 Fourth St. SW. Beginning folk dancing is taught at 7:30 p.m., with advanced instruction starting at 8.

Leaders of the group include Robert P. Baker (2441), Glenn R. Elliott (2452), and Robert J. Burnett (2546). Further information may be obtained by calling the YWCA, tel. 247-8841.

Two Sandia members of the Albuquerque Section of the American Society for Quality Control (ASQC) made presentations July 9 at New Mexico State University before 55 persons interested in forming an El Paso/Las Cruces ASQC subsection.

W. A. Sherman (2114), treasurer of the Albuquerque Section, spoke on Section programs; A. F. Cone (2510) discussed the history and organization of National ASQC.



Gloria Sais (4332)

Take A Memo, Please

The more you hear about safety, the less you hear about accidents.

W. A. Shinnick Accepts Position In UNM Center

W. A. Shinnick of Product Data and Quality Reports Division 2512 will leave Sandia Laboratory Aug. 15 to become general manager of the new Technical Applications Center (TAC) at the University of New Mexico's Bureau of Business Research.



The Center will endeavor to make technical and scientific data published by the National Aeronautics and Space Administration available to business, industry, research organizations, and educational institutions. Emphasis at first will be placed on serving New Mexico and the surrounding Rocky Mountain States.

Mr. Shinnick, who joined Sandia in 1956, will have the primary job of staffing the new TAC program to meet the demand for information. Another facet of his duties will be the development of techniques for contacting firms and institutions who can make use of the technical material.

He said, "TAC is designed to help all businesses and industries maintain a competitive position in the scientific field by making scientific information readily available to them."

Mr. Shinnick has a BS degree in mechanical engineering from Northwestern University and an MS degree in business and engineering administration from MIT.

New Eyes for the Needy Campaign Is Successful

A large box, containing about 400 pairs of eye glasses and items of assorted jewelry, has been sent to New Eyes for the Needy, Inc. The items were donated by Sandia Laboratory employees to the non-profit, charitable organization.

Since its founding in 1932, New Eyes for the Needy, Inc., has helped more than 400,000 people. Distribution of the donated glasses and rework of the serviceable frames are performed by a volunteer staff. Distribution is arranged through hospitals and welfare agencies.

The Sandia campaign to collect the glasses was sponsored by the Sandia Pioneers, a group having 21 or more years service with the Bell System. R. G. Luckey (4100), spokesman for the group, extended the Pioneers' gratitude to all Sandians who contributed to the collection.

Sandia's Safety Scoreboard

Sandia Laboratory:

32 DAYS
1,125,000 MAN HOURS
WITHOUT A
DISABLING INJURY

Livermore Laboratory:

43 DAYS
224,200 MAN HOURS
WITHOUT A
DISABLING INJURY