new ones through technology, the "fixes" themselves often will demand important political decisions—frequently requiring painful shifts in the perceptions and values of public and private decision-makers. Major new institutional changes are likely to be necessary, with increasing power being vested in regional, national, and even international authorities. Resistance to these changes by people accustomed to conventional political forms, which often leave important decisions concerning zoning, pollution controls, and the like to the attention (or inattention) of local and state officials, is certain.

The inquiries and evaluations that Muskie and Daddario have proposed would be designed to help Congress and the public perceive the new imperatives of public policy arising from the impact of technology on the environment. In fact, they would be expected to play an educational and evaluative role of a kind duplicated nowhere else in the government. For example, if the new Senate select committee lived up to the hopes of its sponsors, it would stimulate an enlightening public dialog between Senators and experts on technological and environmental problems from industry, government, and the universities.

The National Academy of Sciences, the President's Science Advisory Committee, and certain other groups have engaged in studies of the impact of technology on the environment, but, generally, these studies have been more narrowly confined than those contemplated by Muskie. Moreover, neither NAS nor PSAC, for all their prestige, has as great a potential for attracting public attention as a skillfully directed congressional inquiry; nor is this their role.

However, in the evolution of U.S. economic policy over the past generation, one can find evidence of the limitations as well as the potentialities of special committee inquiries of the kind Muskie and Daddario contemplate. The inquiry by the Temporary National Economic Committee (TNEC) of the late 1930's and early 1940's brought together members of Congress and representatives of the Executive Branch for the most sweeping examination of economic policy ever undertaken up to that time. Thus, in this way, TNEC (headed by the late Senator Joseph C. O'Mahoney of Wyoming) provided a precedent for the establishment in 1946 of the Joint Economic Committee and the Council of Economic Advisors—potentially two extremely important bodies. However, the influence of these bodies has ebbed and flowed. For example, the Council of Economic Advisors at times has been virtually ignored. Not until the 1960's and the Kennedy Administration did the council reach the peak of its influence. The moral, of course, is that to offer good advice is not enough—it's also necessary to have a President and a Congress ready to listen and to act.

If either the Muskie or the Daddario inquiries should be run-of-the-mine Congressional endeavors, its influence, of course, would be minimal. Both Muskie and Daddario have proven to be men of diligence and capacity, however. Muskie has gained national recognition through his record as chairman of the Senate Public Works Subcommittee on Air and Water Pollution. Senate approval of his proposal to set up the select committee would itself be a tribute from his colleagues. Proposals to create new committees in a body already having dozens of them usually are looked upon dubiously, especially by the chairmen of the standing committees, who do not want their authority diluted.

If the inquiries planned by Muskie and Daddario should produce major results, this will be in part a consequence of the fact that the problems being investigated are real and urgent. In his comments before the Muskie subcommittee, Seaborg underscored the urgency. ". . . The year 2000," he said, "is not waiting for the fulfillment of our Utopian dreams. In less than 33 years, it will be here with a vengeance, and whether we welcome it in jubilation or despair will largely depend on how much we can learn and how wisely, boldly, and quickly we can act in the coming years."

—LUTHER J. CARTER

Clocking Science: Army Lab Puts Meters on Research Equipment

Staff members of an Army-operated research center told a Congressional committee on 9 August about a meter system for determining the lengths of time that various items of laboratory research equipment are actually in use. The system, which has been used on a trial basis at the Army's Natick Laboratories, Natick, Massachusetts, was initiated after a laboratory administrator concluded that large amounts of equipment "appeared to be unused and unneeded." The meters had originally been installed for purposes of maintenance and calibration.

Testimony about the Natick program was presented to Rep. Henry S. Reuss's (D–Wis.) subcommittee on Research and Technical Programs during a hearing on "Procurement and Use of Scientific Research in Federal Laboratories."

Natick Laboratories does some scientific research and is responsible for the Army's research and engineering on textiles, body armor, clothing, insecticides and fungicides, and other items. The laboratory is estimated to have about 15,000 separate items of R & D equipment.

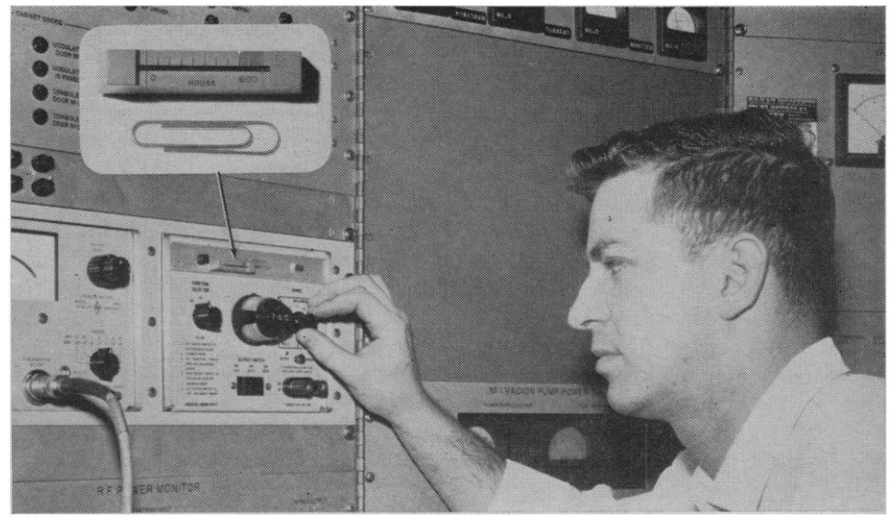
Prior to the hearing, the subcommittee asked the General Accounting Office (GAO), which is Congress's fiscal watchdog, to study equipment-management methods in five federal R & D laboratories. Natick was not included but was later scheduled for testimony because of its meter system. Laboratories studied were: the National Bureau of Standards, Goddard Space Flight Center, Brookhaven National Laboratory, Naval Research Laboratory, and Cambridge Research Laboratory.

During the hearing, two Natick staff members testified about the use of running-time meters at the laboratory. Natick Equipment Manager Arthur Levine noted that Natick operated a meter pilot program between May 1966 and February 1967 on "100 pieces of arbitrarily selected equipment such as galvanometers, oscilloscopes, recorders, counters, signal generators, vacuum tube voltmeters, electrometers, standing wave indicators, and tube testers." Study results indicated that 25.9 percent of the instruments were used more than 25 percent of the total available time. Sixteen percent were not used at all.

Harold H. Rubin, GAO Associate Director for Defense, testified that the metering trials evolved out of a maintenance program that was started at Natick in June 1965. In Rubin's words, "The Equipment Coordinator at Natick informed us that during a tour of the laboratories he had noted substantial amounts of laboratory equipment which appeared to be unused and unneeded. The scientists refused to release the equipment, contending that the equipment was required. Consequently, he sought a means of determining actual utilization of the equipment."

While Levine was enthusiastic about the possibilities the meters offer as a means of identifying little-used equipment and simultaneously providing records for maintenance and calibration purposes, Natick Scientific Director Dale H. Sieling made clear that the Natick scientists and engineers fail to share Levine's views. Sieling stated that the researchers "believe that decisions concerning management of equipment including acquisitions, centralized operations, pooling, storage, and disposal should be made by both scientific and non-scientific managers only after a thorough discussion with the primary users. They are universally opposed to the employment of percentage of numerical utilization information as the principal criterion for determination of need for a piece of equipment."

Sieling indicated that he was vehemently opposed to the use of the meters as the sole method of determining whether a researcher should or should not possess certain equipment. He stated, "I think the elapsed-time meter is unproven as a guide for the manager to realistically determine



ELAPSED-TIME METERS: The U.S. Army Natick Laboratories has installed tiny meters (see insert) on selected laboratory equipment. The program has enabled laboratory officials to determine the percentage of time that researchers actually use their equipment and has also provided maintenance and calibration information. A witness at a congressional hearing 9 August reported that during Natick's pilot program the meters indicated that 16 percent of the equipment selected to be monitored received no utilization.

State Universities: Donations on the Rise

Voluntary contributions to state-supported colleges and universities increased in 1965–66, while total gifts to private educational institutions declined. However, contributions to state schools remain substantially below those received by private institutions, according to a survey by the Council for Financial Aid to Education and the American Alumni Council. The survey results were published by the National Association of State Universities and Land-Grant Colleges. The association reported, "Nearly half of the college students in the nation are enrolled in state colleges and universities, and 6 out of every 10 Ph.D.'s are awarded by these institutions. Yet in 1965–66, state colleges and universities received only 19.1 per cent of all contributions to higher education." More than 58 percent of the donations went to major private colleges and universities, the survey noted, while private colleges for men and women received 10.2 percent; professional and specialized schools, 9.7 percent; and junior and municipal colleges, 2.4 percent. Total gifts to higher educational institutions were listed at $1.54 billion in 1965–66. Contributions to 183 state institutions totaled $234 million—an increase of 25.1 percent over 1964–65. In contrast, total voluntary support to all institutions dropped 1.2 percent between the respective periods. According to the survey, 52 state institutions were among the 239 colleges and universities receiving more than $1 million in gifts in 1965–66, and four state institutions received more than $10 million. They are: the University of California (all campuses), $34.6 million; University of Michigan, $16.8 million; University of Wisconsin, $13.7 million; and the University of Delaware, $12.7 million. The four private institutions with the highest contributions were: Harvard, $44.5 million; M.I.T., $40.5 million; Yale, $27.7 million; and the University of Chicago, $26.4 million. Of the eight highest recipients, California, Chicago, and M.I.T. received substantially more money in 1965–66 than in the previous year. The survey pointed out that support to individual institutions may vary greatly from year to year because of fund campaigns.—K.S.

equipment utilization in research and development laboratories. I have no doubt that these meters would serve a useful purpose in the production plant where the criteria for utilization of equipment are quite different. Before I would recommend the use of these meters universally in a research and development setting, a more complete study would need to be conducted to establish the validity of the results obtained from their use and to allow the users and the managers to arrive at a realistic and responsible procedure for incorporating their use in an equipment management system for a research and development laboratory."

During the pilot program, Natick researchers initially viewed the meters as a game, Levine noted. Because the meters, which were installed externally on the equipment, record only the time the instruments are turned on and not the actual utilization time, uncooperative scientists were able to affect the statistics by merely flipping the "on" switch. However, Levine claimed that, once the initial antagonism had worn off, fairly accurate records were obtained.

At the subcommittee's request, Natick will undertake a new study with the meters again being placed on 100 pieces of equipment.

Each of the meters in Natick's program costs $10. The labor cost of installation is calculated at $2.50 per meter. Levine indicated that quantity purchases of a new type of meter could lower unit costs to $4.55 in lots of 5000 and $3.90 in quantities of 10,000.

Prior to the introduction of running-time meters at Natick, the laboratory used a "walk-through" system of locating unused or little-used equipment. This was said to be similar to the system used at the Goddard Space Flight Center.

Testimony indicated that the Goddard "walk-throughs" essentially consist of teams of management and senior scientific personnel walking through laboratories and inspecting equipment to see if it is needed or being used. Between 1 December 1966 and 1 June, the program was reported to have located $1.9 million of unneeded capital equipment and an additional $598,000 in noncapital equipment. Most of the equipment has been redistributed to other Goddard programs. The remainder is being processes as "excess."

—KATHLEEN SPERRY

Aldabra: Biology May Lose A Unique Island Ecosystem

London. The future of Aldabra Island, an inhospitable atoll about 260 miles (or, about 400 kilometers) northwest of Madagascar, is currently an issue between defense authorities in Great Britain and the United States and scientists in the two countries. Use of Aldabra as an airfield and staging post in the Indian Ocean to meet strategic requirements in the 1970's is under consideration. Biologists strenuously oppose such a move because irreparable damage would be done to the ecosystem of an island which offers literally unique opportunities for research, particularly in evolutionary theory.

An agreement between the United Kingdom and the United States has made available for joint defense purposes islands in the British Indian Ocean Territory, a remnant of empire which includes Aldabra. Because of this American treaty interest, officials of the National Academy of Sciences have discussed the scientific implications with representatives of the British Royal Society and have expressed concern to American defense officials.

The Royal Society has taken strong and unusually public exception to Ministry of Defense proposals for an airfield and supporting facilities. A proposal for erection of a BBC transmitter on the already settled West Island of Aldabra does not seem to elicit such powerful feelings. The case for preserving Aldabra from the Ministry of Defense appears to be an all-or-nothing one. A Royal Society memorandum on Aldabra includes a section on vulnerability of oceanic islands which notes that:

> It follows that drastic ecological changes would occur if the isolation were to end and [continental] dominants were able to invade and compete on equal terms with the insular biota. Man, by developing shipping and aircraft capable of frequent and rapid voyages even to the most isolated parts of the world, and by his habit of carrying with him domestic animals, crops and garden plants, and soils, seeds and insects, has effectively reduced the isolation of remote islands and the predictable consequences are in fact ensuing.

Oceanic islands like Aldabra are volcanic in origin and have not been linked to continental masses. Colonization by flora and fauna, except where man has intervened, therefore, has been by immigration across the sea. The Royal Society memo points out that most land animals and plants are poorly adapted for dispersal across ocean distances and that oceanic islands have "impoverished biotas." The variety of plant and animal life generally corresponds to the distance from a continental source and the age of the island.

Dominant species on oceanic islands are determined to a great extent by their long-range dispersal mechanisms. This is not usually true on the mainland. On an oceanic island, therefore, the ecosystem may be simplified and lend itself readily to study.

As Darwin showed when he made his clinching observations on natural selection on the Galapagos, oceanic islands lend themselves well to the study of evolution. An island may provide a haven for a species which has declined on the mainland because of the emergence of competitors or predators. Endemic plants or animals may evolve. There may be selection for flightless birds and insects on a small island if flying out to sea proves dangerous.

Aldabra is interesting to biologists because it is both fairly close to a continental mass—Aldabra is 400 miles from the coast of Africa and consequently rich in flora and fauna—and relatively untouched by man. It is a high limestone island and is slightly elevated compared with ordinary, sea-level coral atolls. This makes Aldabra particularly attractive to defense surveyors searching for a site for a land-