Diversification in a Government Laboratory

A year has gone since the Ministry of Aviation and the Ministry of Technology were amalgamated. What follows is an account of how one laboratory has responded.

THE Royal Radar Establishment at Malvern, the largest centre for electronics research in the United Kingdom, is still a defence research establishment. But, like other laboratories run by the Ministry of Technology, it is showing an increasing interest in industrial research. Perhaps a tenth of its effort is now directed in this way, and the defence work is also closely scrutinized to see if it could yield commercial dividends. Is this a sensible policy? The question is worth asking, because the tendency to turn military research establishments into industrial laboratories is being actively encouraged by the ministry.

The move towards civil applications at Malvern has had the official seal of approval for only a year, when it was announced that the Ministry of Aviation was to be merged with the Ministry of Technology. In February of this year, the RRE set up a special industrial unit at Malvern to speed the process—the Industrial Applications Unit, directed by Mr B. W. Oakley. This new unit is the channel through which industrialists can gain access to the establishment, which offers them a consultative service with experimental and research backing. The service stops short of engineering development for production, which is left entirely to industry. So far the developments of the unit show more promise than commercial success, but it is early days yet, and a number of the products may well have a future.

In the radar field, use is being made of the Gunn oscillator, which enables transmitters of radar sets to be reduced in size. The oscillator consists of a slice of the semiconductor gallium arsenide, deposited as an epitaxial layer on a substrate of the same substance. Because of the electrical properties of the material, it acts as a source of microwaves when a potential is applied between the epitaxial layer, which acts as a cathode, and the substrate, which acts as an anode. This dispenses with the need for klystron tubes and bulky power packs, since the gallium arsenide slice is very tiny, and the device operates at a voltage of 6–12 volts. The oscillator, invented in the United States in 1963 by J. B. Gunn, has been used at RRE in a variety of small radar sets. These can be used as burglar alarms, portable speedometers, or very accurate radars for short range work. The Gunn effect can be used to produce very short bursts of microwaves, which enables the small radar sets to distinguish distances as short as three feet at a range of fifty yards. This may be of importance in harbour navigation in dense fog.

Other radar developments look far more sophisticated and more distant than this. One group at Malvern is working on the integration of radar with computers, and is developing systems which can function both as general surveillance or as horizon scanning radars. Another military technique, the use of infrared detectors, is also expected to have civil applications. The detectors can be used in a variety of ways—as flaw detectors in such things as brake linings, or for the detection of breast cancers or circulation deficiencies such as varicose veins. Alternatively the detectors can be used as a form of aerial photography, and provide information about sewage outfalls, or the flows of heated water from power stations. Since the possibilities of the technique were first made public six months ago, more than 100 requests for information have come in from industry.

Malvern also boasts a powerful computer group, entirely devoted to development of software. Two main projects are in progress—the development of a simple language for simple computer applications, and the computer-aided design of micro-electronic circuits. Another development of computers is in the supply of information in the form of displays on a cathode ray tube. This can be particularly valuable to air traffic controllers, who have to handle and correlate large quantities of data, but there is no reason why displays should not be applied to more mundane computer applications such as stock control. By the use of touch wires—essentially switches set into the face of the CRT—the operator can achieve some sort of interaction with the machine, and call up from the data stores such information as he requires.

All these developments are interesting, and possibly profitable. It seems clear that industry has been sniffing round Malvern with increased enthusiasm in recent months. What is not clear yet is whether this inversion of normal industrial policy, with market research following rather than preceding research, can ever work. For one thing, it is likely to prove an expensive way of doing research, both in time and in manpower. Unless industry can tell the RRE exactly what it wants, the laboratory is likely to produce ten developments for every one it manages to sell. An industrial laboratory with this sort of record would soon be shut down, but Malvern will never be subject to the full rigour of industrial competition.

This is really the fundamental problem. It is agreed that one of the problems of British industry is the long gap between discovery and commercial application. As Dr Glazier, Director at Malvern, puts it—"It is well known that the development cycle (research to in-service) for modern systems for defence can extend over many years, and civil systems of any magnitude are not likely to be much different". But they must be different if British industry is to shake off its unhappy reputation for getting to the answer too late. On the face of it, it seems unlikely that a division of responsibility between research and production will help. It may well be a positive hindrance. Without in any way maligning government establishments, it is certainly true that they lack the commercial drive which is a characteristic of the best industrial laboratories.

At Malvern itself, there is marked enthusiasm for the new approach. Dr Glazier draws a parallel between Britain's wartime position and her industrial position now, and hopes that RRE has as significant a part to play in the second as it did in the first. Mr Oakley says that enthusiasm is such that it has become difficult to find the men and the money to do all the things industry would like him to do. "But the important effect," he says, "has been to the defence work. The attitude is now completely different." Dr Glazier makes the same point—"We're trying hard to ensure that defence work useful to the economy is not overlooked." This is fair enough—as long as there is a need for defence research, it should be supported, and any industrial benefits can be considered as happy but unplanned accidents. Real industrial research is a very different problem.

Much will depend on the detailed arrangements. Although in the short term the industrial applications unit will be handling projects begun under defence contracts, ultimately it will have to initiate new projects intended solely for commercial development. When this happens it will be important to insist that industry is involved right from the start, and preferably on a sponsorship basis, so that it has a financial interest in seeing the project through quickly. And it may be better if Malvern restricts itself to research of a fairly basic kind—the supply of critical data, for instance—if it is to avoid problems of commercial secrecy.