

ELECTRICITY SUPPLY

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HISTORICAL REVIEW
1882 - 1948

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ELECTRICITY ACT 1947
THE
NEW ORGANISATION

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BRITISH ELECTRICITY AUTHORITY

British Electricity House, Great Portland Street, London, W.1

BRITISH ELECTRICITY AUTHORITY

(THE CENTRAL AUTHORITY)

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* Four Area Board Chairmen serve for a period up to three years and from Area Boards in rotation.

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Commercial Manager	E. R. WILKINSON, M.I.E.E., M.I.MECH.E.

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HISTORICAL REVIEW

1. It was not until the development of the vacuum carbon-filament lamp between 1875 and 1880 that there was any appreciable demand for an organised supply of electricity. Since Faraday's fundamental discovery of electro-magnetic induction in 1831, progress had been made in methods of generating electricity, but the instances of electric lighting were still largely of an experimental nature. The first public supply of electricity in Great Britain was given in 1881, when current generated by the waters of the River Wey was used to light streets of Godalming in Surrey. As there was no legal power to break up streets, the cables had to be laid in the gutters.

2. In 1882, Parliament passed the Electric Lighting Act of that year—the first public measure dealing with electricity supply. This enabled the Board of Trade by licence or provisional order to authorise the supply of electricity in any area by any local authority, company or person. Licences, which could not be granted without the consent of the local authority concerned, were for a short period of years, although they could be renewed. The consent of the local authority to a provisional order was unnecessary; but where an order was granted to anyone other than the local authority for the area concerned, that authority could, after certain prescribed periods, purchase the undertaking on terms laid down in the Act. The Electric Lighting Act of 1888 lengthened the periods of orders and provided that the consent of the local authority was to be obtained to the granting of a provisional order, but the Board of Trade could dispense with consent in case of refusal. The 1888 Act also provided that the existence of a licence or provisional order in respect of an area did not preclude the granting of a competitive licence or provisional order.

3. These legislative provisions gave little encouragement to large-scale enterprise. The use of electricity in the earlier years was confined almost entirely to lighting, and its development on a commercial scale was a speculative risk. For these and for technical reasons, numbers of small distribution undertakings of a local character were set up, each with its independent power station.

4. The system continued to grow on the basis of relatively small distribution units in the thickly-populated areas, leaving the more sparsely-populated areas almost entirely without supply. No attempt was made to bring about uniformity of supply conditions, and there were prohibitions against the association and combination of statutory undertakings.

5. By the end of the century, advances in the technique of generation and transmission, and in particular the development of the three-phase alternating current system, were changing the economic area of supply from under ten to several hundreds of square miles; and the development of the electric motor was greatly extending the uses of power for industrial and other purposes. The years following 1900 saw the passing of special Acts of Parliament under which power companies were set up with rights in perpetuity to supply electricity to authorised distributors and for industrial and manufacturing purposes over wide areas, and to give general supplies in the parts of the areas not already covered by distribution rights. It was the practice to exclude from the areas of the power companies the areas of supply of the larger local authority distributors, and to give established distribution authorities within the areas of the power companies the right of veto on supply within their areas, which many exercised.

6. For a number of reasons, and especially because there was no obligation on the distribution authorities to take supplies in bulk, the progress made by the power companies was necessarily slow; and the policy of promoting large-scale generation and comprehensive transmission networks, and of widening supply areas, was not generally effective up to the 1914-18 war.

The Electricity Commissioners

7. After the outbreak of that war, when the diversion of industrial effort to munition-making and the consequent increased demand for electrical power exposed the weaknesses of the supply system—not only in its capacity to provide adequate and mobile supplies for industrial purposes, but also from the point of view of economy in production cost—the first steps were taken towards reorganisation on a national basis.

8. Three committees were set up by the Government to consider various aspects of the situation. One of these was the Committee appointed in 1918, under the chairmanship of Sir Archibald Williamson (later Lord Forres), to consider what steps should be taken, whether by legislation or otherwise, to ensure that there

should be an adequate and economical supply of electric power for all classes of consumers, and particularly for industries which depended upon cheap supplies of power for their development. The recommendations of the Committee were, in the main, embodied in the Bill that became the Electricity (Supply) Act, 1919 ; but in its progress through Parliament the Bill was so amended that the Act did not fully reflect these recommendations. A further Electricity (Supply) Act was passed in 1922, but still the full powers advocated were not granted.

9. Nevertheless, a significant phase can be said to have begun under the 1919 Act, by which the Electricity Commissioners were established for the purpose of promoting, regulating and supervising the supply of electricity and of securing reorganisation by voluntary agreement. This expert body exercised in a variety of ways a considerable influence towards the more progressive growth of the industry.

10. In carrying out their responsibilities for improving the organisation for the supply of electricity on a regional basis, the Commissioners delineated districts and investigated a number of regional schemes for centralising generation in a relatively small number of large generating stations to be owned by Joint Electricity Authorities. Subsequently, five Joint Authorities were established, with powers to promote regional schemes ; but in general this method of dealing comprehensively with the problem was handicapped by the lack of compulsory powers. Moreover, technical development encouraged the view that the best plan was to consider the whole country as one area for the purposes of generation.

The Central Electricity Board

11. Another Committee—presided over by Lord Weir and with the Chairman of the Electricity Commissioners, Sir John Snell, as technical adviser—was appointed in 1925 to review the national problem of the supply of electrical energy and report on the policy that should be adopted to ensure its most efficient and effective development. They found that no fewer than 572 separate supply undertakings, deriving their energy from 438 power stations, were involved, and they recommended the establishment of a national system of main transmission lines—later known as the Grid—for the purpose of inter-connecting selected power stations and so enabling the distribution systems of public supply authorities to be supplied on a wholesale basis with electricity produced at the most efficient stations. They also recommended that standardisation of frequency of the alternating current systems in the country

should be undertaken as an essential part of a comprehensive scheme of improvement. They further recommended the appointment of an executive body—the Central Electricity Board—which should be responsible for the erection, operation and maintenance of the Grid and for the control of the output of the power stations selected to feed it. Their recommendations, with certain modifications, were put into effect by the Electricity (Supply) Act, 1926.

Subsequent Developments

12. In 1935, a Committee under the Chairmanship of Lord McGowan was appointed to review the organisation of distribution, including the control of statutory electricity companies by other companies; and to advise on methods of ensuring and expediting the standardisation of systems, pressures and methods of charge, and of further extending facilities and reducing costs. Their Report, issued in 1936, stated that, broadly speaking, any scheme for the improvement of distribution must in principle involve either (a) immediate and complete reorganisation on a regional basis under public control, by the setting-up of regional boards which would buy out all the existing undertakings, or (b) the retention and utilisation, where possible, of the larger and more efficient of the existing undertakings (both public authority and company), and the compulsory absorption by them of the smaller and less efficient undertakings. For reasons explained in their Report, the Committee proposed the second alternative.

13. Following the Report, the Government issued a memorandum outlining proposals based on those of the Committee but differing in some important respects. Supply undertakings would be merged into some seventy-six groups based on the largest concerns, whether public authority or company, and those of the new amalgamated undertakings that were owned by companies would, after a period of fifty years, be purchasable by a public body. No legislative action on these proposals had been taken when war broke out in 1939.

14. War-time experience emphasised not only the national value of the integration of electricity supply made possible by the Grid system, but also the need for larger distribution areas. In 1942, after a debate in the House of Lords regarding the control and management of essential public services, the Minister of Fuel and Power requested the Electricity Commissioners to obtain the views of the supply industry on its problems of organisation. While all sections of the industry favoured grouping of some type, there was no agreement about the form it should take.

15. In 1943 the Hydro-Electric Development (Scotland) Act was passed, under which the North of Scotland Hydro-Electric Board were established as authorised undertakers to initiate and undertake the development of all further means of generation of electricity by water power within the North of Scotland District and, so far as their powers and duties permitted, to collaborate in the carrying out of any measures for the economic development and social improvement of the District.

16. Although during the remaining years of the war there were no further legislative developments concerning the supply industry, the problem of its organisation continued to receive attention in relation to the economic and social planning which was being undertaken by the Government. After the General Election of 1945 there was further examination of the problem, and this was followed by the introduction of the Electricity Bill at the end of 1946.

17. The Electricity Bill was introduced in the House of Commons on 20th December, 1946, and received Royal Assent on 13th August, 1947. Thus, some sixty-five years after the supply of electricity to the public was first regulated by Parliament, the Electricity Act of 1947 provided for the transfer to the British Electricity Authority and fourteen Area Electricity Boards and, in the North of Scotland District, to the North of Scotland Hydro-Electric Board, of this industry which, from small beginnings, had now attained a position of prime importance for the future of the nation.

DEVELOPMENT OF GRID SYSTEM

18. The Grid system resulted from the Electricity (Supply) Act, 1926, under which the Central Electricity Board were established and given the following main duties :

- (a) To concentrate the output of electricity for public supply systems in a limited number of power stations ("selected stations") chosen for their efficiency and low operating costs, and to control the output of these stations as regards quantity, time and rate. The stations remained in their existing ownership.
- (b) To connect the selected stations with one another and with the systems of local electricity undertakings, by constructing or acquiring main transmission lines (known as the Grid).
- (c) To arrange for extensions and alterations of selected stations and for the construction of new selected stations, as and when necessary.

- (d) To standardise alternating current frequency throughout the country, so that effective interconnection could be established.
- (e) To supply, either directly or indirectly, local undertakings which required electricity for distribution, and for this purpose to purchase the output of the selected stations and sell it to the local undertakings.

Planning and Construction

19. As required by the 1926 Act, the Electricity Commissioners prepared nine regional schemes which covered the whole country except the North of Scotland. In these schemes, the Commissioners determined which of the existing power stations should be selected stations, and specified the technical layout of the Grid lines (with associated switching and transforming stations) to link the selected stations and to connect the distribution undertakings to the system. The schemes were so designed that they could be integrated to form a complete national transmission system.

20. With certain modifications the schemes were adopted and carried out by the Central Electricity Board, under the initial Chairmanship of Sir Andrew Duncan, and construction proceeded on a programme which enabled supplies that were urgently required to be given in advance of the completion of the network. By the beginning of 1933 it was possible for the Board to begin trading in two scheme areas, and three years later the Grid was in full commercial operation in all areas apart from North East England, where the exceptionally heavy programme of work in connection with the standardisation of frequency caused general trading to be deferred to July, 1938.

21. Provision was made for extensions and reinforcements of the Grid as the national demand for electricity increased, and at 31st March, 1948, immediately before nationalisation, the Grid comprised 355 switching and transforming stations and 5,172 route-miles of transmission lines, of which 3,685 were operated at 132,000 volts and the remainder at 66,000 volts or lower voltages.

Standardisation of Frequency

22. A standard frequency of 50 cycles per second was adopted. This was already a prevailing standard, but 25, 40 and other frequencies were not uncommon. The work of standardisation was undertaken by the local undertakings concerned, in accordance with programmes arranged with the Board. Spread over a number

of years, it affected over 903,000 kilowatts of generating plant, 354,000 kilowatts of converting plant, and 1,840,000 horsepower of motors in the premises of more than 350,000 consumers whose supplies had to be maintained throughout the process. The cost was financed by long-term borrowings by the Board, the service of the loans being provided by annual levies on the whole industry, supplemented by a grant made under the Development (Loan Guarantees and Grants) Act, 1929, by the Minister of Labour.

Selected Power Stations

23. Provision was made by the 1926 Act for the construction of new selected power stations, and for the alteration or extension of existing stations, as necessary from time to time to meet the growth of electrical load. These developments were planned by the Board in co-operation with the undertakings concerned and with the approval of the Electricity Commissioners, to secure the best results for the system as a whole, and greatly encouraged the development of larger-capacity and higher-efficiency plant at the most suitable locations.

24. At 31st March, 1948, there were 143 selected stations, producing over 95 per cent. of the electricity generated for public supply. Earley station near Reading, built as a special war-time measure, belonged to the Board, but all the other selected stations remained in the ownership and under the management of the local authority, public authority or company undertakings, their output being controlled (i.e., as regards quantity, time and rate) by the Board. There were also 55 other stations the output of which was, by agreement, similarly controlled in order to economise fuel and to augment supplies to the Grid at times of peak demand.

Grid Operation

25. By means of the Grid system it was possible to concentrate production of electricity at the larger and more economical power stations and to restrict the use of the remainder or shut them down completely ; so that the output of a station was regulated, not as formerly by the requirements of a particular undertaking, but in accordance with programmes devised to ensure that the production of electricity for the country as a whole was effected at the lowest practicable cost. The other major advantage was the possibility of assistance to hitherto self-dependent undertakings, and the consequent savings in standby plant. As supplies could be afforded from the Grid in the event of plant at a power station being out of service for overhaul or repair or because of breakdown, it was safer to operate with a smaller aggregate of spare plant than was

necessary when each station had to provide its own standby capacity.

26. The output of the selected stations was purchased by the Board, and sold by them to the distribution authorities including the owners of those selected stations. The 1926 Act provided that, unless otherwise agreed, the price at which electricity was supplied by the Board from a selected station, to the owners of that station, was to be either the cost of production of electricity at that station adjusted according to the load factor and power factor of the supply afforded to the owners, together with a proper proportion of the Board's transmission expenses, or the tariff fixed under the Act, whichever was the lower ; but the price was not in any event to exceed the cost which the owners would have incurred in generating their own supplies if the Act had not been passed. In most cases the price was settled by agreement between the Board and the station owners on the basis of estimates of the latter cost. Where the distribution authorities were not owners of selected stations, the price charged for electricity supplied directly by the Board was in accordance with the tariff fixed under the 1926 Act or, in the case of non-selected stations, at special prices authorised by the Electricity (Supply) Act, 1935. The latter Act also authorised the Board to give direct supplies for traction purposes to railway undertakers. In the case of distribution authorities supplied indirectly through another authority, the authorities receiving the direct supply were under obligation to pass it on at the price at which they purchased it, with the addition of appropriate transmission costs and charges.

27. At 31st March, 1948, about two-fifths of the distribution undertakings were being supplied directly from the Grid, and nearly all of the remainder were connected to the Grid through the systems of undertakings which received their supplies from the Grid.

28. The day-to-day operation of the Grid required a comprehensive system of control. In each of the seven operational and control areas of the Board—the original nine scheme areas having been reduced to seven by the amalgamation, in two instances, of two adjoining areas—there was a control centre in direct and immediate communication with the power stations of the area and with National Control in London.

ELECTRICITY ACT 1947

THE NEW ORGANISATION

1. The Act provides for the organisation of the electricity supply industry throughout Great Britain on a national basis, and for the establishment of the British Electricity Authority (the Central Authority) and fourteen Area Electricity Boards to own and operate the industry, except in the North of Scotland District. The Central Authority are responsible for the generation of electricity and its supply to the Area Boards for the purpose of distribution. In the North of Scotland District, which is enlarged by the Act, the existing North of Scotland Hydro-Electric Board have separate responsibility for both generation and distribution of electricity.

2. The Act specifies the assets to be vested in the Central Authority and the Area Boards, and empowers the Minister of Fuel and Power to determine the vesting date, to define the Areas of the Area Boards, and to allocate the ownership of authorised electricity undertakings to the appropriate Boards. It also provides for a Consultative Council, comprising representatives of consumer and general public interests, for each of the Areas and for the North of Scotland District.

3. The Act defines the functions of the Central Authority, Area Boards and Consultative Councils, and their relationship with the Minister of Fuel and Power. It provides for the transfer of the existing undertakings and for the making of compensation therefore, and empowers the Minister to dissolve the Electricity Commissioners and arrange for the transfer of their assets and liabilities.

4. Thus the Act, and the orders and regulations made thereunder, substantially determine the new organisation of the industry.

Functions of Central Authority and Area Boards

5. The main function of the Central Authority is to develop and maintain an efficient, co-ordinated and economical system of electricity supply. For that purpose they are required to generate or acquire supplies of electricity, to provide the Area Boards with bulk supplies (i.e., for the purposes of distribution), to co-ordinate

distribution by the Area Boards, and to exercise general control over their policy. The Authority must also provide supplies of electricity to railway undertakers for purposes of haulage or traction (the Area Boards not being empowered to do so without the approval of the Authority), and also to any other consumers whom they may be authorised by the Ministry to supply.

6. The main function of the Area Boards is to acquire from the Central Authority bulk supplies of electricity, and to plan and carry out an efficient and economical distribution of those supplies to persons in their Areas who require them. Area Boards may also, with the approval of the Central Authority, acquire supplies of electricity from other sources, e.g., from a colliery with a generating plant:

7. In exercising their functions, and subject to any directions given by the Minister, the Authority and the Boards must promote the use of all economical methods of generating, transmitting and distributing electricity; secure, so far as practicable, the development and cheapening of supplies and the extension of supplies to rural areas; avoid undue preference in the provision of supplies; and promote the simplification and standardisation of methods of charge and the standardisation of systems of supply and of types of electrical fittings. They must also promote the welfare, health and safety of their employees.

8. Among other functions specifically mentioned in the Act are these. The Authority, and the Boards if requested by the Authority, must undertake and may assist research. The Authority and the Boards must make provision for facilities for the training and education of persons employed by them. The Authority may manufacture, sell, hire, otherwise supply, install, repair, maintain or remove electrical plant and electrical fittings, including appliances, but may not manufacture for export. Except for manufacture, the Boards have similar powers in respect of electrical fittings, including appliances.

9. The Authority and the Boards are empowered to carry on such activities as appear to them to be requisite, advantageous or convenient for, or in connection with, the performance of their main functions, or with a view to making the best use of any assets vested in them by or under the Act. They are also empowered to do anything and to enter into any transaction which, in their opinion, is calculated to facilitate the proper performance of their functions to which reference has been made above, or is incidental or conducive thereto. They have certain powers, and the Authority

certain duties, in respect of district heating, and the Authority have specified responsibilities in relation to machinery for the settlement of terms and conditions of employment and for the consideration of other labour relations matters.

10. Finally, it is the duty of the Authority to see that the combined revenues of the Authority and all the Area Boards taken together are not less than sufficient to meet their combined outgoings properly chargeable to revenue account, taking one year with another. In other words, the national industry as a whole must pay its way.

Membership of Central Authority and Area Boards

11. The British Electricity Authority are a statutory corporation. The Chairman and from four to six other members are appointed by the Minister of Fuel and Power from among persons who have had experience of, and shown capacity in, the generation and supply of electricity, industrial, commercial or financial matters, applied science, administration, or the organisation of workers. They serve for a period not exceeding five years and are eligible for reappointment. Four other members are appointed by the Minister from among the Area Board Chairmen for a period not exceeding three years, the appointments being made from the Boards in rotation. The remaining member is the Chairman for the time being of the North of Scotland Hydro-Electric Board. One or more Deputy Chairmen are appointed from among the members by the Minister. No member of the House of Commons may be a member of the Authority.

12. The Authority have established fourteen Generation Divisions, with areas corresponding to those of the Area Boards; but this is simply an administrative arrangement, and the Divisions are not separate legal entities.

13. The Area Boards are, however, statutory corporations. The Chairman and from five to seven other members of each Board are appointed by the Minister, after consultation with the Central Authority, from among persons who have had experience of, and shown capacity in, electricity supply, local government, industrial, commercial, agricultural or financial matters, applied science, administration, or the organisation of workers. They serve for a period not exceeding five years and are eligible for reappointment. The remaining member is the Chairman for the time being of the Consultative Council established for the Area by the Minister. A Deputy Chairman is appointed from among the members by the Minister, after consultation with the Central Authority. No

member of the House of Commons may be a member of an Area Board.

Central Authority—Area Board Relationship

14. The Central Authority, as has been stated, are required by the Act to co-ordinate the distribution of electricity by the Area Boards and to exercise general control over the policy of the Boards. For these and other purposes, the Authority are empowered to give such directions to Area Boards as appear to the Authority to be necessary or expedient.

15. These wider responsibilities are linked with certain more specific functions, imposed by the Act on the Authority and the Boards, relating to development programmes, tariffs, general finance, labour relations, information, and other matters. Thus, in carrying out their duty to ensure that the industry pays its way, the Authority may require the Boards to submit for approval periodic estimates of revenue and expenditure; to obtain approval of development programmes involving capital expenditure, or of other expenditure chargeable to capital account, or in classes of cases in which the Authority consider it desirable to secure co-ordination between different Area Boards in matters involving expenditure; and to submit for approval consumer tariffs or proposals to vary or replace tariffs. The Boards may also be required to contribute towards the redemption of British Electricity Stock and the payment of interest thereon, and to the central reserve fund of the Authority.

16. Thus, while the function of distribution is separated from that of generation and main transmission, and is under separate statutory corporations, provision is made for the co-ordination of the whole industry on a national plan.

Relationship with the Minister

17. The Minister of Fuel and Power may give the Authority such directions of a general character, on the exercise and performance of their functions, as appear to him to be requisite in the national interest.

18. Among the other responsibilities of the Minister in relation to the industry are the following. Reorganisation or development involving substantial capital outlay, and the exercise of functions relating to training and education and to research, must be in accordance with general programmes settled from time to time by the Central Authority in consultation with the Minister. The issue

of stock by the Authority, and the extent of temporary borrowing by the Authority and the Area Boards, are subject to his consent and the approval of the Treasury. The Authority and the Area Boards must prepare annual reports and accounts, for submission to him by the Authority ; and he must lay them before Parliament. On a number of matters he makes orders and regulations under the Act.

Relationship with North of Scotland Hydro-Electric Board

19. The functions and District of the North of Scotland Hydro-Electric Board, established under the Hydro-Electric Development (Scotland) Act, 1943, are extended by the 1947 Act. Except as mentioned below, the Board are an independent body, and liaison is maintained by the appointment of the Chairman of the Board to membership of the Authority. The functions of the former Electricity Commissioners in regard to approval of new constructional schemes, for submission to the Secretary of State for Scotland for confirmation, are now exercisable by the Central Authority. The Board is associated with the Central Authority and the Area Boards in certain matters of general co-ordination, particularly in regard to labour relations. The Central Authority are under obligation to purchase from the Board such supplies of electricity as the Board may from time to time notify and undertake to give. In the event of disagreement as to the price for such supplies, the price is determined by the Minister of Fuel and Power and the Secretary of State for Scotland jointly.

Consultative Councils

20. Consultative Councils, comprising representatives of consumer and general public interests, are established for the Areas of the Area Boards. Each Council may have from twenty to thirty members, appointed by the Minister of Fuel and Power for a period not exceeding five years. From half to three-fifths of the members are appointed from a panel of members of local authorities in the Area, nominated by appropriate local authority associations. The remainder are appointed, after consultation with appropriate bodies, to represent agriculture, commerce, industry, labour, the general interests of consumers, and other persons or organisations interested in the development of electricity in the Area. The Chairman, who is also a member of the Area Board by virtue of his office, and the Deputy Chairman are appointed from among the members by the Minister. A member of the House of Commons is not eligible to be Chairman. There is a similar Consultative Council for the North of Scotland District, appointed by the Secretary of State for Scotland.

21. The Councils are required to submit to the Minister schemes for the appointment of committees or individuals to act as their local representatives in such localities as may be specified in the schemes. These representatives need not be members of the Councils.

22. The Councils have the duty of considering any matter affecting the distribution of electricity in the Areas, including the variation of tariffs and the provision of new or improved services and facilities, which is the subject of a representation made to them by consumers or other persons requiring supplies of electricity in the Areas, or which appears to them to be a matter to which consideration ought to be given apart from any such representation. If it appears to a Council that action is requisite, they are required to notify their conclusions to the Area Board. They have also the duty to consider and report to the Board on any such matter which may be referred to them by the Board. They must be informed by the Board of the Board's general plans and arrangements for exercising and performing their functions under the Act, and they may make representations thereon to the Board.

23. The Area Board must consider any such conclusions, reports or representations; and the Council may, after consultation with the Board, make representations to the Central Authority on matters arising therefrom. On matters arising from such representations to the Authority the Council may, after consultation with the Authority, make representations to the Minister. The Authority or the Minister, as the case may be, may direct remedial action if a defect is disclosed in the Area Board's general plans and arrangements for carrying out their functions.

GENERATION DIVISIONS OF
THE CENTRAL AUTHORITY

J. N. WAITE, C.B.E., M.I.E.E., F.INST.F.
London

W. C. PARKER, M.I.E.E., M.INST.F.
South Eastern

R. H. COATES, B.SC.(ENG.), M.I.E.E., M.I.MECH.E., A.M.INST.C.E., M.INST.F.,
M.A.I.E.E.
Southern

A. C. THIRTLE, A.M.INST.C.E., A.M.I.E.E., M.INST.F.
South Western

W. N. C. CLINCH, M.I.E.E., M.INST.F.
Eastern

L. F. JEFFREY, B.SC., M.INST.C.E., M.I.E.E., M.I.MECH.E.
East Midlands

F. W. LAWTON, A.C.T.C., M.I.E.E., M.I.MECH.E.
Midlands

H. V. PUGH, M.I.E.E., M.I.MECH.E.
South Wales

A. R. COOPER, M.I.E.E., M.INST.F.
Merseyside and North Wales

G. A. VOWLES, M.I.E.E., M.I.MECH.E.
Yorkshire

J. C. MITCHELL, M.I.E.E., M.I.MECH.E.
North Eastern

C. T. S. ARNETT, O.B.E., B.SC.(ENG.), M.I.E.E., M.INST.F.
North Western

J. F. FIELD, B.SC., M.INST.C.E., M.I.E.E., M.I.MECH.E.
South East Scotland

E. J. EDGAR, M.I.E.E.
South West Scotland