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1  
Prime Minister

Ref. A083/2531

PRIME MINISTER

Yes not

Agree to this  
draft response, which is  
largely the work of Robin  
Nicholson. You need not look  
at it in any detail.

It s/g

House of Lords Report on "Engineering R and D"

(Agreed) The House of Lords Select Committee on Science and Technology published a report on "Engineering Research and Development" on 22 February, the conclusions and recommendations of which are summarised on pages 68-72. A copy is attached, together with a draft Government response.

2. While many of the report's recommendations were addressed to the then Department of Industry, a number involved the interests of other Departments. Preparation of the response was therefore co-ordinated by Dr Robin Nicholson, using the machinery of the Sub-Committee of Chief Scientists.

3. The Select Committee report was not of the highest quality. It recommended a national strategy for technology and manufactured products which would run completely counter to the Government's view that market considerations should guide the support of technological developments and new products. And many of its recommendations failed to acknowledge initiatives that the Government have already taken. A low-key response has therefore been prepared, significant elements which have already been made public through Lord Cockfield's speech in reply to the House of Lords debate on the report on 4 July.

4. If you and other Ministers are content with the draft response, it would seem appropriate, given the Department of Trade and Industry's major interest in this subject, for the Secretary of State for Trade and Industry to send it as a memorandum to the Chairman of the Select Committee under a covering letter and subsequently, with the agreement of the Chairman, to make the response public.

5. I am sending copies of this minute and the draft response to the Chancellor of the Exchequer and to the Secretaries of State for Education and Science, Energy, Defence, the Environment, Employment, and Trade and Industry, to the Chancellor of the Duchy of Lancaster, and to the Secretary of State for Transport.

7 September 1983

RTA

ROBERT ARMSTRONG

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PLS JH  
CT.

10 DOWNING STREET

*From the Private Secretary*

12 September, 1983

The Prime Minister has now seen Sir Robert Armstrong's minute of 7 September with which he enclosed a draft response to the Report of the House of Lords Select Committee on Science and Technology on "Engineering Research and Development". Subject to the views of Ministers, the Prime Minister has agreed that the response may be made public in the way proposed in the minute.

TIMOTHY FLESHER

R. Hatfield, Esq.,  
Cabinet Office

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Chancellor of the Duchy of Lancaster

Prime Minister (4)

MS 14/9

PRIME MINISTER

## HOUSE OF LORDS REPORT ON "ENGINEERING R AND D"

1. The draft produced by Sir Robert Armstrong covers the ground very adequately and very well.
2. I am not too happy however about the way that paragraph 4 is drafted ("The Government therefore seeks the same ends as the Select Committee but, as detailed below, has reservations over some of the particular means proposed by the Committee.") This is entirely correct: but it leaves the reader with the impression that he is now going to be faced with 20 pages of criticism. This would be an unfair reaction as in fact a great deal of what is said in the rest of the response details specific measures the Government has taken to help.

I had the same problem when I came to draft my own speech. The only way of overcoming this difficulty involves some repetition; but a degree of tautology is better than leaving Lord Gregson or his colleagues feeling that we are unappreciative of their efforts. I suggest:

"The Government therefore seeks the same ends as the Select Committee. They have reservations about some of the specific proposals made by the Select Committee. But there are many areas where they share the Select Committee's approach."

3. Gregson is an engineer, not a scientist and the same is true of most of his Committee. The engineers feel that they have lost out compared with the scientists and this has coloured their Report. It is not necessary to deal with this point in the response. But it does shed some light on the bias which sometimes intrudes in the Report.
4. I am copying this minute to the recipients of Sir Robert Armstrong's minute of 7 September and to Sir Robert.

A.C.

A C

14 September 1983



Parliament : House of Lords  
Select Committee  
on Science + Tech  
+ Engineering

Nov 77.

©  
unclassified subject

11 SEP 1977





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JU553

Secretary of State for Trade and Industry

Sir Robert Armstrong  
Cabinet Office  
70 Whitehall  
SW1

26 September 1983

Dear Robert,

NBRM

ms 27/9

HOUSE OF LORDS REPORT ON ENGINEERING R&D

Thank you for sending me a copy of your minute of 7 September to the Prime Minister with the draft response to this report.

2 I am content with the text, with the exception of paragraph 25 which includes a reference to DTI and MOD considering jointly financing a study by management consultants into ways of enhancing technology transfer to the civil sector. The case for this study is still not agreed between the two Departments. My officials and those of the Ministry of Defence have agreed a draft to replace the current text and I understand that the Secretary of State for Defence will be writing to you about this shortly.

3 I would be happy to sign a covering letter to the response as you suggest if the Prime Minister agrees.

4 I am sending copies of this letter to the Chancellor of the Exchequer and the Secretaries of State for Education and Science, Energy, Defence, the Environment, Employment, the Chancellor of the Duchy of Lancaster, and to the Secretary of State for Transport.

Yours Ever,  
Neil



PARLIAMENT: House of Lords (the  
in Sci + Tech  
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DRAFT

GOVERNMENT RESPONSE TO THE HOUSE OF LORDS SELECT COMMITTEE  
ON SCIENCE AND TECHNOLOGY REPORT  
"ENGINEERING RESEARCH AND DEVELOPMENT"

PREFACE

- 1 The Government has given careful consideration to the recommendations of the Select Committee. This memorandum responds to each recommendation, but in order to avoid repetition, the recommendations have been grouped under common themes; the heading of each section indicates the numbers of the recommendations addressed in the subsequent text.

OBJECTIVES (Recommendation 1)

- 2 The Government fully endorses the Select Committee's view that the United Kingdom cannot do without a vigorous, competitive and successful manufacturing sector. It agrees that an important element in such competitiveness is a sustained R & D effort. And it entirely supports the Committee in its statement that the first essential for such R & D is real profitability in industry, coupled with a climate of confidence that encourages investment and innovation. The economic policies followed by Government over the past four years have had, as an objective, the creation of just such a climate.
- 3 The Government has initiated and expanded many schemes to provide financial assistance for the development and application of new technology, some of which have reflected recommendations in reports from the Advisory Council for Applied Research and Development (ACARD) and other bodies. It has also responded to the proposals in the report of the Finniston enquiry (Cmnd 7794) into the engineering profession, and it has pursued a vigorous programme to encourage public purchasing agencies to

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use their purchasing power to promote the competitiveness of British products.

- 4 The Government therefore seeks the same ends as the Select Committee but, as detailed below, has reservations over some of the particular means proposed by the Committee.

SELECTIVITY AND STRATEGY (Recommendations 2-4)

- 5 The Committee recommended that the Government should devise a national strategy for industry and technology, which would designate those sectors and technologies on which industry should concentrate. Through the National Economic Development Office (NEDO) and with the advice of bodies such as ACARD, R & D priorities would then be drawn up and a more selective approach, supported by resource allocations, public purchasing decisions, etc, pursued.
- 6 While accepting that this country cannot expect to be pre-eminent in all sectors of manufacturing, the Government cannot agree with this approach. In the Government's view, primary responsibility for decisions about the products to be marketed, and the R & D necessary to obtain those products, must rest with industry itself, which alone can respond to market forces and identify technological areas and products which show the most commercial promise. When firms are unable to commit sufficient resources to implement their product decisions, Government can and does provide support, through for example the "Support for Innovation" programme of the Department of Trade and Industry (DTI). Moreover, it has indicated general areas of technology which it believes to be of major importance in the future - information technology and biotechnology, for example - and has promoted initiatives such as IT Year to draw to the attention of both customers and suppliers of IT products the need for appropriate investment in new technology. It is then up to individual firms to decide how they can exploit the market opportunities thus opened.
- 7 DTI support for the development and application of new technology has been recently strengthened and expanded. It focuses on "enabling" technologies



which can be applied across a wide range of industries and to a large number of products. The programmes can be deployed flexibly to support firms with worthwhile applications in any sector.

8 In developing these programmes, the Government has taken into account the advice received from ACARD, Requirements Boards, NEDO and other bodies and it will continue to look to such bodies - and to the Select Committee - as sources of informed advice. The Government notes the Select Committee's proposal that the Fellowship of Engineering should undertake relevant studies.

9 The Select Committee will know that, in response to their previous report "Science in Government", the Government has introduced measures to ensure that its own R & D expenditure is appropriately deployed. There is to be an annual review of research, conducted as part of the Public Expenditure Survey (PES) cycle, with advice from ACARD. In addition, the Chairmen of ACARD and the Advisory Board for the Research Councils (ABRC) have been invited to prepare periodic joint reports commenting on scientific and technological opportunities and reflecting the outcome of the annual reviews. These measures will add to the Government's effectiveness in supporting industry's decisions.

10 The Government has placed emphasis on the role of public purchasing in promoting the competitiveness of UK products and encouraging the development of new technology. Guidance to assist Departments in carrying out the Government's purchasing policy was issued by the Treasury in 1981. Funds are available, within the "Support for Innovation" programme, to assist the introduction of new products and processes by UK public sector bodies. A major development of this concept has been the "Office of the Future" programme in which advanced office technology systems have been sponsored in 21 public sector locations in order both to provide showcases for their suppliers and to help create an informed market amongst users. This programme is budgeted at £6 million. More generally, "pre-production" orders provide a valuable means of introducing new technology to potential users. These finance the initial placing of new, untried equipment with



users who purchase it later if it proves successful.

PUBLIC FUNDING FOR INNOVATION (Recommendations 5, 12(i) - (vii), 13, 14, 26 - 29, 32)

Levels of support (Recommendations 5, 12(i), (iii) and (vi))

- 11 The Government welcomes the Select Committee's endorsement of the "Support for Innovation" programme. The higher rate of grant (33 1/3 per cent) introduced in 1982 is being continued for a further year and the resources available to the scheme have been increased substantially. Between 1978/79 and 1982/83, the sums spent by the DOI in support of R & D in industry increased from £36.5 million to £122 million and there is provision for spending about £200 million in 1984/5. The scheme is now being marketed more intensively and this has led to an increase in the number of applications. The Government has therefore demonstrated its willingness to support projects with sound commercial prospects and in particular those that would lead to internationally tradeable products but it believes that companies must also show their confidence by providing a substantial part of the funds; they must also be able to finance the subsequent exploitation of the results of the project. The Government cannot accept the Committee's proposals for 90 or 100 per cent funding for work of this type. It does however recognise that public funds may have a particular role to play in the support of long term R & D and in bridging the gap between basic research and industrial application. The Research Councils already fund basic research in higher education institutions (HEIs) at the 100% level. A variety of mechanisms exist to transfer the results of such work to industry by co-operative ventures and the Government's recent broad endorsement of the Alvey Committee proposals demonstrate its willingness to work with industry in this way. The Select Committee's call for a substantial increase in support for engineering R & D must be seen against this background.
- 12 The Committee, in commenting on such long-term projects, expressed the view that they were unlikely to be undertaken except by a relatively few profitable companies and recommended that companies should be encouraged



to form consortia, either on an international basis or within this country. The Government agrees that co-operative arrangements can be an appropriate way to finance large scale R & D. Such arrangements present obvious difficulties, however, even within the same country, and these difficulties could be much greater at the international level. It is essential that commercial judgement should predominate and where firms do wish to proceed in this manner, the Government welcomes such developments. DTI Research Requirements Boards have sometimes been able to stimulate the creation of consortia in order to undertake a development. There are many successful "club" arrangements in DTI laboratories and elsewhere. DTI and other Departments support the Research Associations. The European Community can play an important part in promoting co-operation, and the Government welcomes the valuable work of the ESPRIT programme, a collaborative research programme in R & D between major electronics firms.

Conditions of support (Recommendations 12(vii), 29, 32)

- 13 The Committee's report draws on experience of the Government support schemes going back several years. In the last year or so, DOI has reviewed and streamlined application procedures considerably, particularly for applications from small firms for assistance with small projects. DOI guidance notes now say that projects below the £25,000 threshold are welcome from small firms and decisions on such applications have been delegated to Regional Offices. The Small Firms Service is an information and counselling service only and is not set up to handle applications for grants, although where appropriate it helps small firms to prepare their applications. In general, average appraisal times have fallen from around six months in 1979 to around three months now and are still falling. Urgent cases can be processed more rapidly if necessary.
  
- 14 In order to ensure that the limited amount of public funds available for R & D are put to best use, the Government considers that the "additionality" criterion should remain. The intention is that the Government's contribution should lead to action over and above what would otherwise happen, for example, to help a small company undertake a project it would otherwise find difficult to finance or to ensure that a project



is completed more quickly. The arrangements for assessing additionality have been streamlined, particularly for smaller projects, and so it should not constitute a major obstacle. The "no prior start rule" stems from the additionality criterion. It means that a company should not start on those parts of the work for which it is seeking assistance. There is no bar to carrying out feasibility studies or preliminary stages of an R & D project in advance, although these would not be eligible for grant.

- 15 The rule debarring support for parallel projects is criticised by the Committee. The Government's view is that it is inappropriate for public funds to be used in competing projects. In general, the first project that is received that is of acceptable standard would be supported; related proposals might receive support if they prove to be significantly different or aimed at another market, or would help another UK company break into an important market.
- 16 As for the risk associated with the projects receiving Government support, the application of the additionality rule ensures that Government is not funding projects able to attract sufficient commercial support and therefore the risk element is greater.
- 17 DTI keeps its procedures for handling applications under review and had already made changes or clarified the guidance notes in areas covered by the Committee. The Government is not therefore persuaded that further changes are needed.

The organisation of support (Recommendations 12(ii), 26, 28)

- 18 The Government agrees with the Committee that, even when supported by public funds, industrially-relevant applied research and product development should be carried out, as far as possible, in industry itself. This policy has been vigorously implemented by the DTI through a substantial reduction in real terms in its expenditure at its own Research Establishments with a corresponding increase in the amount spent directly in industry. (A similar policy has been pursued in the Ministry of Defence, see paragraph 28.) Furthermore, DTI Establishments are encouraged



to provide services to industry where these are not in competition with the private sector. There are also important functions which Government laboratories should perform in support of industrial engineering. These include the maintenance and dissemination of measurement standards, longer term applied research and the provision of generic technology, and work to support Government technology policy. The research programmes of many of the Government's civil research establishments are already reviewed under arrangements which provide strong industrial and academic advice.

- 19 The Committee consider that a separate Engineering R & D Council would not be desirable; the Government concurs with this view. Requirements Boards advise on the support for the development of new products and systems, acting in response to the market perceptions of firms. DTI frequently reviews the role and operation of its Requirements Boards to take account of changing technical circumstances.

Demonstration projects (Recommendation 12(v))

- 20 The Government agrees with the Committee on the value of demonstration projects. In defence, technology demonstrators have often performed a useful role in showing how technologies may be applied before project development is initiated; examples include gas turbines and electronic sub-systems. Demonstration projects have also been widely used in industrial energy conservation where there has been the Energy Conservation Demonstration Projects Scheme administered jointly by DTI and the Department of Energy.

Research Associations (Recommendations 12(iv), 29)

- 21 The Committee suggested that Research Associations (RAs) should be able to receive funds from SERC. This would run counter to the Council's principal role of supporting HEIs. However, RAs may be the industrial partner in collaborative research programmes carried out with a HEI.
- 22 The Committee also suggested that Requirements Boards might support more "common ground" R & D. The Boards already support a large programme of



generic research, notably at the RAs, and this has increased in real terms over the last decade. DTI is reviewing its support for RAs and has already introduced a simpler system of funding for basic research.

Nationalised Industries (Recommendation 27)

- 23 The Government agrees with the Committee that the private sector should undertake a greater share of the R & D which is presently carried out by the nationalised industries. This is in line with the findings of the ACARD report on R & D for public purchasing, which the Government strongly endorsed. The Government understands that ACARD will be setting in hand the review of the impact of its report, recommended by the Committee. However, it is recognised that the private sector may have difficulty in performing some of the research carried out by the energy industries in direct support of their operations.

Interaction between defence and civil research (Recommendations 13, 14, 28)

- 24 The primary purpose of the Defence R & D programme, including the work of the Defence R & D Establishments, is to support the procurement of the weapons and equipment needed for the Armed Forces in a timely and cost-effective manner. The Government continues to seek ways of promoting the transfer of technology from defence to the civil sector. The circle of firms eligible to compete for defence contracts is already very wide; the essential criterion is not size but competence to undertake the work in question. At any one time the Ministry of Defence (MOD) has direct contracts with over 10,000 UK companies and the number of sub-contractors involved in these contracts will be substantially greater. MOD have nevertheless been seeking additional ways in which the results of defence R & D can be put to wider use.
- 25 Following the informative discussion at an MOD seminar on defence spin-off in July 1982, which brought together industrialists, entrepreneurs, defence scientists and officials, MOD and DTI are considering jointly financing a study by management consultants into ways of enhancing



technology transfer to the civil sector. With the same objective, the two Departments are undertaking studies into the extent to which defence patents and technical reports can be made available to a wider audience. DTI is rewriting a number of MOD patents in the Tech Alert format so that they can reach a wide audience and generate enquiries from potential licensees. (Tech Alert is an information service operated by DTI, by which firms may find out about exploitable technical information produced by R & D in the public sector.)

- 26 In discussion with contractors, MOD always emphasises the advantages of investing in modern production equipment which may then be available for civil uses. Further encouragement for such investment would come from the acceptance of a Government proposal to the Review Board for Government contracts, for the introduction of incentive schemes whereby a contractor would share in the savings resulting from investment in improved methods of manufacture.
- 27 Some 70 per cent of expenditure on defence R & D is already extramural. The MOD is continuing to devolve design, development, project support and post design services to industry, wherever practicable and appropriate, on the lines recommended in the Strathcona Report, 1980 (MOD Defence Open Document 80/35 June 1980). The Government does not believe that complaints of over-classification of defence research are justified. The classifications attached to defence technology are kept to the minimum necessary to meet essential security requirements.
- 28 In addition to the MOD's internal review machinery, oversight of the overall Defence Research Programme is undertaken by the Defence Scientific Advisory Council and its constituent committees, whose members are drawn from universities, other research organisations and industry. Research in particular sectors of the R & D programme is overseen by joint MOD-industry Committees, such as the Joint Research Committee (Aircraft and Aero-engines) and the Joint Committee for Avionics and Systems Research. Detailed scrutiny of particular programmes is discharged by joint MOD-industry Research Consultative Committees, whose members have specialist knowledge in the relevant areas.



## PRIVATE FUNDING FOR INNOVATION (Recommendations 6 - 11)

- 29 The Committee made several recommendations designed to stimulate the flow of private funds into R & D and the development of new technology generally. The Government fully supports this objective and through its general economic policies has sought to create the conditions in which such flows are encouraged. The Committee pointed out that high interest rates were a disincentive to risk investment in R & D; a key objective of the Government has been to reduce interest rates through restraints on public expenditure and other monetary measures. The resulting fall in interest rates, with the fall in inflation, has encouraged just the investment that the Committee wish to see.
- 30 The Committee's suggestion that some development expenditure could be funded separately from the main balance sheet of a company has previously been considered both by the Bank of England and the National Economic Development Council Committee on Finance for Industry, which is in the course of examining the idea against the background of specific projects which firms abandoned or deferred as a result of financial pressures. These studies have suggested that there are cases where a project with the prospect of a good commercial return may be deferred as a result of balance sheet constraints. On the basis of detailed discussion with companies, several specific projects have been identified which are now being examined with a small number of financial institutions to establish whether there is scope for separate funding of such ventures. There is already some experience of off-balance sheet funding of development expenditure. The National Research Development Corporation, now part of the British Technology Group, has for some time provided joint project finance, whereby it shares development costs incurred by a company in return for a levy on eventual sales of the product.
- 31 The Committee suggested that a development fund, offering tax incentives to investors, might be a desirable instrument for channelling private sector money into a range of high risk projects in existing industrial companies. The Business Expansion Scheme (previously known as



the Business Start-up Scheme) offers very generous tax relief to individuals for new, full-risk, equity investment in a wide range of established, unquoted trading companies with which they are not otherwise connected, as well as for equity investment in qualifying start-ups. Relief is available to individuals who invest in qualifying companies directly, or who invest through an approved investment fund acting as their nominee. Such funds give investors a spread of risk over a range of companies although the individual investor remains the beneficial owner of the shares. The success of the extended Scheme, and particularly its take-up in relation to R & D ventures, will be closely watched by the Government.

- 32 The Government notes the Committee's suggestion that Government financial assistance to industrial R & D should be selective rather than through general tax provisions. In practice, the Government's direct aid for R & D (through DTI schemes) is selective, but it is not feasible to apply this principle to taxation and tax allowances for R & D expenditure will continue to be non-selective. The Government intends to maintain the favourable fiscal regime for investment in R & D which it has established.
- 33 The Committee considered that a useful step in the creation of an environment favourable to R & D investment would be a requirement that companies should, in their annual reports, include a statement of their R & D expenditure, and recommended that the Department of Trade should discuss with the accountancy profession how to establish a requirement for this disclosure. Companies are, of course, quite free at the moment to disclose their R & D expenditure, as the Committee suggest, if they believe that it will enhance their reputation, and several companies already do this. The Government would certainly wish to encourage an investment climate in which such forward-looking expenditure was taken fully into account, but is not persuaded that a statutory requirement is the best way forward.
- 34 The last three years have seen significant changes in the legal framework governing company accounts. In particular, the Companies Act 1981 introduced a number of new reporting requirements as well as new



accounting formats and valuation rules as required by the Fourth Company Law Directive of the European Community. In formulating this legislation, the Government took the view that companies should be given the maximum flexibility to present information in a way most suited to their circumstances and that, given that the Fourth Directive required the introduction of a number of new disclosure requirements, further requirements such as that proposed would add unduly to the burdens imposed by the legislation on business. The Government sees no reason at present to change its basic approach.

- 35 The Government agrees with the Committee that efforts should be made to ensure that information about private sector sources of development finance should reach those who need it. The Bank of England have already given this considerable attention, through for example the publication of the booklet "Money for Business". This has been promoted through direct mailing to ensure that even the smallest firms have readily to hand a comprehensive guide to the methods and sources of funding available. A fourth edition is planned for publication in July. The Government does not therefore consider that a further initiative is warranted. DTI regularly participates in and helps to organise and promote seminars on sources of finance, from both private and public sectors, for R & D projects. These are organised by financial institutions, accountancy firms and bodies such as the Confederation of British Industry and are directed towards bankers, accountants, companies etc. DOI's Joint Appraisal Scheme is directed at bringing private sector finance into projects to supplement support available from Government sources and is being more intensively marketed.

MANAGEMENT (Recommendations 15 - 18, 33)

- 36 As the Select Committee pointed out, management issues must primarily be matters for individual firms. However, following the report of the Finniston enquiry Government facilitated the establishment of the Engineering Council. This should enhance the standing of professional engineers and consequently strengthen their position in the management of companies. The Government is pleased to note the Committee's welcome for the Council.



- 37 The Government agrees with the Committee's recommendation that small firms should be encouraged to appoint specialist non-executive directors to improve the performance of boards by bringing a fresh and wider view. Whenever suitable opportunities arise, small firms are encouraged to take such action, and to consult appropriate agency services to obtain advice on such appointments.
- 38 The Committee recommended that management should expose their young engineers more extensively to foreign expertise. SERC's Industrial Visiting Fellowship scheme is designed precisely to fill the need identified, and there is scope for expansion of this scheme in response to good applications. In addition DTI has recently set up its own Visiting Engineers Scheme to help with the costs of sending engineers to Japan.
- 39 Such schemes promote awareness of overseas technology. The Government agrees with the Committee that management should take full account of the possibilities for buying-in appropriate technology, especially from overseas. DOI already provides information to firms through the Overseas Technical Information Unit (OTIU) which receives reports from the network of Science Counsellors in major overseas posts. A pilot scheme has recently been introduced whereby British Council Science Officers (covering Brazil, Colombia, Denmark, Egypt, Finland, India, Italy, Mexico, Norway, Saudi Arabia, Spain, Sweden and Turkey) reinforce the network. Several commercial agencies can also help firms to find new products or new technology from overseas. The costs of licensing-in technology from overseas (provided that there will be a significant enhancement of it in the UK) are allowable in development projects under the "Support for Innovation" scheme.

EDUCATION AND INDUSTRY (Recommendations 18-25)

- 40 Various actions are in hand in response to the recommendations of the Finniston Committee (on the status and training of engineers, and changes in schools) which the Select Committee endorsed, and with which the Government is also broadly in agreement. In his statement on the



education and training of engineers in July 1981, the Secretary of State for Education and Science gave support to greater emphasis on engineering in schools.

- 41 The Government agrees that the needs of industry should be fully reflected in schools. In their policy statement "The School Curriculum" (March 1981) the Secretaries of State for Education and Science and for Wales made clear that it is a major function of schools to prepare children and young people for all aspects of adult life, and emphasised the importance of strong links between schools and industry; they also stressed the need for more attention to be paid to practical applications in the teaching of school subjects - a theme taken up again in the consultative paper "Science Education in Schools" (June 1982) and in the report of the Cockcroft Committee on the teaching of mathematics. More recently, the Government announced a technical and vocational education initiative which will enhance and develop courses in schools and colleges of further education related to engineering and technology. The Department of Education and Science (DES) provides direct financial assistance for the support of the National Liaison Officer for the Science and Technology Regional Organisations (SATROs) (see also paragraph 48), appointed by the Standing Conference on School Science and Technology. In certain cases DES provides financial support for the development of links between schools and industry.
- 42 The Committee may also know of the work of the DOI Industry/Education Unit, which exists to help young people learn about the importance of industry and commerce. The Unit encourages the introduction of new technology into schools and teacher training courses (the "Micros in Schools" scheme), the development of entrepreneurship in schools and collaboration with the Manpower Services Commission (MSC) (eg in the Information Technology Education Centres and the new technical education initiative). It also encourages industrialists to become more positively involved with the education system.
- 43 The Secretary of State for Education and Science has supported the enhancement of engineering degree courses by the inclusion of the



integrated study of engineering practice, and the continuing training of engineers. Some extended engineering courses are being introduced in universities, and a few selected polytechnics are also being invited to take part in a pilot scheme for extended courses in the public sector. In considering proposals for this pilot scheme, and for other new engineering courses in the public sector, the Government will place emphasis on the need for greater relevance to the needs of industry, in particular by the inclusion of engineering applications components, as recommended in the Finniston Report.

- 44 As regards the research links between HEIs and industry the Select Committee welcomed the study carried out by ACARD and the ABRC. The Government is now considering the recommendations made in that report. The Government, like the Committee, attaches importance to the promotion of close working relations between the engineering industry and science and engineering departments in all types of HEIs, including those outside the university sector. While much of the responsibility for promoting such links rests with individual firms and HEIs themselves, the Government recognises that it has a role in creating a suitable climate for such co-operation to occur.
- 45 There are already encouraging trends. The scope and volume of market-orientated R & D already undertaken by universities was highlighted in 1981 in a report by the Committee of Vice-Chancellors and Principals (CVCP) (Research in Universities, July 1980). The research undertaken by polytechnics is even more market orientated. The steady growth of the SERC's Co-operative Research Grants Schemes and Co-operative Awards in Science and Engineering, and of comparable schemes operated by other Research Councils, is bringing more industrial, market-orientated research into the university laboratory.
46. Both DTI and DES have supported a variety of initiatives designed to foster contacts between higher education and local industries. These include:
- Industrial Units at universities, which provide a consultancy service



for local industries and act as marketing agencies for academic skills.

- SATROs (Science and Technology Regional Organisations), which provide the forum for higher and further education institutions, schools, industry and commerce, and undertake a range of activities linking the interests of a local community.
- The Teaching Company Scheme, jointly funded by DOI and SERC, which aims to develop active partnerships between HEIs and manufacturing companies. These usually have a strong local interest.
- The DTI Microprocessor Applications Programme scheme which has a number of HEIs acting as consultants for industry and commerce.
- DTI award schemes, such as EPIC (Education in Partnership with Industry or Commerce) which aim to stimulate and reward successful co-operation between HEIs and companies.

47 The Committee expressed support for schemes, such as the SERC/DOI Teaching Company Scheme and sandwich courses, which bring young engineers and HEIs closer together. The Teaching Company Scheme is now expanding rapidly; the 100th programme was announced on 12 May by the Secretary of State for Industry. The success of early programmes in electrical and mechanical engineering has encouraged diversification into other manufacturing areas, including biotechnology and microelectronics. As for sandwich courses, Government shares the commitment of many HEIs and industry to this principle, and is concerned at the current shortfall of some 3,000-4,000 industrial placements for students. It is aware that many institutions would wish Government to provide financial assistance to companies who take students. Under the MSC's scheme of grants to employers in the fields of engineering, technology and computer science, financial support for 2,250 placements has been made available this year. The general question of industrial placements needs to be considered against the background of the costs and benefits of this type of education and prospect that the shortage of industrial places may be long term, particularly as there are competing claims for industrial training places. DES, in association with



DOI, the Department of Employment and the MSC, is financing a programme of research into sandwich courses to help to decide whether further provision might be justified.

48 Further initiatives to improve the links between higher education and industry include the 'Young Engineer for Britain' competition, which has been run by the DOI for the past seven years and is now to be administered by the Engineering Council. The competition aims to encourage the creative and entrepreneurial talents of young engineers in schools, colleges, polytechnics, universities and industry, and to provide them with an insight into the worlds of industrial and commercial application. Also, SERC is placing more emphasis on modular Advanced Courses and has initiated the Integrated Graduate Development scheme (which combines academic and industrial training for new graduates) and Industrial Postgraduate Studentships. In addition, the Council is supporting experiments in continuing education to improve the mid-career capability of engineering staff.

49 As for science parks, the Government agrees that, in appropriate circumstances, they can make a positive contribution and prove a valuable means of stimulating contact between HEIs and local firms. Currently, companies locating in a science park can and do take advantage of the assistance available under the DTI's Support for Innovation schemes. The Government is examining what further efforts of various types might be made with the aim of improving the liaison between HEIs and industry.

50 The National Advisory Body for Local Authority Higher Education (NAB) has been considering how research might be fostered in the local authority sector of higher education; it has issued a discussion paper (The Funding of Research Activity, April 1983) proposing the selective distribution of an element of the Advanced Further Education pool to provide certain institutions with a basic level of funds for research activity. The Government will be considering advice in the Autumn from the NAB in the light of this consultative exercise.

51 The Committee considered that there was a need for more centres of high



technology resembling the Cranfield Institute of Technology and recommended that at least six HEIs should be specifically earmarked to support contract research. As will be clear from preceding comments, the Government endorses the importance of industry placing more research work in HEIs, with institutions responding fully to the needs of industry. However, it does not consider that the designation of specific centres would achieve the desired objective: it believes that excellence should be encouraged and supported wherever it is found. A wide range of institutions are capable of undertaking developments of high technological importance. Moreover, some of the recommendations in the ACARD/ABRC report on the links between HEIs and industry, if accepted, would have the effect of reinforcing success in contract research and go some way towards providing the concentration of resources that the Committee seeks.

- 52 The Government, like the Committee, is in favour of exchanges of staff between universities and industry. The Royal Society/ SERC Industrial Fellowship scheme is designed to promote such exchanges and the ACARD/ABRC report currently under consideration makes a number of detailed suggestions for ways in which mobility of staff between HEIs and industry may be increased. Government welcomes all attempts by institutions to create greater interaction by secondments and exchanges, different forms of employment contract, the employment of industrial staff on part-time appointments etc. The Committee referred to obstacles to mobility caused by superannuation arrangements; these apply more widely than simply in this area, and any solution would have to be similarly broad in its application. The Government is anxious to remedy this problem and has asked those concerned with occupational pension schemes to improve the arrangements for people who transfer from, or leave, employment before retirement.

INFORMATION AND ADVISORY SERVICES (Recommendations 30 and 31)

- 53 The Government agrees with the Committee that continuing efforts should be made to ensure the effective dissemination of R&D information. DOI's Manufacturing Advisory Service (MAS) has been complemented, since June 1982, by a Small Firms Technical Enquiry Service providing small firms of



fewer than 200 employees with up to 5 days' free consultancy advice. The recent Budget contained provision for an extra £20m to be spent over the next 3 years on MAS, on consultancy arranged through the Design Advisory Service and on the Small Firms Technical Enquiry Service (SFTES). The Government accepts that better publicity of schemes of assistance for small firms is needed. In March 1983, DOI launched a major publicity campaign with this in mind which has generated considerable interest. DOI have also agreed to a request from ACARD to provide a review of the current mechanisms for dissemination of research and development information so that the Council can, as requested by the Committee, consider the adequacy of existing arrangements.

R & D STATISTICS (Recommendation 34)

54 The Committee criticised the lack of up-to-date statistical information on industrial R & D expenditure and recommended an annual survey. While recognising the value of up-to-date statistics, this has to be set against the burden imposed on the firms from whom the information is sought. The Government has endeavoured to reduce such burdens and does not favour the addition of an annual R & D survey: moreover major firms have expressed considerable opposition to the proposal.

55 However, consideration is being given to the possibility of changing to a four-yearly benchmark survey supplemented by a less detailed survey at intervening mid-points. Industry has already been consulted on this proposal which would produce estimates of major R & D aggregates every two years. There are, though, limits on the speed with which the results of such surveys may be assembled. Respondents must be able to provide returns related to an accounting year, and this can end as late as 31 March following the year of the inquiry. The full accounts needed before the R & D questionnaire can be completed are often not available until six months after the accounting year ends.

CONCLUDING COMMENTS

56 This memorandum has shown that the Government and the Select Committee



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share the same overall aim and that many of the measures proposed by the Committee are already incorporated in existing or proposed measures to stimulate and support engineering R & D. The Government has made clear its commitment to the development and application of new technology in all sections of the economy. It will maintain this commitment in the policies to be presented to the new Parliament. The Government would reiterate, though, that the principal incentive to investment in R & D is confidence in the underlying strength of the economy, and stability in market prospects. Since 1979, its policies have been designed to promote just such confidence, and an environment in which firms, responding to market forces, may make their own decisions on R & D and can finance such R & D out of normal business profits. The benefits of these policies are now beginning to show, and the Government looks forward to increasing investment in R & D by the private sector, which it will continue to reinforce through the measures outlined in this memorandum.

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