

the rapid development of emitting stations in restricted geographical areas, the effects of radio interference have been brought home to a much wider public.

On a first inspection of the problem as applied to the reception of speech and music, as in telephony or broadcasting, it appeared that the relatively high selectivity of the telegraphic circuits could not be utilised on account of the distortion which would arise from the loss of the higher note frequencies in the audible range. Recent research has shown, however, first, that the problems of the reduction of interference are the same in all branches of radio communication; and secondly, that the correct application of existing knowledge on radio frequency circuit operation can be of considerable assistance in reducing the interference experienced in any conditions of radio reception.

On account of the importance of this subject, the Radio Research Board appointed a special committee, under the chairmanship of Prof. E. V. Appleton, to report on the properties of very highly selective radio receivers. On behalf of this committee, Mr. F. M. Colebrook carried out a theoretical and experimental investigation of the subject, and the results of this work, together with the committee's considered conclusions on the problems involved, are contained in a report recently published by the Department of Scientific and Industrial Research.

In the course of this investigation the general problem of the reception of modulated electrical oscillations in a circuit of known constants has been considered in a comprehensive manner. The research has been limited in the first place by the assumption of quasi-stationary conditions, and it is realised that the results of imposing transient conditions will need further consideration. Moreover, the investigation was specially directed to studying the behaviour of a circuit of high selectivity, that is, a tuned oscillatory circuit in which the current amplitude falls very rapidly as the frequency of the inducing electromotive force is displaced by comparatively small amounts from its resonant value. The practical application of this work consists in the use of such a high selectivity circuit as part of the apparatus employed for receiving modulated radio signals in the presence of similar signals at neighbouring radio frequencies which it is not desired to receive. The distortion already referred to which results from the gradual amplitude reduction with increasing modulation frequency may be corrected for by using one or

more audio-frequency stages in which the amplification obtained increases with the frequency in the requisite manner.

In the case postulated, the desired signals may be assumed to consist of a carrier wave with associated side waves due to telephonic, telegraphic, or other modulation, and it is by the combination of the effects of these waves in the receiver in their correct phase relationships that reception takes place. Under the conditions stated above, the total interference can be classified into two groups. The first includes all interference which would exist even in the absence of the carrier wave of the wanted transmission. A familiar example of this is the reproduction in a broadcasting receiver tuned to a certain station of the programme of another station transmitting on a neighbouring frequency or wave-length. The second group comprises all interference which would disappear completely if the carrier wave of the wanted transmission were removed. The most important and familiar example of this type of interference is the steady heterodyne beat note resulting from interference between the carrier waves of the wanted and unwanted transmissions.

The results of the investigations of this case show that, by the use of a highly selective receiving circuit in combination with a suitable tone-corrected audio-frequency amplifier, interference of the first type can be reduced to almost any desired extent within certain practical limits of circuit and transmission frequency stability. In the case of interference of the second type, however, the position is totally different in that the magnitude of this interference is independent of circuit selectivity, the relative reduction of interference in the selective circuits being removed by the subsequent tone correction. On account of the presence of this second type of interference, the frequency difference between the carrier waves of the wanted and unwanted transmissions must be at least twice as great as the audio-frequency range it is required to cover in the modulation signals transmitted and received. The advantage to be gained by the reduction of the first type of interference is considerable, and it is likely that the principles, now well established, will attract considerable attention in the future of radio receiver design and practice. The principles apply equally to all classes of receiving apparatus, whether these are for broadcast reception, for telegraphic reception using Morse code signals, or for the reception of those modulation signals which are employed in television and picture telegraphy.

### The Priestley and Pepys Commemorations

WHEN Priestley on April 8, 1794 left the shores of England to seek an asylum in the United States, he could little have thought that nearly a century and a half later his name would be on everybody's lips and that men of light and learning would gather together in many places to pay tribute to his memory. After fleeing from Birmingham in 1791 in fear of his life, he had reached London only to find himself shunned by many of his fellow members of the Royal Society, and as the French Revolution, for which he had at first had much sympathy, reached its climax, his position had become so unpleasant, if not hazardous, that he was driven to the conclusion that his removal would be of more service to the cause of truth than his longer stay in England.

Thus it came about that just a month before France saw her greatest man of science fall beneath the guillotine, England allowed one of her noblest sons to become a voluntary exile. To-day, however, the name of Priestley, like that of Lavoisier, is held in honour throughout the world and the celebrations which have recently taken place in London and elsewhere have done much to atone for the neglect shown him in his later years.

Of these celebrations the most important was that of March 15, when at Burlington House the president of the Royal Society, Sir Frederick Gowland Hopkins, held a reception to commemorate both the bicentenary of the birth of Joseph Priestley and the tercentenary of the birth of Samuel Pepys. Needless

to say, the rooms in which Sir Frederick received the guests were not the apartments known to Priestley, for when in 1773 at the hands of Sir John Pringle he received the famous Copley medal, the Society was still housed in Crane Court, whence, seven years later, it removed to Somerset House. But no doubt Priestley would have found much with which he had once been familiar, for when he was admitted a fellow of the Society in 1766, the Society was more than a hundred years old, and among the exhibits open to the visitors on March 15 was the Charter Book signed by all fellows.

The most interesting exhibits at the Royal Society's reception were those relating to Priestley himself, gathered together from many sources. Among these were to be seen a letter in French intimating to Priestley that he had been nominated for the National Convention, an honour he wisely and firmly declined; the diploma and seal given to him by the Empress Catherine II of Russia and his Copley medal, presented with such graciousness by Sir John Pringle, who remarked that the Society awarded it to him "as a faithful and unfading testimony of their regard, and of the just sense they have of your merit, and of the persevering industry with which you have promoted the views, and thereby the honour of the Society". The diploma, seal and medal were recently bequeathed to the Society by one of Priestley's great-granddaughters and it was to a great-great-granddaughter, Mrs. Belloc Lowndes, that the Society was indebted for the loan of some of the other exhibits, including the letter referred to. Most of Priestley's books, manuscripts and apparatus were destroyed in the fire at Birmingham in July 1791. Another exhibit of great interest was a series of documents, hitherto unpublished, lent by Lord Lansdowne. Beside the Priestley exhibition, there was also a small collection of documents recalling Pepys's connexion with the Royal Society. During the evening Sir Harold Hartley gave an address on Priestley's work.

The Priestley bicentenary was also commemorated in the provinces and his association with Lancashire, Yorkshire and Warwickshire was recalled by articles in the *Manchester Guardian*, the *Leeds Mercury* and the *Birmingham Mail*. His connexion with Leeds was a very close one, for he was born at Fieldhead, close to the city, he attended Batley Grammar School, and in 1767 became the minister of Mill Hill Unitarian Chapel. On March 11, therefore, the Old Boys' Association of Batley Grammar School had a Priestley commemoration dinner at the Hotel Metropole, Leeds, and on the following day a special service was held in Mill Hill Chapel, which was attended by the Lord Mayor of Leeds, Alderman R. H. Blackburn, and members of the Leeds Philosophical Society. During the course of his sermon, the Rev. W. L. Schroeder, referring to Priestley's statue in the city square, said it was symbolic of Priestley's endeavour to bring the light of truth within the reach of all; adding that though most people thought of Priestley as a man of science, it was more important that he was a minister, all of whose activities were devoted to the glory of God and the happiness of mankind.

The Chemical Society will commemorate the Priestley bicentenary by a special meeting in its rooms at Burlington House, London, W.1, on April 6 at 8 p.m., when papers will be read by Prof. A. N. Meldrum, Sir Philip Hartog and Sir Harold Hartley.

## University and Educational Intelligence

CAMBRIDGE.—Mr. W. J. Courtauld has provided the sum of £6,000 for the repair of glasshouses in the Botanic Garden.

Sir Charles S. Sherrington will deliver the Rede lecture at 5 P.M. on May 24. The subject will be "Mechanism and the Brain".

Prof. B. L. Van der Waerden will deliver the Rouse Ball foundation lecture on April 24 at noon. The subject will be "The Aims of Modern Algebra".

It has been recommended that Dr. U. R. Evans be appointed assistant director of research in metallurgy for the period during which he holds the Royal Society Armourers and Braziers' research fellowship in metallurgy; and that the post of assistant in experimental research in crystallography be established in the Department of Mineralogy and Petrology for F. I. G. Rawlins, of Trinity College.

C. C. Hurst, of Trinity College, and A. F. Halli- mond, of Pembroke College, have been approved for the degree of Sc.D.

WALES.—The Council has accepted with regret the resignation of Dr. S. Dickinson, assistant lecturer in botany at the University College of South Wales and Monmouthshire, Cardiff, on his appointment as research assistant in mycology in the Department of Agriculture in the University of Cambridge.

WITH the twenty-first volume, recently published, the series of "Methods and Problems of Medical Education" issued by the Rockefeller Foundation of New York is for the time being brought to a close. This series was begun in 1924 and has comprised volumes of articles devoted to descriptions of teaching facilities and methods in the field of medical education. The present volume deals with nursing education and schools of nursing, and several institutions in the United States and Canada, Peiping and Bangkok, are described and illustrated. Articles on nursing education in England, Denmark, Finland, France and Hungary are also included.

BILINGUALISM and the employment as a medium of instruction and examination of a language other than the mother tongue of the student give rise to problems of educational administration in many parts of the British Empire and especially in India. Some of these problems are dealt with in a report recently published by the Government of India, Central Publications Branch, Calcutta (pp. 48, price As. 10 or 1s.) on the use of the mother-tongue in the matriculation examination of the University of Bombay. It appears that since 1925, matriculation candidates have been permitted to write either in English or in their mother-tongues their answers in history and in Indian classical languages, and the proportion of candidates who have availed themselves of this option to write their history answers in their mother-tongue has steadily increased from one fifth in 1926 to two thirds in 1931, although more than half of the students in the high schools in the Presidency are receiving instruction in English. An analysis of matriculation results goes to show that those who answered the history papers in their mother tongue as a rule gained higher marks than the others but did badly in English.