than 200 million in 1953 ; the latter figure corresponds to one receiver for every twelve persons in the world.

The dearth of frequencies and the continued increase in the number of stations present a serious problem in the maintenance of a home sound broadcasting service in the low- and medium-frequency bands ; and there is little prospect of resolving this problem by an increase in power or improvement in aerial efficiency at transmitting stations. The high-frequency band (3–30 Mc./s.) is not suitable for local services, and now has its own very serious problems for external broadcasting to countries overseas. In pursuance of the present policy of the B.B.C. of providing for the national coverage of three sound programmes, it is therefore proposed to inaugurate home broadcasting services in the very-high-frequency band of 88–95 Mc./s. Considerable experience has been obtained by the B.B.C. in this band with an experimental station at Wrotham in Kent, erected in 1949 ; and it is now planned to build fifty-one stations at nineteen locations to provide for the Home, Light and Third Programme Services. The building of these new very-high-frequency stations will take several years, and additional transmitters may be added later to complete the national coverage.

With reference to television broadcasting, Mr. Bishop first reviewed the considerations that resulted in the decision to reopen, in June 1946, the London television station, which provided a regular public service from November 1936 until the outbreak of war in September 1939. This has resulted in the development of the television service in Britain on the basis of the pre-war transmission standards of 405 lines, with double interlaced scanning at a picture frequency of 25 per sec. In the light of developments since that time, there is no doubt that this was the right decision. The subsequent installation of additional high- and medium-power transmitters in the United Kingdom has been accompanied by technical developments which have enabled a steady and considerable improvement in picture quality to be obtained with the band-width limitations imposed generally by the radio and cable links between the television transmitters and the studio at which the programme originates. While the present plans of the B.B.C. are concerned with providing national coverage to the extent of 98 per cent of the population for a single programme, the Corporation has also under consideration the need for providing an alternative television programme on a nation-wide basis. Such alternative services, together with any competitive programme service the Government may decide to introduce, will have to be transmitted in various bands of frequencies between 174 and 960 Mc./s. A large amount of research on various aspects of the use of these frequencies is in progress in anticipation of such developments. It is in these bands, also, that any system of colour television will have to be accommodated. In this connexion, Mr. Bishop stressed the importance of ensuring that any colour system introduced must be compatible with the present black-and-white system. This means that the colour transmissions must be such that they provide for the reproduction of a black-and-white picture on the two and a half million receivers already in use in Britain, without any modification of the band-width or other features of these receivers. It may, of course, be necessary to add an adaptor to such receivers to enable them to be tuned to the transmissions in the higher-frequency bands ; and this and other matters are already receiving attention by those engaged in the radio receiver industry.

In the concluding portion of his address, Mr. Bishop referred to the fact that the rate of growth of membership of the Institution, which is about 38,000, appears to be decreasing. While this is not necessarily a bad thing, it might, he suggested, be associated with the problem of maintaining a sufficiency of recruits to the electrical engineering profession. He suggested that it is time to make a fresh assessment of the needs of the profession and the manner in which these could be met by stimulating the appropriate class of education in schools and universities.

NATIONAL RESEARCH DEVELOPMENT CORPORATION

ANNUAL REPORT FOR 1952–53

THE report and statement of accounts of the National Research Development Corporation, covering the year ended June 30, 1953*, is the last which will appear before the Corporation's borrowing powers expire at the end of next June. Although the Development of Inventions Act, 1948, which established the Corporation, empowered the Board of Trade, with the consent of the Treasury, to make advances of up to £5 millions for the capital expenditure of the Corporation in connexion with the development and exploitation of inventions, only 10 per cent of that amount has been used by the Corporation for the development of new inventions during its first four years. A statutory function of the Corporation is to secure, where the public interest requires, the development or exploitation of inventions resulting from public research, and of any other invention which it appears to the Corporation is not being, or is being insufficiently, developed or exploited. Of the fourteen development projects currently in hand, five are derived from private sources. The great majority of the public inventions either require no development or are of such a character that industry, when interested, is prepared to accept the risk of development.

The activities of the Corporation in connexion with requests for assistance for development during the past four years thus suggests that within its statutory responsibilities the need for assistance is much less than was anticipated when the Corporation was established. As a result of these four years of working the Corporation is now a party to more than two hundred and fifty licence agreements with industry in the United Kingdom or abroad, and to revenue-sharing agreements with universities, university research workers and industrial research associations. The administration of 2,224 patents and patent applications in the United Kingdom and overseas thereby involved is a continuing commitment for the Corporation in respect of wasting assets with a maximum life of about sixteen years. The Corporation is also required to seek to recover its expenditure by licensing firms engaged in the industry concerned so as to use the inventions which the Corporation administers. Revenue from recurrent royalties has steadily increased, that for 1953 being £21,204, whereas that from paid-up royalties

* National Research Corporation. Report and Statement of Accounts for the Year 1st July, 1952, to 30th June, 1953. Pp. ii+18. (London : H.M. Stationery Office, 1953.) 9*d*. net.

or premium royalties or options is necessarily irregular from year to year, and in 1953 was no more than £2,129 compared with £3,029 in 1950.

As regards development projects, electronic digital computers were still the largest single commitment. Commercial orders, including one for export, have been received for three of four large machines similar to that designed by Prof. F. C. Williams in the University of Manchester, and deliveries were scheduled to be made during 1953–54. The prototype of a smaller machine has been temporarily installed in the Mathematical Laboratory at Cambridge for trials. Development of the Packman potato harvester during 1952–53 was concentrated on the criteria necessary for a successful potato harvester as stated by the judges in the open competition of the Royal Agricultural Society of England. Development of the inventions in the field of hydrocarbon synthesis at the Imperial College of Science and Technology, London, proceeded without setbacks; but rapid progress was not at that time expected. Prototypes of a light steam-engine were being developed to suit the findings of a market survey in India and Pakistan. Development on both the aural microscope and the chick sexer was completed during the year, and a substantial number of chick sexers were sold in Britain and abroad.

Results of the pilot-scale production in East Africa of hecogenin from sisal juice have encouraged further contracts for supplies; the crude concentrate was being purified in the United Kingdom and pure hecogenin acetate was being made available for the synthesis of cortisone. Prototypes of the Burns inhaler for the administration of trilene and other volatile analgæsics were about to be delivered for clinical trials. Resin-based formulations containing insecticides have been the subject of patent applications in the United Kingdom and of overseas and licence agreements made with several British paint manufacturers. Commercially produced formulations are becoming available on an increasing scale. Increased interest in a group of some thirty inventions in the plastic structures field, which originated in the Royal Aircraft Establishment, Farnborough, is attributed to growing realization of the importance of phenolic-impregnated asbestos felts as constructional materials, and polyurethane and furan resins for foams and adhesives, respectively. A special study of the process of shock-curing of plastic laminates was being carried through so that the results could be made available to industry, and the construction by the Corporation of a plastic structures demonstration laboratory was proposed. The prototype of a novel machine for the liquefaction of atmospheric gases on a scale considerably smaller than that of conventional machines, invented at the University of Reading, was being built, and a programme of development of a regenerative system of mechanical transmission, known as the 'Gyreacta' system, has been inaugurated. This is of particular application to public-service vehicles.

Of the 692 inventions communicated to the Corporation during the year, 273 were from Government departments and research councils, 6 from industrial research associations, 16 from Commonwealth official organizations, 48 from universities and 314 from British private firms and individuals. Of the 257 patents or patent applications, the assignment or transfer of which to the Corporation was registered during the year, 185 were from Government departments and research councils, 22 from industrial research associations, 36 from universities and 11 from British private firms and individuals. Of the Corporation's total holdings of patents and patent applications at June 30, 1953, 501 were United Kingdom granted patents and 498 United Kingdom patent applications, the corresponding overseas figures being 227 and 998, respectively.

IMPERIAL FORESTRY INSTITUTE, OXFORD

ANNUAL REPORT FOR 1951–52

THE annual report of the Imperial Forestry Institute, University of Oxford, for 1951–52* shows that the Institute has expanded beyond all recognition from its early beginnings at the inception of the late Lord Lovat, the first chairman of the Forestry Commission. The idea then, as it still is, was to give postgraduate courses to forestry graduates who had been nominated as forestry probationers by the Colonial Office, and to offer refresher courses to members of the Colonial Services on leave. This latter course was attended during the year under review by sixteen forest officers from Nigeria (five), Gold Coast and Tanganyika Territory (two each), and Sierra Leone, Northern Rhodesia, Uganda, British Guiana, Trinidad, Fiji and Sarawak (one each). In addition, an Indian forest officer (Bengal) and one Pakistani forest officer (Punjab) attended the course arranged for them. As evidence of the wide nature of the courses offered at the Institute, five forest officers (Gold Coast, Nigeria, Trinidad and Sudan) attended a special aerial survey course during the Michaelmas term. In addition, the sylviculturist from the Agricultural Research Institute, Wad Medani, Sudan, and a German student from the forestry school of Göttingen attended the Institute for periods. It is of interest and importance to learn that nine students successfully sat the Final Honours School of Forestry. Of these, one Ceylon scholar took up a post in his country, another Gold Coast scholar took a post in the Gold Coast Forest Service, a third forestry scholar has returned to Uganda and two of the others obtained posts in the Colonial Forest Service.

The importance of the wide departure from the original conception of the Institute may lie in the future with the changing administrative policies in the British Colonies. Although little alluded to, forestry must play an important part if the forest services are eventually to be managed by the native administrations concerned. It is not possible, at present at any rate, to train fully the officers required for the higher forestry administrative posts in the Colonies. A final course in Europe may be regarded as indispensable to study European forest management which has been in force for so long a period. At the Institute such advantages are provided and other facilities are available to give the final training. For this reason alone the future importance of the Institute cannot be too strongly emphasized. The report deals fully with the various lecture courses given and the practical courses in the forests of France, Switzerland and Denmark, and also in Great

* The Imperial Forestry Institute, University of Oxford. Twenty-eighth Annual Report 1951–52. Pp. 28. (Oxford: Holywell Press, Ltd., 1953.)