CORRESPONDENCE

Applying Research

SIR,—Professor Temperley's interesting and stimulating letter (June 24, p. 1378) raises a number of points.

Although responsible for running a sponsored research institute, I would question his initial assumption that there should be a correlation between research expenditure and increase in GNP. Research increases knowledge or potential. Usually the knowledge is free for all and the people who provide the knowledge are not often in a position to exploit it commercially. In this respect research is in the same category as accountancy, which provides information but is not itself productive. It is perhaps unfortunate that so many accountants and business administrators consider research to be justified only by profitability, but fail to apply this criterion to other fact-finding activities, including their own. Although both research knowledge and accountant's information can help to increase production and profitability, other conditions have to be right, and a study of the accounts or a satisfactory outcome of research do not lead inevitably to financial gain. However, lack of knowledge of either type must result in eventual loss. We need knowledge to maintain as well as to increase production.

I cannot share Professor Temperley's concern about a Ph.D. being employed in devising production schedules. The Ph.D. degree is, after all, only an indication of a full education and there are few activities that are not the better for an educated mind. The idea that a Ph.D. demeans himself by going into production engineering is probably one reason why we, in this country, fail to use our best brains in increasing productivity. We would do better and be more likely to apply new knowledge effectively if we had university trained people as foremen, or even at the workbench, who would both welcome and understand innovation.

Another reason for failure to apply research in Britain is that most results which emerge from universities, Government laboratories, or research associations are made freely available. In some specific cases results may be exploited commercially through NRDC, but so far the costs of exploitation have tended to equate with or exceed the returns.

Finally, we have the tendency to restrict our scientific manpower by engaging technical staff to work only in specific fields and to maintain industrial establishments or teams of scientific workers in fields where there is no immediate commercial justification. When the icy winds of economic change are experienced, or when there is a change in the attitude of management, scientific personnel are thrown on the market, often when this is at its lowest ebb. This gives British industry the reputation of not being able to use scientific manpower and tempts scientists to seek work abroad.

The efficient use and exploitation of research can be best ensured by the establishment of multi-discipline organizations, in which both research and development can be carried out, with the results kept confidential until ready for exploitation, and where the staff can switch from one project to another without being hampered by the original terms of reference under which they were engaged.

Such an organization should contain experts on industrial management, market research, and commercial intelligence, as well as staff engaged in conventional science and technology. Probably even these business experts would be the better for a basic scientific or technological training, for the techniques involved are comparatively simple and capable of development and improvement by the application of scientific principles.

Such organizations as exist in Britain for sponsored research are hampered by being small in relation to similar

institutions in the US and by being unable to offer those other services by which contact and confidence are established between industry and the scientist. Recently both Arthur D. Little and Battelle have successfully extended their activities in this direction and include many British firms among their clients. Although there has been a very marked growth of management consulting organizations in this country, few of these are science based and one suspects that they recommend reduction of research expenditure or closure of research departments, rather than suggesting alternative lines of research likely to prove profitable. Thus they emphasize rather than reduce the rift between scientific research and industry.

By all means let us question the figures for British expenditure on research and development and their implications, as Professor Temperley suggests, but I, for one, am prepared to accept them as published and to be more concerned with how to remedy the situation. In my view this lies in the enlargement and extension of contract research facilities, coupled with industrial consultancy services in the same organization.

Yours, etc.,

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What Place for Engineers?

SIR,—Professor Thring's ideas about an Academy of British Engineers are attractive. Certainly they have been given much thought within the Council of Engineering Institutions but, for the present, rejected for the reasons given in your leading article (June 17, p. 1175).

To expand on some of your comments, an important difference between the British engineering institutions and the American societies, affecting their relative standing in the community, is that the former are qualifying bodies while the latter are not. The former consequently enjoy a better status as learned societies and may be thought the more effective in promoting the art of engineering. The American federal body, the Engineers' Joint Council, has not had a workable constitution, being inherently unable to offer effective advice to Government. Very recently, its constitution has had a radical change. Whatever factors may be the cause of American industrial pre-eminence, the organization of their engineering profession does not seem to be one, and the need for a National Academy arose for reasons which are not relevant to conditions in Britain.

The CEI has an excellent relationship with the Royal Society. Sixty-three Fellows of the Royal Society are Chartered Engineers. This is not far short of the 10 per cent which had been the normal level of representation of the profession during the 19th and early 20th centuries, until the "Rutherford era" created a preponderance of pure scientists. The purpose for which the Royal Society was created by Charles II would seem to have been the furtherance of science for the betterment of industry by its application, and the engineer deserves a place in such a body. Remembering the difference in scale between the United States and Britain, there would seem every reason for the strength of engineering influence to be built up in the Royal Society rather than to create some new body whose relationship with the Council of Engineering Institutions would be difficult to define. In any case, scientists and engineers are very closely linked through collaboration in industry with the numbers employed of each not greatly different.

Yours, etc.,

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