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The Finniston Committee of Inquiry into the Engineering Profession.

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TO BE RETAINED AS TOP ENCLOSURE

Cabinet / Cabinet Committee Documents

Reference	Date
E(80) 30th Meeting, item 1	06/08/1980
E(80) 87	04/08/1980
E(80) 10th Meeting, item 1	17/03/1980
E(80) 25	13/03/1980

The documents listed above, which were enclosed on this file, have been removed and destroyed. Such documents are the responsibility of the Cabinet Office. When released they are available in the appropriate **CAB** (CABINET OFFICE) CLASSES

Signed J. Gray Date 20/8/2016

PREM Records Team

Published Papers

The following published paper(s) enclosed on this file have been removed and destroyed. Copies may be found elsewhere in The National Archives.

Cmnd 7794 - ENGINEERING OUR FUTURE
Report of the Committee of Inquiry into the Engineering Profession
Chairman: Sir Montague Finniston, FRS
Presented to Parliament by the Secretary of State for Industry by Command of Her Majesty, January 1980
Published by HMSO – ISBN 0 10 177940 2

Signed J. Gray Date 20/8/2016

PREM Records Team

Prime Minister 2 P.U.

RRC6 4/4

MR GRAY

3 April 1990

THE ENGINEERING PROFESSION

The Prime Minister might be interested to know that the Institution of Production Engineers (incorporated by Royal Charter) is changing its name to the Institution of Manufacturing Engineers and hoping to merge next year with the Institution of Electrical Engineers to create a new professional body with around 140,000 members - easily the largest body of its kind in the UK.

The Institution of Production Engineers argues that this could be the catalyst for a change which would ultimately produce a unified engineering profession in a single institution or society; and its aim is to integrate the management of the manufacturing system with product design and market demands. It takes the view that the production engineer has to be responsible for the whole product - design, manufacture, customer support etc.

If this move does gain momentum it would bring the UK engineering profession more in line with the US and Japanese structures and remove barriers to the flow of information and training which many manufacturing companies certainly regard as artificial and quite outdated.

The man who is driving this forward is the President of the Institution of Production Engineers, Frank Turner, who is a director of Rolls Royce (civil engines).

Howell Harris Hughes

HOWELL HARRIS HUGHES

JU441

Mr Langdale MM 30/7
Ind Pol.

DEPARTMENT OF INDUSTRY
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Secretary of State for Industry

28 July 1981

The Rt Hon Lord Soames CH PC GCMG GCVO CBE
Lord President of the Council
Civil Service Department
Whitehall
London SW1A 2AZ

MBPM 7/8

Dear Christopher.

30/7

THE ENGINEERING COUNCIL

I enclose a draft Royal Charter to establish a body for the promotion and development of the knowledge and best practice of engineering to be known as The Engineering Council.

2 As you will recall, my predecessor appointed a Committee of Inquiry into the Engineering Profession, under the chairmanship of Sir Montague Finniston, FRS. That Committee, whose Report "Engineering our Future" (Cmnd 7794) was published in January 1980, made far reaching proposals relating to the improvement of the education, training and use of engineers and to the contribution that engineers can make to the prosperity of the United Kingdom.

3 In the Committee's view, their most important recommendation was for the establishment of an Engineering Authority to advance what they called the "engineering dimension" in national economic life, particularly in manufacturing. They considered that such an Authority would be necessary to encourage and co-ordinate the many initiatives, actions and changes in outlook which their other recommendations required of employers, educational bodies, chartered engineering institutions and others. The Committee recommended that their proposed Authority should be established by statute, in practice as another quango.

4 The Government decided, however, that it would be inappropriate for an Authority to be established by Act of Parliament and that an Engineering Council established under Royal Charter would be more appropriate. I enclose the text of my announcement of 7 August last year (Official Report: Written Answers: cols 290-292).

5 A Royal Charter of incorporation would greatly promote the work of The Engineering Council. The enhanced standing of the Council as a chartered body would permit it to exert greater influence and would facilitate its liaison and co-operation

with other organisations, particularly other chartered bodies. Moreover, the prestige bestowed by a Royal Charter would assist the Council to attract members of standing and individuals seeking registration with it and would enable it to fulfil its objectives more effectively.

6 The draft Royal Charter has been prepared after extensive consultations with those concerned. I recommend that the Privy Council advise Her Majesty to grant a Royal Charter to establish The Engineering Council in the terms of that draft or in such other terms as may seem proper.

7 I am copying this letter to the Prime Minister, Geoffrey Howe, John Nott, Jim Prior, Michael Heseltine, George Younger, Nicholas Edwards, Patrick Jenkin, John Biffen, David Howell, Norman Fowler, Mark Carlisle and to Michael Jopling.

Yours ever,

Keith

Official Report: Written Answers: cols 290-292

7 August

Engineering Authority
(Finniston Recommendation)

98. **Mr. Ward** asked the Secretary of State for Industry whether he is yet ready to make an announcement about the Government's conclusion on the Finniston report's recommendation that they should establish an engineering authority.

Sir Keith Joseph: The Government's consultations over the Finniston committee report, and the pattern of responses to it, were outlined to the House on 13 June by my hon. Friend the Under-Secretary of State for Industry. As he said then, the report has been widely welcomed and has shown that there is general concern for seeking improvements in the areas covered by the inquiry. We have discerned also a willingness from every quarter to help make the best use of our national engineering capabilities.

The report's central proposal affecting the Government is the suggested creation of a new engineering authority established by statute, with all the members appointed by the Government. Not surprisingly, this recommendation has been the object of much controversy; many have expressed concern that a body of this kind would represent undue Government interference in the affairs of the engineering profession, and have advocated a body operating under the auspices of the Privy Council through a Royal Charter. I have received several specific proposals from different groups within the profession for a non-statutory alternative to the proposed authority.

There does seem to be a readiness in the profession and among employers and academics to tackle widely perceived deficiencies in the present institutional arrangements for education and training of engineers. It would seem sensible therefore for the Government to facilitate the emergence of a focal point for the engineers, academics and employers to work with the existing institutions to remedy the deficiencies identified by Finniston.

The Government do not propose the establishment of a statutory body. Instead they propose to facilitate the emergence of such a focal point by recommending to the Privy Council that Her Majesty the Queen should be advised to constitute a new body by Royal Charter. The Government, after full consultation with those concerned, would be prepared to nominate the initial members of this body, but only for a limited period. The central responsibilities of the body would be similar to those recommended by Finniston, centering upon the accreditation of engineering education and training and the formal registration of those engineers qualified thereby. However, instead of the new body itself organising accreditation visits and assessments of individual registrants, I would expect this work to be delegated to nominated institutions, the new body simply determining the standards to be applied. The Government would expect the chartered body to become quickly self-financing, but the Government will be prepared to support initial funding.

The necessary arrangements will have to be discussed in detail with the existing institutions and I am authorising officials to enter into discussions with a view to the new body being established later this year.

The Government wish to repeat their thanks to Sir Monty Finniston and his committee for all their hard work in producing this important report, and also to those many people who have put forward their views and suggestions.

LWR 3/8

DEPARTMENT OF INDUSTRY
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Secretary of State for Industry

The Rt Hon Mark Carlisle QC MP
Secretary of State for Education
and Science
Elizabeth House
York Road
London SE1 7PH

27 July 1981

Prime Minister 2

Sir Keith Joseph proposes to announce the setting up of the Engineering Council by written answer on 30 July.

LWR 28/7

Dear Secretary of State

FINNISTON

Thank you for your letter of 21 July about engineering education.

2 I am glad to say that the way is now clear to make an announcement about the Engineering Council. I enclose the text of the written answer to announce this which Michael Marshall will be handling in my absence. I also enclose a copy of the draft Royal Charter.

3 I agree that our two announcements should be co-ordinated and that we should do so by way of two separate written answers on 30 July. Arrangements have been made for a joint Press Conference in Ashdown House at 3.00pm to be taken by Michael Marshall and Neil Macfarlane.

4 I think it important to try to keep fully open the possibility of acquiring engineering qualifications at all levels by part time study. You will see that the draft written answer on the Engineering Council includes a reference to the part time route and I was glad to see a complementary reference in paragraph 10 of your draft answer.

5 I think it would be helpful to add at the end of the first sentence of paragraph 16:

> "and the proposed Engineering Council would maintain a register which recognised all three levels of qualification."

6 In order to make explicit what I am sure we all intend, I hope you will add at the end of paragraph 17:

"in consultation with the proposed Engineering Council."

7 I am sending a copy of this letter and enclosures to the

Prime Minister, Geoffrey Howe, John Nott, Christopher Soames, Jim Prior, Michael Heseltine, George Younger, Nicholas Edwards, Patrick Jenkin, John Biffen, David Howell and Norman Fowler.

KEITH JOSEPH
(Approved by the Secretary of State and signed in his absence)

APPOINTMENTS IN CONFIDENCE

DRAFT QUESTION

To ask the Secretary of State for Industry whether he will make a statement about the proposed Engineering Council.

DRAFT ANSWER

My Rt Hon Friend, the Secretary of State for Industry, has sent the Lord President of the Council a draft Royal Charter which would establish The Engineering Council, and has recommended that the Privy Council advise Her Majesty The Queen to grant that Charter. I have placed a copy of the draft Charter in the Library of the House.

I am very pleased to announce that Sir Kenneth Corfield has agreed to become Chairman designate of The Engineering Council.

The draft Charter provides that the objects of the Council would be to advance education in, and to promote the science and practice of, engineering (including relevant technology) for the public benefit and thereby to promote industry and commerce in the United Kingdom. The Council's task would, therefore, be to advance what the Finniston Report called the "engineering dimension" - to help to harness this country's engineering expertise into the production and marketing of internationally competitive products and into wealth creation.

For this purpose the Government sees the need for the close involvement of employers and senior managers in industries in which engineers and technicians play an important part; of those in the various sectors of the education system concerned with the preparation of engineers and technicians; and of engineers and technicians themselves **and their representative bodies.**

The proposed Engineering Council is intended to be a focal point with which and through which all can co-operate in the national interest. The Council would promote the development of academic

courses and industrial training programmes for new entrants to engineering. Even more important in the short term, as the Finniston Report recognised, would be the task of updating and developing the existing stock of engineers. The Government would look to the Council to ensure that opportunities are available by part time study and continuing education for engineers and technicians to obtain and enhance their levels of qualification and to update their knowledge. By involving all those concerned the Council would seek to ensure that engineers and technicians were better equipped to deal with rapidly changing technologies and that their skills were effectively used to improve the performance of industry.

The draft Charter would require the Council to establish a national register, open to anyone meeting the Council's standards and criteria, with three Sections: professional engineers; technician engineers; and engineering technicians. Within each of these Sections, registration would be at three stages: Stage 1 for those who had achieved appropriate standards of engineering education; Stage 2 for those who had also achieved appropriate standards of engineering training; and Stage 3 for those who had acquired appropriate experience as engineers or technicians.

I am confident that the Council would attach high priority to determining, in collaboration with all those concerned, the standards and criteria for admission to its register. The draft Charter provides that the Council should endeavour to complete this task as soon as practicable and at most within two years.

Under the draft Charter it would be the Council that controlled the accreditation of academic courses, industrial training programmes and arrangements for experience satisfying its standards and criteria. But the Council would use as its agents, to the maximum extent possible, engineering institutions and other bodies which it nominated for this purpose.

The transition period mentioned above would enable those bodies wishing to seek nomination to make any necessary changes in their arrangements.

Many engineers are already registered by the Engineers Registration Board. The draft Charter would safeguard their position by providing that they shall be admitted at Stage 3 of the appropriate Section of the Council's register. The Charter also provides for the Council to admit to its register members of other bodies which the Council is satisfied meet the appropriate standards.

In view of the widespread interest which has been expressed, I should explain what is envisaged would happen to the title of "Chartered Engineer". At present this is granted by the Council of Engineering Institutions (CEI) under its Royal Charter. The discussions with the leaders of the profession have been on the basis that the title should be made available to The Engineering Council at the end of the transition period, although this change would require a Petition to The Queen which would have to be approved by the membership of the CEI. Once the title was available to The Engineering Council anyone on its register as a professional engineer at Stage 3 would then be able to call himself a "Chartered Engineer" provided that he was a member of a nominated chartered engineering institution or an affiliate; or, if there was no such body for the branch of engineering concerned, of a body affiliated to the Council. This latter possibility would cater for new disciplines emerging as a result of new technologies. Any such person who did not wish to join such a body would still be able to indicate that he was a registered professional engineer at Stage 3.

The draft Charter requires that the membership of the Council should provide a reasonable balance amongst those having experience and knowledge of the major areas of industry, the significant engineering disciplines and their learned societies, and those concerend with the education and training of engineers and technicians.

To facilitate the Council's establishment, under the draft Charter my Rt Hon Friend would be responsible for making appointments to the Council for the first three years: he would make such appointments as individuals and not as representatives of any particular interest group. It is envisaged that Sir Kenneth Corfield's appointment as Chairman would run until the end of that period.

After the initial three years, the Chairman and other members (between 15 and 24 in number) would be selected by the Council in accordance with its Bye-Laws. At least one half of the membership would have to have experience as employers or managers of practising engineers and engineering technicians; and the Chairman and at least two thirds of the other members would have to be Chartered Engineers, selected from a list of names put forward by employers organisations, educational institutions or nominated chartered engineering institutions.

The Government would help finance the Council's initial running costs, but the firm intention is that the Council should become financially independent as soon as possible.

The draft Charter is the result of consultation with employers organisations, educational interests, the engineering institutions, trade unions and others. For the Council to be a success, it needs the broad support of the interests concerned. I am confident that everyone would now wish the Council well and that it would be able to depend on their support in order to achieve the improvements in our engineering practice which are so vital to the national interest.

WR 3/7

Prime Minister 4

new Carlisle proposes to answer a written question on the educational implications of Finniston on 30 July, the same day as Sir Keith Joseph's written statement on the setting up of the Engineering Council.

WR 23/7

DEPARTMENT OF EDUCATION AND SCIENCE

ELIZABETH HOUSE, YORK ROAD, LONDON SE1 7PH
TELEPHONE 01-928 9222

FROM THE SECRETARY OF STATE

MS.

Rt Hon Sir Keith Joseph Bt MP
Secretary of State
Department of Industry
Ashdown House
123 Victoria Street
LONDON
SW1E 6RB

21 July 1981

Dear Secretary of State

STATEMENT ON ENGINEERING EDUCATION

I attach the text of a proposed statement on engineering education, agreed inter-departmentally between officials. It deals with the educational implications of the Finniston Report, and the recommendations of the report of the National Conference on engineering education and training last year.

I propose that this statement should be made, in the form of a written answer, before the recess. There would obviously be advantage if it could be synchronised with your own statement on the Engineering Council, to which it needs to make reference. Our two Departments are now hoping that both statements will be made on 30 July, with a joint Press Conference.

I hope you can assent to this plan, and that you are content with the terms in which our statement refers to the Engineering Council. I very much hope that it will be possible to announce our views on Finniston before the recess, since the educational world is impatient for a response to the implications for higher education. I think I would have to proceed with my statement on the 30th even if your difficulties are not resolved and the statement on the Engineering Council has to be further delayed.

I am copying this letter and the text of the statement to the Prime Minister, Geoffrey Howe, Jim Prior, George Younger, and Nicholas Edwards.

Yours sincerely

CM Cagles
(Private Secretary)

MARK CARLISLE
(approved by the Secretary of State and signed in his absence)

STATEMENT ON ENGINEERING EDUCATION

1 Following the Finniston report, my rt hon Friend the Secretary of State for Industry has been taking the lead in discussions about a proposed new Engineering Council while my rt hon Friend the Secretary of State for Employment has been considering with the Manpower Services Commission (MSC) certain training implications. I have been exanining in consultation with my rt hon Friends the Secretaries of State for Scotland and Wales the educational questions and those related to postgraduate training for intending professional engineers.

2 The Finniston report was a landmark in this vital area of national life. Many recommendations affected education and I therefore arranged for the National Conference on Engineering Education and Training (NCEET) to consider and report on these issues. I am most grateful to Mr Dick Morris who chaired the Steering Committee of the National Conference and to all those involved in making it a success and in producing its very clear and compelling report.

3 The questions raised in this debate require consideration and action at different levels in the education system: by engineering departments in institutions of higher and further education, by the institutions themselves - the universities, polytechnics, Scottish central institutions, and colleges of further education - by the examining and validating bodies, by the University Grants Committee, and by the local education authorities. The role of the Government is not to dictate the response of the education system and its component parts, but to give a clear lead by its own approach.

4 At the same time, the message of the Finniston Report, strongly endorsed by the National Conference, was that the formation of engineers cannot be a matter for the education system and the profession alone. Industry must be brought into active partnership in designing courses to meet its own requirements and in co-operating with educational establishments in the conduct of courses, especially those parts of them concerned with giving students practical experience. It was above all to make a reality of that partnership that Finniston proposed the creation of a new body responsible for registration of engineers and the accreditation of their professional formation.

5 [My hon Friend the Parliamentary Under Secretary for Industry is today making an announcement about the proposed establishment of an Engineering Council by Royal Charter]. This Council would have a very important role in promoting developments in engineering studies in the directions proposed by Finniston and the National Conference. It is clear that the education system stands ready and willing to extend a welcome to an Engineering Council, and will collaborate fully with it in the accreditation of courses.

6 As in all other areas, the Government approach these issues with the determination to improve our national economic health within the limits of what we can afford. One of the main messages to come out of the responses to the Finniston report, and the discussion at NCEET, is the need to improve quality rather than to increase quantity. The education service must therefore concentrate its efforts building on existing strengths and developing new strengths to match changing needs. Engineering education of high quality must be available throughout the country for potential engineers of all kinds - professional engineers, technician engineers and technicians.

7 NCEET recognises that the quality of engineering education depends crucially on what the schools can do to arouse the interest and ambitions of pupils, and to equip them with a broad range of knowledge and skills. The Secretary of State for Wales and I are seeking to promote this important function of the schools by the action we are taking in relation to the school curriculum, and we are also encouraging closer collaboration between schools and industry through such bodies as the Science and Technology Regional Organisations. In Scotland, my rt hon Friend is taking similar action. In a statement on the Munn and Dunning reports which he made in the House on 31 March 1980, he said that the Government considered it essential that all pupils in the last two years of compulsory education should study mathematics and science. On schools/industry liaison, he welcomes the increasing effectiveness of activities at local level involving schools, industry and voluntary bodies.

8 In the professional preparation of engineers, the main question for the education system is the broad pattern of future engineering degree courses. Finniston proposed two streams at degree level leading to a Bachelor of Engineering (B Eng) degree for the main body of engineers after three years and the Master of Engineering (M Eng) degree for the future leaders of the profession after four. Both streams would incorporate important elements of what Finniston called engineering applications.

9 Our consultations have revealed strong support for the inclusion in

neering degree courses of a greater element of engineering practice, but little for the precise B Eng/M Eng split. The NCEET report endorsed the principle of enhancement, but favoured a range of first degree courses, full-time and sandwich, varying in theoretical and practical content according to the needs of the sectors of industry which they serve. The majority of first degree courses would be of the same length as at present, but the range would include a small number of extended courses. NCEET saw the M Eng as a one-year postgraduate course for the high-fliers with the potential to lead technically oriented businesses. The report also proposed that consideration should be given to the introduction of a distinctive practically-oriented stream for technician engineers leading to the award of Bachelor of Technology (B Tech).

10 The Government generally favour the approach of NCEET which may be seen as a development of Finniston's proposals, permitting greater flexibility. Some existing courses, particularly sandwich courses, already give an emphasis to the application of engineering principles. Sandwich courses are threatened, however, by the shortage of suitable industrial placements for students, and the Education Departments and the MSC are currently studying the implications and ways of overcoming this difficulty. We endorse the NCEET's proposal that all engineering departments should review their courses, both internally and with industry and the profession, against the objective of a greater emphasis on applications, while bearing in mind the different needs of the various branches of engineering, and their students' interests and abilities. We hope that the proposed Engineering Council would have particularly in mind this objective in accrediting first degree courses, but we also hope that its accreditation arrangements would be flexible, and that it would co-operate with validating bodies, such as the CNAA. An important consideration is maintaining and where necessary improving opportunities for those who wish or need to become fully qualified through part-time study. We look to all responsible for the management and financing of higher education institutions to respond constructively so far as resources allow to proposals for the enhancement of engineering degree courses. We look to them also, in collaboration with the new Engineering Council, to develop a consistent and co-ordinated approach across the whole higher education system.

11 Particular attention has been paid by commentators to the question of the length of engineering degree courses and the problem of encompassing within them a wider range of engineering knowledge. There are already precedents, not only in Scotland, for courses taking four years. The Government recognises that a number of further courses will contain essential

material making a longer duration than three years necessary. Such courses should be clearly distinctive in terms of staff and student quality, and should be of demonstrable value to industry. The Government's view is that their numbers should be limited, and that normal engineering education should continue to take the form of three-year bachelor courses - or of sandwich courses - followed by structured training and experience. In the present financial climate there can, in any case, be no question of the Government providing extra resources to extend engineering degree courses. The enhancement and extension of courses will have to be accomplished within the funds available; and institutions and those who fund them must weigh the cost of raising quality against the number they wish to accept on their courses. The Government have been glad to note the UGC statement that numbers in the universities in engineering and technology should increase slightly over the next three years and that, within total numbers, universities should decide the extent to which the lengthening of courses can be justified.

12 The Government endorse the importance attached by both Finniston and NCEET to the structured two-year training period after graduation as part of an engineer's basic formation. Industry will have to be prepared to increase its training places if sufficient provision is to be achieved.

13 The Government also endorse fully the emphasis in the Finniston and NCEET reports on the continuing formation of engineers as the most effective way of raising the general level of competence in the engineering profession. The development of professional skill and knowledge must continue beyond registration, and demands a provision for integrated education and training to match the needs of industry. Educational institutions and employers must be partners in the design of such provision.

14 My Department has recognised the need for the expansion of relevant continuing education at all levels, and is actively pursuing the programme of action outlined in its document of post-experience vocational education published last October. But we consider that Finniston was right in saying that the main impetus must come from the engineers and their employers, who together must pursue the essential integration of employment, education and training. We agree with the NCEET Report that the promotion of that integration, and of continuing formation, should be a vital role for the proposed Engineering Council.

15 Continuing formation may or may not lead to higher degree

qualifications, but these principles should apply to the future development of such qualifications. Proposals for the development of M Eng courses and for the future of MSc courses should be evolved to a great extent in partnership between employers and educational institutions, as NCEET recommended. We support particularly the emphasis on planning postgraduate courses of all kinds in modular form to make it easier for more practising engineers, including those at senior levels, to undertake them.

16 As both Finniston and NCEET fully recognised, there is a need for an effective and expert corps of technician engineers and technicians to support professional engineers. The Government have welcomed the MSC's consultative document on the Open Tech. They agree with the NCEET report that this area should continue to be the responsibility of the Technician Education Council and the Scottish Technical Education Council, and that the TEC and SCOTEC Higher Diplomas should be developed and accepted as the principal replacements for the existing Higher National Diplomas.

17 I have mentioned the NCEET's proposal for a new practically-oriented degree, the B Tech. This was seen as a full degree course but corresponding to the technican engineer level of employment. Views at the Conference differed widely on this issue, and the NCEET report's recommendation acknowledges the need for further consideration. One thing is clear, and this is that there is a significant demand for additional high-quality technician engineers in a number of sectors of engineering. There are, however, different views about the need for such a special qualification: its precise nature; its relevance to the needs of employers; even its title. It would be premature for the Government to take a view on a proposition as yet incompletely defined. We urge the universities, polytechnics, and validating bodies to give this matter careful consideration and to reach conclusions as soon as possible.

18 A statement even of this length cannot cover in detail all the recommendations of the Finniston and NCEET reports. Its objective is to indicate the general approach which the Government will adopt in promoting the further development of engineering education and training.

Fred 1st

ENGINEERING COUNCIL

DRAFT ROYAL CHARTER

JULY 1981

DRAFT

ELIZABETH THE SECOND

by the Grace of God of the United Kingdom of Great Britain and Northern Ireland and of Our other Realms and Territories Queen, Head of the Commonwealth, Defender of the Faith:

TO ALL TO WHOM THESE PRESENTS SHALL COME, GREETING!

Whereas Our Secretary of State for Industry has represented unto Us that it is expedient to establish by Royal Charter a body for the promotion and development of the knowledge and best practice of engineering, to be known as The Engineering Council:

NOW, THEREFORE, KNOW YE that We, by virtue of Our Prerogative Royal and of all other powers enabling Us in that behalf, have of Our especial grace, certain knowledge and mere motion granted and declared and do by these Presents for Us, Our Heirs and Successors grant and declare as follows:

1 The first chairman and other members of the said body, and all such other persons as may hereafter become the chairman and other members of the body corporate hereby constituted, shall for ever hereafter (so long as they continue to be members of the said body) be one body corporate under the name of 'The Engineering Council' (hereinafter referred to as 'the Council') and by the same name shall have perpetual succession and a common seal, with power to break, alter and make anew the said seal from time to time at their will and pleasure, and by the same name shall and may sue and be sued in all courts and in all manner of actions and suits, and shall have power to enter into contracts, to acquire, hold and dispose of property of any kind, to accept trusts and generally to do all matters and things incidental or appertaining to a body corporate.

2 In this our Charter unless the context otherwise requires –

(a) 'the Bye-Laws' shall mean the Bye-Laws from time to time of the Council made in accordance with Article 14(2) below;

(b) 'experience' means practical experience in the application of an individual's education and training in engineering;

(c) 'nominated body' means a body nominated by the Council pursuant to Article 5(1) below;

(d) 'person' includes a body of persons corporate or unincorporate;

(e) 'Chartered Engineering Institution' means an institution having as its principal object the advancement of engineering in any of its branches to which We or one of Our Royal Predecessors have granted a Charter of Incorporation; and 'nominated Chartered Engineering Institution' means a Chartered Engineering Institution nominated by the Council pursuant to Article (5) (1) below;

(f) 'the register' means the register to be established under Article 4 (2) (c) below;

(g) words importing the masculine gender include the feminine, words in the singular include the plural and words in the plural include the singular; and

(h) references to a Stage in relation to the register shall be construed in accordance with Article 6 (2) below.

3 The objects of the Council shall be to advance education in, and to promote the science and practice of, engineering (including relevant technology) for the public benefit and thereby to promote industry and commerce in Our United Kingdom of Great Britain and Northern Ireland.

4 *(1)* In furtherance of its objects but not otherwise the Council shall:

(a) generally promote and develop the knowledge and best practice of engineering (including relevant technology) and thereby encourage efficiency and competitiveness in Our said United Kingdom;

(b) take and encourage action for securing the supply and best use of engineers and of engineering technicians; and

(c) seek to cooperate with, and coordinate the actions of, persons whose functions or activities relate to engineering.

(2) In furtherance of its objects but not otherwise the Council shall in particular:

(a) in collaboration with such nominated Chartered Engineering Institutions and other nominated bodies, industrial training boards, industrial and commercial organisations, academic institutions and other persons as the Council may from time to time consider appropriate:

(i) in relation to individuals seeking registration in any section of the register, determine standards and criteria for education, training and experience;

(ii) where it appears to the Council appropriate to do so, authorise such nominated bodies as it may determine and as are willing to be so authorised to accredit academic courses, industrial training programmes and arrangements for experience which satisfy such standards and criteria;

(iii) where it appears to the Council appropriate to do so but it is unable to authorise a nominated body under sub-paragraph (a) (ii) above, accredit such courses, programmes and arrangements; and

(iv) where it appears to the Council appropriate to do so, determine standards of conduct which constitute misconduct for the purposes of this Our Charter and standards of conduct with which failure to comply constitutes such misconduct for those purposes;

(b) encourage the development and provision of education, training and experience to enable individuals (including individuals already registered in any section of the register):

(i) to satisfy such several standards and criteria as may be determined pursuant to sub-paragraph (a) (i) above; and

(ii) thereafter to continue to maintain their competence in the light of technological and other changes; and

(c) establish and maintain a register for the purpose of registering as professional engineers, as technician engineers or as engineering technicians such individuals as satisfy the Council:

(i) that they have achieved standards of education and training and have acquired experience satisfying the standards and criteria determined pursuant to sub-paragraph (a) (i) above appropriate to the practice of such description of engineering as the Council considers appropriate; or

(ii) having started their education, training or experience before the first publication of the appropriate standards and criteria, that

they have received education, training and experience appropriate to the practice of engineering of such description as the Council considers appropriate; or

(iii) that they have otherwise demonstrated their competence to a standard not lower than the relevant standard determined pursuant to sub-paragraph (a) (i) above to practise engineering of the description for which they apply to be so registered;

and may in Our said United Kingdom or elsewhere do anything (including power to enter into any transaction, whether or not involving the expenditure of money or the making of a charge) or engage in any activity which appears to the Council to be conducive to the attainment of any of its objects or ancillary to the carrying out of any activity referred to in the preceding provisions of this Article.

(3) The Council shall publish or shall cause to be published all standards and criteria determined pursuant to paragraph (2) (a) (i) and (iv) above.

(4) Without prejudice to the generality of its powers under paragraph (2) (a) (iv) above the Council shall, in determining standards of conduct pursuant to that paragraph, have regard to standards of conduct (however framed or expressed) established by nominated bodies for observance by their members and by those whose names appear in any register maintained by them.

(5) It shall be incumbent upon the Council to exercise its powers with a view to securing that as soon as practicable after the date of this Our Charter and in any event within two years of that date:

(a) standards and criteria are determined pursuant to paragraph (2) (a) (i) above;

(b) the register is established; and

(c) a list of nominated bodies is published pursuant to Article 5 (3) below.

5 *(1)* The Council shall from time to time nominate Chartered Engineering Institutions and other bodies of persons corporate or unincorporate which appear to it to be fitted to certify the attainment by individuals seeking registration (at any Stage) in any section of the register of standards determined pursuant to Article 4 (2) (a) (i) above and their satisfaction of criteria so determined.

(2) The Council shall, in relation to each description of engineering, nominate a Chartered Engineering Institution to certify the acquisition by individuals seeking registration as professional engineers at Stage 3 of experience which satisfies such standards and criteria, unless it appears to the Council inappropriate to do so.

(3) The Council shall from time to time publish a list of nominated bodies.

6 *(1)* The register shall contain separate sections for the registration of individuals as professional engineers, as technician engineers and as engineering technicians respectively.

(2) Provision shall be made in each section of the register for the registration of an individual at three stages, that is to say:

(a) at Stage 1, when he has achieved standards of education which satisfy the standards and criteria determined pursuant to Article 4 (2) (a) (i) above appropriate to the description of engineering for which he seeks registration;

(b) at Stage 2, when he has achieved standards of education and training which satisfy such standards and criteria; and

(c) at Stage 3, when he has acquired experience which satisfies such standards and criteria.

(3) Any individual who, immediately before the date when the register is established, is registered in any section of the register maintained by the Engineers Registration Board constituted under the Charter of the Council of Engineering Institutions shall be registered at Stage 3 in the corresponding section of the register.

(4) The Council may at any time after the register is established recognise a body for the purposes of this paragraph; and any individual who at the date of such recognition is a member of that body shall be registered at Stage 3 in the appropriate section of the register.

(5) An individual whose name is maintained at Stage 3 in a section of the register:

(a) in the case of a professional engineer who is a member:

(i) of a nominated Chartered Engineering Institution, or

(ii) of a body affiliated to such an Institution, or

(iii) if the Council is satisfied in relation to the description of engineering for which he is registered that there is no such Institution or body of which he can be a member, of a body which is affiliated to the Council in accordance with the Bye-Laws

may use the style or title of 'Chartered Engineer' and the designatory letters 'C Eng';

(b) in the case of a technician engineer, may use the style or title of 'Technican Engineer' and the designatory letters 'T Eng'; and

(c) in the case of an engineering technician, may use the style or title of 'Engineering Technician' and the designatory letters 'Eng Tech'.

(6) An individual shall not by virtue of this Our Charter be entitled to use the style or title or designatory letters specified in paragraph (5) (a) above for so long as the Charter of the Council of Engineering Institutions makes provision for the conferring on any individual of the right to use the said style or title or the said designatory letters.

(7) Without prejudice to his right to hold himself out as registered at any Stage in any section of the register, no individual may use any style, title or designatory letters mentioned in this Article save in accordance herewith.

7 *(1)* The Bye-Laws shall make provision for:

(a) the removal from the register of any individual:

(i) in the case of an individual registered at Stage 3 in any section of the register, whose performance as an engineer or technician, in the opinion of the Council, at any time falls below the level of technical competence appropriate to the practice of engineering of the description for which he is registered; or

(ii) whose conduct, in the opinion of the Council, constitutes misconduct for the purposes of this Our Charter; or

(iii) who holds himself out as registered for a description of engineering for which he is not registered or as registered in a section of the register or at a Stage in which or, as the case may be, at which he is not registered; and

(b) an appeal from any determination of the Council under sub-paragraph (a) above to be heard by a person appointed by Our Secretary of State.

(2) The Council shall:

(a) maintain the registration of any individual whose name it has determined to remove from the register until time for the appeal provided by the Bye-Laws has expired or the appeal is finally determined as thereby provided; and

(b) comply with the decision on the final determination of the appeal.

8 The Council:

(a) in exercise of any of its functions (other than those under Articles 4 (2) (a) (ii) and (iii) and (c), 5 and 7 above) shall take note of any advice or request given to it by any of Our Ministers;

(b) shall from time to time as it thinks fit offer advice to any of Our Ministers on any matter which in the opinion of the Council relates to the objects of the Council; and

(c) shall otherwise endeavour to give such assistance as may be requested by any of Our Ministers on any matter relating to the practice of engineering.

9 *(1)* All money and property howsoever received by the Council shall be applied solely towards the promotion of the objects of the Council and no portion thereof shall, except as provided in Article 13 below, be paid or transferred directly or indirectly to the members thereof or used otherwise than for charitable purposes.

(2) The Council may:

(a) borrow or raise money with or without security for any of its purposes;

(b) acquire by purchase, devise, bequest, donation or otherwise land and hereditaments of any description and tenure and accept any gift, endowment or bequest and the office of trustee and carry out any trusts attached to any such gift, endowment or bequest or attached to any such office;

(c) invest any moneys of the Council not immediately required for the purposes of the Council in any manner specified in the Bye-Laws and may from time to time vary any such investments; and

(d) prescribe and charge such fees (including periodic fees) as it thinks appropriate:

(i) for accrediting and for maintaining the accreditation of any academic course, industrial training programme or arrangements for experience pursuant to Article 4 (2) (a) (iii) above; and

(ii) for registering and for maintaining the name of any individual in the register,

and any such fees may differ as between different courses, different sections of the register, different Stages in each such section and different categories of individuals.

10 *(1)* The Council shall prepare in respect of each of its financial years (ascertained in accordance with provisions to be included in the Bye-Laws) such accounts and such a report on the activities of the Council in each financial year as shall be prescribed by the Bye-Laws which shall also make provision for the publication of such accounts and reports.

(2) The accounts to be prepared in accordance with paragraph (1) above shall be audited by an individual qualified for appointment as auditor of a company under the Companies Acts 1948 to 1980 or any statutory amendment or re-enactment thereof and appointed in accordance with the Bye-Laws.

11 *(1)* The Council shall consist of a chairman and not less than fifteen nor more than twenty-four other members who shall be appointed in accordance with the provisions of paragraph (3) or (4) below.

(2) The chairman and other members shall at all times together provide a reasonable balance amongst those having experience and knowledge of the major areas of industry, the significant engineering disciplines and their respective learned societies and those concerned with the education and training of individuals aspiring to be registered.

(3) The first chairman and other members of the Council shall be appointed by Our Secretary of State from among individuals appearing to him to be qualified under paragraph (2) above and any vacancy in the office of chairman or other members shall, for the period of three years beginning with the date of this Our Charter, be filled by such an individual appointed or re-appointed by Our Secretary of State; and such chairman and other members shall hold and vacate their offices in accordance with the terms of their appointment or re-appointment.

(4) After the period referred to in paragraph (3) above any vacancy in the office of chairman or other members shall be filled by an individual selected by the Council in accordance with the Bye-Laws and the following provisions of this Article and shall hold such office for such period and on such terms as to re-selection as the Bye-Laws shall provide.

(5) Without prejudice to the generality of paragraph (2) above the Council shall so exercise its power of selection under paragraph (4) above as to secure that:

(a) the Chairman and at least two-thirds of the other members shall be Chartered Engineers; and

(b) whether or not themselves engineers, at least one-half of the members shall have experience as employers or as managers of practising engineers and of engineering technicians.

(6) It shall be the duty of the Council when making a selection in accordance with paragraph (4) above not to select an individual in compliance with paragraph (5) (a) above otherwise than from a list constituted for that purpose.

(7) The list referred to in paragraph (6) above shall be constituted by the Council in accordance with the Bye-Laws which shall provide that nominations to it may be made by any organisation of employers, any educational institution and any nominated Chartered Engineering Institution .

(8) The quorum for any meeting of the Council (other than such meetings as are mentioned in Article 14 (2) and 16 below) shall be not less than one half of the members for the time being.

12 The Council may appoint a Director General and may appoint such other officers and employ such other persons as it thinks appropriate; provided that neither the chairman nor any other member of the Council shall be appointed to any office of, or any employment by, the Council in respect of which any salary, wages or other remuneration is receivable by him.

13 The Council shall pay:

(a) to the chairman and other members such expenses;

(b) to the Director General and other persons employed by it such salaries, wages, remuneration and expenses; and

(c) to or in respect of the Director General and other individuals employed by it such pensions or gratuities or may make such arrangements for the payment of such pensions or gratuities;

(if any) as the Council may determine.

14 *(1)* Without prejudice to the other provisions of this Our Charter, the Bye-Laws shall make provision for the management and regulation of the affairs of the Council, and the affairs of the Council shall be managed and regulated in accordance with this Our Charter and the Bye-Laws.

(2) The first Bye-Laws shall be approved by resolution passed at a meeting of the Council held not more than fifteen months after the date of this Our Charter by not less than two-thirds of the members present and voting (being an absolute majority of the whole number of the members of the Council); and the Bye-Laws may be amended, added to or revoked only by a resolution passed in a like manner:

Provided that the first Bye-Laws, or any amendment or addition thereto or revocation thereof, shall not have any force or effect until the same shall have been approved by the Lords of Our Most Honourable Privy Council of which approval a certificate under the hand of the Clerk of Our said Council shall be conclusive evidence.

15 *(1)* Each member of the Council shall be accountable in respect of his own acts only and shall not be accountable for any act done or authorised to which he shall not have expressly assented and no member of the Council shall incur any personal liability in respect of any loss or damage incurred through any act, matter or thing done, authorised or suffered by him being done in good faith for the benefit of the Council although in excess of his legal power.

(2) Every member of the Council and every officer or individual employed by the Council shall be indemnified by the Council against all costs, losses and expenses which it or he may incur or become liable for by reason of any act or thing done or any act or thing omitted to be done by it or him in the discharge of its or his duty; and any person employed by the Council shall be similarly indemnified against all costs, losses and expenses which he may incur or become liable for by reason of any act or thing done or any act or thing omitted to be done by him in discharge of any duty performed for and with the authority of the Council.

16 The Council may by resolution passed at a meeting of the Council by a majority of not less than three-quarters of the members present and voting (being an absolute majority of the whole number of the members of the Council) amend, add to or revoke any of the provisions of this Our Charter (other than Articles 3, 4 (1), (2) and (4), 5 (1), 11 (1) and (2), 12 and 13) and such amendment, addition or revocation shall, when allowed by Us, Our Heirs or Successors in Council, become effectual so that this Our Charter shall thenceforward continue to operate as though it had been originally granted and made accordingly. This provision shall apply to this Our Charter as amended, added to or revoked in manner aforesaid; provided that no amendment, addition or revocation shall be made which shall cause the Council to cease to be a charity in law.

17 The Council may by resolution passed and confirmed as required by Article 16 above surrender this Our Charter and any Supplemental Charter subject to the sanction of Us, Our Heirs or Successors in Council and upon such terms as We or They may think fit and wind up or otherwise deal with the affairs of the Council in such manner as shall be directed by the Council; and if on the winding up or dissolution of the Council there shall remain after the satisfaction of all its debts and liabilities any property whatsoever the same shall not be paid or distributed among the members of the Council or any of them but shall (subject to any special trusts affecting the same) be given and transferred to some association or associations having objects which are exclusively charitable and similar to the objects of the Council and which shall prohibit the distribution of its or their property among its or their members to an extent at least as great as is imposed on the Council under Article 9 (1) above, such association or associations to be determined by the members of the Council present in person and voting at a meeting of the Council at or before the time of dissolution.

18 Our Royal Will and Pleasure is that this Our Charter shall ever be construed benevolently and in every case most favourably to the Council and the promotion of the objects of this Our Charter.

IN WITNESS Whereof we have caused these Our Letters to be made Patent.

WITNESS Ourself at the day of 1981
in the year of Our Reign

BY WARRANT UNDER THE QUEEN'S SIGN MANUAL

APPOINTMENTS IN CONFIDENCE R H

Originals filed in Appointments

22/7/81

17 July, 1981

Ind Pol

Engineering Council

The Prime Minister was grateful for your Secretary of State's minute of 16 July.

She is content for your Secretary of State to appoint Sir Kenneth Corfield as Chairman of the Engineering Council, when this is set up.

I am sending copies of this letter to the recipients of your minute.

W.W.B. RICKETT

Ian Ellison, Esq
Department of Industry

Top copy held by Joan Porter in Appointments.

Yes ... mt

Prime Minister

Content to appoint Sir Kenneth Corfield as Chairman of the Engineering Council? Mr Wolfson and the Policy Unit have no comments.

10/7

PRIME MINISTER

ENGINEERING COUNCIL

You have agreed the proposals set out in my minute of 22 May for an Engineering Council (Tim Lankester's letter to my private secretary of 6 July). I expect to settle the few outstanding details on the text of the draft Royal Charter next week. I plan to announce before the House rises that I have submitted it to the Privy Council.

2 I now need to find a Chairman.

3 The basic reason for establishing this Council is to help to improve the performance of industry. Appointing an industrialist, preferably from a high technology area, will help to keep the Council's sights firmly focused on that objective - and underline the change in emphasis that I am seeking to bring about.

4 The Council will operate to a substantial extent by persuasion: its Chairman must therefore be well known and command respect.

5 Given the Council's remit, its Chairman should be a professional engineer - but not someone who is too closely associated with any particular interest group.

6 These are clearly formidable requirements - but I believe that I have identified a candidate who satisfies them, Sir Kenneth Corfield.

7 Sir Kenneth, who is 57, will be well known to you as the outstandingly successful Chairman and Chief Executive of Standard Telephones and Cables Limited. But he also has experience, from his early days, of the problems of setting up and running a small business. He began his working life as an engineering apprentice and is now a chartered (mechanical) engineer. I am convinced he is the man for the job.

8 I know from our informal soundings that Sir Kenneth is keen to take on this important (unpaid) appointment. However, very properly, he feels the need to clear his lines with his parent company, ITT, which he cannot do before the last week of this month.

9 I have considered a number of other names. There has been support for Robert Carr, but I understand that he is definitely not available. Viscount Caldecote in particular is too closely associated with the professional institutions. This drawback also applies to some extent to Sir Denis Rooke and Sir Francis Tombs. Sir Arnold Hall is rather too old.

10 I am, therefore, seeking your agreement to appoint Sir Kenneth. I do so now because, if ITT raise no objections, I might just be able to include in the announcement in the Royal Charter the name of the Chairman.

11 I am sending a copy of this minute to Geoffrey Howe, John Nott, Christopher Soames, Jim Prior, Michael Heseltine, George Younger, Nicholas Edwards, Patrick Jenkin, John Biffen, David Howell, Mark Carlisle and Norman Fowler, as well as to Sir Ian Bancroft and Sir Robert Armstrong.

KJ

K J

16 July 1981

Department of Industry
Ashdown House
123 Victoria Street

10 DOWNING STREET

From the Private Secretary

6 July 1981

Finniston Committee - Engineering Council

I wrote to you on 10 June stating the Prime Minister's reservations about your Secretary of State's proposals for the Engineering Council.

The Prime Minister has now read the letters of 15 and 30 June from Peter Shaw commenting upon the CERN and UGC points respectively; in the light of those letters, she is prepared to go along with Sir Keith's proposals.

I am sending a copy of this letter to John Wiggins (HM Treasury), Richard Dykes (Employment), Brian Norbury (Defence), David Edmonds (DOE), Godfrey Robson (Scottish Office), Don Brereton (DHSS), John Rhodes (Trade), Julian West (Energy), Peter Shaw (DES), Anthony Mayer (Transport) and David Wright (Cabinet Office).

J. P. LANKESTER

Ian Ellison, Esq.,
Department of Industry.

Industrial Policy

DEPARTMENT OF EDUCATION AND SCIENCE

ELIZABETH HOUSE, YORK ROAD, LONDON SE1 7PH

TELEPHONE 01-928 9222

FROM THE SECRETARY OF STATE

T Lankester Esq
10 Downing Street
London SW1

Dear Tim

FINNISTON COMMITTEE - ENGINEERING COUNCIL

In your letter of 10 June to Ian Ellison you referred to the approach of the University Grants Committee to engineering. We invited the Committee's observations on this matter; ... a copy of these is enclosed.

Copies of this letter go to the recipients of yours.

Yours sincerely

Peter Shaw

P A SHAW
Private Secretary

Prime Minister

We held up Sir Keith's proposals for The Engineering Council (see Flag A). Since we now have satisfactory answers on both the points we raised, Can he go ahead?

30 June 1981

Yes - But I am surprised that engineering exp. is such a poor second compared with medical physics. I'm afraid CERN demands are endless

PL 3/7

The UGC point is answered in this note; the CERN point in the letter at Flag B.

PL

THE UGC AND ENGINEERING IN THE UNIVERSITIES

The University Grants Committee, which has a Sub-Committee on Technology, has over a number of years, and certainly well before the initiatives which led to the establishment of the Finniston Committee, been concerned to raise the quality and output of engineering in United Kingdom universities. The most significant recent innovation in the quality and content of undergraduate engineering courses has been the establishment in eight universities of 'enhanced' four-year courses which include elements of management studies and economics in order to enable the engineer to make his contributions to industry more effectively. Specially earmarked funds were made available for these courses. In addition, extra grants have been given to support developments in micro-electronics teaching and research.

Apart from these special initiatives, UGC grants have been deployed in such a way as to raise the number of degrees awarded in applied science from under 5,000 in 1965 to over 12,000 (in engineering alone) in 1979. In addition to increases in numbers, the academic attainments of students entering engineering have continued to rise: there is no longer any significant difference between the A level scores for students entering pure science course (9.8) and those entering engineering (9.6). Even within the severe financial constraints now imposed, it is likely that the universities will achieve a further slight increase in engineering numbers, though overall total student numbers are expected to decline.

FILE

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hd P5f

cc FCO
D/I
HMT (CST)

16 June 1981

We spoke this afternoon about your letter to Tim Lankester of 15 June about the CERN project to build a large electron-positron accelerator and storage ring near Geneva.

In view of your Secretary of State's reassurance that SERC's nuclear physics programme is not being promoted at the expense of engineering, the Prime Minister is content to approve UK participation in the CERN project to build an LEP. Her agreement is subject to the two caveats set out in your Secretary of State's minute to her of 8 June, and is given on the understanding that the proposal will not increase the UK's contribution to CERN.

I am copying this letter to Brian Fall (Foreign and Commonwealth Office), Ian Ellison (Department of Industry) and Terry Mathews (H.M. Treasury).

W F S RICKETT

Peter Shaw, Esq.,
Department of Education and Science.

Tim? May we discuss?
Willie
16/6

B

B

DEPARTMENT OF EDUCATION AND SCIENCE

ELIZABETH HOUSE, YORK ROAD, LONDON SE1 7PH

TELEPHONE 01-928 9222

FROM THE SECRETARY OF STATE

T Lankester Esq
10 Downing Street
LONDON
SW1

15 June 1981

Dear Tim

CERN (LEP)

I am replying to Willie Rickett's letter of 11 June about LEP, and the point about the AERC mentioned in your letter to Ian Ellison of 10 June about the Finniston proposal.

The AERC is still in process of formulating its advice to my Secretary of State on the distribution of the Science Budget in the light of the submissions made to it by the individual Research Councils. That advice will not be ready for some weeks yet; and there is then the further stage in which my Secretary of State considers his attitude to that advice. Thus his view on LEP derives from such discussion as the AERC has had hitherto on the LEP project and from the position taken by the Science and Engineering Research Council itself as formulated in its preparation for this year's review of the Science Budget by the AERC.

The AERC has had a presentation on LEP and has discussed it on more than one occasion; as we indicated in the submission, it has not made objection to SERC's proposal to participate.

The SERC's latest forecast, based on the figures given in Cmnd 8175 (March 1981), shows that at 1981 Survey prices the SERC expect to spend on nuclear physics £40.9M (20.5% of their total budget) in 1981/82; and that this will increase to £44.3M (22.4% of the total) by 1984/85. On the same basis expenditure on Engineering is expected to be £34.9M (17.7%) in 1981/82 and £36.6M (18.5%) in 1984/85. These figures do not suggest that high energy physics will be promoted at the expense of Engineering.

Within the total figures given above for nuclear physics the CERN subscription accounts for £20.6M (10.4% of SERC's total budget) in 1981/82; and the SERC now expect to keep that provision level. Thus the condition mentioned in your letter should not present them with difficulty. Moreover, with regard to LEP, the CERN administration has no intention of increasing the budget to meet the cost. It is proposed that for the immediate future CERN should be maintained within a constant budget and that LEP should be provided by using some existing facilities and phasing out others.

We will be writing again shortly on the point about the UGC's approach to reducing expenditure on universities. This point related to Finniston rather than LEP; and my Secretary of State very much hopes that, with the clarification I have given on the AERC and the SERC, he might have the Prime Minister's agreement to LEP, subject to the caveats, during this week. We are due to brief the UK delegates to the CERN Committee and Council meetings on Monday 22 June immediately before they leave for Geneva. He hopes that it will be possible publicly to indicate the UK support for LEP both at the CERN meeting and in parallel here in this country.

Copies of this letter go to the recipients of yours and Willie Rickett's.

Yours sincerely

Peter Shaw

P A SHAW
Private Secretary

10 DOWNING STREET

From the Private Secretary

11 June, 1981

The Prime Minister was grateful for Mr Carlisle's minute of 8 June proposing that the SERC should participate in the CERN project to build a large electron-positron accelerator and storage ring near Geneva.

You will however have seen Tim Lankester's letter of 10 June to Ian Ellison about the Finniston Committee. This reported the Prime Minister's concern that the ABRC may be recommending a high level of continued support for high energy physics possibly at the expense of the SERC's Engineering Board. Before taking a decision on SERC participation in CERN's LEP project, the Prime Minister would like to see your Secretary of State's comments on her concern over SERC's engineering work.

Pending your Secretary of State's advice on this point, the Prime Minister has said that she approves the two caveats to the UK position proposed by the SERC. However, she has added that she will not be able to agree your Secretary of State's proposal except on the understanding that the proposal will not increase the UK's contribution to CERN.

I am copying this letter to Brian Fall (FCO), Ian Ellison (Department of Industry) and Terry Mathews (Chief Secretary's Office).

P.S. RICKETT

P Shaw, Esq
Department of Education and Science

RESTRICTED

fca VB

10 DOWNING STREET

From the Private Secretary

10 June 1981

Dear Ian.

Finniston Committee - Engineering Council

The Prime Minister has now considered your Secretary of State's minute of 22 May. She has also seen the Secretary of State for Education's minute of 5 June and the Chancellor of the Exchequer's letter of 2 June.

The Prime Minister is disappointed at the outcome of the negotiations with the various interested parties. Together with two other developments which have come to her notice, she is concerned that a decision to go ahead with the Council on the lines proposed will mean that Britain will continue to do less well in engineering than her principal competitors.

The two further developments which she has heard about are as follows. Firstly, she understands that the Advisory Board for the Research Councils will shortly be making its recommendations for the distribution of Science and Engineering Research Council funds, and that it is already recommending a high level of continued support for high energy physics, possibly at the expense of SERC's Engineering Board. Secondly, she understands that the University Grants Committee may very well favour the pure science effort in our universities rather than the attempts that have been made to improve their engineering competence in deciding where to make the necessary cuts in expenditure.

Before taking a final decision on the Engineering Council proposal, the Prime Minister would like to have the Secretary of State for Education's comments on the SERC and UGC points mentioned above.

I am sending copies of this letter to John Wiggins (HM Treasury), Richard Dykes (Department of Employment), Brian Norbury (Ministry of Defence), David Edmonds (DOE), Godfrey Robson (Scottish Office), Don Brereton (DHSS), John Rhodes (Department of Trade), Julian West (Department of Energy), Peter Shaw (DES), Tony Meyer (Department of Transport) and David Wright (Cabinet Office).

Yours ever.

Tim Lankester.

Ian Ellison, Esq.,
Department of Industry.

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(A)

PRIME MINISTER

cc Mr. Duguid

Finniston Committee: Engineering Council

It was agreed in E Committee last August that an Engineering Council should be set up under Royal Charter in preference to the statutory Engineering Authority recommended by Finniston. Sir Keith Joseph announced in the House that this was the Government's intention; since then, his Department have been having protracted negotiations with the employers, the universities and polytechnics, and the engineering institutions.

Sir Keith's minute at Flag A reports the outcome of these negotiations. Arrangements for the working of the new Council have been agreed, subject to yours and other colleagues' approval. Sir Keith says these are "not ideal". The powers of the Council will be less wide-ranging than the Department had hoped: in particular, whereas they had intended that access to the title of chartered engineer would be open to anyone who fulfilled the qualifications laid down by the Council, those wanting this title will also have to be members of one of the engineering institutions. Thus, the 'closed shop' element in engineering will be protected to a greater extent than had been envisaged.

Nonetheless, Sir Keith believes this is the best outcome he is likely to get, and Mr. Carlisle (Flag B) and the Chancellor (Flag C) agree.

Robin Ibbs, in a minute at Flag D, has expressed disappointment at the outcome, and suggested that it might be worth reconsidering the decision not to set up a statutory Authority. I rather think we have gone too far down the non-statutory road to justify reopening the earlier decision; and in any case, the earlier arguments against a statutory Authority remain (higher public spending and the problem of reconciling it with professional self-regulation). But Robin Ibbs makes two other points which might be worth following up. First, the Science and Engineering Research Council (formerly the SRC) seems likely to cut back its spending on engineering in order to maintain support for CERN in Geneva. Second, there is a risk that the UGC will cut back their funding of engineering.

/Robin's

Robin's general point is that, taking all these things together, we look like doing less for engineering than is needed to make our engineering industries competitive.

Would you like me to write to Sir Keith Joseph's office -

(a) agreeing the Engineering Council proposal; but

(b) saying you are concerned about the general trend of decision-making in relation to engineering (on the lines of Robin's minute)?

The two matters at X are both for SofS for Ind. - we might enquire on both these points

9 June 1981

Prime Minister

1

Content to approve UK participation in the CERN project to build an electron-positron accelerator, subject to the caveats at 2(i) and (ii) below?

The project would go ahead within the existing CERN budget: the cost to the UK will therefore be no more than if CERN uses its existing facilities. Treasury are content at official level.

WFSR 9/6

PRIME MINISTER

CERN: PROPOSAL TO BUILD A LARGE ELECTRON-POSITRON ACCELERATOR AND STORAGE RING (LEP)

1. I think you should know that I propose to approve UK participation, through the Science and Engineering Research Council (SERC), in CERN's project to build a Large Electron-Positron accelerator and storage ring (LEP) at CERN's site near Geneva. I enclose a note on some of the salient points of the LEP proposal and a copy of CERN's brochure.

2. The proposal has been thoroughly prepared and appraised. CERN's planning for the next generation of accelerators began in 1974. UK physicists have been closely involved; and, directly and through the SERC, the UK physics community has been kept informed. Alternatives were thoroughly evaluated before the LEP approach was preferred; and the LEP plans have been closely scrutinised and evaluated in all their aspects by the SERC which supports the project unanimously, giving it a high priority within their total programme. They have now sought my formal agreement that the UK delegate to CERN should be able to signify the Government's agreement to the adoption by CERN of LEP Phase 1 project within the basic programme of the Organisation at a stipulated annual budget level. The SERC itself has, sensibly in my view, proposed two caveats to the UK position namely that the UK might have to consider withdrawing from the project (through, in effect, withdrawal from CERN) if:

(i) LEP proves more expensive to build than has been foreseen, and it is not possible to build it within a reasonable timescale;

(ii) SERC's budget falls seriously in real terms over a period.

3. The Advisory Board for the Research Councils has considered the proposal carefully with the SERC, most recently in the context of its annual Forward Look on which it bases its recommendations for the allocation of the Science Budget; and has made no objection to the SERC's proceeding on the basis proposed, although with renewed emphasis on the financial conditions that the SERC itself had formulated.

4. The proposal will be considered at meetings of the CERN Committee and Council on 22-26 June when it is likely that Member countries will be invited to state their positions. Our understanding is that all the other Member countries are expected eventually to declare their support although up to three may not be in a position to do so by June. For a project of this kind, on which the whole future of CERN and European nuclear physics turns, unanimity is desirable although the CERN Council will be prepared to go ahead with a two-thirds majority in support and no-one dissenting. The attitude of the UK is crucial to the decision and I propose that the UK delegates should be authorised to signify our intention to participate, subject to the two caveats indicated. As and when we declare our support publicly at CERN I think there should be some parallel announcement here.

See the first paragraph of the background note.

5. I should be glad to know if you are content for us to go forward on this basis.

6. I am copying this minute to Peter Carrington, Keith Joseph and Leon Brittan.

M.C.

MARK CARLISLE

8 JUN 1981

European Organization for Nuclear Research

THE LEP PROJECT

Updated version
April 1981

The LEP project

Further developments

Since this brochure was prepared, the CERN Council, which comprises representatives of each of the twelve Member States, has approved at its meeting in June 1980 the definition of Phase 1 of the LEP Project. As thus defined, the main technical features of the Project are:

(i) a Main Ring circumference close to 30 km;

(ii) an initial design energy of 50 GeV per beam of electrons and positrons at a luminosity sufficient for the initial research experiments;

(iii) the equipping of four of the eight possible experimental areas with sufficient technical infrastructure to enable the initial experiments to be installed and operated;

and (iv) the use of the existing CERN synchrotrons, the Proton Synchrotron (PS) and Super Proton Synchrotron (SPS) as part of the injection complex to provide LEP with electrons and positrons.

In view of this close link between LEP and the PS and SPS, the Council also expressed its interest in keeping open the possibilities of colliding electrons from LEP with protons from the SPS in the further future.

It is intended to finance the building of LEP from within the normal annual budget levels accorded to CERN and using the present staff of the Laboratory. This will require a choice of priorities and a reduction or even stoppage of some programmes. Also in view of the use of the existing synchrotrons as part of the injection system, LEP can be considered as an extension of the existing CERN facilities. For these reasons the Council decided, at its session in June 1980, that LEP, once approved, could be considered as part of the Basic Programme of the Organization.

This decision has very important implications, as it will enable an optimization of the construction programme to be made year by year and ensure the flexibility of assigning money and manpower to LEP and to the other programmes of the Laboratory as the needs arise, within the constant budget and staff levels mentioned above.

Machine optimization

With the advent of a new management of the CERN Laboratory at the beginning of 1981 and the appointment of a Project Leader Designate for LEP by the Council, a re-examination of all aspects of the project was carried out to confirm the basic design features of the machine, as described in more detail in this brochure, and also to verify the corresponding cost estimates. In addition, a LEP Machine Advisory Committee was set up to benefit from the expertise of electron machine specialists from all over the world, including the USA and the USSR.

This has led to a further optimization of the machine design. It has been found that by increasing the focusing applied to the electron and positron beams, it is possible to use the accelerating voltage in the radiofrequency cavities more effectively, without increasing the radiofrequency power fed to the cavities. More energy can be given to the particles without requiring more power to operate the machine. Thus a higher energy loss due to synchrotron radiation can be tolerated and the machine can be built with a slightly smaller radius.

It is intended to follow this possibility since a reduction of the LEP circumference (from 30 to 27 kilometres) minimizes potential problems of tunnel stability and of water pressure, which could have arisen with the ring tunnel under the deepest part of the Jura. The reduction in circumference avoids the strata, known as the Trias, which tunnelling experts have warned is a difficult rock in which to tunnel and is also a material which could exhibit instability long after the initial tunnelling is finished. It also reduces the depth penetrated below the surface of the mountains from 1000 metres to 600 metres. This may still not completely eliminate difficulties with water pressure but it will reduce them.

Overall, the proposed new location of the ring reduces the distance traversed by the tunnel under the Jura from 12 to 8 kilometres. It also eases the problems of access to three of the beam collision regions. The access gallery will be reduced in length by about 1 kilometre for two of the regions and eliminated for the third, probably being replaced by a vertical shaft.

Further consideration of the power requirements of LEP make it unlikely that copper cavities would be used to increase the peak energy of LEP beyond the 50 GeV per beam of Phase 1 of the project. Good progress with superconducting cavities indicates that the subsequent development of LEP to higher energies will make use of superconducting techniques. For example, for an energy of 85 GeV the total mains input power required for the radiofreqency supply when using superconducting cavities is about 54 MW, compared with 155 MW for normal copper cavities. It is estimated that the coming into operation of LEP will not increase the yearly power consumption of the Laboratory by more than about 30% above the present level up to the middle of the 1990's.

Cost and Timescale

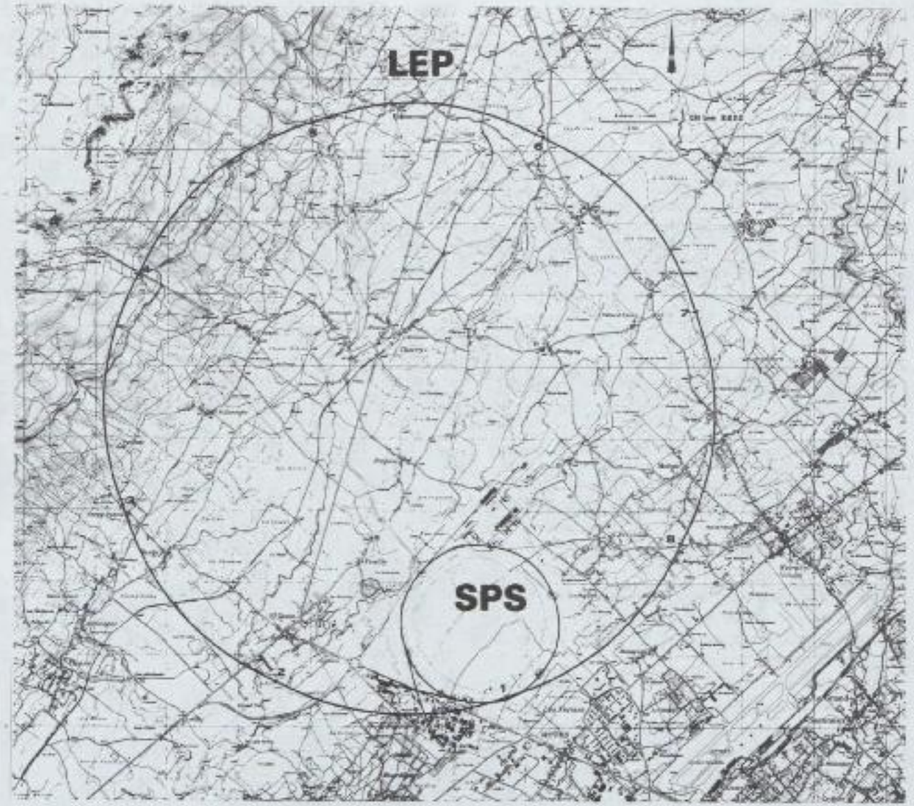
The optimized version of LEP Phase 1, as outlined above, has been recosted. The cost estimate, now in 1981 prices, is 910 million Swiss francs for the machine itself and about 40 million Swiss francs for CERN's contribution to the detection systems to equip four of the beam collision regions for the initial experiments. The remaining areas, to which access is now considerably easier than before, as mentioned above, can subsequently be equipped with experiments whose design can take into account the physics results obtained from the first experiments, thus enabling a flexible and evolving research programme to be carried out.

The time-scale envisaged for the construction of LEP Phase 1, assuming authorization in June 1981, foresees completion of the project in 1989. However, it is intended to have first colliding beams in 1987, even though all the equipment to achieve the full design parameters will not be in place.

Budgets

A budgetary procedure is proposed whereby the CERN Council would authorize a budget level for the Laboratory at the same time as the LEP project is approved. This budget level (apart from cost variation factors) would not be increased throughout the period of LEP construction without the unanimous agreement of the Member States. On the other hand, a budget reduction could be agreed by a two-thirds majority, giving Member States an assurance that the level of the CERN budget could be adjusted in the light of the general economic situation in Europe.

A possible location of the underground LEP ring superimposed on a map of the CERN Laboratory region on the Franco-Swiss border on the outskirts of Geneva. The optimization of LEP parameters in the early months of 1981 has enabled the ring circumference to be reduced to 27 kilometres while still achieving the same performance. The smaller circumference reduces the risk of tunnelling problems under the Jura mountains (on the left). The link with the existing CERN synchrotrons, the SPS and the PS, which are used in the injection system, is retained.



Research during LEP construction

The proposed budget level would enable a healthy research programme to be carried out using the existing CERN accelerators during LEP construction. At the SPS there will be resources for research with proton-antiproton colliding beams and for "fixed-target" experiments. Even after physics begins at LEP, its foreseen annual number of hours of operation will allow considerable time for proton-antiproton physics at the SPS, while fixed-target physics is compatible with LEP operation. At the PS, experiments with intense beams of low-energy antiprotons at the LEAR storage ring will be a major feature of the research programme. At the Synchro-cyclotron (SC) some 4000 hours of operation will be available for the on-line isotope separator ISOLDE and other experiments, for example those using heavy ion and muon beams.

Support from the high-energy physics community

The latest developments of the LEP project were presented to representatives of the European Committee for Future Accelerators (ECFA) on 23 February 1981 and to the Scientific Policy Committee of the CERN Council on 27 February 1981. Both Committees gave the new proposals their unanimous support. It is hoped that authorization for the construction of LEP Phase 1 will be forthcoming at the CERN Council Meeting in June 1981.

When LEP comes into operation it will have a complementary role amongst the large research facilities for high-energy physics throughout the world. There will then be no duplication of machines in different regions as there has been in the past. For this reason, more extensive exchange of scientists between Laboratories is anticipated and, via the International Committee for Future Accelerators (ICFA), the various regions are establishing guidelines as to how these exchanges should be effected.

The LEP project

The European Organization for Nuclear Research (CERN) is planning the construction of a Large Electron-Positron storage ring, usually referred to as LEP. The storage ring will allow intense beams of electrons and positrons to be collided at very high energies and thus provide Europe's scientists with unique conditions for the investigation of the fundamental particles and forces in Nature.

The LEP project has evolved from several years of discussion and study concerning future research facilities in Europe and has received the very strong backing of the European high energy physics community as the machine most likely to contribute to further major discoveries in their field of research.

LEP is a large and complex facility involving a ring tunnel about 30 kilometres in circumference housing thousands of precision components. It is proposed to build the machine at the CERN Laboratory on the outskirts of Geneva. If the project is approved, construction will take many years and the cost of the first phase will be about 900 million Swiss francs.

It is the purpose of this brochure to answer questions about the present state of high energy physics, about why LEP has been selected as the appropriate machine to pursue this research, and about the design of the machine.

What do we know about the constituents of matter?

The experimental investigation of matter, carried out since the beginning of this century, has revealed that it is composed of atoms each containing electrons orbiting round a small nucleus. There are hundreds of different nuclei but all of them are built up from just two particles — protons and neutrons.

For a time it looked as though protons and neutrons, along with electrons and a few other particles, were the ultimate building blocks from which all matter is made. However in the past twenty years it has become clear that Nature has a still deeper layer of constituents. Protons and neutrons are not elementary particles, but are themselves built up of smaller entities, which have been given the name "quarks".

Our everyday world can now be explained in terms of a quartet of basic building blocks — two kinds of quark (called "up" and "down"), and two kinds of lepton (the familiar electron, and the neutrino which carries off energy in the radioactive decay of nuclei). Experiments at high energy physics laboratories have shown that Nature brings additional particles into play at higher energies. All the behaviour seen in these experiments can be accounted for by augmenting the initial set of particles with two further quartets, each, like the first, containing two quarks and two leptons.

The particles behave in several different ways and, up to now, the differences in behaviour have been explained by saying that the particles are responding to different forces. A force, called the electromagnetic force, accounts for the existence of atoms since it holds the electrons in orbit around the nucleus. It also accounts for a whole spectrum of radiation including visible light, heat, X-rays and radiowaves. A force, called the weak force, accounts for radioactivity since it controls the break-up of particles. A force, called the strong force, accounts for the existence of nuclei since it holds the protons and neutrons together.

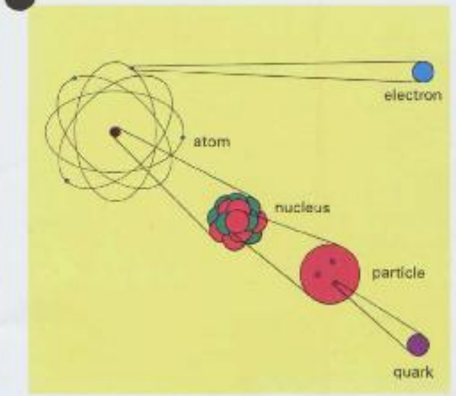
LEP is expected to advance our knowledge of the constituents of matter and the forces which control their behaviour.

What do we know about the forces which control particle behaviour?

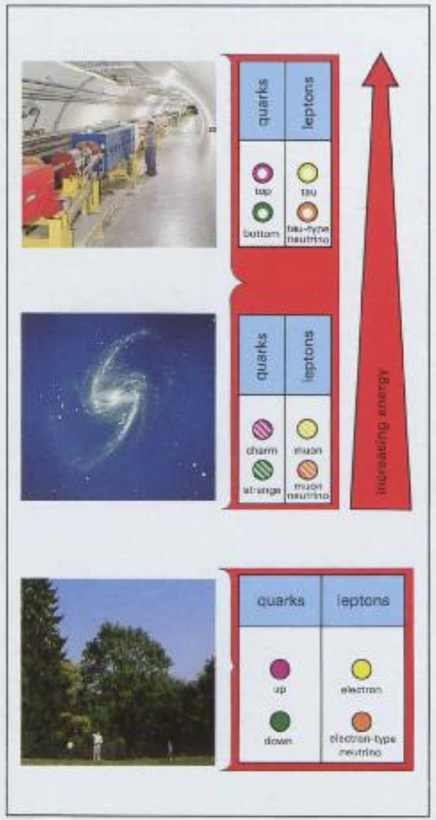
One of the greatest achievements of physics in the 19th century was to link electricity and magnetism — two types of the behaviour of matter which were previously thought to have different origins. They were found to be manifestations of the electromagnetic force which is now understood to such an extent that the behaviour of matter under its influence can be correctly calculated in the minutest detail. Because of this success, our interpretation of how the electromagnetic force operates is taken as a model when attempting to understand the other forces.

The electromagnetic force is transmitted from one particle to another by massless particles called photons. The photons are packets of electrical energy radiating from particles; according to their energy they can manifest themselves as radiowaves, visible light, X-radiation and so on.

The present approach to understanding the strong force postulates the existence of another type of particle transmitting the force be[illegible]en



The progressive analysis of the structure of matter has reached the stage where the basic components are believed to be a small number of leptons, such as the familiar electron of the atom, and a small number of quarks, which are inner constituents of the proton and neutron, the particles which make up the atomic nucleus.



We now know that our "everyday" world can be explained by the existence and the behaviour of only four building blocks — two leptons (the electron and the electron-type neutrino) and two quarks (the up quark and the down quark). When higher energies are in action, such as in cosmic rays and the "Big Bang" mechanism for the creation of the Universe, or in the conditions created in the laboratory by accelerators and storage rings, additional leptons and quarks co[illegible]to play.

quarks. These carrier particles have been given the name gluons since they seem to stick the quarks together so effectively that no "free" isolated quark has yet been observed.

The present approach to understanding the weak force requires the existence of other force-transmitting particles called weak intermediate bosons. There are two electrically charged types, called W^+ and W^-, and a neutral type, called the Z^0. They are built into a theory of the weak force which is so intimately linked to that of the electromagnetic force that it is no longer appropriate to speak of them as two separate forces and the generic name of "electroweak" force is now used.

So far this interpretation has met with very great success, especially through the experimental discovery of a new type of particle behaviour as predicted by the electroweak force theory. It is a great advance in the understanding of Nature which combines our explanation of phenomena as dramatically different as a flash of lightning and the radioactive decay of a nucleus. These insights are holding out the hope, as never before, that we are on the way to unifying the behaviour of matter in a single theoretical description.

It is in the context of this new understanding of the constituents of matter and how they interact that the LEP project is being proposed by Europe's physicists as the most appropriate machine on which to tackle some of the outstanding questions that the latest developments have raised, and to study the overall properties of the electroweak force, including the W and Z bosons. These particles are predicted by theory to be very heavy and have not yet been observed.

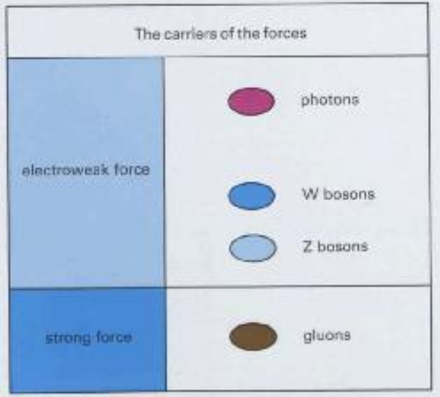
Why was an electron-positron storage ring selected as the next research machine?

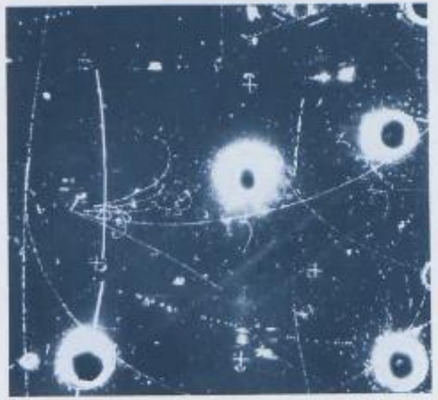
The progressive analysis of the structure of matter has been made possible by access to the progressively higher energies available from accelerators and storage rings. It is convenient to express these energies in units of electronvolts (the energy given to an electron in passing through a potential difference of one volt). Energies of thousands of millions of electronvolts (GeV) are necessary to penetrate the interior of particles. In accordance with the famous $E=mc^2$ equation, which specifies the equivalence of energy and mass, it is possible to create particles from energy. For this reason the mass of particles is also quoted in electronvolts. The heavy carriers of the electroweak force for example are predicted to have masses of around 80 GeV for the W bosons and around 90 GeV for the Z bosons.

CERN up to now has constructed and exploited proton machines. The highest energy accelerator is a proton synchrotron (the SPS) which normally operates at an energy of 400 GeV. It is a machine where the accelerated protons are fired onto fixed targets which allows the production of beams of a wide variety of particles whose interactions can be subsequently studied.

When a particle hits a nucleon in a fixed target, only a small part of the energy of the incoming particle is available for the creation of new particles, the majority remaining as the kinetic energy of the incident particle and the "knocked-on" nucleon.

The "carriers" which communicate the forces between particles, thus dictating their behaviour. The W and Z bosons are the only ones for which no experimental evidence exists, though they are strongly predicted by theory. It is anticipated that these bosons will be produced at the high energies of LEP and their study is a major aim of the LEP project.





One of the many photographs taken in a bubble chamber at CERN in 1973 which discovered a new phenomenon. An examination of the tracks left by the particles revealed a new type of interaction involving the weak force, as was predicted to follow from the existence of the Z^0 boson. It was this discovery which launched the electroweak theory as a very successful scheme linking the electromagnetic and weak forces.

For example, a 400 GeV proton hitting a stationary proton in a target will only release about 28 GeV for the creation of new particles.

This "inefficiency" can be overcome by colliding two similar particles travelling with the same energy in opposite directions, so that when they collide, the two particles effectively come to rest. If one of the colliding particles is the antimatter counterpart of the other, the two particles can annihilate each other, releasing their total energy for the creation of other particles.

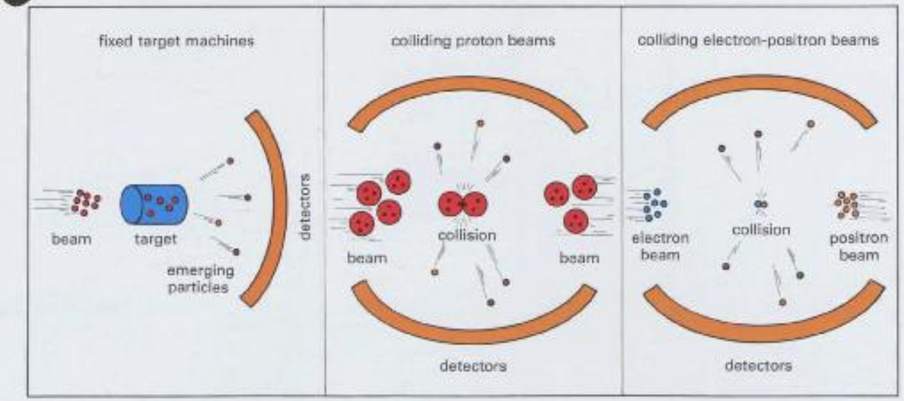
This technique requires beams of particles travelling in opposite directions in a storage ring (or rings) in such a way that the beams intersect at certain points. These types of machines are called colliding beam machines, but even with the most dense beams that can be made, relatively few particles actually collide at each intersection. Most of the particles continue round the ring, perhaps to collide on a subsequent revolution.

At CERN, intersecting storage rings (ISR) have been in operation since 1971 where protons are brought into collision at a peak energy of 31 GeV per beam. A project to collide protons and antiprotons in the SPS is designed to give collision energies of several hundred GeV from 1981. This should make it possible to produce the postulated heavy carriers of the electroweak force and it is hoped that it will prove possible to identify these particles for the first time. But proton machines will not allow an extensive study of the electroweak force because of the unavoidable complexities resulting from the strong force which always tend to overshadow the electroweak effects.

An electron-positron storage ring provides much better experimental conditions. The colliding electron and positron can annihilate each other, producing a packet of energy which can then materialize as massive particles. For example, if the electroweak theory predictions are correct, a storage ring operating at 45 GeV could produce the Z^0 with its predicted mass of 90 GeV from the electron-positron collisions. A storage ring operating above 80 GeV could produce W^- and W^+ pairs from the collisions with their combined predicted mass of 160 GeV.

Irrespective of present theoretical ideas, there is bound to be very interesting physics around such energies in any case because the weak force, which is so feeble in our everyday world, grows in strength as the energy is increased and at LEP energies it should reach the same strength as the electromagnetic force. LEP will make it possible to discover and study in detail what happens when they become comparable. New particles may be discovered, adding to the known constituents of matter. Also, access to higher energies has always provided a rich crop of surprises in the past which has modified our interpretation of Nature, and the same is likely to happen with LEP.

The selection of LEP as the ideal machine to pursue high energy physics in Europe was made on the grounds of these physics interests. In addition it contributes to a world-wide balance of facilities for high energy physics research. At the end of the next decade the likely distribution of high energy machines will be — proton-proton storage rings of several hundred GeV energy (named ISABELLE) at the Brookhaven National Laboratory in the USA, a 1000 GeV proton synchrotron (named the Tevatron) at the [illegible]mi



Fixed target machines, like proton synchrotrons, are very versatile in allowing many types of particle interaction to be studied. Most of the energy given to the beam particles goes, however, into the kinetic energy of the emerging particles. Colliding beams in storage rings makes more efficient use of the energy. Colliding proton beams involves the complicated quark structure of the proton which makes analysis of the phenomena rather difficult. Colliding electron and positron beams avoids these complexities. In addition, a particle and its antimatter counterpart can annihilate each other, producing a packet of energy which can materialize as new particles.

The probable locations of the major facilities for high energy physics research in some ten years' time. Projects which are already authorized are the Tevatron 1000 GeV proton synchrotron at Fermilab, ISABELLE 400 GeV colliding proton beams at Brookhaven and UNK 3000 GeV proton synchrotron at Serpukhov. The LEP high energy electron-positron storage ring is the proposal for Europe's research facility at CERN. Further machines of smaller size are being proposed at Stanford, DESY, Peking and Tokyo.

National Accelerator Laboratory in the USA, followed by a 3000 GeV proton synchrotron (named UNK) at the Institute for High Energy Physics at Serpukhov in the USSR, and a high energy electron-positron storage ring (LEP) at CERN in Europe. To complement these larger machines, new machines may be built, or existing ones enhanced, at DESY in the Federal Republic of Germany, at the Stanford Linear Accelerator Center in the USA, near Peking in China and near Tokyo in Japan.

Why is LEP so big?

To achieve good conditions for the experiments it is necessary to arrange for as many collisions between electrons and positrons as possible to occur per second at the locations where detection systems are installed. This is the reason for building a "storage ring" where large numbers of electrons and positrons can be gathered into small bunches and circulate for hours in opposite directions in the ring.

Only one storage ring is needed for electrons and positrons. Because of their opposite electric charges they are bent in opposite directions by the magnetic fields. Thus they can circulate in opposite directions in the same ring, resulting in head-on collisions.

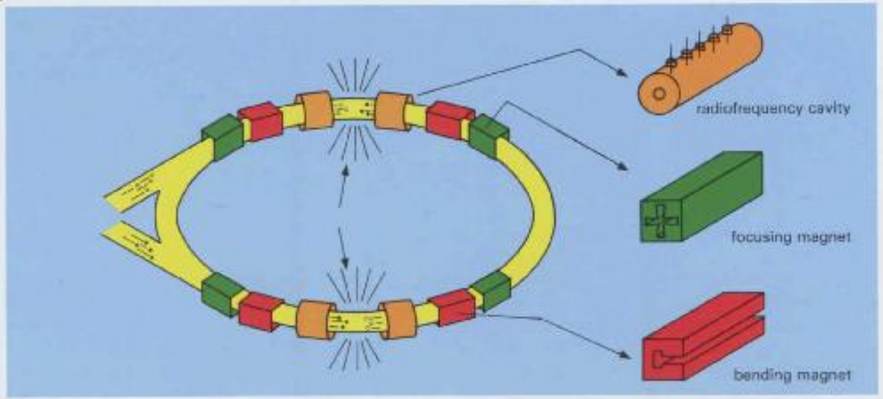
In the ring, a series of bending and focusing magnets will ensure that the particles follow the desired paths and stay concentrated in a narrow beam. A very good vacuum in the tube in which they circulate will greatly reduce the number of particles lost due to collisions with air molecules.

The amount by which the beams are bent depends upon the strength of the magnetic field and upon the energy of the particles. As particles are accelerated to higher energies, by passing them through electric fields generated by a radiofrequency system, it is necessary to increase the strength of the magnetic fields to hold the beams on the same orbit.

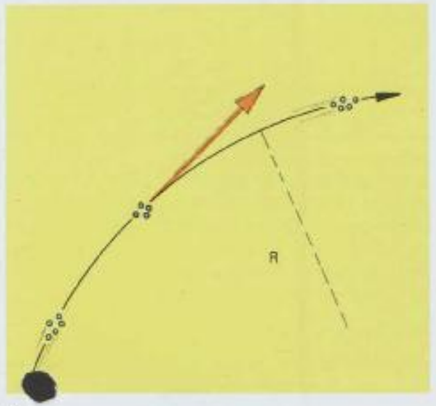
The SPS ring has a circumference of 7 kilometres and is adequate for protons of 400 GeV energy. One could therefore expect that LEP, which is designed for peak electron and positron energies of 130 GeV, would require a much smaller ring.

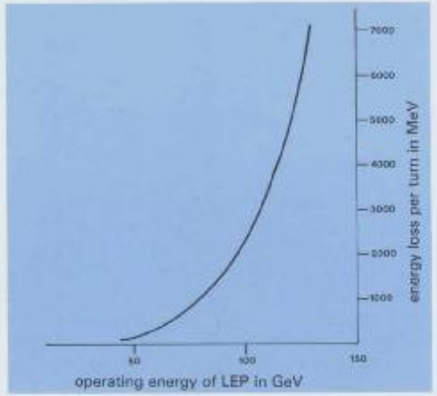
Unfortunately, electrons and positrons are much lighter than protons. When they are bent by a magnetic field they radiate very much more energy than protons. This radiation is known as synchrotron radiation, and the amount emitted rises rapidly as the energy of the electrons and positrons is increased. The only way to reduce the energy lost by synchrotron radiation is to bend the electrons less, which means having a bigger ring.

For this reason the LEP ring is proposed to have a circumference of 30 kilometres. A smaller ring could be built but it would greatly increase the electricity consumption of LEP at all the electron and positron energies at which the ring would be operated, and it would limit the maximum energy of the machine.



Schematic representation of the storage ring principle. Magnetic fields (in bending magnets of which there will be four thousand around the LEP ring) bend the paths of charged particles so that they travel repeatedly around a ring in a vacuum chamber. Electrons and positrons, which carry opposite electric charge, are bent in opposite directions and only a single ring is needed to store and collide them. Focusing magnets (of which there will be two thousand around the LEP ring) keep the particles concentrated in narrow beams. The energy of the particles is increased by radiofrequency accelerating cavities (which can occupy up to 2 kilometres of space distributed around the LEP ring).





Electrons and positrons following a curved path emit "synchrotron radiation" as sketched on the left. The amount of energy radiated increases with the energy of the particles and decreases with the radius of the path they follow (proportional to E^4/R). The energy loss per turn at different LEP operating energies is shown on the right. This loss has to be made up by the acceleration system, and it is to keep it as low as possible that the LEP ring needs to be so large.

What are the main components of the machine?

The injection system

The first important component of LEP is its injection system which is designed to provide, in about twelve minutes, some five million million electrons and positrons for the bunches orbiting the ring.

There is no difficulty in obtaining sufficient electrons. A heated filament emits electrons which can be drawn off by electric fields in a similar way to what happens in the electron gun of every television tube. Obtaining sufficient positrons requires a much more complex scheme.

Bunches of electrons will be accelerated by a linear accelerator to an energy of 200 MeV. They will then bombard a target and, because of the interchangeability of mass and energy, this can produce positrons. First of all, energy in the form of photons will emerge from the electrons being slowed down in the target. These photons can then convert to mass, producing an electron and positron pair. The positrons can be selected by appropriate magnetic fields and taken to 600 MeV by a second linear accelerator.

To build up sufficient numbers of positrons will require an accumulator ring where the positrons produced from the target over a long period of time can be collected. When the required number has been reached, they will be transferred to the CERN proton synchrotron (PS) for acceleration to 3.5 GeV and then transferred to the SPS for acceleration to 22 GeV. At 22 GeV, electrons and positrons can be injected into the main LEP ring. The electrons and positrons will be accelerated in the PS and the SPS in between pulses of protons, so that the use of these machines for LEP will not interfere with experiments using protons.

Some modifications and additions to the PS and SPS will be needed but some of these are already under way for the proton-antiproton colliding beam project. Use of the existing machines instead of the injector synchrotron previously foreseen makes the LEP project a logical extension of the present facilities at CERN.

The magnets

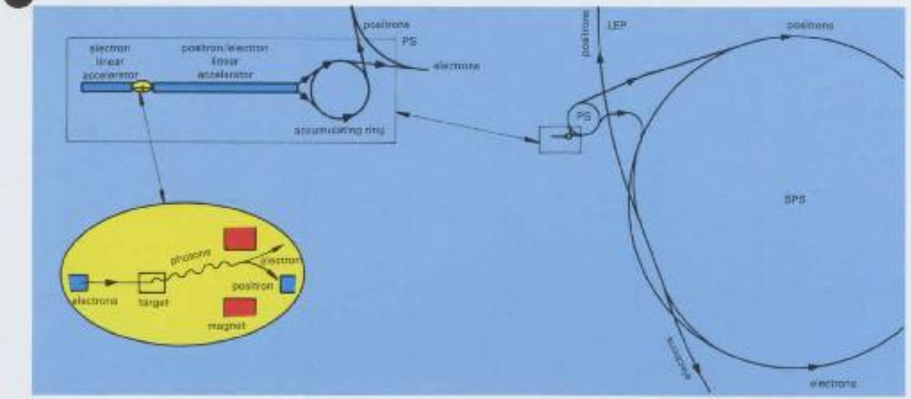
About 22 kilometres of the LEP ring will be occupied by "bending magnets" to hold the particles on their circular orbits. The unusual feature of these magnets (compared to those used in proton accelerators) is that, even at the highest energies, they need to provide only a low magnetic field.

CERN has developed a new technique for the production of such magnets. Instead of building cores completely out of steel laminations, fewer laminations are used, held apart by spacers and the gaps filled with concrete. This gives magnets of the required quality, of great mechanical rigidity, of reduced weight and at about half the cost of conventional magnets. Since about four thousand magnets, each nearly six metres long, will be required, this technique could save a considerable amount of money.

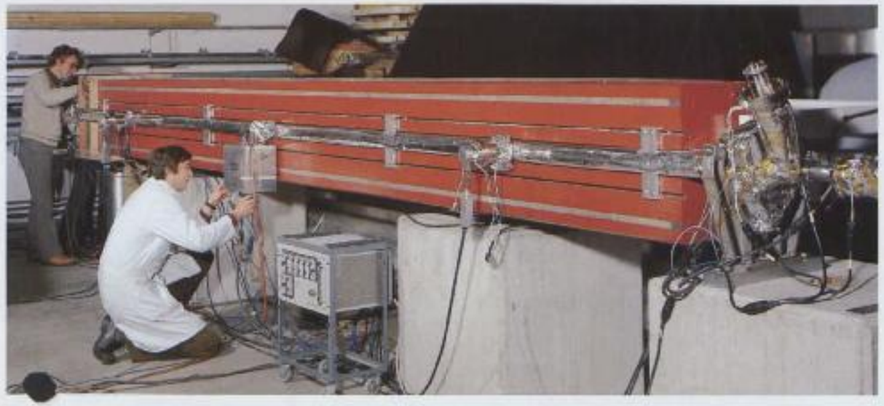
Advantage is also taken of the low field requirement to reduce the cost of the system to power the magnets. Instead of the usual coils, two water-cooled aluminium bars will run through all the bending magnets around the circumference of the LEP ring, connecting the magnets in series.

The vacuum system

Inside the magnet gaps, the particles will circulate in a water-cooled aluminium vacuum ch[illegible]er



The injection scheme for LEP. Positrons are obtained by bombarding a target with 200 MeV electrons and selecting the positrons produced by the resulting photons (see inset). An accumulator ring is needed to collect sufficient positrons. The existing proton synchrotron, PS, and super proton synchrotron, SPS, are used to take the electron and positron energies to 22 GeV before they are injected into the LEP ring.



A prototype magnet for LEP which has been built with the new technique of spacing out the steel laminations and filling the gaps with mortar. This is acceptable because only low magnetic fields are needed. Such magnets provide adequate fields at half the cost of conventional magnets, and have better mechanical properties.

constructed using techniques which were developed for lower energy electron-positron machines.

The vacuum must be very good because it is important to reduce the number of collisions between the electrons or positrons and the gas molecules remaining in the chamber. The design vacuum (3×10^{-9} torr) is chosen to reduce these losses to the point where other effects will determine the useful lifetime of the beams. It will only be necessary to refill the storage ring with particles once every two hours.

The acceleration system

Because of the energy lost in the operation of LEP due to the phenomenon of synchrotron radiation, the most crucial components of the project are the radiofrequency accelerating cavities and their power supplies. It is in these cavities that the energy to accelerate the electrons and positrons, and to replace the energy lost by synchrotron radiation, will be transmitted to the circulating beams. Some two kilometres of space around the ring is reserved for the installation of the cavities.

Three development programmes are under way to achieve the best possible acceleration system. The first concerns the radiofrequency power amplifiers where the aim is to improve the efficiency of the power sources (which are likely to be klystrons or tetrodes) and to watch the progress with alternative sources (gyrocons or trirotrons), which are being developed elsewhere.

The second programme aims to reduce the loss of radiofrequency power by operating the accelerating cavities in conjunction with "low-loss" cavities. A large part of the radiofrequency power is dissipated as heat in the structure of conventional accelerating cavities and the idea is to transfer the power from these cavities for part of the operating time into others which have a special structure where much less power is dissipated. The accelerating cavities would then receive the power when each bunch of particles passes, so as to accomplish the necessary acceleration, but the power would be transferred to the low-loss cavities in the intervals in between. The first tests of this idea have been successful.

These two development programmes can reduce the total power required while operating with copper cavity structures. However, to go much above 90 GeV it will be necessary to replace the copper cavities by superconducting niobium cavities which could operate with much lower power consumption. A development programme is being carried out by CERN in collaboration with a number of laboratories and universities in Europe.

Initial progress with this work is encouraging but it is likely to take several years before it will be possible to say if all the problems have been thoroughly mastered. When they are, superconducting cavities could be introduced progressively into the LEP ring to reduce the power consumption at any given energy of operation and to increase the peak energy.

Other systems

The many other systems required for the supply and distribution of power, for instrumentation and control of all the components of LEP, for cooling and ventilation, etc.. will follow the principles which have been successfully applied in the construction of the existing CERN accelerators.

The use of superconducting radiofrequency cavities to accelerate the electrons and positrons would make it possible to increase the peak energy of LEP and reduce the power consumption at all operating energies. The development of such cavities is being pursued at CERN in collaboration with European laboratories and universities. A single cell niobium cavity is shown undergoing tests.

One idea to reduce the energy burden of LEP is to use "low-loss" radiofrequency cavities in conjunction with the LEP accelerating cavities. Successful preliminary tests have been carried out at CERN and a full-scale spherical low-loss cavity is shown.

How will experiments be carried out at LEP?

The electron and positron beams will be injected into LEP each in four bunches equally spaced around the ring. As they circulate in opposite directions these bunches will collide at eight positions around the ring and it is around these positions that detection systems will be installed to observe what is produced by the collisions. At these eight positions the circular form of the ring is interrupted and straight sections some three hundred metres long are introduced. At the centre of each of these, the particle bunches can be concentrated by magnetic fields to achieve the maximum number of collisions per second.

To be able to analyse what happens, the experimenter would like to be able to measure with great precision the properties of the particles which emerge from the collisions — such things as their direction, their time of passage, their energy, their electric charge and their mass. A variety of techniques can be applied and most of them make use of the electrical disturbance caused by the passage of a charged particle as the source of the information.

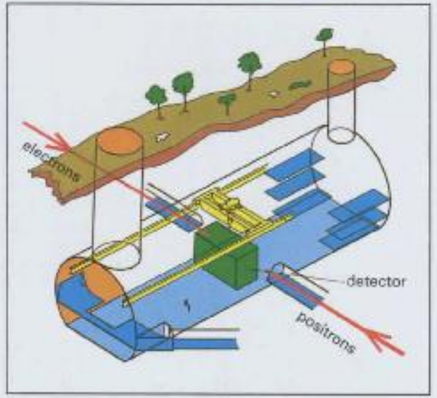
For example, charged particles produce tiny flashes of light where they cross blocks of plastic and this light can be recorded by photomultipliers. Such detectors record the time of passage of a particle to accuracies approaching a thousandth of a millionth of a second. The ionization caused by a charged particle passing through a gas can be picked up by the electric field between closely-spaced planes of wires. Such detectors record the position of a particle to accuracies of about a millimetre. The energy deposited in a gas by a charged particle can be calculated according to the amount of ionization it produces. Such calorimetric methods give estimates of particle energies. Magnetic fields curve the paths of particles in opposite directions depending upon the sign of their electric charge and the amount of bending measures the particle momentum (which is related to its energy). Many of the detector systems therefore involve large magnets. They also involve advanced electronics, and large computers are used for gathering and analysing the experimental data.

Experiments at LEP will involve complex detection systems built up of the types of detector mentioned above. They will surround the region where the collisions occur and record properties of the emerging particles. Several of the halls at the collision regions will be sufficiently large to allow two such systems to be used alternately. One can be moved into place in the LEP ring while the other is retracted for development or modification.

The experiments at LEP will generally require large collaborations of physicists for their conception, for the building and operating of the complex detectors and for the analysis of the results. This is in complete accord with the usual CERN tradition of making its research facilities available to collaborative teams of physicists coming from many research centres.

An indication of the scale and complexity of detection systems on an electron-positron storage ring can be seen from this photograph taken at the PETRA storage ring at the DESY Laboratory. Systems for LEP are not expected to grow much in size but advances in detection techniques may improve the accuracy of the information which is obtained. (Photo DESY)

Drawing of a possible layout of an underground experimental hall. With such an arrangement, two detection systems could be built and moved alternately into position surrounding the electron-positron collision region. Thus, more than eight basic experiments can be prepared for LEP despite the limitation of having only eight colliding beam regions.



What impact will LEP have on the environment?

The LEP ring will be housed in a tunnel in the stable molasse rock which underlies the region of the CERN site on the Franco-Swiss border on the outskirts of Geneva. Around its 30 kilometre circumference, the tunnel will also pass through the limestone rock of the Jura range of mountains. The underground construction technique was used successfully in the building of the SPS.

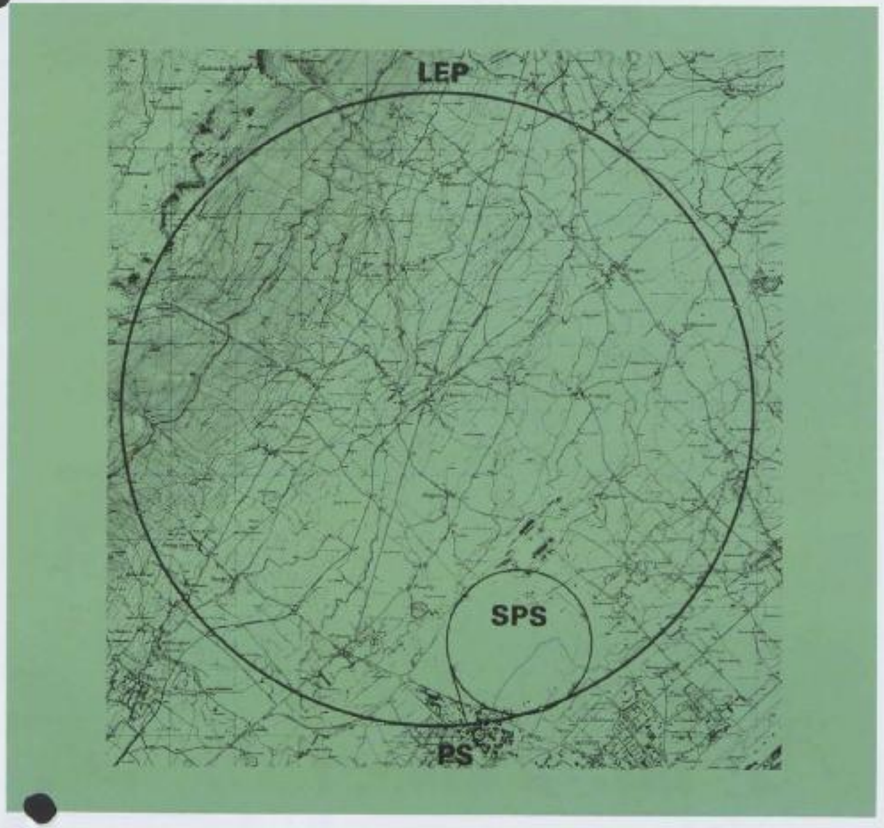
With the exception of small buildings on the surface to house auxiliary equipment for the machine supplies, constructing the machine underground avoids interference with the existing countryside. The costs are comparable to those which would be required to build such a machine on the surface. Underground construction also provides more than sufficient shielding to ensure that the radiation level on the surface is unaffected by the operation of LEP.

Vertical shafts from the service buildings (or tunnels where the machine passes under the mountains) will provide access at the eight collision regions where enlarged excavations will be made for the experimental halls.

Electrical power will be drawn from the French electricity network via an overhead line from Génissiat. Cooling water will be pumped from Lake Geneva. Both the power lines and the water pipes already exist since those which were installed during the construction of the SPS at CERN are adequate also for the needs of the LEP project.

The power requirements for LEP will depend upon the energies at which the storage ring is operated and on the amount of the time assigned to machine operation but they will increase the electrical power consumption of the CERN Laboratory. In 1978 the consumption was 687 GW h which represents 0.06 per cent of the consumption of the European States which the Laboratory serves. When LEP is in its initial stages of operation at the end of the 1980s, its power consumption is expected to be around 300 GW h. Because of the closure of other machines and of further steps to ensure energy savings, the total annual consumption of the Laboratory is then expected to be between 800 and 900 GW h. For the next stages of operation, with increased radiofrequency power, the total consumption would rise to almost 1000 GW h/year. The consumption for later stages will depend on the development of superconducting technology which it is hoped will have a significant impact on reducing the power requirements at high energies. Even so, the consumption will rise for the later stages, but this is expected to be partly offset by reductions in the use of other equipment at CERN. It is expected that a balanced programme of physics can then be carried out with a consumption of a little over 1000 GW h/year.

Efforts are also being made to find ways of using the large quantities of heat emerging from the cooling systems of LEP. The possibilities of heat recovery, of heating of buildings and of use in agriculture or fish farming are being investigated. The major drawback to these applications is the intermittent nature of LEP operation.



A possible location of the underground LEP ring superimposed on a map of the CERN Laboratory region on the Franco-Swiss border on the outskirts of Geneva. The large size of the machine, 30 kilometres in circumference, is apparent in comparison with the existing Super Proton Synchrotron which is also drawn. On the left, LEP passes under the Jura mountains.

How long would LEP take to build and what would it cost?

A detailed design study for LEP was published in 1979 (document CERN/ISR-LEP/79-33), leading to the presentation of the formal proposal for construction to the Member States in June 1980. It is hoped that approval can be given by all the Member States before the end of 1981 so that construction can start at the beginning of 1982.

LEP is a big and complex project and will take many years to construct. In the latter half of the 1980s the abilities of the existing CERN machines will have been surpassed by the ISABELLE and Tevatron projects in the USA and later by UNK in the Soviet Union. There is therefore great eagerness to begin research with LEP as soon as possible so as not to be far behind developments elsewhere.

However the speed with which LEP can come into operation will depend predominantly on the annual rate of expenditure which can be authorized by the CERN Member States. It is proposed that the LEP project will be financed from within an annual CERN budget at about the level it had in 1978. This could be achieved by closing down or reducing the research programmes on some of the existing CERN machines. Thus it is planned to close down the intersecting storage rings, and to reduce greatly the exploitation of the 600 MeV synchro-cyclotron.

Almost all components of LEP will need to be in place in order to begin operation but two items could be built up to their full complement progressively. One is the amount of radiofrequency power installed; the other is the number of detection systems installed for the experiments. Because of this the physics programme will probably be developed in stages corresponding to the progressive installation of radiofrequency cavities, allowing progressively higher peak energies to be reached, and the progressive build-up of the experiments around the collision regions.

The aim is to begin operation as soon as possible at an energy of 50 GeV per beam with, initially, a modest set of experimental equipment. The use of the PS and SPS in the injection system also brings a significant saving. Altogether these measures result in a cost for what is known as 'Phase 1' of LEP of 900 million Swiss francs.

In subsequent phases, further copper radiofrequency cavities could be installed to take the peak energy as high as 90 GeV per beam, and the number of detection systems and experimental halls in use could be increased. Advance to the ultimate peak energy of 130 GeV per beam will require the installation of superconducting cavities. Until the development programme for the production of such cavities is much further advanced, it is not possible to estimate costs or timescales to reach 130 GeV energies.

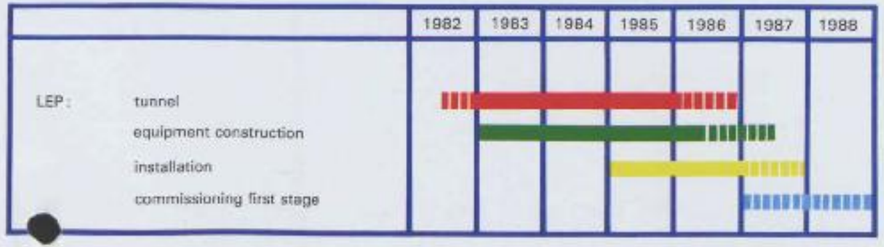
The European Committee for Future Accelerators has also investigated the financial and manpower resources in the research centres in Europe which make use of the CERN facilities. They concluded that the high energy physics community can mount an excellent programme of research on LEP and continue a reasonable level of research on older machines without calling for resources beyond the levels which are presently obtained.

CERN has provided its Member States with world-class facilities for particle physics research for many years. A community of some 1500 experimental physicists, based in universities and laboratories throughout Europe, is now involved in

the research programme. CERN has also achieved a reputation as a laboratory which implements complex technological projects within the projected timescales and within the assigned budgets. The demands of these projects have also proved a great stimulus to European industry where, in general, working with CERN has led to further business worth many times the value of the initial contract with CERN. LEP also has many challenging features which will help develop the abilities of European industry.

It is with this role in the service of science in Europe and with this reputation in accelerator construction that CERN now proposes the LEP project to ensure Europe's continuing participation in one of the greatest intellectual adventures of mankind.

A possible schedule for Phase 1 of LEP construction taking into account only technical considerations.



Publications Group CERN/PU-ED 80-12 (September 1980)
EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH
ORGANISATION EUROPÉENNE POUR LA RECHERCHE NUCLÉAIRE
1211 GENEVA 23 (SWITZERLAND)

LEP PROPOSAL: SOME SALIENT POINTS

Scientific Background

In the view of particle physicists developments are at a point of quite exceptional scientific opportunity, involving a complete reorientation of the understanding of matter. The super proton synchrotron (SPS) accelerator, operational since late 1976, can be expected to dominate world high energy research for the next five years; but from about 1986/7 onwards its role will be severely challenged by new US proton machines. Recent theoretical developments however suggest that the logical next machine to build would be a large positron-electron collider (ie LEP), a realisation that has come when the US is fully committed to developing its new machines. Theory suggests that there are two important energy thresholds which must be attainable with LEP, at about 90 Gev and 170 Gev. LEP would enable Europe to maintain world leadership within a balanced and complementary world programme, with different types of machine in the different regions (taking account on the one hand of the US machines and on the other the prospective USSR fixed-target proton machine).

Since 1974, as a major policy decision, expenditure on nuclear physics basic research has been reduced as part of the reduction in, and reallocation of, big science expenditure. This has been achieved mainly by major reductions in domestic facilities making UK particle physics research wholly dependent on overseas facilities. Our overseas research is primarily concentrated at CERN, with an important secondary centre at the German laboratory DESY. The SERC's future planning for particle physics is based on the continued use of these facilities. By concentrating resources British physicists have, despite reduced funding, participated on comparable terms with their European colleagues; and the subject has been organised in such a way that the research is undertaken by university staff - 90% of British experimental particle physicists are in the universities which can thereby directly benefit from the intellectual challenge of the subject.

Industrial Aspects

LEP offers substantial opportunities to UK industry. CERN is the largest single customer in Switzerland for UK exports, and the specialised nature of the market gives it even more importance. The performance requirements associated with high energy physics research mean that suppliers' products are often improved as a result of meeting a CERN specification. CERN's technology leads to product development and hence increased market prospects; a study has shown that the benefits to a firm that

arise from selling a product to CERN averaged four times the revenue from that sale. Thus LEP represents, as well as a scientific opportunity, a commercial opportunity for British industry both in the increased volume of business that it should generate and in the unique opportunities for firms to be in at the start of new departures in technology. The Department of Industry and the SERC have for some time been alert to the opportunities for British industry and with the FCO (through the interDepartmental UK Committee on CERN chaired by DES, and in direct bilateral dealings) have been planning ways of bringing these opportunities to public notice and encouraging participation by UK firms.

Timescale and Cost

If the proposal is approved at the June meeting, construction is likely to start in January 1982 and to be completed in a period of 7-9 years at a total cost of 900,000,000 Swiss francs at 1980 prices. The proposal envisages the project going ahead within the existing total CERN budget; this will be made possible by CERN's using some of their existing facilities and phasing out others. The cost to Member States will therefore be no more than if CERN were to continue to use its existing facilities. CERN has a good record for completing projects on time and within cost limits; there are good grounds for confidence in the abilities in this respect of Dr Schopper, the new Director-General; and there is scope for reducing other activities at CERN or extending the construction time for LEP if the estimate of cost looks like being appreciably exceeded.

PRIME MINISTER

FINNISTON COMMITTEE: ENGINEERING COUNCIL

The Secretary of State for Industry sent me a copy of his minute to you of 22 May.

My Department has been closely involved in the negotiations leading up to the compromise of 14 May. I agree with the Secretary of State for Industry that, in view of the united stand by the institutions, employers and education interests, we have to decide whether to accept the compromise or abandon hope of an agreed settlement. I further agree that it is worth establishing a body on these lines. If good people are appointed and move decisively they should be able to exercise considerable influence not only on initial degrees and training but also on chartered status.

Colleagues may like to note that I shall shortly be proposing a Parliamentary Statement on the educational consequences of Finniston and our National Conference on Engineering Education and Training.

I am sending copies of this minute to recipients of the Industry Secretary's minute of 22 May.

M.C.

MARK CARLISLE
5 June 1981

RESTRICTED

Qa 05379 5 June 1981

To: MR LANKESTER

From: J R IBBS

Support for Science vs. Engineering

1. I am concerned that three iminent decisions on science and engineering matters whilst entirely defensible in the context in which each has to be considered, would be cumulatively disturbing because of failure to support much needed improvements in this country's engineering strength.

2. The three issues are:

a. Finniston Committee recommendations

Sir Keith Joseph wrote to the Prime Minister on 22 May reporting the "not ideal" outcome of the negotiations he has had with the engineering employers, the engineering institutions and the engineering professors. The proposals for an Engineering Council which Ministers are invited to endorse represent the best that can be achieved by consensus on the basis of a chartered body but fall far short of those that Finniston (and others) feel to be needed. In the light of this disappointing outcome it might be worth reconsidering ~~January~~ August's decision not to set up a statutory Engineering Authority.

b. The distribution of the Science Vote

The Advisory Board for the Research Councils (ABRC) have been considering the advice that they should be offering to the Secretary of State for Education on the distribution of the Science Vote between the Research Councils. Dominating this year's discussions have been the concern of the ABRC that good science (and good scientists) should not be lost in the process

RESTRICTED

of cutting the UGC support for the Universities and the understandable desire of the Science and Engineering Research Council (SERC - formerly SRC) to continue to support the UK high energy physics community. This latter objective means that approximately 20% of the SERC budget will be irreversibly committed for the rest of this decade in support of CERN in Geneva. There is a severe risk (including exchange rate exposure) that insufficient funds will remain for vigorous exploitation of initiatives that have been taken by the Engineering Board of SERC in the fields of manufacturing technology, polymer engineering, marine technology and microelectronics.

c. Implementation of cuts in support for the Universities

The UGC have announced that the impact of the necessary cuts is to be selective and imposed in such a way as to preserve existing centres of excellence. There is an obvious risk that the result of the exercise of the UGC's academic judgment will favour the pure science effort of our Universities (which is excellent) rather than the attempts that have been made to improve their engineering competence (where the UK record is mostly, at best, mediocre by world standards).

3. Decisions have not yet been taken on these latter two issues - the ABRC discussions on the allocation of the Science Vote will not be completed until 10 June: the critical CERN Council meeting is not until 24/26 June; the UGC will not be advising Universities of their grant for 1981/82 until 22 June.

Final ABRC decisions not until Feb 24 12 ..

4. The Prime Minister may feel it is worth drawing the attention of Sir Keith Joseph and Mr Carlisle to the way in which these three imminent decisions might add up to a further blow to the long term prospects of our developing an internationally competitive engineering industry. It may be that together they could secure the emergence of a more satisfactorily balanced outcome.

5. I am sending a copy of this Minute to Sir Robert Armstrong.

As requested

With the Compliments
of the
Chancellor of the Exchequer's
Private Secretary

We are arranging to
copy this to the other
recipients of the
Budget Letter.

Treasury Chambers,
Parliament Street,
S.W.1.

cc CST
FST
MST(C)
MST(L)
Sir D Wass
Mr Ryrie
Mr Downey
Mr Dixon
Mr Potter

Treasury Chambers, Parliament Street, SW1P 3AG
01-233 3000

2 June 1981

The Rt Hon Sir Keith Joseph Bt MP
Secretary of State for Industry
Department of Industry
Ashdown House
123 Victoria Street
LONDON SW1

Dear Keith

FINNISTON COMMITTEE - ENGINEERING COUNCIL

Thank you for copying to me your minute to the Prime Minister on the revised proposals for the new Engineering Council.

I am pleased that you have reached agreement with the main parties concerned on the role of the Council. I realise that the consensus reached is not perhaps ideal and that there may be critical remarks about the extent to which we have accepted the status quo as regards the role of the main Engineering Institutions. However I take the view that it was important to carry the Engineering Institutions with us in establishing the Council; their commitment to the new body is therefore an important step forward.

I also agree that the success of the Council is likely to depend on the quality of individuals who serve as its members. I hope we will be successful in attracting individuals of the right calibre and that the Council can be successfully launched as soon as possible.

Yours

GEOFFREY HOWE

JH 195

RESTRICTED

Mr Wallace
cc Mr Wolfson
Mr Duguid
cc Mr Wright (C.O.).

(4)

Prime Minister

A

PRIME MINISTER

FINNISTON COMMITTEE - ENGINEERING COUNCIL

Last August I announced the Government's conclusion on the Finniston Committee recommendation that we should set up a statutory Engineering Authority. We had concluded, after widespread consultation, that an Engineering Council set up under Royal Charter would be preferable to a statutory body and my announcement, which had been agreed with colleagues, said that the Government were prepared "to facilitate the emergence of a focal point for the engineers, academics and employers to work with the existing institutions to remedy the deficiencies identified by Finniston".

2 Officials have been in long drawn out discussions with the Engineering Institutions, employers and educationalists to try to reach the consensus we were seeking.

3 A month or so ago I saw the leaders of the profession to discuss the outstanding difficulties and at that meeting it was suggested that agreement might be reached if a joint meeting of employers, educationalists and the Engineering Institutions was called. Sir Peter Carey held a meeting on 14 May, when a team from the Institutions was led by Lord Caldecote, President of

the Fellowship of Engineering. The CBI and EEF were represented by teams led by their Presidents and the Committee of Vice Chancellors, Directors of Polytechnics and Engineering Professors were similarly represented by their respective Chairmen. At this meeting there was agreement on a proposal that the new Engineering Council should register a three stage system - academic degrees, initial training and professional experience. The first two stages would be the entire responsibility of the Engineering Council and the third stage, which would lead to the title Chartered Engineer, would normally be awarded only if the individual were a member of a Chartered Engineering Institution nominated by the Engineering Council. (I enclose a copy of the agreed document for those colleagues who would like to see it.)

4 While this solution is not ideal, it has been agreed by all the main parties concerned and I think we should accept it: the important thing now is to get the Council set up and operating. We must expect criticism from the Opposition and trade unions that the Government have preserved some of the exclusive aspects of the Institutions; but at the end of the day the success of the Council is more likely to depend on the quality of the individuals nominated to launch the Council during its first 3 years rather than on the terms of the Charter. I hope it will prove possible, on the basis of the agreement which has been secured, to attract the commitment needed by distinguished individuals to serve on the Council. We shall be able to point out the opportunities to influence both the academic qualifications and the initial training of young engineers as

well as to improve industry's use of our engineering talent.

5 Before officials here enter into the final stages of preparing a Royal Charter for recommendation to the Privy Council, I would be glad to know that you are content to proceed on the basis I have outlined.

6 I am copying this minute to Geoffrey Howe, Jim Prior, John Nott, Michael Heseltine, George Younger, Patrick Jenkin, John Biffen, David Howell, Mark Carlisle and Norman Fowler.

KJ

22 May 1981

Department of Industry

DEPARTMENT OF INDUSTRY PROPOSAL FOR NEW ENGINEERING COUNCIL FOR INCORPORATION BY ROYAL CHARTER

REVISED TEXT AGREED ON 14 MAY

(i) The Engineering Council should operate a register of professional engineers covering three stages - accredited degree course, accredited training, experience as a professional engineer. Accreditation of the first two stages must be in the control of the Engineering Council, using nominated engineering institutions (and other bodies) as their agents as the Council may consider appropriate. The Monitoring of professional experience would be a matter primarily for the Engineering Institutions. The C Eng title would normally be awarded at the end of the final stage provided the individual was also a member of a nominated Chartered Engineering Institution. There would be no title awarded by the Engineering Council, other than C Eng when this is transferred from the CEI.

(ii) There needs to be a transition period during which the Engineering Council makes decisions as to which of the Engineering Institutions (and other bodies) are nominated for the accreditation role. During this transition period, a maximum of 2 years, the Institutions would carry on their accreditation functions as at present, and the Engineering Council would define minimum criteria and standards with which Institutions would be

required to comply in order to fulfil their accreditation role thereafter.

(iii) In respect of the composition and selection of the Council provision should be incorporated in the draft Charter that the Council shall consist of a Chairman (who shall be a Chartered Engineer) and not more than 25 other members, two-thirds of whom will be Chartered Engineers selected, in a way to be determined by the Council, from lists of Chartered Engineers submitted by the nominated Chartered Engineering Institutions, the Engineering Schools, and the principal Employers' Organisations.

(iv) It should further be provided that the membership of the Council as a whole shall be so composed as to reflect a reasonable balance at all times of those with experience and knowledge in the major areas of industry, principal engineering disciplines, their learned societies, and those concerned with the teaching and training of those aspiring to be registrants.

(v) In Article 6 (2)* it would be preferable to revert to an earlier wording of the last two lines, to read "shall be registered in the corresponding section of the register".

(vi) It should be established that non-Chartered Engineering Institutions should continue to enjoy facilities similar to those which they already enjoy at present as members of the CEI/ERB. This would also cover the situation where a new technology is being developed before an appropriate engineering institution has been nominated by the Engineering Council.

(vii) It should be emphasised that any agreement must be on the understanding that it will be possible to rely upon the observance of the spirit as well as the letter of the Charter, particularly in regard to the initial appointment of members (see (iii) and (iv), above).

* Refers to DOI draft Charter dated 3 March 1981.

JU.

DEPARTMENT OF INDUSTRY
ASHDOWN HOUSE
123 VICTORIA STREET
LONDON SW1E 6RB
TELEPHONE DIRECT LINE 01-211 3301
SWITCHBOARD 01-212 7676

Secretary of State for Industry

7 August 1980

Tim Lankester Esq
Private Secretary to the
Prime Minister
10 Downing Street
London SW1

Dear Tim

FINNISTON - ARRANGED PQ

Following the discussion in E Committee yesterday I understand that it was agreed that an announcement should be made by the way of a written PQ today.

2 I enclose a copy of the text of the question and answer for your information.

3 I am copying this letter and enclosure to the private secretaries to members of E, the Chancellor of the Duchy of Lancaster and the Paymaster General.

Yours sincerely
Catherine Bell

CATHERINE BELL
Private Secretary

"To ask the Secretary of State for Industry whether he is yet ready to make an announcement about the Government's conclusion on the Finniston Report's recommendation that they should establish an Engineering Authority?

COMMITTEE OF INQUIRY INTO THE ENGINEERING PROFESSION

1 The Government's consultations over the Finniston Committee Report, and the pattern of responses to it, were outlined to the House on 13 June by my Hon Friend, the Under-Secretary of State for Industry. As he said then, the Report has been widely welcomed and has shown that there is general concern for seeking improvements in the areas covered by the Inquiry. We have discerned also a willingness from every quarter to help make the best use of our national engineering capabilities.

2 The Report's central proposal affecting the Government is the suggested creation of a new Engineering Authority established by statute, with all the members appointed by the Government. Not surprisingly, this recommendation has been the object of much controversey; many have expressed concern that a body of this kind would represent undue Government interference in the affairs of the engineering profession, and have advocated a body operating under the auspices of the Privy Council through a Royal Charter. I have received several specific proposals from different groups within the profession for a non-statutory alternative to the proposed Authority.

3 There does seem to be a readiness in the profession and among employers and academics to tackle widely perceived deficiencies in the present institutional arrangements for education and training of engineers. It would seem sensible therefore for the Government to facilitate the emergence of a focal point for the engineers, academics and employers to work with the existing institutions to remedy the deficiencies identified by Finniston.

4 The Government does not propose the establishment of a statutory body. Instead it proposes to facilitate the emergence of such a focal point by recommending to the Privy Council that Her Majesty the Queen should be advised to constitute a new body by Royal Charter. The Government, after full consultation with those concerned, would be prepared to nominate the initial members of this body, but only for a limited period. The central responsibilities of the body would be similar to those recommended by Finniston, centering upon the accreditation of engineering education and training and the formal registration of those engineers qualified thereby. However, instead of the new body itself organising accreditation visits and assessments of individual registrants, I would expect this work to be delegated to nominated institutions, the new body simply determining the standards to be applied. The Government would expect the Chartered body to become quickly self financing but the Government will be prepared to support initial funding.

5 The necessary arrangements will have to be discussed in detail with the existing institutions and I am authorising officials to enter into discussions with a view to the new body being established later this year.

6 The Government wish to repeat their thanks to Sir Monty Finniston and his Committee for all their hard,work in producing this important Report, and also to those many people who have put forward their views and suggestions.

CONFIDENTIAL

Qa 05099

To: MR LANKESTER

From: J R IBBS

Finniston Report on the Engineering Profession

1. I support the proposal to have as a focal point a new chartered body rather than a statutory authority.

2. The existing engineering institutions are highly fragmented and tend to be narrow in outlook. Whether or not the new chartered body succeeds in improving the profession and the use made in industry of its members will depend crucially on the calibre and experience of those appointed to serve on it when it is first set up. The quality of these appointments will matter more than the detail of its constitution.

3. It is most important that users of engineers should be adequately represented on the new body and that its affairs should not be left entirely to representatives from the existing institutions and academics.

4. I support the proposal that the new body should have an initial loan. I believe that repayment of this might with advantage be deferred to five years rather than three years so that repayment does not coincide with the moment when the body becomes free-standing. It is important that during the first three years attention should be concentrated on the tasks of welding together and improving the profession.

5. I am sending a copy of this minute to Sir Robert Armstrong.

6 August 1980

CONFIDENTIAL

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Ref. A02816

PRIME MINISTER

Finniston Report on the Engineering Profession

(E(80) 87)

BACKGROUND

In his paper the Secretary of State for Industry puts forward his own recommendations modifying the Finniston Report's proposals for a new Engineering Authority.

2. Finniston saw a new body as necessary to improve the status of engineers, mainly through supervising their qualifications and training. Under the Finniston proposals, the Engineering Authority would be a statutory body, spend about £10 million per year, mainly on accrediting, establishing (and in some cases funding) new engineering courses, registering engineers who had passed accredited courses, and generally galvanising public opinion into recognising the importance of engineers.

3. The Secretary of State accepts the need for improvements in standards, status and training of engineers, although he does not set a high value on their likely benefit to our industrial performance. The main differences in his proposals compared with Finniston's are:-

(a) His new body would be a chartered institution and not statutory authority - this would reduce its dependence on the Government, give more flexibility in its functions, and make it easier if necessary to wind it up if it proved unsuccessful.

(b) It would work to a much greater extent through existing institutions - e.g. it would channel its funds mainly through the University Grants Committee and rely on existing engineering institutions to do some of the accreditation work. As a result it would only cost about £1 million per year instead of the perhaps £10 million per year proposed by Finniston. Moreover it would aim to recoup its costs after the first year or so through a levy of perhaps £5 per head on individuals who applied for registration.

(c) It would only be guaranteed an initial life of three years. Although the Secretary of State would appoint the first members, he implies that future appointments might be in the hands of the engineering professions themselves.

HANDLING

4. After asking the Secretary of State for Industry to introduce the paper, you might particularly like to seek views from the Secretary of State for Education, the Secretary of State for Employment and Mr. Ibbs. Questions you might raise are:-

(a) Is a new body needed at all? It is another quango. On Sir Keith Joseph's proposals it seems a relatively cheap one. Would it act as a lobby for increased expenditure? Or can it be regarded as sufficiently cheap that it is a gamble worth taking to set it up?

(b) What about membership? It is cardinal to the Finniston recommendations that the new body would have strong representation from industrial management; in this way it would help to remove the existing distrust which exists between management and the professional engineering institutions, which are seen as partly irrelevant to industrial needs. The choice of its chairman and of its chief executive will be fundamental to its success; the chief executive is likely to be particularly important, since much of the work will consist of a hard grind of persuading universities, etc. to establish particular courses, and there will be a good deal of liaison needed with senior industrial management. This raises the question whether it is desirable for the Government to announce the establishment of a body before it can announce who the new chairman will be and have an idea of the chief executive. Is there a case for delaying an announcement until a chairman has been lined up? (If so, the Secretary of State would need to make a holding Written Answer now, as he is committed to some statement before the Recess).

(c) A three-year life? Is it desirable for the Government to announce in advance that the body can only be guaranteed a three-year existence? Could this act as a deterrent to obtaining good people on the new Authority? Presumably if nothing is said about its life-span, this would not rule out disbanding it eventually.

(d) Funding. Do colleagues agree with the proposal for a Government-guaranteed private sector loan, as opposed to a direct initial grant? There would be no public expenditure unless the guarantee were called, in which case the cost would have to be found from DOI's existing PES allocation. This arrangement would require relatively simple legislation, which could be incorporated in the Industry Bill planned for next Session: there is no provision in the legislative timetable for a separate Bill.

CONCLUSIONS

5. The available conclusions are:-

EITHER

(i) to accept the Secretary of State for Industry's main recommendations in paragraph 15(a)-(d) of his paper, and to authorise him to make the announcement he proposes at Annex B of his paper;

OR

(ii) to agree the Secretary of State's proposals in principle, but delay an announcement until a chairman has been found

OR

(iii) if colleagues have more fundamental objections, to have the issue reconsidered in the autumn.

(iv) In the event that the choice falls on courses (ii) or (iii) to authorise the Secretary of State for Industry to give a holding reply before the Recess.

RA

(Robert Armstrong)

5th August, 1980

Ind Pol

DEPARTMENT OF INDUSTRY
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Secretary of State for Industry

15 May 1980

Rt Hon Norman Fowler MP
Secretary of State for Transport
Department of Transport
2 Marsham Street
London SW1P 3EB

Dear Norman,

Thank you for your letter of 9 May about the Finniston Report; your Department is of course a major employer of engineers and therefore your assessment of the situation will be a most important part of our consideration of this matter.

As you know, we too have consulted very widely and I am hoping shortly to hold discussions myself with one or two of the major groups involved, particularly industrial employers. All this will be brought together in the report which officials are now preparing for our collective consideration. It is at that point that we shall have to decide on our position and choose which course of action to pursue. In the meantime I am glad to have your assessment of the situation.

I am copying this letter to the recipients of yours.

Yours,

Keith

cc AD Inquiry

Ind Pol

DEPARTMENT OF TRANSPORT
2 MARSHAM STREET LONDON SW1P 3EB

The Rt Hon Sir Keith Joseph Bt MP
Secretary of State for Industry
Department of Industry
Ashdown House
123 Victoria Street
LONDON
SW1

9 May 1980

PR
MS

Dear Keith.

I understand that you have been considering with colleagues the Finniston Report. As my Department directly employs a large number of civil, electrical and mechanical engineers and indirectly employs many more, I thought I should let you have my thoughts on the Report's recommendations.

The Finniston analysis accurately emphasises the essential role of engineering skill and innovation to Britain's competitive position in world markets, as the overseas performance of British Consulting Civil Engineers shows. Nevertheless, there is still much room for improvement in the Construction Industry, and elsewhere even more radical changes are required.

Despite the apparent diversity of work across the engineering spectrum there are a set of common personal attributes and skills demanded of practioners which make it sensible to govern the profession as a whole.

Any new governing structure for the Profession will need to command the widespread support of engineers, employers and educationalists while achieving the Finniston aims. I doubt whether an imposed system would work well. But a voluntary system with sanctions attracts me and I am surprised that sanctions have so far attracted little attention in the debate. The success with which they can be applied will be crucial to achieving Finniston's aims. The design of the new system therefore requires subtlety but I believe a format is beginning to emerge which would suit my needs rather well and, I believe, would achieve what we all want from the Finniston initiative.

Opinion in the profession now seems to accept the need for a governing body, which they seem to like to call a Council, but they want this to be more independent of any Department than Finniston envisaged. The Council would hold the engineers' register and prescribe policy for education, training qualification and Finniston aims, but it would implement those policies by accrediting willing Engineering Institutions or particular groupings of Institutions to carry out executive tasks in their particular fields. The Council would consist of representatives of engineers, employers, educationalists and Government.

This pattern resembles the General Medical Council, and I believe it is the better for that. But the medical and engineering professions are not the same and details, particularly in respect of sanctions, will need to differ.

I think that it would be essential for the Council to have the right to withdraw accreditation from Institutions if they failed to comply with policies or standards set by the Council. The Council would, therefore, have to be able to inspect Institutions and to require changes through the threat of sanction. Similarly, the Institutions engaged in the statutory registration of engineers would have to be able to apply similar powers of sanction by withdrawal of accreditation from employers who failed to provide adequate structured training, universities who failed to meet required standards or individuals who transgressed ethical requirements.

Even so, the sanctions alone might not be sufficient to exploit our engineering skills to full advantage. It might be necessary to consider how Government could set a lead in this respect.

My Department already employs qualified engineers to its own staff and in firms which work for it. For example, a Consulting Engineer firm would be unlikely to be selected for work by my Department if they offered unqualified engineers in professional tasks. Wider adoption of such requirements in Government would be sufficient, I believe, to ensure that registration would come to have the commercial value Finniston seeks.

The Finniston report places considerable emphasis on higher education in the development of the registered engineer. There appears to be some unease about the balance and nature of

these proposals and I shall be interested in the appraisal which the Department of Industry makes of the comments which they have invited on this aspect of the matter. I would not want to see the path to registration made too narrow.

I am generally content with the other Finniston proposals. My people will make some detailed comments through the interdepartmental committee, but I believe that the structure of the profession, the maintainance of the learned societies within it, and the question of sanctions are the essential issues if we are to raise professional standards and get the commercial pay-off from doing so. I also think that they matter if we are going to prevent the profession from turning towards some brand of militant trade unionism.

Finally, I urge that the necessary changes should be determined and implemented as quickly as possible. I do not like the tendency for the argument to drag on and make the profession spend time looking at itself instead of getting on with work in the markets here and overseas. It is only in those markets where they are going to get the taste of success and the high morale that goes with it.

I am sending copies of this letter to the Prime Minister, the members of E and Sir Robert Armstrong.

Yours ever Norman

NORMAN FOWLER

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Action

National Economic Development Council

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NEDC(80)27

"Engineering our Future": Report of the Finniston Committee: Education Aspects

Note by the Secretary of State for Education and Science.

1. The Finniston Report contains a number of interesting and valuable ideas on the education and training of professional engineers and makes a large number of recommendations in this area, aimed at aligning present arrangements more closely with the requirements of manufacturing industry. These are currently the subject of urgent and widespread debate in the educational world, and I am planning to bring this to a head at a Conference in the Autumn.

2. The educational issues which the Report traverses include:

a. The Schools

The Report's analysis of school education and the associated recommendations are closely in line with existing DES policy. For example the Report emphasizes the importance of encouraging pupils to continue their studies in mathematics and science and of adequate careers education (with particular reference to opportunities in industry). This is consistent with the work we are currently pushing forward on the school curriculum and on examinations, concerning which I am conducting consultations following publication of "A Framework for the School Curriculum".

b. The Pattern of Degree Course

The Committee recommends adoption of a single, fixed pattern of degree courses. There is wide agreement with need for change, but no agreement that Finniston offers the best or even a sound choice, given present arrangements and what might be evolved from them. It might be better to evolve new courses from the existing pattern rather than change it radically.

c. The Incorporation of Training Elements into Degree Courses

Finniston calls for the inclusion in degree courses of certain kinds of practical training, now provided if at all during subsequent industrial employment after graduation. This raises the question of whether educational institutions are the best agencies to undertake this work, and of the cost of their doing so in terms of additional accommodation, equipment and suitably qualified staff. Success will in any case depend on industry's carrying out other forms of training which it alone can provide.

d. Relationship with Technician Education

The Committee said little about technician education as such, recommending a separate study. Technician supply and education remains an urgent problem, and attention will need to be given to the relationship (on which the Committee did have something to say) between technician qualification routes and those of professional engineers.

e. The Place of Engineering Research

The Committee questioned whether the present system, under which most students pursue research end-on from their first degree, is in the best interests either of the individuals or of the contribution which engineering research should make to manufacturing industry. Alternatives are already being urgently studied e.g. by the Science Research Council.

f. The Role of Educational Institutions in Continuing Education

The Report recognised the importance of continuing and post-experience formation as a means of updating the skills and knowledge of the existing stocks of engineers in response to changes both in technology and in individuals' responsibilities. The DES see this as one of the most important growing points in the educational system. Educational institutions are already providing courses of this kind, and industry is usually prepared to pay for them. But we shall need to be sure that the courses offered are of high quality and up-to-date in their technological content, and that employers and employees who want to avail themselves of these facilities are kept fully informed through suitable local liaison arrangements.

3. These are issues which cannot all be settled within the timescale for a decision on an Engineering Authority foreseen by the Secretary of State for Industry. My Department is sponsoring a two-day Conference which will take place on 15 and 16 October. Last year I appointed a small Steering Committee under the Chairmanship of Mr J R S Morris to plan and organise the Conference. The Committee are consulting the major interests, including industry, the Engineering Institutions and the education world; and they aim, through this consultation and their own work, to present papers to the Conference which will command the maximum degree of consensus. By this means I hope that the impetus on the educational and training issues raised by Finniston can be maintained and that the key decisions needed can be reached this Autumn.

Department of Education and Science
Elizabeth House
York Road
London SE1 7PH

24 March 1980

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ACTION

National Economic Development Council

NEDC(80)26

'ENGINEERING OUR FUTURE': REPORT OF THE FINNISTON COMMITTEE

Memorandum by the Secretary of State for Industry

1 The Finniston Report, published on 9 January, has already been successful in drawing wide attention to the critical importance of engineering excellence within industry. Their analysis of Britain as an industrial nation, with which the Report begins, will be familiar to members of the Council, since much of the Committee's arguments draws on analyses and special studies commissioned and discussed by NEDC. The continuing importance of manufacturing industry within the British economy, the importance of non-price factors in determining international competitiveness, productivity and profitability, are all drawn into the identification and development of what the Report terms the 'engineering dimension'.

2 A feature of the approach taken in the Report lies in the way in which it seeks to relate debates which had been continuing in relative isolation within industry, education, and the Engineering Institutions, showing that the success or failure of policies pursued in one sphere frequently depend for success on those pursued in the others. In particular the Report highlights the key role of employers - in shaping the environment in which engineers' contributions are made, in developing the career patterns and rewards open to engineers, and in taking a fuller part than hitherto in the initial and continuing education and training of engineers.

3 The Government is persuaded of the importance of an adequate supply of high calibre engineers for industry, and notes the warning from the Finniston Committee and others that the numbers joining the ranks of our engineers and technologists may be insufficient to meet national needs in the 1980's and beyond. While many other issues of importance for the success of manufacturing industry must not be neglected in considering the Finniston proposals, the fostering of a high level of engineering capability, reflected in the design, manufacture and marketing of products must be a matter for national concern and action.

4 The Report makes 80 recommendations for actions which the Committee believe would help generate a healthier engineering dimension within the UK economy. The majority of these are directed towards those in industry and to those in educational and professional institutions. Some are addressed directly to NEDC, NEDO and the sectoral bodies. The role recommended for Government is to support, to facilitate and to encourage where appropriate the efforts of these groups. There would accordingly be little gain from the Government responding positively to those recommendations aimed to it directly except in support of a positive response from employers, the educational sector and from

/engineers .....

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engineers themselves. The question of whether Finniston's analysis is accepted and recommendations are implemented is thus by no means one for Government alone.

5 It is encouraging to note from the responses which Government has received since the publication of the Report that many companies have been led to review their recruitment, training and use of engineers in the light of the Finniston Report, so in a real sense it can be said that the Report is already being taken into account.

6 There are several issues on which the Committee has called for changes in policies and machinery at a national level, in which there is a clear call for some Government involvement. In particular the Report recommends the creation of a new Engineering Authority which will be responsible for the many diverse aspects of the 'engineering dimension' including accreditation of the education and training of engineers, in the oversight of these activities and in the consequent qualification of engineers. The Secretary of State for Education is circulating a separate paper on the educational aspect of the Report.

7 The Department of Industry (DOI) have consulted over 350 industrialists and Institutions on the following key issues:-

a. the establishment of a new Engineering Authority;
b. the establishment of a statutory register of qualified engineers;
c. the accreditation of engineering degree courses, training programmes, and individual applicants for registration;
d. the introduction of licensing or other restrictions over engineering practice; and
e. measures to encourage the continuing formation of engineers.

8 The Government is aware that many schools of engineering and many employers already provide an excellent preparation for engineers and also that the Engineering Institutions have long been active in seeking better standards through their accreditation and registration activities. Any reforms or new machinery which might be introduced would need to build upon and extend this valuable work and not detract from it. The Government will in fact only introduce changes in these areas if they believe that they are justified in themselves, that they will command adequate support amongst the various groups concerned, and that they will facilitate actions by these groups working together which will represent a worthwhile improvement over current machinery and activities.

/9. The Government ....

9 The Government is therefore asking the various interested groups:

a. do they agree with the Committee's analysis of the problems to be remedied?
b. do they agree with the objectives for change identified in the Report?
c. do they agree with the particular actions which the Committee has recommended?

If not, what alternatives would they prescribe?

10 Many responses have now been received, although some, such as the CBI, have told us they need more time to consult their own membership before arriving at a considered view. From the views which have been received so far there seems to be much endorsement of the analysis and general objectives as identified by the Finniston Committee, but opinions are more mixed on the best way to pursue them.

11 The present intention of Government is to indicate its response to the key issues raised by the Finniston Report (see para 7 (a) to (d)) in the summer, after taking full account of the results of the current consultations and discussions such as those which will take place in the Council. The Government is also considering the recommendation in the Report that there should be a separate study of the problems caused by the shortage of technicians. While the present consultations continue it would not be appropriate for Ministers to endorse or reject the Finniston analysis and proposals.

Department of Industry
Ashdown House
123 Victoria Street
London SW1

24 March 1980

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ACTION

National Economic Development Council

NEDC(80)25

FINNISTON REPORT - TUC COMMENTS ON THE REPORT'S RECOMMENTATIONS
Note by the Secretary

A copy of the TUC response to the recommendations of the Finniston Committee of Inquiry into the Engineering Profession is attached. This paper is relevant to the item on the Finniston Report shown on the April Council agenda.

T U Burgner
21 March 1980

National Economic Development Office
Millbank Tower
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TRADES UNION CONGRESS

ENGINEERING OUR FUTURE

This document summarises and comments on the recommendations of the Finniston Committee of Inquiry into the Engineering Profession.

Introduction

1 The Finniston Report proposes that radical and fundamental improvements in UK manufacturing performance are required if Britain is to become a high earning growth economy on a par with its main competitors. It develops the concept of the engineering dimension, which conveys the interaction of engineering with non-engineering factors in determining manufacturing performance, and emphasises the importance of considering the whole manufacturing system and not just aspects of it. It stresses that prosperity for the advanced industrial nations depends on the production of high quality, high value added goods, utilising the best of current knowledge and technology and it proposes that a new national Engineering Authority should be established with powers granted to it by Parliament to advance the engineering dimension in national economic life and particularly in manufacturing.

Comment

2 The General Council welcome the publication of the Finniston Report, and endorse its general analysis. The TUC is fully committed to achieving a much improved manufacturing performance and recognisesthat an essential element in this is greater public recognition of the nature and importance of engineering within the British economy. This is vital for all areas of engineering; in the past craft, technician and professional engineers have all been undervalued in our society. The extension of education and training opportunities should go hand in hand with improvements in the conditions of work; for craft and technician engineers in particular, an enhancement of the quality of life at the workplace is an essential step towards achieving the overall enhancement of engineering within the British economy.

3 The findings of the Committee of Inquiry confirm the TUC's own view, that engineers have been regarded too often in Britain primarily as purveyors of technical skills, who are called on only when technical problems arise. For too long British industry has suffered from the lack of an adequate engineering input to management, business and marketing decisions. Engineers must be involved at every stage of the manufacturing process, from the technical appraisal of world market opportunities to the design of products and systems, through to the development, manufacture, sale, delivery and service of the products.

A Public Investment

4 The need for increased public investment in industrial expansion to further engineering at national, sector, company and plant level is a theme running throughout the report. The report states that 'the scale and urgency of the

investments required are greater than manufacturing industry can find itself, or than private investors currently seem prepared or able to finance'. It draws attention to the long-term nature of effective financing for manufacturing innovations. Engineering based innovation requires high capital expenditure to execute and returns may not accrue until long after the initial investment. It recommends that the Government should review its machinery for encouraging innovation in British industry, and states unequivocally that the possibility of substantially increasing present levels of financing must not be precluded.

Comment

5 The TUC has long argued that Britain's survival as an advanced industrial nation depends critically upon the extent to which British industry can prosper in international competition for markets for its goods and services. That is why there must be sustained intervention by the Government at every level of industrial decision making in order to overcome current inadequacies. The TUC's industrial strategy over the past few years has been addressed to the problem that many industrial innovations (particularly engineering based innovation) require extensive financial assistance from the Government in order to counter the prevalence of short-term low risk investment policies in many companies. Unfortunately the present Government's industrial policies are doing nothing to foster a financial environment more conducive to investment in manufacturing industry; on the contrary, they are aggravating the situation still further. For example, productive investment in the nationalised industries is being restricted by the Government-imposed limits on external financing, with serious consequences in many sectors of manufacturing industry.

6 The European Commission has estimated that industrial investment in Britain will fall by at least 7.5 per cent in real terms in 1980 and that this decline will probably be unparalled elsewhere in the EEC. This underlines the importance of the TUC's proposals (contained in its evidence to the Committee to Review the Functioning of Financial Institutions in 1978) that a new joint lending facility should be set up to finance the industrial strategy, with the involvement of the Government and of financial institutions. It also confirms the urgency of the TUC's request to the Government to reconsider its present economic policies, which would lead to severe deindustrialisation, and to seek a fresh consensus for economic growth and the planned expansion of industry.

The National Economic Development Council

7 The report proposes that the machinery of the National Economic Development Council and that of the new Engineering Authority should be used to bring together the relevant official bodies to develop a national policy for setting technical standards and codes of engineering practice. It recommends that the machinery of the NEDC should be re-oriented towards establishing greater interchange of information and views about the impact of technological and market changes, and should give special attention to fostering the growth of new industries. It proposes that the 'leader' of the Engineering Authority should sit on the NEDC.

Comment

8 The TUC has some sympathy with these proposals, although the precise mechanisms for establishing engineering priorities through the NEDC machinery will have to be given detailed attention when the Finniston Report is considered by the NEDC in March. The TUC would not favour, however, the 'leader' of the Engineering Authority becoming a full member of the NEDC. This would weaken the principle of tripartism on the NEDC and open up claims from other important interests. There must of course be close and effective liaison between any new Engineering Authority, the NEDC, the Manpower Services Commission and other bodies, but the TUC would wish to maintain the present basis for membership of the NEDC. The Chairman of the MSC is, of course, a member of the NEDC.

Access to Information

9 The report proposes that companies should examine how to strengthen their access directly or indirectly to engineering research developments, and that the Government should consider imposing requirements upon companies regarding the publication of information about their 'total technical efforts' similar to those required in the United States.

Comment

10 The TUC welcomes this proposal and would particularly emphasise the need for more extensive publication of information about investment by companies in research, development and industrial innovation.

Education and Training

11 The report points to the importance of innovations arising from the introduction of new technologies, and suggests that 'there is clearly a need for a massive programme planned to educate and retrain employees of all ages and all levels if the human skills and support required to implement and sustain new technologies are to match demands for them'.

Comment

12 The General Council endorse this statement, and commend the way in which the Committee of Inquiry have identified the importance of the recurrent education and training of all adults as an indivisible part of the 'engineering dimension'. The TUC has been concerned at recent statements by senior Government Ministers, that it might be an illusion to suppose that massive training programmes can lead the way in making British industry more innovative. There is a direct and real relationship between the scale of industrial training available and the pace at which industry will be able to adapt to change. The Government would be making a mistake if they were to dismiss or underestimate the education and training needs of the existing workforce. The TUC believes that continuing education and training is as vital as the need to improve the education and training of young people in the immediate post-school period.

The Supply of Engineers

13 The report recommends that every effort should be made in schools to ensure that as many young people as possible retain the option to enter engineering, and that young people should be strongly encouraged to maintain the study of mathematics at least until after sixteen. It proposes that efforts should be made within schools, engineering departments and employing organisations to encourage more women to enter careers in engineering through special bridging programmes and arrangements to assist women engineers to return to engineering work after a break from full-time practice. It also proposes that the Manpower Services Commission, the Technician Education Council and the National Economic Development Council should initiate urgent action to review and where necessary increase the supply of engineering technicians.

Comment

14 The General Council endorse these recommendations. In their evidence to the Committee of Inquiry, the General Council stated that 'the schools have a major role to play in providing young people with a better educational foundation for their future working lives'. This view is supported in the recent report on the schools curriculum of HM Inspectorate. The General Council drew particular attention to the lack of opportunities available for women. It is deplorable that women should contribute only 0.5 per cent of the present stock of engineers, and that girls should comprise only a little over 3 per cent of all engineering students. In effect, engineering has been recruiting from only half of the population.

15 On the issue of the severe shortage of technicians, the General Council would wish to see speedy action taken by the new Engineering Authority. In this area, as in all areas of manpower policy, the Authority will need to work closely with

the Manpower Services Commission, and with the appropriate educational bodies, particularly in assessing the implications of the acute shortage of engineers.

School/Industry Liaison

16 The report proposes that the many school/industry links which presently exist should be built up with the aim of ensuring that every secondary school and every company is involved in at least one such scheme. It suggests that the Government should take steps to encourage a more positive and informal presentation of engineering to pupils in schools, through improved careers advice, more short secondments to industry of teachers and senior pupils and more emphasis upon industry and technology within teacher training programmes.

Comment

17 The General Council endorse these proposals. In recent years they have urged such policies upon successive governments. It is important to recognise, however, that school/industry liaison must be wider than the 'engineering dimension', and must concern itself with issues such as the development of industrial society, and the processes of decision-making within industry. In conjunction with the CBI the TUC hs sponsored the Schools Council's Industry Project, and it is hoped that this will produce practical materials that are of use to all schools and teachers for improving school/industry liasion.

Employment of Engineers

18 The report proposes that all employing organisations should undertake a comprehensive review of their salary and career provisions for engineers to ensure that they are not undervalued. It also points to the need for 'a sustained major programme to stimulate widespread understanding among employers of the nature and persuasiveness of the engineering dimension'.

Comment

19 The General Council wish to reiterate the point they made in their evidence to Finniston that 'questions of pay and status can only be satisfactorily resolved through trade union representation and collective bargaining'.

Formation of Engineers

20 The report proposes that British engineers should receive a full and balanced 'formation' to prepare them for careers as practising engineers. By formation is meant the progressive process through which a young engineer develops his or her technical and personal capabilities. It proposes three main routes for the formation of engineers: a route leading to the qualification of 'Registered Engineer' (R Eng) for the main body of engineers, a route leading to the qualification of 'Registered Engineering Diplomate' (R Eng Dip) for those

showing early potential for engineering leadership, and a route leading to the qualification of 'Registered Associate Engineer' (R Eng (Assoc)) for those engineers who will work mainly in support roles. The first two routes would involve a programme of structured post-graduate training and experience, and the third would involve experience and practical training, thereby hopefully overcoming the 'compartmentalisation' that exists within the current system between theory, practice and application. Intending engineers would complete their initial formation in a working environment, and this would complement the academic phase of their preparation. These training elements would be subject to external accreditation by the new Engineering Authority in order to ensure high standards and continuing relevance.

Comment

21 The General Council note these proposals and will be discussing them fully with affiliated TUC unions within the education service, and other unions with a direct interest. In principle, the General Council welcome the commitment demonstrated in the report to the development of balanced course structures, that include theoretical education and practical vocational experience. It is important, however, to avoid the dangers of elitism that might arise from this 'three tier' approach. Students should have the opportunity of benefitting from mixed mode study, which combines full-time and part-time learning and offers greater flexibility. The TUC believes strongly that a broadly based education for all engineers is essential in order to break down the 'vicious circle' that has grown up, whereby engineering students have not been encouraged to develop the wider skills and outlook that would be required within the engineering dimension and in consequence employers have taken the view that as engineers their role is to provide technical services, and not to take on broader responsibilities.

Industry and Engineering Departments

22 The report proposes that the teaching of engineering practice should be undertaken jointly between industry and academic engineering departments. There should be provision for engineering teachers regularly to update their industrial experience, through industrial sabbaticals. Systems of recognition should be introduced (with associated additional pay) for engineering teachers who maintain close links with industry, and part-time teaching appointments for engineers working in industry to teach part of the academic programmes. Also, employing organisations should be subject to accreditation by the Engineering Authority.

Comment

23 The General Council welcome the proposal that there should be a much closer relationship between industry and engineering departments. They believe that this could make a significant contribution to improving the teaching of

engineering practice within engineering departments. The General Council would wish the collective bargaining implications of these proposals to be explored fully with the unions concerned. There could be a risk of ill-conceived arrangements undermining established pay scales and creating hostility on the part of teaching staff.

24 Moreover it should be stressed that the contribution of industry is not the exclusive prerogative of employers, as is implied in the report. Trade unions have a practical and creative role to play in the development of new approaches to learning, and in assisting with the programmes of structured experience and training for students on placement. Indeed trade union and employer co-operation is vital to preventing some of the abuses that can occur when higher education students are on placement in industry. The accreditation of employing organisations by the Engineering Authority is an essential step for assisting with this task and this recommendation is to be welcomed. The experience of the MSC would be of considerable use to the Engineering Authority here, and the Commission might usefully become involved in drawing up guidelines, that specify conditions which would need to be met by accredited employing organisations.

Paid Study Leave for Engineers

25 The report recommends that the Government should introduce a statutory right to paid study leave for all statutorily registered engineers, on criteria and lines to be devised by the Engineering Authority.

Comment

26 The General Council welcome this proposal and urge that the new Engineering Authority should be required to draw up criteria that take into account the implications of rapid technological change for the reskilling needs of engineers. In this area the new Authority will need to work extremely closely with the Manpower Services Commission as part of a more general strategy for developing paid educational leave for vocational preparation. It will be particularly important for craftsmen and technicians to have access to paid educational leave in order to gain full engineering qualifications, and for new opportunities to be linked in with the development of more part-time avenues of study.

Financing Engineering Education

27 The report is frank about the implications of the Government's restrictive expenditure policies. 'The recent announcement of cuts in the funding for higher education from 1980 onwards, linked to proposals that fees for overseas students be charged at an 'economic' rate to make up the deficit, raises the prospect of substantial reductions in the annual provisions of funds for engineering education'. It warns that some engineering departments might have to turn away acceptable home applicants over the next four or five years. On the issue of funding their new proposals, the Committee of Inquiry recommend

that specific and long-term additional funding should be earmarked by the University Grants Committee for accredited engineering departments, and equally effective measures should be instituted in the maintained sector. This would add perhaps £15-40 million per annum to the cost of engineering education in the universities and polytechnics. The report states that 'notwithstanding current constraints on expenditure, this price must not and can not be baulked'. Nevertheless, it does concede that this might well imply the diversion of funds from other areas of education or from elsewhere within the public sector.

Comment

28 The TUC's opposition to the Government's cutbacks in expenditure on education and training is well known. Every sector of education and training services is being hard hit by the spending cuts, with the inevitable result that opportunities generally in education are being eroded. Cuts are also leading to a narrowing of curricula choices, particularly in innovatory areas of study and in the eingeering field, undermining the capability of the education system to prepare the nation's future engineers at the very time when engineering education needs to be expanded. The TUC would make the same point with respect to educational opportunities generally. It would argue most strongly that in order to achieve full co-operation for the report's proposals for engineering education, additional resources will be required. The TUC would be opposed in principle to the diversion of funds away from other sectors of the hard pressed education service.

29 It is unclear how the proposed new funding mechanisms would operate in practice, and these proposals will need to be discussed with the parties concerned in considerable detail. It would be quite wrong for the new Authority to identify manpower needs in the field of engineering in isolation from the MSC. The TUC would wish to strengthen and develop the overall co-ordinating role of the MSC in relation to manpower policies, and this should be reflected in the new financing mechanisms that are established.

Bursaries

30 It is proposed by a majority of the Committee of Inquiry that in order to increase demand for engineering places, all students accepted on to accredited courses should be assured a bursary of at least £250 (over and above their mandatory LEA award and any industrial sponsorship) for the duration of their course. This would cost about £10m per annum if present student numbers were maintained.

Comment

31 The General Council believe that this would be

entirely the wrong approach. The report itself recognises that there could be problems in such positive discrimination in favour of engineering students, and that apart from being divisive within the student body differential grants might attract engineering students who have no enthusiasm for the subject.

32 The General Council are convinced that such additional bursaries would create an unacceptable bias within the grants system. It would open the way to differential grants which could be used to discriminate against areas of study which were not favoured by the Government. This would be to the detriment of the education service as a whole as well as individual students. The General Council would also urge that new entitlements to mandatory grants should be introduced for adult students following part time courses within higher education. Such entitlements would improve the educational, training and promotional prospects of adult students wishing to gain higher education qualifications during their working lives. This would benefit adults with appropriate industrial experience wishing to obtain higher qualifications in engineering.

The Registration of Engineers

33 The report proposes that responsibility for the qualification and registration of engineers should pass to the new statutory Engineering Authority, which should maintain the sole statutory register of engineers qualified to standards and criteria laid down according to the requirements of engineering practice and the engineering dimension. The Institutions would continue to play an important role, especially in relation to the dissemination of best engineering practices and new techniques.

Comment

34 In their evidence to the Committee of Inquiry the General Council criticised the limitations of the present registration system which is based on professional Institutions and urged the creation of a statutory system of registration. The TUC therefore fully endorses the proposed statutory register under the control of the Engineering Authority, and in particular shares the Committee's view that registration ought not (as is presently the case) to be based upon Institutional membership. The TUC believes that the Institutions have a valuable role to play in assisting with the education and training of engineers through their involvement in the activities of the Engineering Authority. The TUC welcomes the positive role outlined for the Institutions.

Engineers and Trade Unions

35 The report states that engineers have 'an important contribution to make within trade unions'. It notes that in recent years there has been a steady trend towards

increasing unionisation among engineers. In the public sector, 77 per cent of Chartered and 85 per cent of Technician Engineers were in a union in 1977. The CEI's 1977 survey revealed that in private industry the proportion of Chartered Engineers belonging to a trade union increased from 37 per cent in 1975 to 44 per cent in 1977. In order to minimise the potential conflicts between engineers' professional responsibilities and their union loyalties, the report recommends that a new Code of Professional Practice should include clear guidelines drawn up by the Authority in consultation with the TUC and employers' organisations.

Comment

36 The TUC notes the comments in the report about the role of engineers within trade unions. Whilst the TUC has no objections to the principle of a new Code of Practice, the wider implications of such a Code would need to be reviewed in considerable detail before it could be endorsed. There would be a need to define closely the circumstances under which the proposed threat of deregistration of engineers who breach the Code could legitimately be brought into play.

The Engineering Authority

37 The report recommends that the aim of the new Engineering Authority should be to 'create an environment in which the engineering dimension can be given its due weight within efforts to stimulate a vigorous and dynamic national manufacturing capability and to ensure the availability of an adequate supply of properly qualified engineers to progress those efforts'. This statutory body would be funded by the Government at a cost of approximately £10 million per annum, with 15-20 members appointed by the Industry Secretary to reflect the balance of interests within the engineering dimension. The majority of members would be qualified engineers. The Authority would be protected from 'discontinuities' in national policies and 'exigencies' of short-term constraints'.

Comment

38 The TUC General Council attach importance to the establishment of the proposed Engineering Authority. Without a new statutory body, with adequate trade union representation, the majority of the recommendations in the report will stand little hope of being translated into reality. It will be important, however, to clarify the relationship between the Engineering Authority and the Engineering Industry Training Board, so that the valuable work of the EITB is not undermined by the new Authority.

Conclusions

39 The report concludes by reiterating that 'it is essential that an Engineering Authority with statutory backing be created to oversee the implementation of our recommendations. The TUC endorses this statement. The General Council are now looking to the Government to make

a clear and positive response to this report, one that pays full regard to the depth of its analysis and the scope of its recommendations. As the report itself acknowledges, it is the lack of a cultural understanding of the nature and importance of engineering and the engineering dimension which underlies many current concerns. It is precisely because of this culture gap that the Government must act with speed, determination and imagination.

- - - - - - - - -

March 1980

Trades Union Congress
Congress House
Great Russell Street
London WC1

Ref. A01701

PRIME MINISTER

Committee of Inquiry into the Engineering Profession (Finniston Report)
(E(80) 25)

BACKGROUND

The Finniston Committee was appointed by Mr. Varley in late 1977: its report was finally published on 9th January after numerous leaks to the Press. Its general remit was to review the use, education and professional status of engineers in manufacturing industry - hence the reservations of civil engineers to some of its proposals. The Committee's principal proposal is for a statutory Engineering Authority to supervise the engineering profession.

2. Sir Keith Joseph's note reviews the consultations now proceeding over the report, forecasts the range of options with which the Government will be presented, and proposes that decisions on the major recommendations in the report should be made before the Summer Recess to allow for legislation if required next Session. In his final paragraph, he also invites the Committee to endorse a non-committal line from Ministers when the NEDC discusses the report on 2nd April.

3. The last point provides the only point of principle for discussion in the Committee. Sir Keith's third paragraph refers to the "need to maintain credibility on the intention of the Government to take some action on Finniston's proposals". A more positive view might therefore be expressed at NEDC, with Ministers indicating that the Government is not content with the present situation in the engineering profession and believes that some changes - whether or not Government is directly involved - should be made. (The CPRS are concerned that the Official Committee considering the report is not taking a wide enough view on the issues raised - a positive line from Ministers now would, they think, be helpful.)

HANDLING

4. You should invite Sir Keith Joseph to introduce his paper. Mr. Prior and Mr. Carlisle may then wish to comment. The questions for discussion are:-

(a) Will it be possible to make final decisions on the main recommendations before the summer? Would this timetable actually allow legislation next Session; given the detailed consultations that would be needed to follow any decisions in principle? Sir Keith Joseph, Mr. Carlisle and Mr. Prior might comment.

(b) Should the Government take a more positive line at NEDC? Without indicating support for any particular set of actions, the Government could express its desire to see changes made that will enhance the performance of British manufacturing industry. Or does the Committee think that "no change" is a real option?

CONCLUSIONS

5. Subject to the discussion, you might guide the Committee:

(i) To note the progress of the current round of consultations.

(ii) To endorse the proposed timetable for decisions.

(iii) To agree that at the NEDC, Ministers should indicate their desire to see changes in the engineering profession, but without commitment to specific measures.

ROBERT ARMSTRONG

14th March, 1980

FILE

CONFIDENTIAL

cc: CAB TRANS N.V.

Ind Pol

16 January 1980

The Prime Minister has read the Chancellor of the Exchequer's minute of 11 January about the Finniston Report. She agrees that the report should be discussed in E Committee within the next two months.

I am sending copies of this letter to the Private Secretaries to members of Cabinet, Minister of Transport and Martin Vile (Cabinet Office).

P. LANKESTER

M Hall Esq MVO
HM Treasury

CONFIDENTIAL

Prime Minister

The suggestion that this be discussed by E within the next 2 months is sensible.

Agree?

Yours R

14/1

Treasury Chambers, Parliament Street, SW1P 3AG
01-233 3000

PRIME MINISTER

FINNISTON REPORT

Flag A

I have seen a copy of Keith Joseph's minute to you of 17th December containing proposals for handling the Report by Sir Monty Finniston's Committee of Inquiry into the Engineering Profession. I have also seen Quintin Hailsham's minute of 18th December, Mark Carlisle's minute of 20th December, and your Private Secretary's letter of 21st December.

2. I agree with Keith Joseph that we should approach the recommendations in this report positively. However, as you have said, we shall need to consider very carefully the case for the proposed new statutory Engineering Authority. In particular, we shall need advice on the likely costs of establishing and running it, and I note that Finniston puts the annual running costs at about £10m at current prices. If we were to decide in favour of a new body, I would expect the DOI to accommodate the costs within their present public expenditure programme, and to deal similarly with any other costs of implementing Finniston's proposals which fell within their responsibility. I need hardly remind colleagues of the public expenditure constraints at present.

3. I also note that some of the recommendations in the educational field would have expenditure implications. Again, a much more detailed appraisal of these than the Report provides is essential before decisions can be taken. It will be for Mark Carlisle to comment in the first place.

/My main concern

CONFIDENTIAL

My main concern at this stage is of course to contain expenditure on education within the presently planned levels.

This was Keith Joseph's view - not yours!
P.

4. I note your view that no early decisions are needed on the recommendations in the Committee's Report; and that you agree that Departments should begin consultations with interested bodies. Keith Joseph has proposed a programme of consultation designed to enable the Government to give a definitive response by Easter. Mark Carlisle has doubted the feasibility of this timetable in the case of the educational recommendations.

5. I accept the need for outside consultation, and appreciate the time this can take in the case of educational bodies. But notwithstanding the fact that early decisions are not essential, I would very much hope that we could have an initial Ministerial discussion of the Report within the next two months i.e. before the process of outside consultation has been completed. The Finniston Report is on the agenda for the meeting of the NEDC on 5th March. While on that occasion we will be mainly interested to learn the views of industrialists and trade unionists on the Report, I think that Ministers would be in an embarrassing position if they were unable to give even a broad indication of the Government's views on the main recommendations. I hope, therefore, that we would have an opportunity to discuss the Report, perhaps in E Committee, within the next two months. There is a danger that the impetus behind its recommendations will be lost if, after publication, a lengthy process of consultation ensues before anything is said about the Report by Ministers.

6. I am copying this minute to all members of Cabinet, and Norman Fowler, and to Sir Robert Armstrong.

(G.H.)
11 January, 1980

CONFIDENTIAL

Ind Pol 24

cc:-HO SO Dept Trans
LCO WO CO
FCO NIO
CE DHSS
MOD CDL
LPO DT
Emp DEnergy
LPS DESS
MAFF Chief Sec.
Env.Paymaster Gen.

10 DOWNING STREET

From the Private Secretary

21 December 1979

The Prime Minister has now had an opportunity to consider your Secretary of State's minute of 17 December about the Finniston Committee of Inquiry into the Engineering Profession. She has also read the Lord Chancellor's minute of 18 December and the minute of 20 December from the Secretary of State for Education.

The Prime Minister has noted that no early decisions are needed on the recommendations in the Committee's report, and that very careful consideration will have to be given to the particular recommendation for a new statutory Engineering Authority. She agrees that your Department and other departments with an interest in this subject should begin consultations with interested bodies, as proposed.

I am sending a copy of this letter to the Private Secretaries of members of the Cabinet, the Minister of Transport and Martin Vile (Cabinet Office).

TPL

I K C Ellison Esq
Department of Industry

JN

L

B

PRIME MINISTER

1. The Secretary of State for Industry sent me a copy of his minute to you of 17 December about the report of Sir Monty Finniston's Committee of Inquiry into the Engineering Profession.

2. The education and training recommendations of the Finniston Report are amongst their most important. But there must be reservations about their detailed prescriptions, and what the Committee say will need wide discussion.

3. Like Keith I hope we would be able to welcome this report and approach it positively, although welcoming the report should not imply that we necessarily accept its conclusions but rather that we welcome the Report's recognition of the importance of engineering in this country. Although I agree that we ought to enter into consultations with a spirit of urgency, I frankly do not think it will be possible to complete this process and reach conclusions on all aspects of the report by Easter.

4. Copies of this go to all members of the Cabinet and Norman Fowler, and to Sir Robert Armstrong.

M.C.

MARK CARLISLE
20 December 1979

FROM: CONFIDENTIAL

THE RT. HON. LORD HAILSHAM OF ST. MARYLEBONE, C.H., F.R.S., D.C.L.

A

HOUSE OF LORDS,
SW1A 0PW

PRIME MINISTER

I have seen a copy of Keith Joseph's minute to you of 17th December about the report of the Finniston Committee on the Engineering Profession. I do not wish particularly to barge into this, but owing to my former connexion with Science and technology I might offer a few thoughts:

1) The underlying weakness of the engineering profession is the multiplicity of professional organisations, many of them Chartered. I am an honorary Fellow of most of them. The Federal body (of which I was the instigator when Lord President) also chartered is deplorably weak and notoriously split.

2) The Feilden report (1963) (which I also instigated) still repays study and ought to be fully implemented.

3) There is a real danger that the professional institutions could be ousted by aggressive tactics from TUC affiliated bodies (e.g. ASTMS) which do not emphasise the importance of engineering as a profession.

4) The other underlying weakness lies in the unattractiveness of mathematics to schoolchildren, girls and boys. This is partly because it is unattractively taught. Mathematics, from the differential calculus upwards, is the grammar of engineering.

I am sending copies of this minute to all Members of Cabinet and Norman Fowler, and to Sir Robert Armstrong.

H. of S. M.

18 December 1979

JB

CONFIDENTIAL

- Prime Minister

Primarily for information. This is an important report, but whether we will want an engineering quango is another matter.

Agree that Sir Keith should consult as proposed in last para ?

PRIME MINISTER

I have now received the report by Sir Monty Finniston's Committee of Inquiry into the Engineering Profession. This is a wide-ranging report which considers many fsctors in the engineering performance of industry, as reflected in the types and qualities of products made by British companies and in the technological efficiency of their production. In doing so they have considered the attitudes in schools, the attractions of engineering as a career, the education and training of engineers, employers' policies towards both current and potential engineers, and the effective priority accorded to engineering in industrial policies at company and national level. They have related all these together as they affect results - that is, the engineering capabilities manifested by industry - within a framework which they call the "engineering dimension". This report makes over 80 recommendations for changes within this framework, calling for action from employers, unions, government, those in education and others.

Summary attached

This report fits into the mainstream of our efforts to encourage innovation, excellence and competitiveness in manufacturing industry. Last summer the Conservative Political Centre published a report by a Committee convened and chaired by Keith Hampson entitled "The Engineering Profession - a national investment"; the Finniston recommendations for changes

/in ...

in the education and training of engineers are close in spirit to those made in the CPC document, although they go rather further and are more detailed. In addition, the Election Manifesto said "We are aware of the special problems associated with the need to increase the number of high-quality entrants to the engineering professions". I hope that we can welcome Sir Monty's report, and that we can approach his recommendations positively.

i.e. after the recommendations have been properly considered. TL.

The key recommendation and the most difficult, which we must consider most carefully, is for a new statutory Engineering Authority which would, inter alia, set patterns and standards for the qualification of engineers, register those attaining the prescribed qualifications, and generally operate as what the report calls "a champion of change" within the engineering dimension. The rationale for a new body would be that it could actively involve all those concerned with the recruitment, education development and employment of engineers - especially employers - with a coherence which past efforts in each particular respect have lacked. Many of the recommendations in the report rest on the establishment of this Authority.

I am not yet in a position to endorse or reject this proposal. I suggest we should keep an open mind until we have heard the reactions of industry, the educational sector and the many other interests concerned. We shall have to initiate a programme of consultations with a wide range of bodies and organisations

/once ...

once the report is published. The likely date of publication is 9 January. As soon as possible after that date we propose to write to all the interested bodies for whom this Department is their point of contact with Government, and also to a number of leading industrialists. I hope that colleagues will do likewise in their respective areas. The responses will be considered by the official interdepartmental group which my Department is co-ordinating and which I hope will be in a position to advise on the Government's response to the Finniston report by Easter.

I am copying this minute to all Members of Cabinet and Normen Fowler, and to Sir Robert Armstrong.

KJ

K J

17 December 1979

Mr St Mr Stevas has some general comments at Flag A; Mr Carlisle a few comments at Flag B

TL 20/12

Department of Industry
Ashdown House
123 Victoria Street

SUMMARY OF RECOMMENDATIONS

ENGINEERING IN THE UK ECONOMY

role and mechanics of an Engineering Design and Development Council to sponsor and encourage engineering developments to the point of commercial viability; the Government should respond positively if the review endorses this proposal. 2.13

7 The Government should review its mechanics for encouraging innovation in British industry in the light of our observations regarding the engineering dimension and taking account of the advice given by ACARD in their report, "Industrial Innovation". 2.15

8 The Government should take every possible measure to foster a financial environment more conducive to investment in manufacturing industry, and especially to direct such investment towards the design, manufacture and sale of products for world markets. 2.17

9 The trade union movement should adopt the positive policies towards participation in technology-based innovations in industry advocated in the TUC document, "Technology and Employment". 2.23

10 Government, employers and trade unions must work together within a major national programme of training and re-training of employees of all ages and at all levels to develop the skills and support needed to implement and sustain new technologies. 2.24

11 The machinery of the National Economic Development Council should be re-oriented towards establishing greater interchange of information and views about the impact of technological and market changes and the appropriate responses to them from the level of companies to Government and back. 2.28

12 In the role NEDC and its working levels should work closely with

the new statutory Engineering Authority which we propose to lead and coordinate national policies concerned to strengthen the engineering dimension. 2.30

13 Companies should take appropriate measures to ensure their capability to respond to the demands of the engineering dimension, by fostering and giving the necessary authority to technologically-knowledgeable "Product Champions" within senior management and also ensuring the development of an adequate supporting "Corporate Expertise" within their organisations. 2.33

14 Companies should also take measures to ensure that the contribution of engineers and others in related functions are responsive to and coordinated around the need to adapt flexibly to changing market demands, paying attention in particular to the organisation and relationship of engineering and other functions and to the career experiences of engineers in the organisation. 2.37 ff

15 Engineers themselves must be prepared and equipped to take a broad view of their contribution, taking into account not only the technical implications of their work but also the human and organisational factors involved and the processes of consultation and change through which innovations are realised. 2.41

see para

16 Future official censal surveys should be structured to collect the information necessary for the maintenance of a continuing national inventory on engineering manpower to be built up by the new "Engineering Authority". 3.5

17 Every effort should be made in schools to ensure that as many young people as possible retain the option to enter engineering and that they are properly informed about the attractions of an engineering career. 3.12

18 In particular, all pupils should be strongly encouraged to maintain the study of mathematics and physics at least until after 'O' level and careers advisers should ensure that children are aware of the growing intrinsic and material incentives to qualify as an engineer in the modern world. 3.13

19 The various routes into engineering degree courses for students who do not have 'A' levels or Scottish higher in mathematics and physics should be expanded and publicised by engineering departments and teachers. 3.14

20 Employers should recognise and act upon the fact that the only sure way to attract more able young people into an engineering career if they see such a career as more attractive in terms of a likely rewards, job interest, and career prospects than the alternatives. 3.16 ff

21 Greater emphasis should be laid by all those advising young engineers of the incentives being offered by some employers to attract more good engineers into the production function, so that more talent can be employed in this vital area. 3.27

see para

22 The Government, working with other interested bodies including in due course the Engineering Authority, should initiate urgent actions to increase the supply of engineering technicians and to enhance their preparation for careers in industry. 3.31

see para

23 Employers must recognise and act upon the responsibilities on them to complete the formation of young graduate engineers by giving them further support, training and structured experience; at the same time the teachers of engineers and the graduates themselves must recognise the growing variety of work in which engineers must be prepared to contribute. 3.24

24 The new Engineering Authority should be remitted to take the lead in a sustained national programme to stimulate more wide-spread understanding among employers of the nature and importance of the engineering dimension and of the potential benefits to him from employing able engineers in a wide range of activities. 3.34

25 Employing organisations should review their salary and career structures for engineers to ensure that they adequately reflect a value of engineers' contributions within the engineering dimension; the Engineering Authority should become a source of information and stimulus to employers in this. 3.44

26 Companies should institute regular "engineering manpower audits", building upon best employment practices in this country and overseas to ensure that they are making the best use of engineers as their key assets within the engineering dimension; the Engineering Authority should act as a source of information and encouragement to companies in this. 3.47

27 Efforts should be made within schools, engineering departments and employing organisations to encourage more women to enter careers in engineering through school/industry liaison schemes, special bridging programmes and arrangements to assist women

engineers to return to engineering work after a break from full-time practice. 3.60

28 Companies, especially small enterprises, should ensure that they are making sufficient use of available engineering consultancy services and of the various schemes to help them gain access to such services. 3.62

29 The activities and services of the Overseas Technical Intelligence Unit should be given greater publicity to encourage companies to use their scarce resources to build upon the best of relevant technical developments from overseas; this service should be expanded if and as industrial interest subsequently justifies it. 3.63

30 The Government, and in due course the Engineering Authority, should greatly extend current schemes for the two-way exchange of staff between industry and engineering teaching departments. 3.64

31 The contribution of applied sciences and others with similar skills to the engineering dimension should be encouraged by the establishment of a number of six month or one year conversion courses through which people whose initial formation was in applicable subjects can develop engineering skills. 3.65

CHANGES REQUIRED IN SCHOOLS

see para

32 The Department of Education and Science should direct attention and resources towards the improvement and possible rationalisation of the teaching of mathematics and science in schools, building upon the eventual recommendations of the Cockcroft Committee and taking into account recent measures to this end in Scotland. 4.4

33 The various 'O' and 'A' level Examining Boards should extend and maintain their efforts to ensure that the syllabi for relevant subjects are geared to developing pupils' awareness of the nature of the modern economy and the role of technology in its development. 4.7

34 The many schools/industry schemes should be built upon with the aim that every school and every company is involved in at least one such scheme, the Departments of Industry and Education and Science should ensure the availability of funds for developing the activities of the Science and Technology Regional Organisation (SATRO) movement in this regard. 4.8

35 Related measures should be introduced to encourage a more positive and informed presentation of engineering to pupils in schools, including improved careers advice, more short secondments to industry of teachers and senior pupils and more emphasis upon industry and technology within teacher training programmes. 4.9

FORMATION OF ENGINEERS

36 The formation of engineers should in future be through one of three principle routes:

(a) a route leading to the qualification of Registered Engineering Diplomate (R Eng(Dip)), for those showing potential for leading the development of advanced technology and/or the management of engineering operations which would be based upon new degree programmes leading to an award of a Master of Engineering (M Eng) degree plus a programme of structured post-graduate training and experience;

(b) a route leading to the qualification of Registered Engineer (R Eng) for the main body of engineers based upon new degree programmes leading to a Bachelor of Engineering (B Eng) degree plus a programme of structured post-graduate training and experience;

(c) a route leading to the qualification of Registered Associate Engineer (R Eng(Assoc)) for those engineers who will work mainly in support roles based upon enhanced higher national or TEC(Higher) programmes plus appropriate structured experience and practical training. 4.42 ff

37 We propose a system of statutory registration of these formation qualifications based upon the accreditation and assessment of each phase of the formation package to be carried out by the new statutory Engineering Authority. 4.43

38 Selection for the M Eng stream should come after a diagnostic first year on a common course with E Eng entrance; thereafter it would take another three years (while the B Eng course would

take another two to two and a half years) to graduation. 4.47 ff

39 The design and planning of B Eng and M Eng courses within the criteria set out in the report should be a task for engineering teachers and employers working together through the Engineering Authority; "teaching contracts" should be placed withselected university and polytechnic departments for a development of model courses. 4.59

40 The academic part of the Associate Engineering package should be based upon the new TEC qualifications of Higher Certificate and Higher Diploma in appropriate engineering subjects, equivalent SCOTEC qualifications, and a modified form of the current Higher National Diploma in engineering which should be designated Higher Engineering Diploma. 4.60

41 Graduates from accredited B Eng and M Eng programmes must undergo a further period of structured training and experience in a working environment to complete their formation; this should be in two phases which we have described as Engineering Applications III and IV culminating in a period during which the novice engineer demonstrates the ability to carry engineering responsibility in a substantive post. 4.63 ff

42 The post-graduate experience EA3 and EA4 would be subject to accreditation by the Engineering Authority, in addition to which individual young engineers who had gone through accredited degree and post-graduate formation programmes would have to satisfy the Authority that they had met all the requirements for registration as R Eng(Dip), R Eng or R Eng (Assoc). 4.69

43 The method of accreditation for EA3 and EA4 would in most cases be for the Authority to accredit particular employing organisation who demonstrably provided adequately for these phases;

none-accredited employers would be able to submit individual programmes for acceptance by the Authority, while engineers who had not undergone an accredited formation would nonetheless be able to seek registration through achievement via an "external" route designed to assess their attainments against a criteria for the three accredited formation streams. 4.72 ff

44 The Engineering Authority should maintain a variety of ladders and bridges between the three registered categories for those engineers who wish to extend their qualifications during their careers. 4.62

45 Every effort should be made to increase the interchange of staff between industry and teaching establishments to improve the teaching of engineering practice within engineering departments, including the introduction of systems of recognition (with associated additional pay) for engineering teachers who maintain close links with industry, and part-time teaching appointments for engineers working in industry to teach part of the B Eng or M Eng programmes. 4.82

46 Academic research in engineering departments should emphasise work done in a context of economic purpose; to this end many current taught MSc courses in engineering should be discontinued and absorbed into the latter stages of M Eng courses, while suitably remunerated engineering "teaching fellowships" should be established to attract working engineers to undertake research work and some teaching in engineering departments. 4.86

47 Since the minimum size for viable M Eng courses will be 25-30 students, regional consortium arrangements should be set up to link several academic departments in a region in order that between them they can sustain a range of M Eng courses for their students. 4.87

see para

48 We oppose the separation of engineering department from the rest of the higher education system. Specific and long-term additional funding should be earmarked by the University Grants Committee by the establishment and maintenance of accredited B Eng and M Eng courses; courses which failed to get or lost accreditation by the Engineering Authority should not be eligible for these earmarked funds. 4.90

49 Comparable earmarking arrangements should be made for the funding of accredited engineering courses in the maintained sector. If this cannot be established effectively within the current management arrangements for the polytechnics, then the Government should introduce appropriate reforms in their constitutional standing. 4.91

50 The training expenses associated with EA3/EA4 provision should be the responsibility of companies who will benefit from the services of the engineers concerned. Continuing on the same point we welcome existing arrangements whereby some firms can obtain help with engineers' training costs through Industrial Training Boards, etc, and we envisage the Engineering Authority being in a position to back up this support with "pump priming" funds to stimulate experimental schemes and to assist group training schemes in getting off the ground. 4.92

51 To stimulate student demand for places on B Eng and M Eng courses, allowing greater selectivity in those admitted, all students accepted on to accredited courses should be assured a bursary of at least £250 (over and above their mandatory LEA award and any industrial sponsorship for the duration of the course. 4.95

see para

52 Support through the Training Opportunities Scheme for engineers to follow full-time courses in either technical or management subjects should be extended. All registered engineers should be required to commit themselves to maintaining their expertise as a condition of remaining on the register, and demonstrable failure to uphold this commitment should be grounds for de-registration. 4.108 4.111

53 The Government should introduce a statutory right of paid study leave for all registered engineers, on criteria and lines to be advised by the Engineering Authority. 4.110

54 A number of sites should be designated Regional Engineering Centres, funded by the Engineering Authority, to encourage the development of continuing formation provision for engineers and to act as foci for such activities in their region. 4.113

55 The Engineering Authority, working with engineering departments, companies and capitalis institutions should evaluate, promote and where necessary fund the initial trial and expansion of "distance learning" methods as vehicles for continuing formation for engineers. 4.114

56 We recommend that the Department of Education and Science, Scottish Education Department, University Grants Committee, and Local Education Authorities when reviewing the extra resources needed by engineering departments to undertake the extra demands of B Eng and M Eng courses, also take full account of the importance of allowing adequate senior staff time for building up their activities in continuing and post-experience formation for engineers. 4.115

57 The Engineering Authority should consider the special additional formation needs of the groups identified in the report, and

see para

should be provided with funds to support preparatory and "start up" work for selected continuing formation initiatives in these and other areas. 4.117

see para

58 Responsibility for the qualification and registration of engineers should pass to the new statutory Engineering Authority, which should register engineers on the basis of the new formation packages proposed in Chapter IV with no institution membership requirements. 5.16

59 Until the new formation packages are established, the Authority should make arrangements whereby engineers currently practising could seek registration against the principles outlined in the report. 5.21

60 Once the new statutory register is established, the necessity for the Engineers' Registration Board disappears, and it should be wound up. 5.19

61 We are opposed to any generalised reservation of engineering work to registered engineers, except in areas of activity where public health and safety considerations arise. 5.29

62 Where such considerations justify the licensing of engineering practice, the relevant regulations should require the employment of "suitably qualified people who are registered engineers"; the Engineering Authority should work closely with the Health and Safety Executive and other bodies in the framing and extension of such regulations. 5.31

63 An early task for the Engineering Authority should be to advise the Government on the terms and coverage of legislation to license engineering consultants. 5.32

64 The Government and other public sector employers should set the lead in recruiting engineers on the new register and in

preparing trainee engineers for registration, and should encourage supplying and contracting companies to follow their example; engineering teaching departments should also seek to employ registered engineers wherever appropriate. 5.34

63 The Authority should draw up a Code of Professional Practice based upon engineers' technical competence and continuing fitness to practice, to which registered engineers would be required to commit themselves and breach of which would render them liable to de-registration. 5.37

see para

66 The Institutions should continue to play an important role in advising upon and assisting in the education, training and registration of engineers through their involvement in the activities of the Engineering Authority. 5.38

67 We would hope that in addition they would expand their learned society functions, particularly in the direction of continuing education provision for engineers; the pump priming funds allocated to the Engineering Authority for it to sponsor approved initiatives should be available to support the Institutions in this role. 5.41

68 We would also wish to see the Institutions concentrating more upon disseminating best engineering practices and new techniques, again working closely with the Engineering Authority within the priority areas identified through the NEDC framework recommended earlier. 5.40

69 The Institutions should also seek to expand their activities in promoting the standing and attractions of engineering among young people, working in collaboration with SATROs and within schemes like the Engineering Careers Information Service. 5.45

70 The future of the Council of Engineering Institutions is a matter for discussion between the Institutions in the light of the changes which will follow from our recommendations. 5.51

71 The Engineering Authority should take an active role in promoting joint activities and functional groupings among the engineering Institutions, extending where appropriate to promoting mergers between them; it should be empowered

see para

to provide limited financial assistance in furtherance of this function. 5.52

72 The Fellowship of Engineering has a potentially valuable role to play complementing that of the Engineering Authority and the activities of individual Institutions; in particular it should consider concentrating upon the identification and promotion of new directions for engineering research, developments and innovation which have not yet been exploited, among other functions suggested in the report. 5.67

73 The trades union organisation among engineers in private industry must be recognised as a fact of life as it has long been in the public sector; it is important that potential conflicts between engineers' professional responsibilities and their union loyalties are minimised by including clear guide-lines to them within their Code of Professional Practice, which should be drawn up by the Authority in consultation with the TUC and Employers' Organisations. 5.61

74 We express no view on the argument for and against the establishment of a single trade union to represent all engineers, but we urge the TUC and the unions concerned to recongise the damage being done by current inter-union disputes over the rights to represent engineers, and to take steps to end them. 5.63

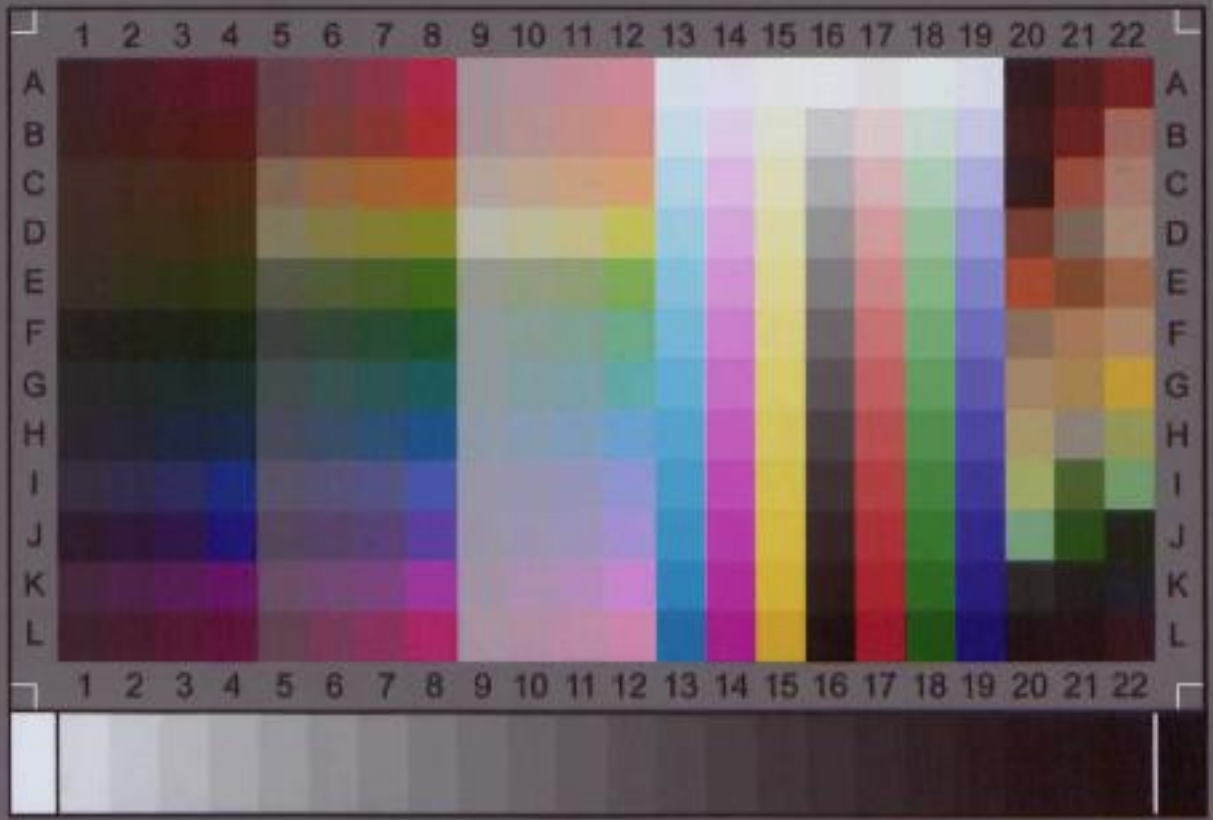
see para

75 We propose the establishment of a new Engineering Authority with a remit to promote and strengthen the engineering dimension within the British economy and with the particular responsibilities identified in Chapters II-V. 6.6

76 This should be a statutory body, funded by the Government with 15-20 members appointed by the Secretary of State to reflect the balance of interests within the engineering domension; members, the majority of whom should be engineers, would serve in an independent capacity. 6.19 ff

77 The Authority should maintain close working liaison with a wide range of organisations and institutions including the NEDC; to this latter end the leader of the Authority should sit on the NEDC. 6.21 6.18

78 The Authority should be accountable to the Government for its exercise of statutory powers (particularly with respect to the registration of engineers) and for its use of money voted to it by Parliament, but should not be subject to direction or strategic intervention from the Government. 6.27 ff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