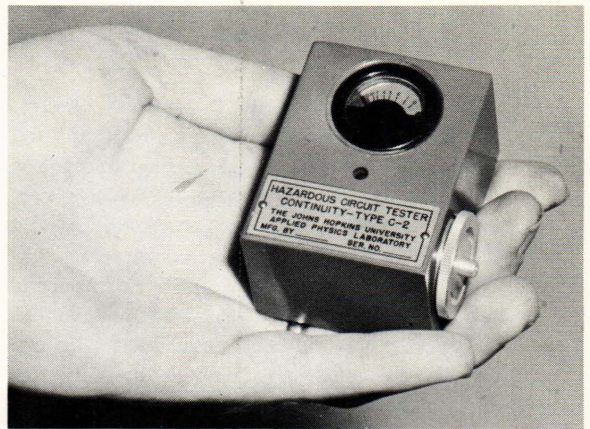


Hazardous circuit tester, type VO-1, in its current configuration showing settings that permit its use as a multirange AC or DC voltmeter. Not shown is an earlier model now in use in the Fleet.



Type C-2 hazardous circuit tester designed for "GO" or "NO-GO" checking of circuit continuity.

ohms, with an accuracy of ± 200 ohms.

Both the ohmmeter and the continuity meter have been successfully used in the Polaris program for checking Conax explosive valves, gas generator squibs, separation initiators, bellows motors, initiator cartridges, and mild detonating fuze circuits. They have also been employed for various spot checks, from a remote point such as the blockhouse, of continuity of inaccessible terminals and connections in the missile after the missile has been "buttoned-up" and count-down started. In addition, a specialized version of the continuity meter has been developed for the AEC (Sandia Corporation) to be used for checking hazardous circuits of atomic and nuclear warheads.

George W. Gardiner and

New Mexico State University

W. H. Goss

The retirement of Dr. George W. Gardiner this past summer from active teaching and administration at New Mexico State University provides an occasion for recognition of a noteworthy personal accomplishment. The Physical Science Laboratory, which he founded, has been one of the Associate Contractors of the Applied Physics Laboratory since the inception of the former, and it is with genuine regret that we note Dr. Gardiner's retirement. The occasion provides opportunity for a personal tribute, while at the same



time highlighting a little-recognized and often ignored reverse feedback from applied research, as exemplified by military weapon development, to the furtherance of education and pure research in an academic environment.

The story can be told in terms of Dr. Gardiner's personal history, since his life's work and the growth of the University—particularly the physical science departments—are inextricably associated.

Coming to New Mexico State in 1934, Dr. Gardiner found himself the chairman of a one-man physics department whose primary function

was the training in physics of the engineering majors. Dr. Gardiner had taken his Ph.D. at Yale in 1929 and had done research at the National Bureau of Standards prior to coming to New Mexico. This, however, was his first teaching experience.

The department had grown to a two-man staff when World War II intervened and temporarily curtailed further growth. The end of this period of enforced hibernation brought with it opportunities that were immediately apparent to a man of Dr. Gardiner's vision. In particular the opening of nearby White Sands Proving Ground (now White Sands Missile Range) for firing captured German V-2 rockets initiated a series of events that have brought about vast changes on the campus of New Mexico State and have made Dr. Gardiner and his students participants in some of the most exciting missile developments in U. S. history.

The birth of the Physical Science Laboratory (PSL) at New Mexico State was marked by the flight of one of the first V-2's from WSPG on May 26, 1946. The records of that flight were sent by the Army's Ballistic Research Laboratory to PSL for reduction and analysis. This work was supervised by Dr. Gardiner's wife, Anna, herself a competent mathematician with a background of college teaching. This first contract was followed by others with WSPG itself, and also with the Navy's Bureau of Ordnance (as an Associate Contractor of this Laboratory), the Bell Telephone Laboratories, the Naval Research Laboratory, the Air Force, and more recently with the National Aeronautics and Space Administration. The annual volume of contracts has now reached a total of nearly \$6,000,000, doubling in the last five years.

The chief interest in this account lies in the feedback brought about by Dr. Gardiner from PSL activities to the campus itself. He had at his disposal two primary sources of funds. The first was that used to pay salaries for student part-time help; the second was PSL's share of the small fee percentage allowed to New Mexico State to cover overhead. The former amount was used

to create part-time campus jobs, available to scholars only, paying from \$600 to \$2000; the "overhead" funds went entirely into Freshman scholarships, paying approximately \$400 each to qualified science students from high schools all over the state. Some thirty of these PSL scholarships are now awarded annually. As the program grew, so did the feedbacks. In 1955-56 a new physics building was erected (appropriately christened Gardiner Hall), made possible by a payment of one third of the cost from PSL funds.

But more important to Dr. Gardiner than physical construction was his growing conviction that undergraduate students, given the chance, were capable of far greater accomplishments than were expected of them in the ordinary college curriculum. He had seen his part-time student workers, stimulated by their work assignments, move to the top of their academic classes. In 1956-57 he began a pioneering experiment by awarding from PSL a limited number of research grants, ranging from \$300 to \$600, to undergraduate physics students. The number was increased the following year, during which application was made to the National Science Foundation for aid in the support of such a program. In 1958-59 the Foundation initiated its own program, and during this first year awarded New Mexico State students the largest number of grants given by it to any college or university. Since that time the total number of grants has increased at New Mexico State University until today approximately thirty such research grants are made annually to undergraduates.

With all of the above activity the physics department has grown dramatically. Dr. Gardiner's one-man department now boasts a staff of 15, with 100 physics majors and graduate enrollment of approximately 50. Its present chairman is Dr. Harold Daw, Dr. Gardiner having resigned in 1955 to devote full time as Director of the Physical Science Laboratory. Interestingly, the two organizations have been kept entirely separate throughout

the history of PSL.

Never content, Dr. Gardiner's most recent accomplishment may well prove to be his most significant. While his efforts in supporting and encouraging growth in physics and mathematics had been outstandingly successful, there were other departments at New Mexico State, not directly participating, that needed support and encouragement in their research activities. In 1958, Dr. Gardiner proposed the establishment of a Research Center, to be funded jointly by the State, PSL, and research contracts. Its staff was to consist of a limited number of full-time research professors, the bulk of the work being conducted as part-time projects by staff members from departments on the campus. All research projects and personnel appointments were to be approved by the departments concerned rather than by PSL.

To get the Center started, Dr. Gardiner proposed that PSL funds be allocated for construction of a building. The University agreed and appointed him as the first Director of the Research Center, a post he held until his retirement, in addition to his duties as Director of PSL. A \$250,000 building was completed in 1959 and the Center now has a staff of four research professors and approximately 30 graduate students, and is currently engaged in a total of 15 research projects.

In addition to all of these activities, Dr. and Mrs. Gardiner have found time to encourage individual scholarship and teaching excellence. Of the various scholarships and prizes that are given on Awards Day, none are more coveted than the Westhaver Awards, two \$500 prizes donated personally by Dr. and Mrs. Gardiner for the best research paper and for the best teaching.

In a day when there is much concern among universities about the possible detrimental infringement of sponsored developments—usually military—upon the traditional academic functions, it is a welcome thing to realize that under the guidance of men with vision, such as Dr. Gardiner, exactly the reverse can be made to happen.