federally paid-for equipment—and going elsewhere. The extent of this situation is difficult to ascertain, but the Johnson directive is based on the assumption that remedial measures are in order, although it also throws a bit of support to the researchers' complaint about intrusions of Washington bookkeepers.

As stated in Johnson's directive, "More support will be provided under terms which give the university and the investigator wider scope for inquiry, as contrasted with highly specific, narrowly defined projects." In Hornig's interpretation, this could be expected to lead to an increase in institutional grants, or money to be used at the discretion of the university administration. NSF and NIH now limit these amounts through a formula that holds the totals to no more than several hundred thousand for any one institution. Hornig also stated that, in general, university administrators would be given more discretion and responsibility for overseeing the use of federal research funds. And, in response to a question from a newspaper reporter, he agreed that this would serve the purpose of "helping the universities get control over their prima donnas."

The assent of congressional appropriations committees will be required to implement some aspects of the Johnson policy, particularly on the matter of enlarging institutional grants. At present these are limited by a formula that the committees jealously guard, since the distribution of money without strings reduces their power over the federal agencies in their jurisdiction. (Hornig didn't want to be drawn into any specific predictions, but he said that he would not be surprised to find that eventually institutional grants might total as much as 10 percent of grant funds; it is difficult to assess what percentage they now comprise in the total of federal research funds going to universities, but it is safe to say they are a small fraction of the figure foreseen by Hornig.)

Nevertheless, the general administration of federal funds going to universities is subject to great executive discretion, and now that Lyndon Johnson has spoken, there is every reason to believe that his science adviser was speaking correctly when he said that many things will look different a few years from now.—D. S. GREENBERG

Technical Services Act: Industry To Benefit from New State Programs Paralleling Farm Extension Service

In 1963 a Kennedy Administration effort to begin an ambitious program to stimulate technological innovation in the economy got nowhere in Congress. In fact, it was knifed by a House Appropriations Subcommittee and left for dead. But it was picked up by its friends and carried back to the Department of Commerce, whence it had come, for a long period of rest and recovery. This year, with the program shrunk to much smaller dimensions, another try was made on Capitol Hill. A modest legislative success, of possibly great potential, now has been won in the passage of the State Technical Services Act, which was signed last week by President Johnson, who called it the "sleeper" of the 89th Congress.

The act authorizes for industry a program somewhat analogous to the long-established agricultural extension service for farmers. The new service is but one element of the ill-treated 1963 program, which inspired controversy because major industry feared that its provision for direct government sponsorship of industrial research could, as some industry representatives put it, "upset the competitive balance." Even though the goal was not to support the development of proprietary products, but rather to spur industrial innovation by having universities look for new ways of doing things (such as home building), well-entrenched firms could visualize weaker competitors seizing on the new processes and invading their markets.

A prime mover of the program was J. Herbert Hollomon, who had left a high-salaried job as general manager of GE's General Engineering Laboratory in 1962 to come to the Department of Commerce to fill the new post of assistant secretary for science and technology. Hollomon, though articulate in describing the sluggishness of technological change in many parts of the economy not stimulated by national defense, space, and public health programs, found himself unable to cope with big industry's opposition.

The National Association of Manufacturers viewed the program coldly, and even the U.S. Chamber of Commerce, which represents more small companies than large ones, was not enthusiastic. No effective work was done to mollify industry or line up support to offset industry criticism; consequently, Hollomon was helpless when the $7.4 million the Administration had requested (as a starter on a program expected ultimately to cost many millions) was cut down to $1 million; this sum was earmarked for a textile research program, which did have influential friends in Congress. Hollomon had left GE for Washington because, as he remarked shortly after taking the new job, "The problems are larger here"; he was now finding that the problems could be large indeed.

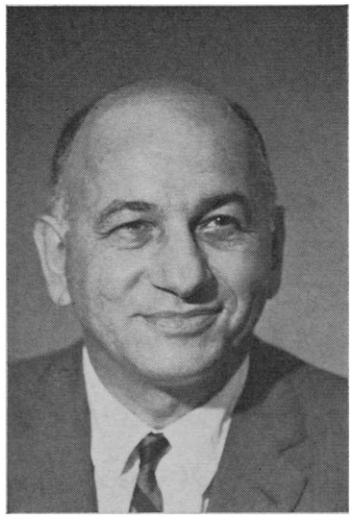
He proceeded to demonstrate his resiliency, however, by rethinking his strategy and seeking to gain at least some of his objectives by administrative means as well as by legislative action. In addition to stepping up industrial innovation by federal sponsorship of research, the major objective of Hollomon's original program was to encourage industry to increase its own research activities. Hollomon set to work to investigate, and in some cases to implement, various means by which this goal might be achieved. Currently, the situation is as follows:

1) Three panels of the Commerce Technical Advisory Board, which Hollomon chairs, have undertaken studies. One study, already completed and now being evaluated by industry, is concerned with technical standards, especially as they relate to the acceptability of American products abroad. A major recommendation is that a federally chartered standards organization be created to coordinate the development of commodity standards at home and to represent American interests overseas in the development of voluntary international standards.

Studies still under way are concerned with (i) the relation between tax, antitrust, and regulatory policy, on the one hand, and research and development and innovation on the other, and (ii) the philosophy and possible consequences of direct federal intervention in industrial technology. A fourth study, recently undertaken by a presidential commission, is directed to U.S. and foreign patent systems and their effect on American technology.

2) To bring about better collection and distribution of the vast output of technical information generated by defense programs and by the "civilian" economy, a Clearinghouse for Federal Scientific and Technical Information was created last year as part of a reorganization within the Bureau of

Geological Survey Changes Guard



William Thomas Pecora (left) has been named to succeed Thomas B. Nolan (right) as director of the U.S. Geological Survey. Nolan, who has been director of the Survey since 1956, will remain at the Department of the Interior, of which the Survey is a part, as an adviser and representative on several international groups. Pecora will step up from his present job as the Survey's Chief Geologist, a post he has held since September 1964. He had previously been Chief of the Branch of Geochemistry and Petrology, Geologic Division. Pecora, 52, received his B.S. in geology at Princeton and his Ph.D. at Harvard. This year he was one of 35 new members elected to the National Academy of Sciences. Nolan, 64, did both his undergraduate and graduate study at Yale. He has been with the Survey since 1924, and was assistant director from 1944 until 1956, when he was named director.

Standards. The clearinghouse, considered an improvement over earlier services of a similar kind, comes under the Institute of Applied Technology, which emerged from the reorganization along with the Bureau's Institute for Basic Standards and the Institute for Materials Research. Together with the preexisting Central Radio Propagation Laboratory, the new institutes are carrying on the Bureau's traditional mission of providing services and information useful to industry.

3) The State Technical Services program has been authorized by Congress, and a request for an initial appropriation of up to $10 million (though probably less) will be made soon. Rep. John J. Rooney, the Brooklyn, New York, Democrat who chairs the subcommittee that spiked Hollomon's earlier plans, was noncommittal when asked last week about the technical services program. Now that Congress and the President have expressed themselves through the authorizing legislation, however, the chances of getting money for the program appear good.

In any event, the Department of Commerce is acting on the assumption that all will be well. Hollomon has delegated responsibility for the program to his new Deputy Assistant Secretary, Charles L. McCabe, formerly vice president in charge of research and dean of graduate studies at Carnegie Institute of Technology. Each state governor has been urged to designate an agency promptly to plan the state's participation in the program. The Department soon will ask the agencies to send representatives to Washington for a conference.

At the ceremony for the bill's signing, President Johnson was not restrained in his comments. "This bill will do for American businessmen what the great Agricultural Extension Service has done for the American farmer," he said. "It will put into their hands the latest ideas and methods, the fruits of research and development." Johnson predicted that the program will lead to the establishment of new industries and the expansion of old ones, the development of cheaper and better consumer products, and the diversification of local industry, and that it will reduce the impact of technological change on workers and local economies. "If we had had this legislation 25 or 30 years ago, we might have prevented the economic depression that today exists in Appalachia," the President said.

Johnson's claims may seem farfetched to economists who believe that the chief stimulants for technical innovation will continue to be the working of the free enterprise economy, supported by government fiscal policies designed to assure high consumer demand. In this view, for every state technical representative who visits a small industrialist to offer help, a dozen salesmen pushing new materials or processes probably will call.

Moreover, it can be argued that the new service is, at best, only a loose parallel of the agricultural extension service. By suggesting the use of new seeds or cultivation practices, farm agents can render useful services to large numbers of farmers who do the same kind of farming and face common problems. But industry within a given area may be highly variegated, producing everything from plastic toys to kitchen sinks; the most highly qualified state technical expert (who, incidentally, may be difficult to hire in the numbers required) could find himself baffled by the array of problems thrown at him, even granting that in many cases he simply will refer a plant operator to private consultants who are specialists in his field.

On the other hand, in its endorsement of the technical services program, the President's Council of Economic Advisers observed that studies have shown that innovations frequently take years or decades to spread throughout industry. "As modern technology becomes more complex and specialized, it becomes more important to have improved channels for its dissemination to all potential users," Gardner Ackley, the Council's chairman, said in a letter to the House subcommittee handling the measure. He noted that in striving to attain the nation's full employment goals primary attention has been given to fiscal and monetary policy; as the gap between

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potential and actual output is narrowed, however, greater attention must be paid to measures for increasing productivity and enlarging the growth potential, Ackley said. Speeding up the application of new technology by means of the technical services program, he said, should be a major step in raising productivity.

President Johnson, in his remarks on the program, emphasized the importance of "local initiative and local imagination," and added: "The vehicles for success will be 250 colleges and technical schools throughout the land. They will distribute the information. They will serve as the economic planning centers for their areas." The careful cultivation of these institutions' interest in the technical services program contributed to the ease with which the bill cleared the Congress. So little opposition was there that the measure was approved by both House and Senate on voice votes without roll calls.

As early as December 1962, an advisory committee on which universities and colleges, the Department of Agriculture, and industry were represented was created by Commerce and asked to draft a plan for a university-industry technical service. Enough interest had been aroused by late 1963 that the Association of State Universities and Land-Grant Colleges adopted a resolution in favor of the proposed service.

In early 1964, and again this past May, Hollomon called national conferences at which the technical services program was taken up as part of a broad review of state science and technology. Representatives from nearly all of the states attended, many of them from college and university extension programs and from the budding agencies for the diffusion of science and technology which some states had created already.

The conferences each brought more than 100 persons to Washington, some of whom called on their congressmen and senators to urge their support of a federally aided state technical services program. Governors were apprised of plans for the program when, in late 1964, draft legislation was sent to them for comment. A survey of the responses indicated that in their attitude to the program only six of the 50 governors were lukewarm or "reserved."

As a result of this careful political

foundation work, the Congress that convened in January was to be receptive to the technical services program. Hollomon had learned from his earlier mistakes and knew better than to try to get an appropriation without specific legislative authority. So the authorizing measure was duly introduced with an impressive list of sponsors in both houses. The commerce committees of the two houses held hearings on the measure in June, and the testimony was nearly all favorable.

The National Association of Manufacturers, which opposes most administration proposals almost as a reflex, could not bring itself to favor this one, although Commerce had said no government-sponsored research would be undertaken. The NAM did not testify, but in a statement for the record said the program was unnecessary. "We submit that it is not the lack of programs or dissemination of information that limits the growth potential of small business," it said. "It is a well documented fact that small business problems center around two factors—lack of management skills, and inadequate financing."

The Consulting Engineers Council and the National Society of Professional Engineers favored the program, but said the bill needed stronger safeguards against competition by state agencies with their members. The Council, for example, proposed that the bill prohibit services that are "now available or could be made available as practicably" by professional consultants. As finally passed, however, the bill simply proscribed services that are "economically and readily available" from private sources.

The administration wanted a 5-year program and a $140-million authorization; instead it got a 3-year program with spending limited to $60 million: $10 million the first year, $20 million the second, and $30 million the third. Thirty to 35 states, most of which already have technical services programs of sorts, are expected to participate the first year. They will be able to get $25,000 planning grants for each of the first 3 years on a nonmatching basis; but grants to implement the program, which could go up to $2 million for the largest state, must be matched dollar for dollar from state or other nonfederal sources.

The formula for deciding each state's share will reflect population, technical resources, and degree of economic and industrial development and productive

efficiency. Two or more states, if they desire, can join in a regional program. The agency responsible for the state or regional program is expected, in most cases, to be a state university, although some state science or economic development units may be designated. The agency will draw up a 5-year plan outlining the area's technological and economic conditions and identifying its major industrial problems; general methods for solving the problems through the technical assistance program will be explained. This 5-year plan, together with an annual technical services program, containing a detailed budget and description of specific steps (such as contract proposals) for aiding industry, must be approved by the Secretary of Commerce before any grants (other than for planning) are made.

An Office of State Technical Services will be established under Hollomon; the staff, limited to about 30 persons including clerical help, is expected to be headed by someone well respected in university or industry circles; his salary will be about $24,500 a year. The Office will maintain a central reference service, drawing on such special resources as the Clearinghouse for Federal Scientific and Technical Information and the Science Information Exchange, as well as on federal information centers such as those of the Department of Defense and the space agency.

A credo of the Commerce officials in charge of the program is that in many cases technical information will not be well used unless an active personal interchange occurs between donor and recipient. Technical documents mailed to the hard-pressed owner of a small, obsolescent manufacturing plant are likely to go into the trash unread. If the representative of a state technical services agency calls on the plant owner, the chance of engaging his interest in information that may upgrade his operation is much improved. Accordingly, such existing state technical services programs as those run by Iowa and Georgia, both of which practice intensive field work, are held out as models. Seminars and workshops are viewed as other means of bringing about direct personal contact between industrialists who need help and the agencies prepared to give it.

How critical such help can be is suggested by the plight of a veneer company in North Carolina a year or so ago. Air pollution caused by another

firm nearby was making it impossible for the plant to operate; the veneer firm was thinking of moving, although this would mean the loss of a substantial investment and unemployment for several hundred persons. The industrial extension service staff at the state university helped the offending company abate the nuisance, thus avoiding a major economic loss to the community. Commerce Department files tell of other cases where small industrialists have received help from state technical advisers.

The State Technical Services Act is only a remnant—though an important one—of the ambitious plan Commerce lost in Congress in 1963. But if it manages to achieve anything approaching the successes that President Johnson has predicted for it, the act may encourage enough innovation to end all thought of direct federal support for industrial research. The act, together with other encouragement for technological change, perhaps resulting from such initiatives as the current studies of patent, tax, and antitrust policy, could facilitate the kind of industrial dynamism about which Hollomon has been talking.—LUTHER J. CARTER

Announcements

A group of about 15 laboratory business managers and administrative associates at Yale have formed an **Organization of Administrative Associates**, representing the university's various science, engineering, health, and personnel departments. The group aims to explore means for more effectively utilizing business managers to free department chairmen and laboratory heads to concentrate more on professional and policy matters. Ken Hartford, laboratory business manager in the biology department at Yale, was elected chairman of the organization.

A **Center for Research on Language and Language Behavior** (CRLLB) has been established at the University of Michigan, Ann Arbor. Plans call for programs of basic research on language learning with people of all ages and levels of language proficiency; activities to improve the techniques of language learning; applied research to field-test instructional techniques, materials, and devices; and distribution of information for the enhancement of research, development, and instruction in language learning. The Center is organized with