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THE TECHNICAL NEWSPAPER OF THE ELECTRICAL INDUSTRY

14 NOVEMBER 1947
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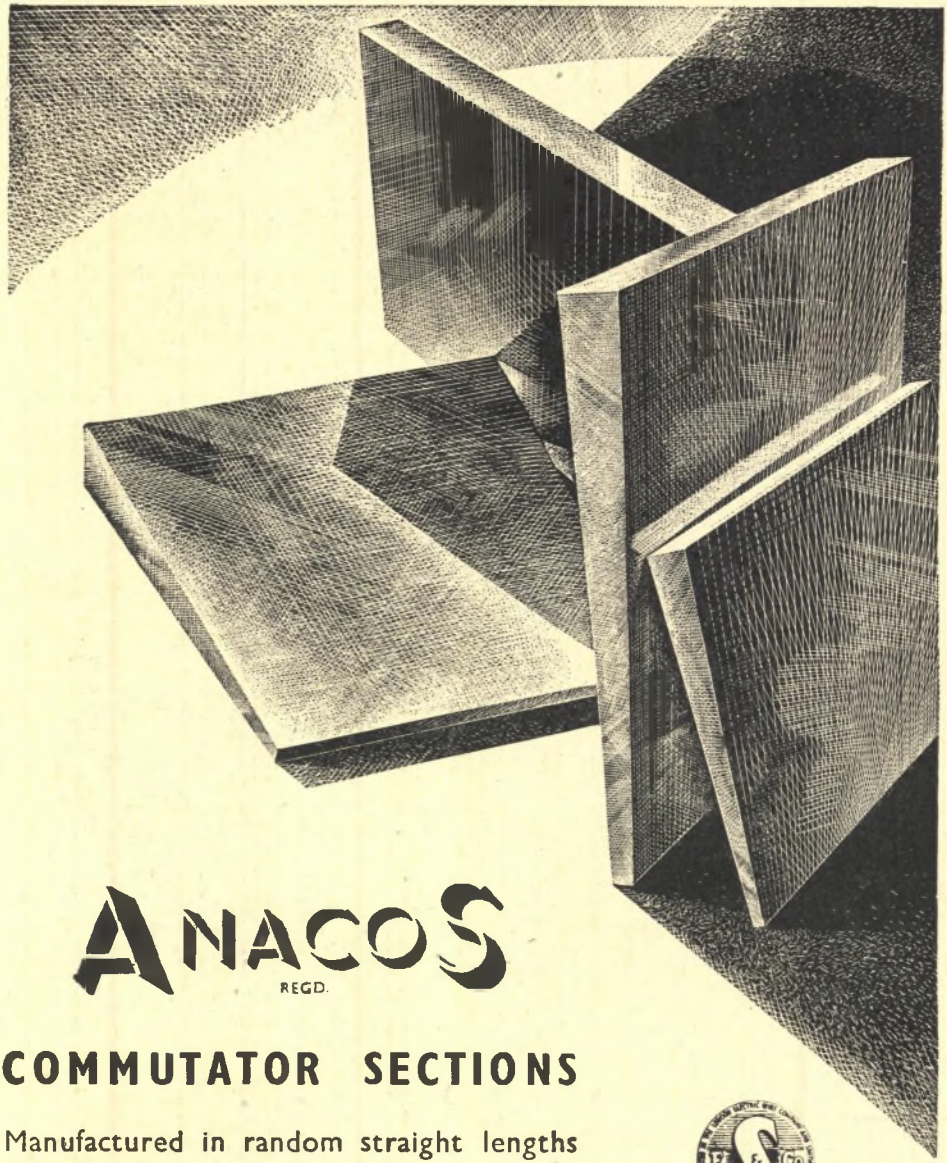

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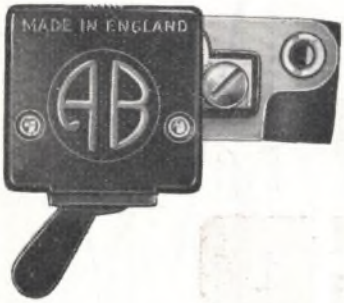

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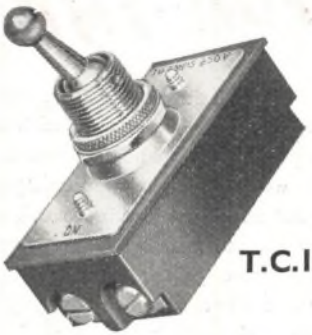

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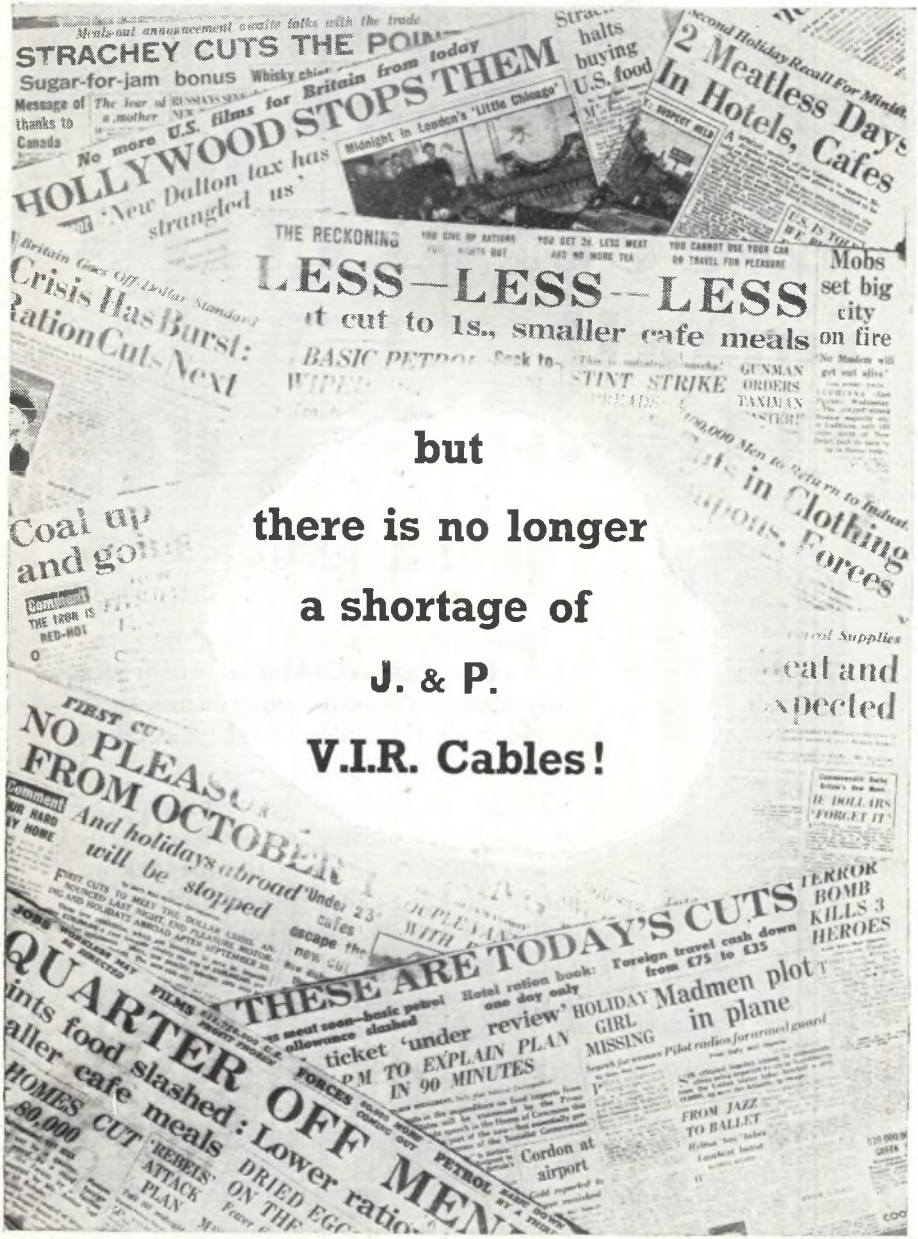
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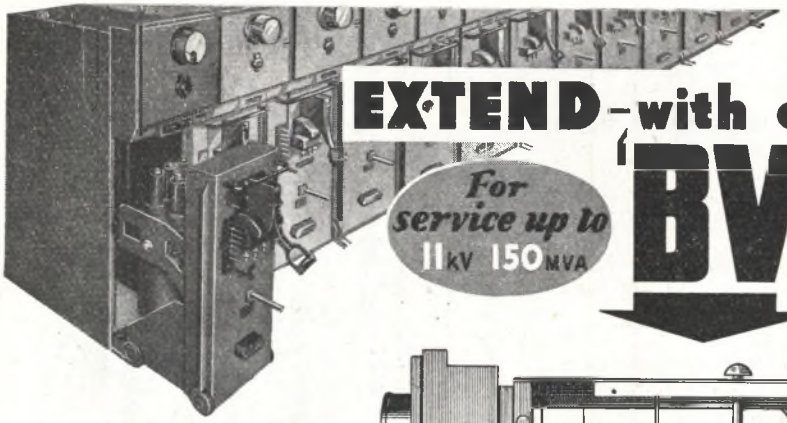

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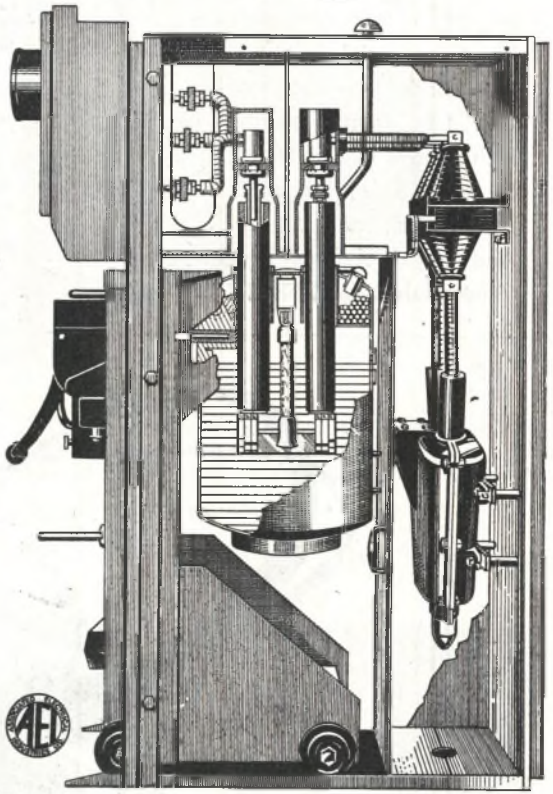

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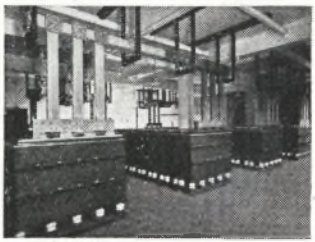

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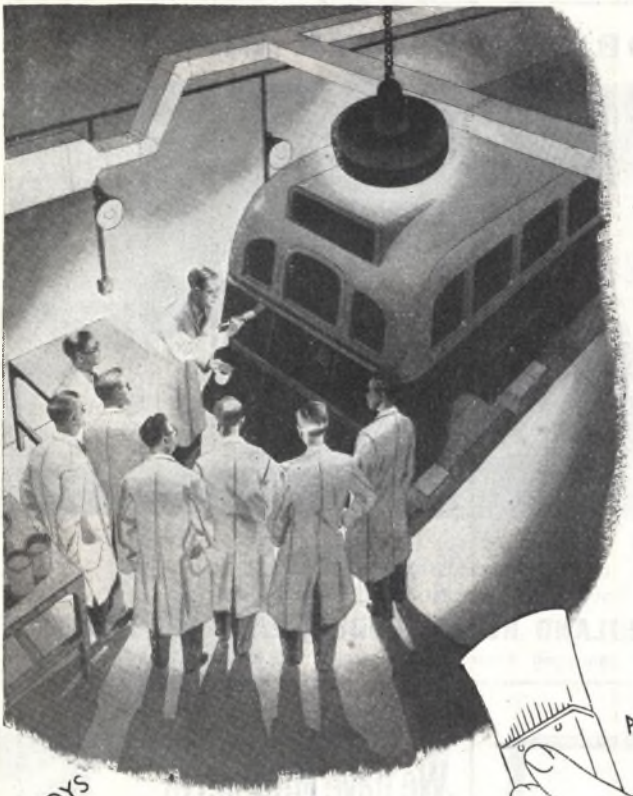

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A Radio Occasion

FROM the enterprise of a number of manufacturing organisations which, twenty-five years ago, introduced radio broadcasting to this country, has grown one of our most important industries. The promoters of that enterprise were for the most part engaged in the electrical industry, and they, together with the then few radio concerns with resources adequate enough to lend material aid, have this week joined, in spirit if not in deed, in the celebrations arranged by the B.B.C. As the founders of an industry which, first designed to meet the needs of a home listening public, is to-day making a substantial contribution to the export drive, they are fully entitled to do so.

Confining our observations to the broadcasting side of radio, there were before 1922 few people who had heard the human voice in wireless transmission, and then only as a result of the experiments of an enthusiastic body of licenced amateur radio transmitters and the independent work of a few pioneer companies.

Such was the appeal of broadcasting to the public imagination, however, that by 1924 the number of broadcast receiver licences issued by the G.P.O. was roughly one million, by 1926 two million, and by August, 1947, nearly eleven million.

The British radio industry has given the world many technical developments which have benefited both hemispheres in peace and war, and is continuing to do so in the fields of television, navigation, and general communications in a way

not yet seriously challenged by radio engineers of any other country. Prior to 1922, the future of British radio was in the hands of two or three companies whose belief in that future led to the developments that resulted in the starting of a system of communications which twenty-five years before, would have been regarded as impossible. The silver jubilee of that achievement is an occasion of which the pioneering concerns of 1922 may well be proud, and is an occasion on which the rest of the industry is proud to offer congratulation.

Electrical Research

AN appreciable addition to the facilities for carrying out electrical research was made last week, with the official opening of the Nelson Laboratories of the English Electric Co. at Stafford. The laboratories have behind them an interesting history, for the building of them was commenced during the inter-war slump, thus indicating the confidence with which the company regarded the future. The first stage of the high power laboratory was completed in 1938, when it was decided to proceed with the building of a second stage, but the war, alas, stopped the work from going beyond the building foundations. In 1945 the work was resumed, and from the brief details given in this issue it will be appreciated that the buildings have lost nothing by the delay. Among the investigations being undertaken at the laboratories are researches concerned with nuclear physics, facilities for which include electrostatic generators up to 5 MEV and synchrotrons which will subsequently produce 140 MEV. Reference to this work makes clear how closely allied to physics the electrical industry has become, and the fact that the latest of the industry's high tension laboratories includes among its departments equipment for developing atomic research, indicates in some measure the lines upon which the industry will develop in the years to come.

Tribute to Lord Rutherford

APROPOS of the observations on nuclear physics in the preceding paragraph, it is interesting to note that ceremonies were held in Paris last week, on the occasion of the tenth anniversary of the death of Lord RUTHERFORD. The President of the Republic gave a reception at the Elysée Palace and in the amphitheatre of the Sorbonne a congress was held at which the achievements of that great scientist were recalled by, among others, Prof. NIELS BOHR, of Copenhagen University, Prof. MARCUS OLIPHANT, of Birmingham University, Prof. HAROLD UREY, of Chicago University, and Prof. JOLIOT-CURIE. A similar but more informal ceremony was held in the College de France, the principal centre for physical research in the country.

The Public and the Telephone

THERE was a time when the Post Office by means of Telephone Weeks and other devices, invited the public to become more telephone-minded, and but for the austerity conditions which exist to-day, it would no doubt continue to do so. During the war years a long waiting list for telephone installations was built-up, possibly assisted by the pre-war sales drives, and the Post Office have since 1945 been trying to catch up, despite the material difficulties put in the way by other Government departments. There are to-day nearly 4.5 million telephones in use in this country as compared with 2.5 million in 1936, of which the record number of 832 101 were installed during the year ended March 31 last, as against 365 114 in 1936. The telephone service is still a long way from being free of criticism, but with some knowledge of the difficulties which the Post Office telephone engineer has to overcome with respect to materials, the wonder is that the rate of installation is as high as it is.

U.S. Load Spreading ?

THAT the doubts, expressed in these columns two months ago, that the U.S. supply industry might not be able to meet the demand during the coming winter did not err on the side of pessimism, is indicated by recent reports from across the Atlantic. The total production of electricity from all sources during the current year is expected to reach 300 000 million units, over double the figure for 1937, the best pre-war year, and the "Financial Times" New York correspondent reports that already some undertakings are asking industrial and commercial consumers to shift operations so as to take power at off-peak

times. Many undertakings are in the habit of selling large blocks of power at cheap rates on "discontinuable" tariffs which can be cut off when necessary, and this arrangement provides a useful means of shedding load. These embarrassments, however, are likely to be short-lived. Facilities for interconnecting major regional generating groups permit surplus capacity to be used for relieving tight spots to a greater extent than was possible before the war, and, as the President of the Edison Electric Institute has pointed out in a recent article, an expansion programme now under way provides for new construction amounting to 16 000 000 kW during the next five years, of which 12 000 000 kW, at a cost of $5 000 000 000, will be sponsored by privately operated companies.

Understatement

THERE has appeared in the national Press this week, a Government announcement with respect to load spreading and how the domestic consumer can assist in avoiding load shedding. In an attempt to explain the need for economy in electricity consumption, it is pointed out in the statement that "it is not a matter of not enough coal, but of not enough power houses . . . and there won't be enough of them for four or five years." In view of cuts which may be applied to the station building programmes from 1950 onwards, this last sentence is both misleading and unfair to the industry, and must be corrected without delay. By 1952—that is, five years from now—the shortage of generating capacity may well be an even greater problem than now, for the conservative estimate of power station needs in the years 1951/52 may be cut by 923 MW in compliance with the restriction imposed by the Minister for Economic Affairs on capital construction; cut, let it be remembered, not by the Central Board, but by the Government. As we have already pointed out in these columns, any shortcomings in power station capacity from 1950 onwards will be credited to the British Electricity Authority, when in fact the reasons for them are being established even before that Authority has taken over. We have said before, and we say again, that, in order to save the good name of electricity from suffering discredit as a result of Government policy, every opportunity must be taken to publicise the industry's dislike of the position and to negative such understatements as the Government has announced in the Press this week.

Coal Utilisation Interim Report

A FUEL Utilisation Sub-Committee sent to the Minister of Fuel last June an interim report on coal utilisation with, we presume, the intention of assisting in some way the solution of the fuel problem this winter. Since the preparation of the report the economic background has changed and the Minister's considered observations on it at so late a date as October 31 and made known to the Press on Monday cannot, therefore, be regarded as of much value. The problems associated with fuels of all types became urgent as long ago as the summer of 1946 and we were told at the time of the crisis last February that their solution would receive immediate attention. In the weeks following the crisis, conferences were held, committees were formed and officialdom appeared to be very busy. With the coming of summer the official wheels slowed down, however, and the issuing of a reply at the end of October to something received in June, is an example of the carefree manner in which the Ministry of Fuel appears to regard its responsibilities. The Government is calling for increased effort in all branches of industry, but, we ask, what of its own Departments?

Railway Electrification

THE I.E.E. meeting last week, at which the paper on the electrification of the Southern Railway was read, was interesting from many points of view. The paper was a most comprehensive description of the complete scheme, and among other things, gave an account of the working of goods sidings by Diesel-electric locomotives. The audience was representative of a large section of the railway world, and in conversation, both before and after the meeting, it was manifest that considerable interest is being shown in Diesel-electric operation. The performance of the shunting and main line units which the Southern have at present under construction will be followed with critical attention, not only in this country, but overseas.

Portrait—Philip R. Coursey

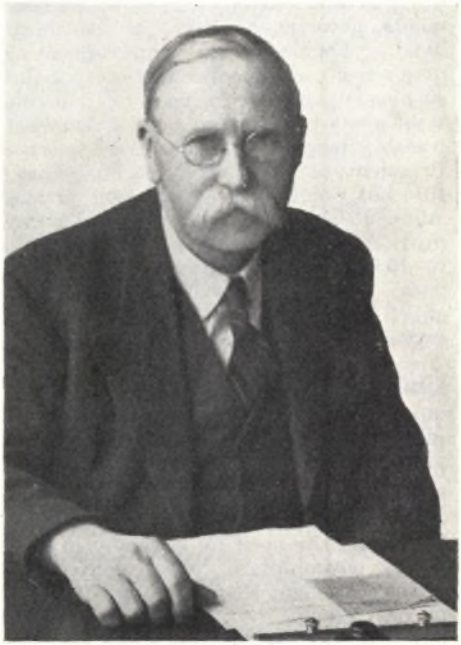
THE evolution of the condenser from the Leyden jar in use prior to the 1914 war to its present forms, owes not a little to the researches of Philip R. Coursey, who has been associated with this branch of the radio components industry since 1912. The same period has seen the expansion of the Dubilier Condenser Co.—which he joined as a consultant on its foundation in 1912 and of which he is now technical director—to its present position of importance in the industry.

A Londoner, born in 1892, Mr. Coursey was educated at Tollington School, the Northern Polytechnic Institute and University College, where he gained first prizes in electrical engineering in 1910-11 and 1911-12, and first prize in mechanical engineering in 1912. He took B.Sc. (Engineering) with first class honours in 1913. His interest in what was later to become his special subject—power factor and dielectrics—had begun while he was still a student, and he worked on the subject during his period of post-graduate research, subsequently adding to this investigations on crystal detectors and the radio-frequency magnetic properties of iron. As lecture assistant to Prof. J. A. Fleming (subsequently Sir Ambrose Fleming) he designed, constructed and demonstrated much of the special electrical equipment for Fleming's Royal Institution lectures.

Like that of many other radio engineers of his generation, Coursey's war service was in the Royal Navy, and he held several important appointments as an inspector of wireless telegraphy equipment. During a period as Honorary Secretary of the Radio Society of Great Britain, he did much to demonstrate the practicability of short-wave long distance transmission.

In 1919, Coursey became research engineer of the Dubilier Condenser Co., but in the same year he left to enter technical journalism, later becoming assistant editor, with Prof. G. W. O. Howe, of "Radio Review." Although he rejoined Dubilier in 1922, his connection with the Press continued for another two years. Coursey was appointed chief engineer of the Dubilier Co. in 1923, holding that position until he joined the board in 1932.

Between the wars, his activities included original work on general electrical engineering problems, as well as condensers, resistors and the other well-known products of his company. An early achievement was the design of the 3½-ton mica condensers for the first Empire wireless station at Rugby. The increasing size of condensers



at this time involved the development of new constructional methods, and, more important, the design of high-frequency terminal insulators to carry the heavy h.f. currents at the high voltages involved. The form of insulator he evolved and patented in 1923 is with minor changes, still the standard type in use throughout the industry to-day. On resistors and condensers, he has in all, been granted some 50 patents.

During the war, Coursey, amongst other activities, designed the self-contained delay line, which features, in various forms, in almost all radar equipments.

An associate member of the I.E.E. since 1919 and a full member since 1926, Mr. Coursey belongs also to the Physical Society (fellow), American Institute of Radio Engineers (associate), Royal Institution (member), Institute of Physics (founder fellow), and the Royal Society or Arts (fellow). He has served on many technical committees of the I.E.E., B.E.A.M.A., etc. One of his six books is now a standard work on electrolytic condensers and he has, since 1912, delivered many papers before professional and scientific bodies, including the I.E.E. Premium Paper, in 1938, on condensers.

Rating of Cables

By "Supervisor"

INCREASED and increasing austerity surrounds every facet of our daily lives, and our standards are becoming progressively lower, applying especially to many manufacturing processes, building and even food production. In one direction, however, we have achieved complete reversion to pre-war standards, but it is a matter of opinion as to whether this is a case for congratulation or for remorse. It now seems clear that we were in far too great a hurry to throw overboard the war emergency relaxations in installation practice, in that if they were necessary during the war years they are even more essential to-day.

1945 AND NOW

The prologue to the recommended relaxations may be quoted for our present information, and it will be noted that they were issued as late as May, 1945, two and a half years ago. This, says "The Council (I.E.E.) consider it desirable to issue, for the guidance of those concerned, the following statement on the extent to which the provisions of the Eleventh Edition of the Regulations for the Electrical Equipment of Buildings may be relaxed during the present war in order to economise in materials, by amending the regulation relating to voltage-drop, by increasing the current ratings of certain cables and by certain other amendments, including provision for the substitution of other types of cable." If we replace the word "war" by "emergency" the above statement appears to fit our present-day circumstances exactly, but its application would be a much simpler matter to-day than it was in 1945.

For instance, the last reference to substitution of other types of cable no longer applies, as the most important substitute, the p.v.c. insulated cable, has been promoted to standard practice and complete respectability with the issue of the March, 1946, Supplement to the Regulations. War emergency grades of v.i.r. cable are no longer necessary, as it is understood that there is no lack of rubber in the country, in fact, for the first time for many years cable makers have stocks on their shelves. How far this is due to increased manufacture, or to lack of steel conduits in which to place the cable, is uncertain, but the surplus applies, apparently, to all types of cable except lead-covered.

The re-introduction of emergency relaxations would therefore mean dealing with voltage drop and an increased rating for cables. Regarding the first of these, close concern with voltage drop in interior wiring was always more or less wishful thinking, as all the time that supply authorities can vary the supply voltage within some 12 V, the saving of a volt on a sub-circuit is an academic consideration that can be forgotten. We are thus reduced to a consideration of increased current rating for cables, and there seems no good and sufficient reason why the war-emergency standard should not be re-introduced. This would automatically eliminate the interior voltage-drop fetish, which, as pointed out above, has never really been effective in practice.

The war emergency relaxations were in use for such a short period that many may have forgotten what the approved cable ratings were. In brief, the smaller cables received definite allocations for increased currents (how these present-day terms stick), as follows: 1/.044 was ignored, and remained at 5 A only, an injustice that could be removed on this occasion, but 3/.029 went up to 10 A. The next size, 3/.036 was allowed to convey 15 A, and 7/.029, 20 A. Above these sizes a general increase of 20 per cent. was allowed for v.i.r. cables, and was also extended to the, then, substitute cable insulated with p.v.c.

SAVING MATERIALS

To all practical users and installers of cables these new ratings did not appear in the light of emergency relaxations, but represented a more realistic loading of our common cables. It can hardly be denied that we have always rated modern cables far too conservatively, and it would cause no undue increase in fires or civil riot if these ratings, called war emergency, were retained as standard. The overall saving in copper alone in the annual output of cables would be well worth while—copper is not only dear but scarce—to say nothing of rubber, which, although not now in short supply is expensive.

There would, however, be a more important economy possible still, represented by the use of smaller steel conduits and the saving of valuable iron and steel. This would appear to be an over-riding consideration at present, and although the cynic may say that there is no steel conduit available anyway, yet there is no

doubt that the industry is absorbing more than it should, by reason of our obsession with conservative cable ratings. If we are to do with fewer clothes and less food, and will thus presumably last for a shorter period, why need we concern ourselves unduly with the possibility of shortening the lives of cables by giving them a little more current to carry? In any case, this is only a possibility, and by no means a probability, and in practice most cables occasionally carry a little more current then they are legally entitled to.

If, however, the powers that be decide that increased cable ratings are not desirable, then may we please have a relaxation in another direction, also designed to save precious steel? That is, may we pack a few more p.v.c. cables into any given size of conduit than the I.E.E. Regulations will at present allow? It will be remembered that p.v.c. unbraided cables, of much smaller outside diameter than v.i.r. braided cables, are treated on a basis of parity with v.i.r. cables for conduit loading, and this is palpably unnecessary. All installation engineers know that up to 50 per cent. more p.v.c. cables will go into steel conduits of average length of run and number of bends, as compared with the approved number of v.i.r. cables, but for some reason the practice is severely frowned on.

ASSISTING EXPORT TRADE

There may be good and sufficient reasons for keeping the number of cables in conduits to a minimum, under normal conditions, but surely our present sorry plight would enable these to be set aside indefinitely. As has been pointed out above, although the increased rating of cables, applying both to cables for installation in conduit and in the form of wiring systems, would save copper but only indirectly save steel, the packing of more cables into conduits would be a wonderful steel saver. More steel and even more cables would become available for export, and the capital cost of our installations considerably reduced.

Both these methods, increased cable loading and increased conduit capacity, need occasion no changes in manufacturing or marketing procedure, no design of new material, and no change in installation technique. All that is necessary to effect these economies is their approval in the proper quarter, and a few strokes of a pen, or a few taps on a typewriter, to secure their introduction. Nor should there be necessity for long consideration as to the merits or demerits of any such proposals, merely the one that if our need in 1945 was great enough to warrant the mild changes, then are our needs to-day any less? Surely, if anything, the saving of precious raw material to-day is a thousand times more necessary than in 1945, and it is difficult to conceive any valid argument against the point.

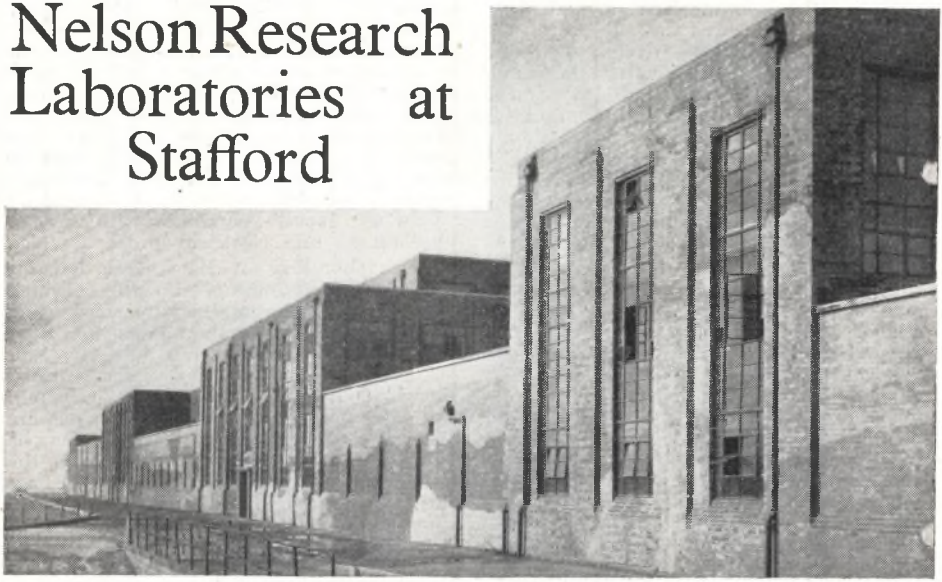
We cannot argue that our installations must remain at a luxury standard when all around us we see the introduction of ever more austere standards, and we should be unpatriotic to even attempt to do so. Coats must be cut according to cloth available, we are told; we cannot reduce the size of the volt or ampere, or lessen their quality, but we can crowd them up a bit.

Electrical Statistics

THE consumption of coal by authorised electricity undertakings during September amounted to 474 000 tons, compared with 409 000 tons in August and 463 000 tons in September last year. The figure for 1938 was 287 000 tons and for 1939, 306 000 tons. Stocks of coal held by authorised electricity undertakings increased from 3 739 000 tons in August to 4 106 000 tons in September, as against 2 108 000 tons in September last year. The amount of electricity generated rose from 2 767 000 000 kWh in August to 3 150 000 000 kWh in September, contrasted with 3 105 000 000 kWh in the corresponding month of 1946, and 2 201 000 000 kWh in 1938. The production of electrical appliances for housing requirements in September was as follows: Cookers, 22.5 thousands; wash-boilers, 16.2 thousands; immersion heaters, 28.2 thousands; and meters, 155.0 thousands. In August 18.7 thousand cookers, 18.2 thousand wash-boilers, 22.2 thousand immersion heaters and 153.9 thousand meters were made. In September last year the figures were: 13.3 thousand cookers, 19.2 thousand wash-boilers, 39.8 thousand immersion heaters and 99.6 thousand meters. Exports of electrical machinery increased from 5.7 thousand tons in August to 6.7 thousand tons in September; wireless receiving sets from 31.0 thousand in August to 35.7 thousands in September, and wireless valves from 288 thousands in August to 390 thousands in September. In 1939 the figures were: electrical machinery, 2.8 thousand tons, wireless sets, 5.5 thousands, valves, 150 thousands.

The value of electrical goods and apparatus, apart from machinery, exported during September was £4 824 000, which was higher than the monthly average for any of the three quarters of this year. The average monthly figures for the first, second and third quarters, respectively, were: £3 417 000, £3 601 000 and £4 665 000. In 1938 the average was £1 134 000.

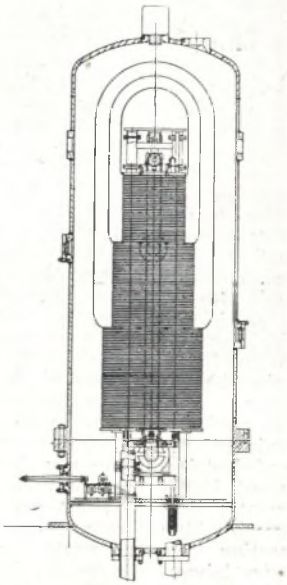
Nelson Research Laboratories at Stafford



THE Nelson Research Laboratories of the English Electric Co., Ltd., were opened at Stafford on November 5 by the President of the Board of Trade, Mr. Harold Wilson, at the invitation of Sir George Nelson, chairman of the company.

The laboratories consist of two main groups. The first adjoins the Stafford Works and its area of 70 000 sq. ft. is divided into sections classified as high power, high voltage, chemistry, insulation, general and vacuum physics, electrical, radiological, electronics and metallurgical. The second group is at Blackheath Lane, near Stafford, where the construction and investigation of special equipment used in nuclear physics research is carried out. As with the first group, the Blackheath Lane laboratory is divided into sections, the classifications being h.v. electrostatic generators, synchrotrons, h.v. impulse equipment for X-rays and accelerating electrons, and radiation.

Construction of the laboratories was commenced during the inter-war slump, and the first stage of the high power and voltage sections was completed in 1938. The work of constructing the chemistry, insulation, physics, electrical and electronics sections, together with their associated services, was then commenced.



Diagrammatic arrangement of 5 MEV electrostatic generator

At that time it was decided to proceed with the erection of a second high power laboratory to increase the short circuit output available, but soon after the outbreak of war this extension was stopped after the foundations had been completed, and permission to continue was not received until 1945. During the war, however, buildings for metallurgical research were added and used in connection with the company's war-time activities. Associated with the laboratories are workshops, a library, a photographic section, and drawing office.

The high power laboratory now comprises two complete installations which may be operated simultaneously, either independently or in parallel, for producing instantaneous short circuits of $2\frac{1}{2}$ million kVA at voltages from 11 kV to 264 kV. All the equipment is of a special nature and it is suggested by the company that this installation may be the largest and most up-to-date of its

kind in the world. The second part of the equipment was the subject of the opening ceremony on November 5, and while it will be appreciated that anything which is subjected to conditions imposed by an electrical fault is investigated in this laboratory, it should be understood that fundamental work is also carried out on the phenomena of the conduction of gases, and a study is made of the factors which influence deionisation in various media, such as in gases of all kinds and vacuum.

The high voltage laboratory is primarily intended for producing voltages such as may be caused by atmospheric lightning disturbances in electrical networks in service and consists of a 3.2 MV generator and transformers for producing up to a million volts at power frequencies. Fundamental work is also carried out on the electrical breakdown phenomena in solid, liquid and gaseous insulation.

The analytical section of the chemical laboratory provides a service to all of the laboratories for analysis, while the organic side deals with the preparation and investigation of special resins, plastics, etc. The insulation laboratory is equipped with a Schering Bridge up to 250 kV, pressure vacuum impregnating plant, extrusion machines, and humidity ovens, while the general physics laboratory is used for the standardisation of all electrical measurements; the study of the magnetic properties in materials and some of the physical properties of both conductors and non-conductors. The vacuum physics laboratory is equipped to manufacture all types of special vacuum apparatus, and deals with all problems of vacuum apparatus such as electronic valves, X-ray tubes, vacuum type apparatus, gas and vapour filled tubes.

The electrical laboratory is an intermediary between the high power and the physics laboratories, and contains equipment for the special measurement of electrical phenomena. With regard to the other laboratories, that classified as radiological, comprising 220 kV and 140 kV X-ray equipment, is used for radiological work and special problems which cannot be conveniently solved in the various X-ray laboratories for routine work in the Stafford and other works of the company.

The electronics laboratories are equipped for light current work of all kinds and are responsible for the introduction of electrical measuring and control equipment in all the other laboratories. Fundamental work is also carried on in connection with high frequency current, and the section is a partner with the vacuum physics laboratory in the application of new vacuum devices.

In the metallurgical laboratory is a section for metallographic investigation, spectrographic analysis and X-ray crystallographic work, and another wherein is a comprehensive range of hot and cold rolling mills, and high frequency furnaces from which all types of special steels can be prepared, from the raw materials to the finally cold rolled product. Included in the metallurgical laboratory is a ceramic section equipped for the preparation of all types of special ceramics with special mechanical and electrical properties.

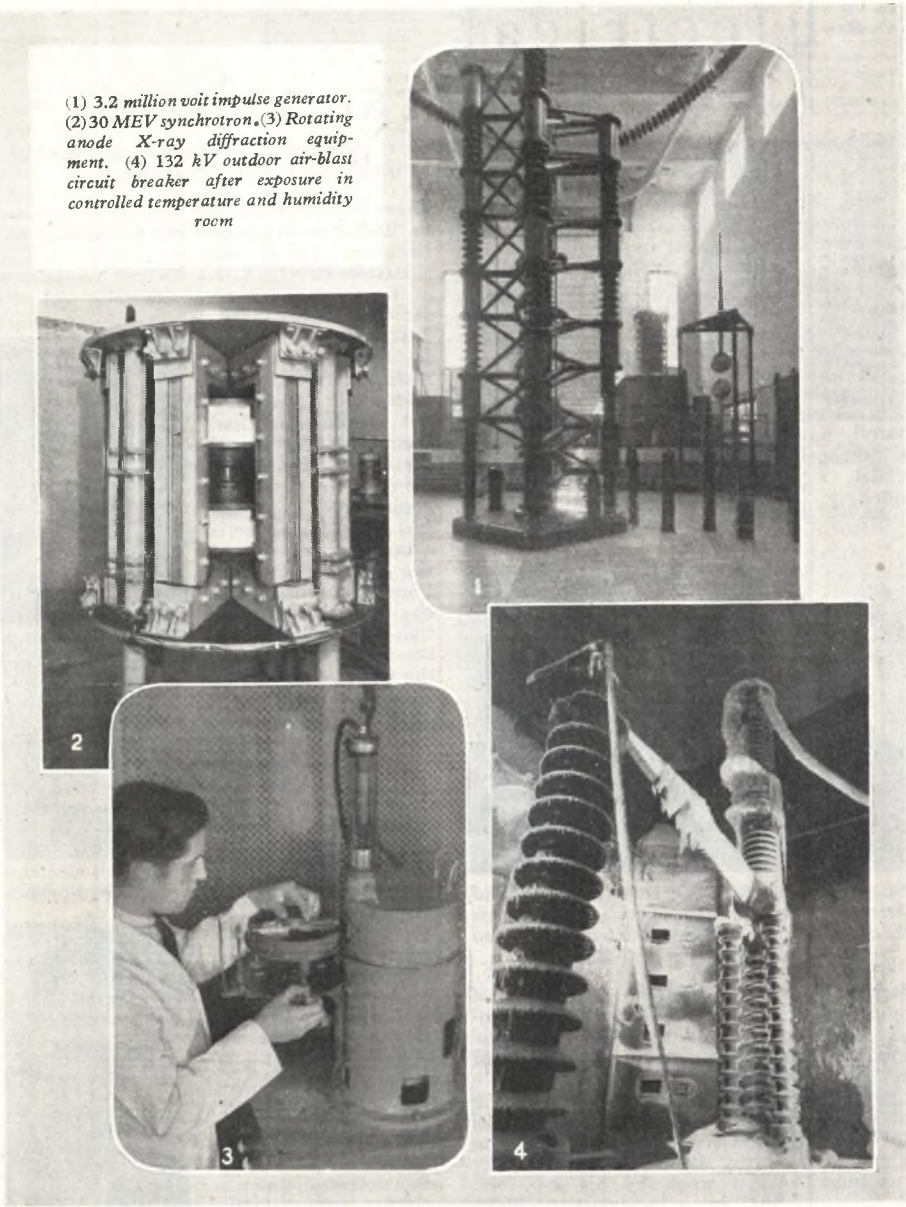
The laboratory at Blackheath Lane is housed in a group of buildings which during the war were used for the testing of aeroplane engines, and have now been converted into laboratories for the construction and investigation of special machines used in nuclear physics research. At present two high voltage machines are being constructed, one for 2 MEV, and the second for 5 MEV, both working on the electrostatic principle. The machines are insulated by compressed nitrogen up to a pressure of 400 lb./sq. in. The first is used for accelerating electrons and the second for accelerating electrons and protons.

There are in the laboratory several synchrotons being developed, the first group of which is for a voltage range of 30 MEV. These will be used by the Atomic Energy Research Establishment at Harwell and the Medical Research Council at Hammersmith and Cambridge for the treatment of cancer. A second type of machine is being built to produce 140 MEV for the Clarendon Laboratory at Oxford.

Impulse equipment for producing heavy current disturbances of 1 million volts is being developed from an invention of one of the members of the laboratories, and will be used for producing pulses of electrons or X-rays of very short duration. A programme of work is being considered with the Medical Research Council on the sterilisation of food.

In order that the high voltage machines may be viewed without danger while they are operating and without the operator being in the same room, a television type of equipment has been developed. This will naturally be of importance in the future, both from the scientific and medical points of view. The Blackheath Lane laboratories are being provided with the services similar to those in the main laboratories, and special attention is being given to the provision of adequate medical facilities so that proper care will be taken of all those working on what are at the moment rather unknown types of equipment.

The cost of building and equipping the laboratories is of the order of £1 000 000, and before leaving the subject it may be



(1) 3.2 *million volt impulse generator.* (2) 30 *MEV synchrotron.* (3) *Rotating anode X-ray diffraction equipment.* (4) 132 *kV outdoor air-blast circuit breaker after exposure in controlled temperature and humidity room*

pointed out that there is close co-operation with the Government Research Establishments of the various Ministries and with the universities in this country. Further, there is close collaboration between these laboratories and the American laboratories of the Westinghouse Corporation in Pittsburgh and the Radio Corporation of America in Princeton.

Among many outstanding contracts seen in progress during our visit to the works were a 60 000 kW, 3 000 r.p.m. hydrogen-cooled alternator for Stourport power station—the corresponding steam turbine is under construction at the Rugby works; and a 15 000 kW, 125 r.p.m. vertical shaft alternator for Waitaki power station, New Zealand.

• Electrical Personalities •

We are always glad to receive from readers news of their social and business activities for publication in this page. Paragraphs should be as brief as possible.

MR. E. WHITLOCK TURNER, vice-chairman of the Electricity Committee, has been elected Mayor of Croydon.

MR. C. PARKER, managing director of London Associated Electricity Undertakings and Central London Electricity, Ltd., has been appointed chairman of these companies in place of the late Lord Lytton.

SIR GEORGE USHER, Mr. F. G. Penny, the Hon. Douglas Vivian and Mr. Ray Armstrong (secretary of the company), have joined the board of directors of Senior Economisers, Ltd.

MR. E. E. HOADLEY, engineer and manager, Maidstone electricity department, accompanied by Mrs. Hoadley and

MR. E. E. HOADLEY, *with* MRS. HOADLEY *and their daughter Margaret, outside Buckingham Palace after* MR. HOADLEY *had been invested with the honour of C.B.E.*

their daughter Margaret, attended at Buckingham Palace on Tuesday, November 4, when he was invested with the honour of a Companion of the Order of the British Empire.

A bronze plaque now identifies the premises, 130, Bold Street, Liverpool, as the birthplace of Dr. S. Z. de Ferranti. The tablet, provided by members of the I.E.E., was unveiled last week by his son, Mr. V. Z. de Ferranti, immediate past-president of the I.E.E., in the presence of members of the I.E.E. Mersey and North Wales Centre.

MR. W. REDMAYNE, chief assistant and distribution engineer, is to retire after 36 years' service with Rotherham electricity department. He is 61 years of age and started his career with a York firm of electrical engineers. He took charge of Rotherham meter department in 1911. Later he became meter superintendent and in 1933 was appointed chief assistant and distribution engineer.

MR. J. F. STANLEY has been appointed an assistant technical director of the British Standards Institution. Mr. Stanley has been with the institution for 25 years and for a number of years has had charge of its electrical section. He has served on several committees of the I.E.E., of which he is a member, including the Wiring Regulations Committee and the Installations Section Committee. He is also a member of the Codes of Practice Committee for the Electrical Equipment of Buildings, a member of the Council of the I.E.S., and vice-chairman of the British Society for International Bibliography.

MR. J. F. STANLEY

MR. D. W. PLAISTOWE has been appointed to the board of the Glacier Metal Co., Ltd., as commercial director. He was formerly commercial manager.

MR. R. C. GOLDING, borough electrical engineer and manager, Southend-on-Sea, has been admitted a member of the Chartered Institute of Secretaries following his success in the final examinations of the institute. He believes that it is necessary for engineers to qualify on the commercial side of the electricity supply industry if they are to retain managerial posts. Mr. Golding, who holds an aircraft pilot's "A" licence, has now taken up gliding, and during a week spent on Dunstable Downs recently he was awarded the " C " certificate of the British Gliding Association.

MR. R. C. GOLDING

MR. J. R. BARDSLEY, of Cryselco, Ltd., has been appointed manager of their Leeds branch in succession to Mr.

Gordon Redmond, who has been transfered to the Birmingham branch, and who took up his new duties on November 1. He takes the place of Mr. Walter La Brum, who has now retired.

In the international $200 000 design-for-progress competition sponsored by the James F. Lincoln Arc-welding Foundation, Cleveland, Ohio, a classificational award of $2 000 goes to three employees of Yarrow and Co.—Mr. A. M. Clark, assistant chief draughtsman; Mr. James Loughray, foreman welder; and Mr. W. Denovan Garrick, in charge of test and X-ray department—co-authors of a paper on containers. The works manager of Stewarts and Lloyds, Mr. Andrew Scott, and the chief designer of the firm, Mr. Ernest M'Minn, are awarded $250 for a paper on functional machinery. Mr. John H. White, a draughtsman with John Brown and Co., gets $100 for his paper on water craft or parts.

MR. S. BRIGG, senior assistant distribution engineer in the Croydon electricity department, has been appointed deputy electrical engineer and manager at Peterborough, in succession to Mr. F. Overstall, who has resigned to take up another appointment. Mr. Brigg, who was educated at Keithley Grammar School, entered the supply industry as a student in the Keithley electricity department. He left there in 1930 to become mains assistant under the Cannock Urban District Council, and in 1933 he was appointed by the West Hampshire Electricity Co., Ltd., as distribution engineer. Mr. Brigg went to Croydon as assistant mains engineer in 1937.

MR. S. BRIGG

MR. I. S. L. CLUNAS, of the London office of C. A. Parsons and Co., Ltd., has been transferred to their Bristol office, 15, Great George Street, Park Street, to assist Mr. J. L. Packard.

Wallasey and Birkenhead Electrical Trades' Golfing Society held its final match of the season a few days ago, when 40 members and friends competed for the Cryselco Challenge Cup and replica. The winner was Mr. R. S. Owen, with a return of 74 off a handicap of six. Mr. F. H. Ashworth secured second prize in Class A (handicaps scratch to 14). Winners in Class B (handicaps 15 and over) were Mr. H. D. Hardwick and Mr. R. M. Gravett. At the hot-pot supper and entertainment which followed the competition, Mr. B. T. Hawkins, who presided, thanked members for their support during the season.

ALD. HENRY COATES, who was Mayor of Watford 1936-7, has been elected for a second term of office. He has been a member of the Town Council since the incorporation of the borough in 1922, and was created a J.P. for Herts. in 1939. He has been chairman of the Electric Light and Power Committee, since 1925. An engineer by profession, and the owner of several patents of electrical devices, Ald. Coates is a member of the I.E.E., and a director of the Watford Electric and Manufacturing Co. To his persistence and foresight is largely due the technical college now in course of erection in Watford. Mrs. Coates is a founder member of the local branch of the E.A.W. She was president during the war years and also chairman of the E.A.W. knitting circle.

ALD. H. COATES

MR. J. S. WOODROW, managing director of the Pulsometer Engineering Co., Ltd., has been elected a member of the Reading Town Council.

MR. FRANK HODGES, formerly general secretary of the Miners' Federation and a member of the Central Electricity Board since 1927, left £132 959 (net £122 344). Duty paid, £42 685.

Obituary

AIR COMDRE. H. LEEDHAM, managing director of Ericsson Telephones, Ltd., on November 5. He participated in pioneer research on radio valves at the Royal Naval College, Greenwich, where he was a lecturer, and was head of the Radio Division of the Royal Aircraft Establishment, Farnborough, when the first radio-controlled aircraft was evolved. In 1935 he was transferred to the Air Ministry as Assistant Director of Research and Development (Aircraft Instruments) and during 1937-9 was Deputy Director of Radio

AIR COMMODORE HUGH LEEDHAM

Research and Development. From 1940 to 1943, Air Commodore Leedham was Director of Radio Production, M.A.P. He was also the first chairman of the Inter-Services Valve Production Committee and of the Inter-Services Components Committee. He was awarded the O.B.E. in 1929 and the C.B. for services in connection with radiolocation in 1942. From 1943 to 1945 he was Director of Radio Research and Development, M.A.P., and retired to become managing director of Ericsson Telephones, Ltd., on September 1, 1945.

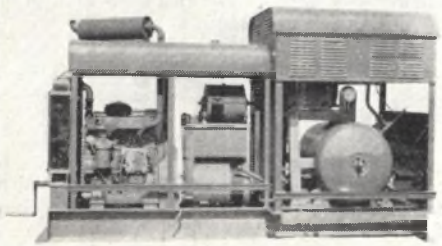
MR. E. W. H. THOMAS, works manager for Richardson, Westgarth and Co., Ltd., Hartlepool, until his retirement 18 years ago, aged 79 years. He joined the firm in 1910.

MR. ERNEST WILLIAM HYNES, for 38 years a member of the staff of the Marconi International Marine Communications Co., Ltd., on November 5, aged 59 years. He joined the Marconi Company in 1909 as a radio officer, was transferred to the technical manager's department, head office, in 1912, and in 1925 became chief of stores. At the time of his death he held the position of service manager (fitting and stores).

Diesel-Driven Welding-Compressor Set

A DIESEL driven welding-compressor equipment, designed originally by Murex Welding Processes, Ltd., for the repair of machinery used in open-cast coal operations, has facilities for electric arc-welding, portable inspection and floodlights and portable electric and pneumatic machine tools.

The unit consists of a four-cylinder Diesel engine driving a 9 kW "Murex" patent drooping characteristic d.c. welding generator, a 2 kW 220 V auxiliary d.c. generator and a two-stage air compressor. This latter component is coupled to the generator shaft through a dry plate disc clutch, which enables the operator to disconnect the air compressor, when not required, by the simple movement of a lever.



The Murex combined electric arc-welding and compressor equipment, complete with auxiliary generator

The Diesel engine develops 34 H.P. at full load at a speed of 1 500 r.p.m. and consumes 0.39 pint fuel oil per B.H.P. It is cold-starting without the aid of preheating, ignition cartridges or glow plugs. The generator is self-stabilising, the output being variable by combined series and field control from 15-300 A at 30 V. The open circuit voltage is approximately 70.

Mounted in a cabinet built over the generator, the controls include a 30-stud regulator for fine current adjustment over each range, ammeter, voltmeter, and one negative and three positive welding terminals. The auxiliary generator has an output of 9 A and its controls include a double-pole switch-fuse, one power socket for tools and another for lighting circuits.

Delivering 31 cu. ft. of free air per min. at 100 lb. per sq. in., the compressor is fitted with an air intake filter, constant speed unloader, and an air-cooled inter-stage cooler. It is connected to the air receiver, which is a welded container 36 in. long × 24 in. dia., fitted with two hand holes and covers, safety valve, pressure gauge, drain valve and two 1 in. outlet valves.

The whole unit is mounted in line on a substantial bed-plate of welded and fabricated design, and the complete assembly, including radiator, fan, silencer and 10 gall. fuel tank, is covered with a canopy with six sliding doors.

Whilst the unit illustrated was built for transportation in a lorry, it could equally well be mounted on a high speed, low centre of gravity, pneumatic-tyred trailer with Ackermann steering, parking and over-run brakes. Other optional equipment would include fuel level indicator, re-fuelling pump, tool boxes, cable reels, storage bins, etc. The makers state that the design complies with all relevant B.S. specifications and electrical regulations.

B.E.A. Salaries

UNDER this heading, on page 1375 in our last issue, it was inadvertently stated that Mr. J. Hacking, as a full-time member of the British Electricity Authority, would receive a salary of £3500 per annum. Mr. Hacking is, of course, one of the two deputy chairmen of the Authority, and will, therefore, receive a salary of £5 000 per annum.

THE SOUTHERN RAILWAY

I.E.E. DISCUSSION ON ELECTRIC TRACTION WORKING

THERE was given in our last issue a brief summary of the paper "Electric Traction on the Southern Railway," by Mr. C. M. Cock, which was read before the I.E.E. on November 6, and below is given an abstract of the discussion which followed.

MR. JOHN ELLIOT (general manager, Southern Railway) said that railway management was interested in electrification only as a means of moving trains over its tracks. The Southern had to move in and out of London in 2½ hours in the morning and 2½ hours in the evening, just over half a million people, and they were convinced that electrification had no equal for their problem. It meant rapid movement and punctuality. Electrification also made it possible to provide services on the "even time" system every so many minutes. With all the equipment available, it was possible in non-peak hours to run short trains continually up and down the lines, thus building up a very considerable business and giving the public good service. He was confident that a State-owned railway system could and should work. Given the necessary allocation of steel and other raw materials to make it possible to carry out in the next ten years the scheme of electrification which would completely eliminate steam working east of the London-Portsmouth line, the Southern section of the State Railways should be able to cope with the developments which ought to be introduced in this closely-packed part of the country.

SIR JOHN KENNEDY (Electricity Commission) expressed regret that originally on the South Western system, the 50-cycle system was not adopted; the fact that it had not been, meant that during the war considerable difficulties might have arisen in ensuring that supplies were available to the railway in case of accidents. It also seemed unfortunate now, he said, that a higher voltage, such as 1 500, which was recommended by the Kennedy Committee in 1920, was not adopted when the South Eastern section was electrified, because future development was handicapped by the conductor rail system. With 1 500 V the goods traffic could be worked by electricity without any trouble from breaks in the supply of current. The Southern Railway were not at the moment using their capital investment in electrification to the best advantage, because 25 per cent. of their traffic (the goods traffic) was still steam-hauled. If the goods traffic was electrically hauled it would be handled mainly at night, with no addition to the generating plant capacity required, nor to the bulk supplies bought; the average cost per unit of electricity used would thus be very much reduced. In that connection, it was interesting that the Southern Railway paid 0.48d. per unit for the grid supply, as compared with 0.475d. given in the Weir report.

MR. H. W. H. RICHARDS (L.N.E.R.) mentioned that on the North Tyneside line, where the average distance between stations was about one mile, increasing the scheduled speed from 20 to 23½ m.p.h. meant an increase in the cost of energy of about 15 per cent., while to go up to 25 m.p.h. would mean an increase of 35 per cent. On a suburban electrification the cost of the energy supply (including sub-station maintenance and depreciation, the conductor system, etc.) amounted to about half the total train-mile cost, so that obviously the cost of energy and scheduled speed were most important. On suburban services the train heating might represent 16 per cent. of the maximum demand in the winter, and lighting about 3 per cent., so that only about 80 per cent. of the maximum demand was for traction. The Southern Railway electric locomotive was of 1 470 H.P., and weighed 101 tons, but the latest Swiss double-bogie locomotive weighed only 79 tons and developed just under 4 000 H.P.

MR. F. A. HARPER (L.M.S.) said that on the main line of the L.M.S., if freight as well as passenger services were electrically hauled, they would expect a load factor of at least 70 per cent. On the Southern, with its smaller amount of goods traffic, the figure would probably be about 50 per cent., which was the figure given in the Weir report for the whole of the British railways. Apparently, the electrical gear on the Southern, apart from the control gear, was stripped after about 100 000 miles. On the L.M.S. there were motors which had run over 300 000 miles with only minor attention. Their normal period for inspection and light attention for control gear was 50 days, but as an experiment they had left an equipment running for 500 days without attention, and it still showed no sign of trouble.

MR. R. BROOKS (Metropolitan-Vickers Electrical Co., Ltd.), emphasising the reliability of electric railway equipment, pointed out that from the figures given in the paper it appeared that only 0.2 per cent. of the delays on the railways were due to the electrical equipment of the trains.

MR. H. H. SWIFT (L.N.E.R.), commenting on the proposed introduction of a 275-H.P. traction motor weighing only 1.92 tons, pointed out that this meant only 15.4 lb./H.P., and was approaching the weight of an a.c. traction motor, a step in the right direction.

MR. F. WHYMAN (Metropolitan-Vickers Electrical Co., Ltd.) said that there was so much experience throughout the world that d.c. axle-hung, nose-suspended motors were satisfactory, even at the highest speeds, that he was surprised to find that the Southern contemplated going back to resilient drives. Resilient drives, he thought, owed their origin to the shortcomings of a.c. traction, and to add their complication to the simplicity of a d.c. locomotive, would not be beneficial.

MR. C. M. COCK, replying to the discussion, said the 25-cycle system was originally adopted because at the time, the rotary converter was the only satisfactory way of coping with the traction conditions; it was, however, intended to make an alteration as soon as possible. He agreed that it was time that goods traffic was hauled electrically, and that was under active consideration. A lightweight locomotive for freight haulage was not favoured because it was necessary to deal with loose-coupled goods trains. With electric traction for goods trains the railway would expect a load factor of about 50 per cent. For normal goods service the energy consumption of the locomotive might be as low as 35 Wh per ton-mile, while for the purely suburban service it might go up to 85-90.

Magnetic Coolant Clarifier

USERS of grinding, honing or lapping machines, or any machine producing fine swarf, are well aware that the highest class of surface finish of which such machines are capable, cannot be obtained so long as grinding swarf and broken abrasive grit are allowed to circulate in the coolant.

Many of these machines, however, are inadequately tanked, nor are the tanks cleaned sufficiently or often enough, and to obtain a finish of the best quality it may be necessary to equip the machine with some additional form of coolant cleaning device which will automatically and continuously remove the contamination.

By acquiring the exclusive manufacturing and marketing rights of the Scrivener clarifier, announce Philips Industrial (Philips Electrical, Ltd.), the company has included in its range of magnetic filters a model of greater capacity for bulk sludge removal than has hitherto been available, and one which is certain, they claim, to solve the problem of heavily contaminated coolant, especially where ferrous swarf is concerned.

Simple in operation, the clarifier consists of a comparatively small distributor tank to which the coolant is fed through a restricted channel past a rotating disc. This disc carries a number of powerful permanent magnets and revolves slowly, the ferrous matter and grit contained in the used coolant as it passes through the restricted channel thus being collected by the magnets and brought round by the revolution of the disc (which works in an upright position) to where wiper arms remove the particles and deposit them in a separate discharge channel. The contaminating particles are then transferred to a bucket or other receptacle. The cleaned coolant is then pumped back into the machine. A small electric motor serves to drive the disc and wiper arms. The whole action of the magnetic clarifier, which requires no attention or supervision while running, is entirely automatic.

Swedish Developments

ACCORDING to a recent report from Sweden, the new 260 000 kW hydro-electric station now under construction at the Harspranget Waterfall north of the Arctic Circle (referred to in THE ELECTRICIAN of October 10, 1947) will be equipped with three 105 000 kVA generators. Now being designed at the Swedish A.S.E.A. works, these units, it is claimed, will be the biggest water-driven generators so far made in Europe and will be surpassed only by the 108 000 kVA sets at Grand Coulee in the U.S.A. The station diameter of each set will be 32 ft. and the total weight 800 tons; the machines will run at 167 r.p.m. Because of transportation difficulties, the 10 ton rings, the biggest components, will be assembled on the spot. Scheduled to start operating in 1950, the Harspranget plant will have a maximum output of 6 250 000 kWh a day.

A grant of £35 000 has recently been made by the Swedish Government for atomic energy research. The sum has been distributed to several scientists and institutions working on nuclear physics. The largest single grant, of £14 000, is for a cyclotron now being built at Upsala.

Answers to Technical Questions

We produce below the answers to a selection of questions which have been sent to us by readers. The co-operation of students and others in making this feature one of general interest is invited

How can the tides be used to produce electrical energy ?

Various mechanical tide mills have been devised in the past for harnessing the energy of the tides, but the only practicable scheme for using them for the generation of electrical energy is to impound the water in a basin at high tide and allow it to run out at low tide through water turbines driving electric generators.

A plan view of a simple scheme of this nature is shown in Fig. 1, the barrage having incorporated in it some large sluice gates for admitting the water and a turbine house through which the water runs away.

A diagram showing the operation of such a scheme is given in Fig. 2, in which the full line represents the height of the tide plotted to a base of time for a period of just over 12 hours. At time A the large sluice gates are open and water is allowed to flow from the sea into the basin, the height of the water in the basin being represented by the dotted line. The water in the basin thus rises until high tide (point B), when the sluice gates are closed and the tide begins to recede. As soon as the tide has fallen to a level a few feet below that of the water in the basin the turbine valves are opened and operation commences (point C). The level of the water in the basin drops slowly, but the difference in head between the basin and the sea, i.e., the head at the turbines, increases to a maximum at D and then decreases again until at point

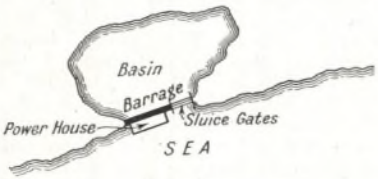


Fig. 1.—Layout of tidal power arrangement

E, the turbine valves are closed and operation ceases for this tide. At A the main sluice gates are again opened and the cycle is repeated. It is thus seen that generation can only take place during about two-thirds of the day—furthermore, the time at which generation occurs will be different for each day. Provided the tidal power station is feeding into a relatively large network which can absorb its total power at any time, this is not a serious feature. If, however, a continuous power output is required, a pumped storage scheme can in some cases be employed or a more complicated lay-out involving two or three basins can be utilised.

An obvious necessity for a tidal power scheme is a large tide range—the Bay of

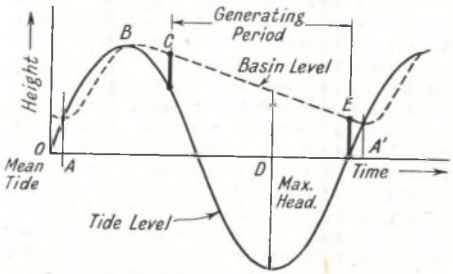


Fig. 2.—Operation of tidal power scheme

Fundy in N. America has a range of 50 ft. which is the largest in the world, and schemes have been proposed for this site. In this country the largest ranges are on the West coast with a maximum of about 30 ft. in the Severn Estuary, for which comprehensive plans for an 800 MW installation have been prepared. Schemes in France, South America and other places have been suggested, but in all cases the high cost has prevented their construction. The increasing cost of coal and the difficulty of obtaining it are, however, rendering such schemes more favourable from the economic viewpoint.—E. O. T.

The A.S.E.E.

A PAPER on the electrical equipment of a modern hospital (a summary of which appeared in our issue of March 14, 1947) was delivered by Mr. J. Tomlinson at a recent meeting of the Association of Supervising Electrical Engineers at the Electricity Showrooms, Nottingham. Mr. M. Wadeson, city electrical engineer, took the chair. After a lively discussion, in the course of which the author was asked many questions about the dangers of static electricity in operating theatres, a vote of thanks was proposed by Mr. J. F. Bridge, a member of the executive council, and seconded by Mr. W L. Henderson.

Electricity Generation in 1945

COMMISSIONERS' TWENTY-FIRST ANNUAL REPORT

COVERING the period April 1, 1945, to March 31, 1946, the twenty-first report of the Electricity Commissioners was published this week (H.M.S.O., 2s. 6d. net). At March 31, 1946, states the report, there was a total of 568 authorised undertakers, of which 62 were in Scotland, and 506 in England and Wales. These comprised the North of Scotland Hydro-Electric Board, three J.E.A.'s, five joint boards, 365 local authorities and 194 company undertakings. Inclusive of the C.E.B., and allowing for the cases of three companies with undertakings both in England and Scotland, the number of separate undertakings was 566, a net decrease of four from the preceding year.

Counting selected stations with separate sections as single stations, 197 public authority undertakings generated 20 702 431 978 units, and 149 company undertakings generated 16 582 166 014 units, during the year ending December 31, 1945, making the total units generated from 346 stations 37 284 597 992. For this, 22 821 088 tons of coal and coke breeze and 19 741 tons of oil fuel were consumed. The output by authorised undertakers during the calendar year 1945 thus showed a decrease of over 1 078 million units, or 2.8 per cent., on the figures for 1944. The amount of coal or coke consumed showed a similar decrease of 626 853 tons, or 2.7 per cent.

Dealing with the sources of generation, the report states that 96.81 per cent. of the grand total of units generated were derived from steam plant, and 3.07 per cent. from water power, the remainder coming from waste heat, oil engine or gas engine sources. The average number of units generated per ton of coal or coke consumed amounted to 1 578 units, as compared with 1 582 in 1944.

In an analysis of generating stations in accordance with output for the calendar year 1945, it is shown that the largest output (31.54 per cent.) came from stations generating between 200 million and 500 million units during the year. There were 38 stations in this group, comprising 27 local authorities and 11 company undertakers. Of stations generating over 1 000 million units during the year, three were operated by companies and three by local authorities. Although comprising only 1.7 per cent. of the total number of selected stations, these six plants were responsible for 23.75 per cent. of the annual output. Stations generating less than one million units each during the year comprised 34.1 per cent. of the total, while 42 per cent. generated more than one million but under 100 million units each. The remaining 83 stations with individual outputs of 100 million units or over were collectively responsible for an output of 34 533 million units, or 92.63 per cent. of the total.

Turning to coal supplies, the report points out that while the average weekly consumption in the June, September and December quarters of 1945 showed a decrease as compared with the corresponding figures for 1944, there was an increase in the March quarter of 1946. The average weekly deliveries in each quarter of 1945-46 were less than in the corresponding quarters of 1944-45, and both the minimum and maximum coal stocks in each quarter showed a substantial reduction.

At December 31, 1945, there were 142 selected stations in operation, an increase of one over the previous year. From a total output of 37 285 million units generated in 1945 at the stations owned or leased by authorised undertakings, 96 per cent. were generated at selected stations, non-selected stations of authorised undertakers, numbering 206, being responsible in 1945 for 1 509 million units.

A table analysing generation by areas shows that only in S.E. England and S.W. England and S. Wales were there increases in outputs over 1944. In the E. England area there was a drop of 20 per cent. in units generated and, as already stated, the decrease over the whole country amounted to 2.81 per cent.

The aggregate capacity of new plant sanctioned by the Commissioners during the year 1945-46 for one new station and for extensions amounted to 917 475 kW, as compared with 1 179 400 kW in the preceding year. The grand total of generating plant sanctioned between January, 1920, and March 31, 1946, was 14 276 132 kW, of which 8 867 880 kW was in the stations of public authority undertakers. Exclusive of plant taken out of commission or obsolete, the total amount of generating plant installed at the end of March, 1946, was about 12 million kW. The one new station for which a consent was given during the year was Bromborough (Birkenhead Corporation), for which an initial installation of 100 000 kW was sanctioned. The remaining 817 475 kW of new plant sanctioned was for the stations of 24 authorised undertakers.

Units sold to consumers during the calendar year 1945 showed a decrease of 3.5 per cent. over 1944 at 30 911 million.

Electricity Supply

Reading.—A scheme for strengthening the 11 kV ring main system has been approved by the Electricity Committee. The cost of carrying out the proposals is estimated at £50 444.

Islington.—Recently approved at a Council meeting were proposals to set up an inquiry bureau adjacent to the records office and to provide facilities for showing films in the demonstration theatre. A tender for the supply of 200 transformers from the British Electric Transformer Co., Ltd., at an approximate cost of £47 000, was accepted.

Brighton.—The acceptance of the following tenders has been recommended by the Electricity Committee: Richardsons, Westgarth and Co., Ltd., for generating plant at the Southwick "B" station, £1 292 128; Brush Electrical Engineering Co., Ltd., for twenty 500 kVA transformers, £11 500; Siemens Bros. and Co., Ltd., for 33 kV cables, £63 791.

Manchester.—Directions have been received from the Central Electricity Board for the construction of a further section of the Carrington generating station by the installation, ready for commercial operation by July, 1951, of one 60 000 kW (M.C.R.) turbo-alternator, two 360 000 lbs. per hr. boiler units, ancillary plant and the necessary buildings, cooling tower and civil engineering works.

Warrington.—The Electricity Committee has recommended acceptance of a number of tenders in connection with the No. 4 extension of the generating station. These include: one 20 000 kW turbo-alternator, with surface condensing plant, boiler feed pump, step-up transformer and one additional high-pressure feed heater (English Electric Co., Ltd.); one 200 000 lbs. per hr. boiler unit, auxiliaries, fans, ducting, grit arrestors, piping, extensions to coal conveyor, air pre-heaters, evaporators, etc. (Simon Carves, Ltd.); 33 kV switchgear (Ferguson, Pailin, Ltd.); boiler control board, additional air preheater panels and phase failure protection for fan and feed pump motors (Brookhirst Switchgear, Ltd.); high tension cables (B.I. Callender's Cables, Ltd.); and fire protection equipment (Mather and Platt, Ltd.).

Liverpool.—Sixty-nine tramcars were destroyed by a fire which wrecked the Green Lane depôt on Friday last. The damage is estimated at £300 000 and the wrecked tramcars represent 88 per cent. of the city's tramway vehicles. The fire started in the early morning in one of the modern cars. In the hope of saving the others an attempt was made to drive them into the street, but one became derailed at the shed entrance and blocked the way against further movement. Mr. W. G. Marks, general manager of the department, said that the 69 cars must be regarded as a total loss. When the fire started there were 88 in the depôt. Five were slightly damaged and 14 were removed to safety.

Scotland.—The North of Scotland Hydro-Electric Board projects at Glen Lussa, Argyllshire (constructional scheme No. 8), and at Storr Lochs, Skye (constructional scheme No. 13), have been confirmed by the Secretary of State for Scotland. The Glen Lussa project, which it is estimated will cost £480 000, will have an estimated annual output of 8½ million units. New transmission lines, taking a supply to both sides of the Kintyre peninsula between Campbeltown and Tarbet, will link the new hydro station to the existing Diesel station at Campbeltown and with the Tarbet-Ardrishaig system. A 2 400 kW station, with an average output of 5½ million units, will be built on the sea-shore as part of the Storr Lochs scheme. The electricity produced will be distributed by the Board's distribution scheme for Skye (confirmed last year) and will eventually make a supply available to 70 per cent. of the 10 500 people on the island.

Douglas, I.o.M.—A maximum load on the generators of 6 880 kW, to meet which was available a total installed plant capacity of 11 545 kW, is recorded in the annual report for the year ended March 31, 1947, prepared by the Borough Electrical Engineer and Manager (Mr. Bertram Kelly). The maximum load in the previous year was 6 612 kW. With 6 864 consumers connected, compared with 6 693, the units sold for private supplies amounted to 1 515 per consumer, or 416 units per head of population. The load factor of the undertaking was 42.95 per cent., compared with 41.43 per cent. Units generated during the year amounted to 25 885-619—25 854 480 at Pulrose and 31 130 at the North Quay station—an increase of 1 891 565 units, or 7.9 per cent. on the previous year. The supplies given to the Electricity Board for distribution outside the Douglas area amounted to 11 243 185 units, or 43.43 per cent. of the output, the Electricity Board load representing 43.08 per cent. of the maximum

demand. Revenue income for the year totalled £180 035 and expenditure £142 132, leaving a gross profit of £37 903. After payments to the loans fund, etc., a balance of £4 380 was carried to reserve.

Cheltenham.—By 12 votes to 11, a proposal by the Electricity Committee that premises in the main shopping centre be used for electricity showrooms was defeated at a recent meeting of the Borough Council, on the grounds that in view of nationalisation the electricity department should "die gracefully," that any electrical needs were catered for by private traders and that in any case the present time was not propitious for encouraging the use of electrical apparatus. The showrooms, which are at present housed in the Municipal Offices, will instead be moved to the administrative offices, a considerable distance from the shopping centre. As a result of representations from industrial consumers, the Electricity Committee has recommended that where supply is taken under the two-part tariff, the maximum demand before 8 a.m. and after 6 p.m. shall be ignored for the purpose of computing charges. This will pass on to industry the benefits which the Corporation may obtain in reduced bulk supply charges.

Oldham.—Units generated during the year ended March 31, 1947, totalled 121 946 600, compared with 109 980 600 in the previous year, according to the annual report of the undertaking, prepared by Mr. E. Binns, chief engineer and manager. Imports from the C.E.B. amounted to 36 323 000 units (34 805 000) and exports to 8 537 000 (15 642 155) units, and the total units to the undertaking were 143 639 530, compared with 123 804 015 units in the previous year. Total sales were 130 536 604 units, compared with 112 432 492. The maximum load on the undertaking increased by 9 400 kW to 51 219 kW, the highest figure so far recorded, and the total station capacity remained unchanged at 61 500 kW. Commenting on the year's results, Mr. Binns states that power sales reached 83 million units which, compared with 56 millions for the year 1939, was indicative of the extent to which industrial electrification was taking place. Even more extensive progress would have been shown if it were not for the difficulty in obtaining electric motors and other equipment required by the mills to enable the change from steam to electric driving to proceed.

In Parliament

Generating Plant Repairs.—Manufacturers of generating plant have been informed that repair facilities exist in the Royal Dockyards, and have already made certain use of them. (Mr. JOHN FREEMAN, Ministry of Fuel and Power.)

Machinery Priorities.—Priority is still being given to machinery for the development of fuel and power resources and for atomic energy, but the existing priority system is under review. (Sir STAFFORD CRIPPS, Minister for Economic Affairs.)

Stretford Economy Scheme. — The Stretford Electricity Board's plan to give a rebate to consumers, equal in value to the units saved, who reduce their consumption to at least ten per cent. below the level of last year (THE ELECTRICIAN, October 3, 1947, p. 1008) has been examined by the Ministry of Fuel and Power. If the scheme is successful, the Ministry may consider its extension to other parts of the country. (Mr. H. GAITSKELL, Minister of Fuel and Power.)

Contracts Open

WE give below the latest information regarding contracts for which tenders are invited. In the case of overseas contracts, particulars are to be had from the Board of Trade, Millbank, London, S.W.1 (corner Horseferry Road), unless otherwise stated:—

Formby, November 17.—Supply and delivery of one 400 kVA transformer and one l.t. oil circuit-breaker. Specification from Electrical Engineer, Council Offices, Formby.

Edinburgh, November 21. — Supply, delivery and erection of an electric passenger/goods lift at Portobello power station. Specifications from the Consulting Engineers, Messrs. Kennedy and Donkin, 12, Caxton Street, London, S.W.1.

Woolwich, December 1.—Supply of meters during year beginning January 1, 1948. Specification from Borough Electrical Engineer, Electric House, Powis Street, Woolwich, S.E.18; deposit, £1 1s.

Woolwich, December 1.—Supply of: (a) meters; (b) h.v. and m.v. cables; (c) transformers; during year beginning January 1, 1948. Specifications from Borough Electrical Engineer, Electric House, Powis Street, Woolwich, S.E.18; deposit, £1 1s. each.

Downpatrick, December 1.—Electrical installations in 76 houses. Specification from County Architect, Irish Street, Downpatrick.

Industrial Information

Telephone Equipment for China

The Chinese Ambassador, Dr. Cheng Tien-Hai, visited the Strowger Works of

The Chinese Ambassador watching spring-tension adjustments being made to telephone relays during his tour of the Strowger Works of Automatic Telephone and Electric Co., Ltd. With him is MR. W. S. VICK, *works manager*

the Automatic Telephone and Electric Co., Ltd., on Monday, November 3. He was accompanied by the Chinese Consul in Liverpool, Mr. M. S. Loh. During his tour of the factory the Ambassador was very impressed by welfare facilities and working conditions and was particularly interested in the scheme by which operatives, working in teams, are paid on the output of the team. Mr. W. S. Vick, works manager, told the Ambassador that the company had manufactured and shipped 8 000 telephone instruments to China on the instructions of U.N.R.R.A., and was at present engaged in producing rural automatic telephone exchanges for use in China.

Electric Coal Vans

The coal van illustrated on this page is mounted on a Metro-Vick 25/30 cwt. battery-electric chassis, the precursor of the battery-electric vehicles now built by Brush Coachwork, Ltd., a subsidiary of the Brush Electrical Engineering Co., Ltd. It is one of three which have been in constant use since 1939, carrying two loads averaging about 35 cwt. The batteries lasted, on an average, for four years before requiring replacement.

Electric coal van in use since 1939

Neasden Power Station

London Transport have saved over 25 000 tons of coal at their Neasden station since last January, when the first of six boilers which are being converted from p.f. to oil burning was brought into use. When the conversion is completed, approximately two-thirds of the station's consumption prior to the start of conversion will be saved.

Export Drive Display

One of the windows on the ground floor of Crown House, Aldwych, London, the

Window display at the head office of the British Thomson-Houston Co., Ltd., showing the part the company is playing in the export drive

head office of the British Thomson-Houston Co., Ltd., is being used for a very effective display showing the part the company is playing in the export drive. A large aerial view of the main works at Rugby is surrounded by illustrations depicting typical products, which are being exported to markets in many parts of the world.

Cheerful Rationing

After stressing the need for economy in the use of electricity in the home, this month's "Cheerful Rationing" card, issued by the E.A.W., 35, Grosvenor Place, London, S.W.1, gives hints on the reconditioning of electric fires, the care of

irons and the recovering of lamp shades. A number of recipes for tasty fruit dishes as well as savoury snacks are included.

Traction Switchgear Control

Equipment despatched by the General Electric Co., Ltd., for the supervisory control of switchgear used in connection with track supplies to the Brisbane tramways, enables switchgear in five different substations to be controlled and supervised from one central control point.

Radio Components Exhibition

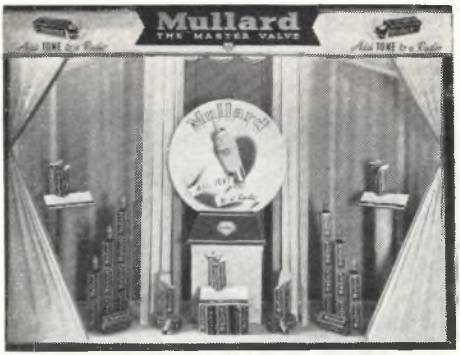
The fifth annual private exhibition of British radio television and electronic components and test gear, organised by the Radio Component Manufacturers' Federation, will be held in the Great Room at Grosvenor House, Park Lane, London, W.1, from Tuesday, March 2, to March 4, 1948.

New E.D.A. Leaflet

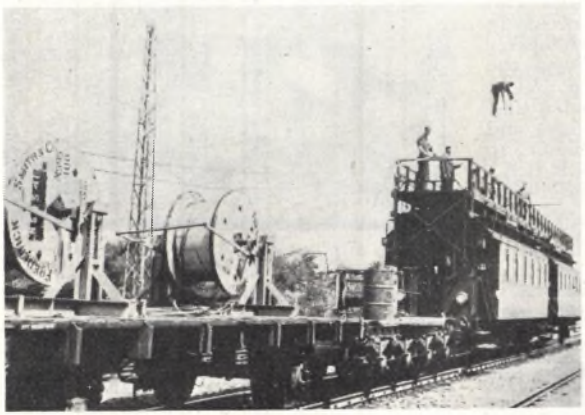
Entitled "Cooking the Electric Way," an illustrated leaflet, issued by the British Electrical Development Association, gives some useful notes on the efficient use and care of an electric cooker and should be of service to demonstrators as well as housewives.

New Company for Eire

The formation of a new company in Eire, the Aberdare Electric Company, for the manufacture of electrical equipment has been approved by the Minister for Industry and Commerce. The company will have an authorised capital of £400 000, and the directors will include Sir Robert Renwick, chairman, the County of London Electric Supply Co., Sir George Usher, chairman of Aberdare Cables, Ltd., and of South Wales Switchgear, Ltd., Mr. J. Digby, managing director of Pye (Ireland). Mr. F. G. Penny, managing director of Aberdare Cables, Ltd., Lt.-Col. H. Boyd-Rochford, and Mr. C. O. Stanley, chairman and managing director of Pye, Ltd. Part of the company's production will be required for the intensive rural electrification programme.



Display provided by the Mullard Wireless Service Co., Ltd., as part of their window dressing service



Overhead lines, supplied by Frederick Smith and Co., in the course of erection on a Netherlands railway

Restarting Netherlands Railways

The photograph, reproduced on this page, shows overhead lines in course of erection in Holland, where the Netherlands railways faced a tremendous task in rebuilding their war-ravaged railway system. Many hundreds of tons of trolley wire and strand have been supplied by Frederick Smith and Co. (incorporated in the London Electric Wire Co. and Smiths, Ltd.).

Valve Sales Publicity

Valve dealers are being offered a complete window dressing service by the Mullard Wireless Service Co., Ltd., Century House, Shaftesbury Avenue, London. There is a choice of three types of display, two of which permit the inclusion of sets and other products which the dealer may wish to show. The company point out that this publicity has been made possible by salvaging some pre-war display material.

Rochdale Technical Society

Rochdale electrician members of the National Trades Technical Societies have formed their own local group. Mr. G. A.

Overstall is chairman and Mr. H. Hargreaves (of Whipp and Bourne, Ltd.) secretary. At the inaugural meeting, Mr. Overstall, of the Corporation electricity department, gave a technical paper on "Electrical Water Heating."

Erratum

Owing to a misprint in the report of the prize-giving ceremony held in connection with the education scheme of W. T. Henley's Telegraph Works Co., Ltd., in our last issue, this event was referred to as the first annual conversazione when, in fact, it was the fifth of such occasions.

Public Speaking Competition

The E.D.A. public speaking competitions which were held at regular intervals before the war, have been revived, and a brochure has been issued by the association from 2, Savoy Hill, London, W.C.2, setting out the purpose and method of holding the competition, the conditions of entry, procedure of judging, together with details of the awards. Entry forms, provided at the back of the booklet, should be returned not later than Friday, December 12, to the E.D.A. area officers whose names and addresses are given.

E.A.W. Branch Activities

The Cheltenham branch of the E.A.W. celebrated its 21st birthday on Monday, November 3. A luncheon was held in the Town Hall and the Mayor, Coun. H. T. Bush, proposed the toast of the E.A.W., to which its director, Dame Caroline Haslett, replied. Miss E. C. Morris, branch chairman, presided. The Cambridge branch, which was formed in April of this year, now has 58 members, many of whom made an interesting visit to the sugar beet factory at Ely, on October 30. They were especially interested in the electrically operated plant used in processing the sugar from the beet to the finished product.

City and Guilds Institute

The regulations and syllabuses for examinations in telecommunications and electrical subjects for the session 1947-48 is now available from the Department of Technology of the City and Guilds of London Institute (price 1s.). In drafting the scheme for a grouped course in telecommunications engineering adopted by the institute, the Advisory Committee had in mind the needs of employees of the Post Office and of other organisations engaged in the manufacture and operation of telecommunications apparatus. Other courses of instruction include electrical installation work, electrical engineering practice, radio service work and for the radio amateurs' examination. The report for 1946 shows that in the telecommunications group the number of examinees was 14 941, a net decrease of 93 compared with the figure for 1945; for electrical engineering practice, the number was 1 182, an increase of 85; electrical installation work, 454, an increase of 83; and radio service work, 289, an increase of 33.

S.H.E.F.I. Moving Coil Pick-Up

Brooks and Bohm, Ltd., 90, Victoria Street, Westminster, S.W.1, announce that manufacture has started on a greater scale of S.H.E.F.I. moving-coil pick-ups and consequently the price has been reduced considerably.

Twintube Economisers

The recently-revised illustrated catalogue issued by Senior Economisers, Ltd., 11, Southampton Row, London, W.C.1, is an admirable production describing in detail the principal features of the company's twintube economisers. Photographs and diagrams of recent installations are reproduced on art paper.

Earthing of Installations

THE Commissioners have been considering the difficulty often experienced in obtaining reliable earthing, particularly in quarries and where there is no piped water supply, or where non-metallic water pipes are used. As a result, and following consultation with the Electricity Supply Joint Committee and relative Government departments, it is suggested that, where earth leakage trip switches are not considered suitable, consumers might be allowed to connect to the earthed neutral point of the supply system, (a) by a direct connection where the undertakers' transformer is on the consumers' premises, such connection having a cross-sectional area of not less than .0225 sq. in.; (b) by an additional conductor, having a cross-sectional area of not less than .0225 sq. in. where the supply is by overhead line; (c) by a connection to the lead sheath of the low or medium voltage cable, where the supply system is underground.

Where the earthing difficulty only arises in relation to the installation of a particular consumer connected to a low or medium voltage system, a conductor could be carried from the earth continuity system of the consumer's installation to the nearest point where there is an existing low resistance and reliable earth. The Commissioners are advised that none of these courses would conflict with the provisions of the Electricity Supply Regulations, 1937, and that no specific consent or approval under Regulation 4 of those Regulations would be involved.

Book Reviews

The Technique of Stage Lighting. By R. GILLESPIE WILLIAMS. (London: Sir Isaac Pitman and Sons.) Price 21s. Pp. 189.

An alternative title for this book might well have been "Stage Lighting Without Tears," as the author has been most successful in his task of producing a work for the ready reference of all concerned with this important subject. Stage lighting is essentially both an art and a science and Mr. Williams is well qualified to write a book, which includes much of the results of his own extensive experience, in this particular specialised field. The book is divided into four main parts; the first part, which is entitled Scientific Basis, consists of two chapters dealing with the fundamentals of vision, colour and light control, and this information facilitates an understanding of the more advanced treatment in the chapters that follow.

The second part of the book, which deals with the practical aspects of choice, layout and installation of lighting equipment, will be of special interest to architects and electrical engineers. One chapter gives a detailed technical treatment of the various types of incandescent filament, arc and electric discharge lamps available for stage lighting work. The vast amount of progress made during the last few years, in connection with lighting and control equipment, is clearly shown in Chapters 4 and 5. All types of footlights, battens, spotlights, floods, effects projectors and dimmers are described and recommendations and advice are given regarding their correct utilisation.

As with many other spheres of lighting, the author emphasises the need for consideration of the lighting before the stage is constructed, in order to avoid errors. It is appreciated that many of the special technical stage expressions used may not be understood by the beginner and a glossary of terms appears at the end of Chapter 6. Stage lighting treatment will obviously depend upon whether we are dealing with a professional theatre, repertory theatre, private theatre, etc., and the practical aspects of each of six main classes are consequently fully dealt with.

Part 3 of the book is devoted to the theory and use of directional and coloured lighting and many examples are given showing how the appearance of objects is determined by projected light radiation. The reader is also given an insight into some of the methods used for creating optical illusions on the stage. One section, which will be of particular concern to those connected with production problems, consists of practical suggestions for the lighting of plays, operas, musical shows, etc. Elaborate lighting effects require organisation and planning and this is clearly revealed by the inclusion of cue sheets of the lighting plot of a popular West End musical show. The book is illustrated with well-drawn diagrams, photographic prints and coloured plates, and represents a concise and up-to-date work in which theoretical considerations are closely linked with practical application.

Income Tax (by C. N. BEATTIE, pp. 116). **Hire-Purchase Law** (by MAURICE SHARE, pp. 111). (London: Stevens and Sons, Ltd.) Price 4s. each.

Both these recent additions to Messrs. Stevens's "This Is the Law" series maintain the standard of their predecessors in rendering complex subjects into comprehensible form, while avoiding over-simplification, the customary pitfall of "popular" guides. The work on income tax, which is written largely from the viewpoint of the wage and salary earner, opens with a general explanation of direct taxation, following this with explanatory notes on allowances. More specialised chapters deal with adjustments and repayment claims, taxation on income from property and the special allowances applicable to certain trades and professions. A section on the collection of P.A.Y.E. will be found useful by those about to engage labour for the first time, as it amplifies the instructions issued by the inland revenue authorities. Subsequent chapters summarise the special rules applicable to husband and wife and matters such as taxation in the armed forces and deeds of covenant, the latter a complex subject on which, as the author wisely stresses, only general advice can be given. The book includes all changes in rates of taxation and reliefs introduced in the spring budget.

Mr. Share's work on hire-purchase law can be recommended to those who have entered the retail trade since the end of the war and who wish to know what the law requires of both the owner and hirer of goods. The aspects of contract law which apply to hire-purchase agreements are summarised in the opening chapter, and this is followed by a brief survey of the Hire-Purchase Act of 1938. The remainder of the book is devoted to the mechanism of recovery of arrears and of competing claims, such as those of landlord, judgment creditors and money-lenders. The book can be recommended to all interested in the subject.

Company News

ISLE OF THANET E.S. CO., LTD.—Prft. 1946 £67 453 (£51 069), plus int. £554 (£917), mkg. £68 007 (£51 986), less "A" and "B" skg. funds £11 921 (£11 844), deb. int. £7 684 (£7 997), int. on skg. funds "A" and "B" £3 668 (£3 216), lvg. £44 735 (£28 929), plus blce. brot. in £6 863 (£22 066 debit), mkg. £51 598 (£6 863). To 4 yrs. Pref. div. to Mar. 31, 1944, £37 224, fwd. £14 374 (£6 863). Div. on Pref. for yr. ended Mar. 31, 1945, pd. Sept. 10, reducing undistributed prft. to £5 068. The rept. states deb. stk. of £7 896 redeemed durg. yr. Co.'s elec. supply undertakg. transfd. to Margate, Broadstairs and Dist. Elec. Bd. Dec. 31, 1946, co. received £650 000 on acct. of purchase price. Following receipt paymt., co. repaid outstandg. 4% deb. (£187 402). Agreement of final purchase price of elec. sply. undertakg. has been delayed pending settlement of co.'s liabil. for local rates. This matter has been settled, dirs. hope they will be able to call an extra gen. mtg. before end of yr. to pass a resolution that co. be wound up by members voluntarily.

ELECTRICAL COMPONENTS, LTD.—Presiding at the annual meeting, Mr. H. S. Seccombe (chairman) said that the economic crisis and the Government's plans for solving it would hold up many schemes in connection with rehousing and town planning. When the effect of these plans began to be felt, and capital schemes already commenced were completed, they could expect a contraction of sales in certain departments. The company was not engaged in direct export in any volume, but it had a live interest in the present programme and supplied substantial quantities of components and accessories forming part of a variety of exportable goods and appliances. It had, in addition, a large turnover of industrial lighting components and equipment for power installations. Any intensified drive for more efficient production would, therefore, be of direct benefit to the company.

FERRANTI, LTD.—Mr. V. Z. de Ferranti (chairman and managing director) presided at the recent annual meeting. In the course of his statement, circulated with the report and accounts, he stated that during the year the output of their commercial department had been doubled. All departments had contributed to this increase, both those producing transformers, electricity house-service meters and instruments for the electricity supply industry, and those producing radio, television, domestic electric appliances and clocks for the general public. One-third of this output had been exported. Of their unexecuted orders for the supply industry, 48 per cent. were for the overseas market. The total volume of export orders showed an increase of two and three-quarter times over that of the last year before the war. There had been more rearrangement of their manufacturing facilities, and in particular the giving up of a requisitioned factory in which they made valves and cathode-ray tubes. Development work on radar navigational aids and certain applications of electronic devices to industry had been concentrated in the Edinburgh factory. They were now faced with further re-arrangements as the result of the concentration on heavy plant at the expense of electrical appliances for the public. Considerable capital expenditure would be involved to deal with the increasing demand for heavy plant. They were building a new transformer factory and also a new foundry. The Canadian company had increased its output by 40 per cent. over the previous year.

Metal Prices

		Monday, Price	Nov. 10 Inc.	Nov. 10 Dec.
Copper—				
Best Selected	per ton	£130 10 0	—	—
Electro Wire bars	„	£132 0 0	—	—
H.C. Wires, basis	„	£149 10 0	—	—
Sheet	„	£173 10 0	—	—
Bronze Electrical quality 1% *Tin*—				
Wire (Telephone), per ton		£172 5 0	—	—
Brass (60/40)—				
Rod basis	per lb.	1s. 1¾d.	—	—
Wire	„	1s. 6⅛d.	—	—
Iron and Steel—				
Pig Iron (E. Coast Hematite No. 1)	per ton	£9 10 0	—	—
Galvanised Steel Wire (Cable Armouring) basis 0.104 in.	„	£35 15 0	—	—
Mild Steel Tape (Cable Armouring) basis 0.04 in.	„	£22 15 0	—	—
Lead Pig—				
English	„	£91 10 0	—	—
Foreign or Colonial	„	£90 0 0	—	—
Tin—				
Ingot (minimum of 99.9% purity)	„	£442 10 0	—	—
Wire, basis	per lb.	5s. 6¾d.	—	—
Aluminium Ingots	per ton	£80 0 0	—	—
Spelter		£70 0 0	—	—
Mercury (spot) (*ex. warehouse*)	per bott.	£16 0 0	—	—

Prices of galvanised steel wire and steel tape supplied by C.M.A. Other metal prices supplied by B.I. Callender's Cables, Ltd.

Commercial Information

County Court Judgments

NOTE.—*The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be actions. But the Registry makes no distinction. Judgments are not returned to the Registry if satisfied in the Court books within 21 days.*

SAVAGE, Leonard, Rose Cottage, Hammersley Lane, Tylers Green, Bucks, electrical contractor. £17 9s. September 23.

NATTRASS, M. A. (male), Victoria Street, Bishop Auckland, Durham, electrical dealer. £74 19s. 5d. September 26.

BISCHOFF, Chas. E., 39, Claremont Road, Westcliff-on-Sea, electrical contractor. £56 13s. 3d. September 17.

PICKARD, C. E. (male), 47, Beckingham Road, Guildford, electrical contractor. £26 12s. 7d. September 11.

NICHOLSON AND PEDEN (a firm), 22, High Street, Cleator Moor, Cumberland, electrical dealers. £15 10s. 10d. September 9.

Amended Notice

BOOT, Cyril Henry, 39, St. Cuthberts Street, Wells, Somerset, formerly residing and carrying on business at 29, Lyndon Road, Rubery, near Bromsgrove, Worcester, radio and electrical engineer. Court: Worcester. Amount per £: 1s. 10d., first and final, payable, November 17, 1947, at the Official Receiver's Office, Somerset House, 37, Temple Street, Birmingham, 2.

Coming Events

Friday, November 14 (To-day)

TELEVISION SOCIETY, CONSTRUCTORS' GROUP.—London. E.L.M.A. Lecture Theatre, 2, Savoy Hill, W.C.2. "Reduction of Interference in Television Sound Reception." *7 p.m.*

Saturday, November 15

I.E.E., N. MIDLAND STUDENTS' SECTION.—Leeds. "Railway Signalling," by T. W. Ballantine. *2.30 p.m.*

Monday, November 17

BIRMINGHAM ELECTRIC CLUB.—Grand Hotel. "Electricity in the Merchant Navy," by S. A. G. Emms. *6.30 p.m.*

I.E.E., WESTERN TRANSMISSION GROUP.—Cardiff. "Economics of High-Voltage Transmission by Underground Cables," by R. N. Berry. *6.30 p.m.*

I.E.E., N. EASTERN CENTRE, RADIO AND MEASUREMENTS SECTIONS.—Newcastle-on-Tyne. Chairmen's Addresses by C. E. Strong and D. C. Gall. *6.15 p.m.*

I.E.E., MERSEY AND N. WALES CENTRE.—Liverpool. Reece's Restaurant, Parker Street. Annual Dinner and Presidential Visit. *6.30 p.m.*

I.E.E., E. MIDLAND CENTRE.—Nottingham. Albert Hall. Faraday Lecture, "Electricity and Everyman," by Dr. P. Dunsheath. *6.30 p.m.*

INSTITUTION OF ELECTRONICS.—London. Royal Society of Arts, John Adam Street. Adelphi, W.C.2. "Industrial Radiology," by R. H. Cooke. *6.30 p.m.*

Tuesday, November 18

I.E.E., N. WESTERN STUDENTS' SECTION.—Manchester. "High Frequency Telephone Cables," by A. C. Holmes. *6.45 p.m.*

ASSOCIATION OF SUPERVISING ELECTRICAL ENGINEERS.—London. Magnet House, Kingsway, W.C.2. "Electronics," by F. R. Unwin and A. W. Corneck. Joint meeting with Institution of Engineers-in-Charge.

I.E.E., S. MIDLAND CENTRE.—Birmingham. Midland Institute. Faraday Lecture, "Electricity and Everyman," by Dr. P. Dunsheath. *6.15 p.m.*

I.E.E., N. MIDLAND CENTRE.—York. Station Hotel. "Comparison Between Gas and Electricity on the Basis of Coal Economy," by P. Schiller. *6.30 p.m.*

Wednesday, November 19

I.E.E., N. WESTERN STUDENTS' SECTION.—Manchester. "High Frequency Telephone Cables," by A. C. Holmes. *6.45 p.m.*

I.E.E., N. WESTERN CENTRE RADIO GROUP.—Manchester. "Trends in Television Receiver Design," by N. H. Searby. *6.30 p.m.*

I.E.E.—London. "The Cavity Magnetron," by H. A. H. Boot and Prof. J. T. Randall. "The High-Power Pulsed Magnetron: Development and Design for Radar Applications," by W. E. Wilshaw, L. Rushforth, R. Latham, A. W. Balls and A. H. King. "The High-Power Pulse Magnetron; a Review of Early Developments," by Dr. E. C. S. Megaw. *5.30 p.m.*

I.E.E., N. MIDLAND CENTRE, SHEFFIELD SUB-CENTRE.—Barnsley. Town Hall. "Commercial Development of Electricity Supply as a Consumer Service," by C. T. Melling. *7 p.m.*

Thursday, November 20

I.E.E., IRISH BRANCH.—Dublin. "Record of Experience on the Irish Electricity Supply System," by A. Burke, R. C. Cuffe and W. O'Neill. *6 p.m.*

I.E.E., W. WALES (SWANSEA) SUB-CENTRE.—Guildhall. Chairman's Address, by J. B. Gwynne Lewis. *6 p.m.*

I.E.E., SOUTHERN CENTRE.—Haslemere. The A.S.E. "The Design of a High-Fidelity Disc Recording Equipment," by H. Davies. *5.45 p.m.*

I.E.E.—London. Report. "The Practical Training of Professional Electrical Engineers," by Sir Arthur Fleming. *5.30 p.m.*

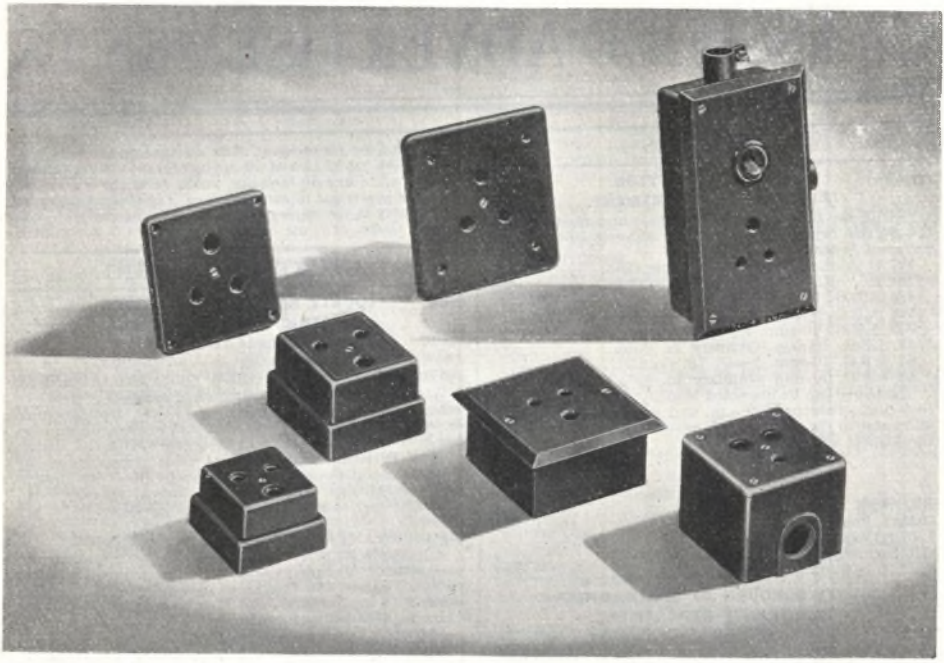
Friday, November 21

I.E.E., N. EASTERN STUDENTS' SECTION.—Newcastle-on-Tyne. "Transients in Transmission Lines," by T. W. McLean. *6.30 p.m.*

JUNIOR INSTITUTION OF ENGINEERS.—London. "Patents from the Layman's Point of View," by L. H. A. Carr. *6.30 p.m.*

I.E.E., MEASUREMENTS SECTION.—London. "Iron-Loss Measurement by A. C. Bridge and Calorimeter," by Prof. J. Greig. *5.30 p.m.*

INDEX TO ADVERTISERS IN THIS ISSUE



The above illustration shows a group of NETTLE Sockets. A consistently high standard of manufacture is maintained throughout the NETTLE range which includes a wide variety of domestic and industrial switches, lampholders, bell transformers, sockets and plugs, ceiling roses, handlamps, etc.

These accessories are designed for safety and easy wiring and are manufactured in accordance with the appropriate B.S.I. specification.

Your enquiries will receive our careful attention.

NETTLE

VICTOR H. IDDON LTD. HARPER RD. WYTHENSHAWE. M/CR.

CLASSIFIED ADVERTISEMENTS

TENDERS

BOROUGH OF LEYTON
ELECTRICITY DEPARTMENT.

OFFERS are invited for the purchase and removal from the address below of the following 230-volt 50-cycle Prepayment Meters :—

127 C & H. 5-amp. 2-part Single Coin.
104 C. & H. 5-amp. Ordinary 1d. Coin.
486 A.E.G. 5-amp. 2-part Dual Coin.
356 A.E.G. 5-amp. Ordinary Dual Coin.
345 A.E.G. 10-amp. 2-part 1s. Coin.
43 A.E.G. 10-amp. Ordinary 1s. Coin.
80 A.E.G. 10-amp. 2-part 1d. Coin.
42 A.E.G. 10-amp. Ordinary 1d. Coin.

The above can be inspected Mondays to Fridays, 9 a.m. to 5 p.m.; Saturdays, 9 a.m. to 1 p.m. Enquiries to be addressed to the undersigned, who is not bound to accept the highest or any offer.

A. E. MORGAN,
B.Sc.(Tech.), M.I.E.E., A.M.I.Mech.E.,
Borough Electrical Engineer and Manager.

Electricity Offices,
Cathall Road,
LEYTONSTONE, E.11.
October 28th, 1947. (313)

COUNTY BOROUGH OF SOUTHAMPTON
ELECTRICITY DEPARTMENT.

SALE OF OLD PLANT, ETC.

TENDERS are invited for the purchase, dismantling, loading and removal from the Generating Station, Western Esplanade, Southampton, of the following old plant and spare parts, etc.

Two Babcock & Wilcox two-drum Water Tube Boilers and mountings, originally rated at 18 950 lb. per hour, working pressure 200 lb. per sq. in., one installed in 1911 and the other in 1914. The boilers are fitted with superheaters and chain-grate stokers and, in one unit only, an economiser.

Two Babcock & Wilcox three-drum Water Tube Boilers and mountings, each originally rated at 36 850 lb. per hour, working pressure 200 lb. per sq. in., one installed in 1919 and one in 1920. The boilers are fitted with superheaters and chain-grate stokers and, in one unit only, an economiser.

One 3 000 kW British Thomson-Houston Co. Steam Turbine, 3 000 r.p.m., 200 lb. per sq. in. and superheat 150° Fahr., coupled direct to a 3 750 kVA 2-phase, 3 111/2 200 v., 50 cycle Alternator, together with Worthington Simpson Co. surface condenser, motor driven, circulating, air and extraction pumps, all installed 1919.

One Lot Miscellaneous Spare Parts and articles for old plant.

Conditions of sale, specification, schedule of spare parts, form of tender and permission to inspect the plant, etc., may be obtained from Mr. W. G. Turner, Borough Electrical Engineer, Civic Centre, Southampton. Tenders, in a plain wax sealed envelope, bearing no name or mark indicating the sender, and endorsed "Sale of Old Plant," shall be delivered to the undersigned not later than December 20th, 1947.

The Corporation reserves the right to accept tenders for the whole or part of the plant, etc., to be sold, and does not bind itself to accept the highest or any tender.

R. RONALD H. MEGGESON,
Town Clerk.

Civic Centre,
SOUTHAMPTON. (348)

AUCTIONEERS & VALUERS

RICHARDS & PARTNERS, Auctioneers and Valuers of PLANT AND MACHINERY AND INDUSTRIAL PROPERTY, Granville House, Arundel Street, London, W.C.2. Telephone : TEMple Bar 7471. (13)

None of the vacancies in these columns relates to a man between the age of 18 and 50 inclusive, or a woman between the ages of 18 and 40 inclusive, unless he or she is exempted from the provisions of the Control of Engagement Order, or the vacancy is for employment exempted from the provisions of that Order.

SITUATIONS VACANT

COUNTY BOROUGH OF PRESTON
ELECTRICITY UNDERTAKING.

APPLICATIONS are invited for the following positions from suitably qualified persons :—

(*a*) SENIOR COOKERY DEMONSTRATOR (FEMALE).

Applicants must hold a Diploma of Domestic Science or other approved qualification, and have had previous experience in demonstration work and assisting in an electricity showroom. Salary in accordance with the Miscellaneous Division, Grade 1, of the Scale of Salaries of the National Joint Council for Local Authorities' Administrative, Professional, Technical and Clerical Services, viz., £255-£300 per annum, plus bonus, at present £48 2s. per annum.

(*b*) ASSISTANT SHIFT CHARGE ENGINEER.

Applicants must be experienced in the operation and maintenance of high pressure plant in a modern power station. Salary and conditions of employment in accordance with the National Joint Board Agreement, Grade 8a, Class K, £523-546 per annum.

(*c*) JUNIOR MAINS ASSISTANT.

Applicants must have a good technical knowledge in electrical engineering up to at least ordinary National Certificate standard, and preferably some experience in the distribution department of an electricity undertaking. Possession of the Higher National Certificate in Electrical Engineering or its equivalent will be an advantage. Salary and conditions of employment will be in accordance with the National Joint Board Agreement, Grade 10, Class K, £379-£397 per annum.

(*d*) INSTALLATION INSPECTORS.

Applicants should have had a considerable experience in electrical installation work of all classes. A thorough knowledge of the I.E.E. Wiring Regulations and the ability to write clear and concise reports are essential. Possession of the ordinary National Certificate in Electrical Engineering, or its equivalent, is desirable.

The appointments are subject to the provisions of the Local Government Superannuation Act, 1937, and the successful applicants will be required to pass a medical examination.

Applications, stating age, qualifications and giving full particulars of training and experience, accompanied by not more than two recent testimonials, and endorsed "Senior Cookery Demonstrator," "Assistant Shift Charge Engineer," "Junior Mains Assistant" or "Installation Inspector," to be forwarded so as to reach the undersigned not later than Saturday, November 29th, 1947.

This advertisement is published by permission of the Ministry of Labour and National Service under the Control of Engagement Order.

G. A. ROBERTSON,
M.Sc.Tech., M.I.E.E., M.I.Mech.E.,
Borough Electrical Engineer.

40 and 41, Lune Street,
PRESTON.
November 6th, 1947. (354)

SPECIALIST in the manufacture of Automobile Lamps and Miniature Lamps of all kinds wanted by a large incandescent lamp factory abroad. Applicants should be perfectly versed in modern automatic manufacture of such lamps and possess a wide experience. Passed examinations are of less importance than sound experience.—Replies giving full details of experience, qualifications, etc., should be addressed to : Box L.H.R., "THE ELECTRICIAN," 154, Fleet Street, London, E.C.4, before December 13th, 1947. (356)

SITUATIONS VACANT

BOROUGH OF ACCRINGTON ELECTRICITY DEPARTMENT.

APPLICATIONS are invited for the following positions at Hyndburn Road Generating Station :—

(1) CHARGE ENGINEER, Class F, Grade 8, of the National Joint Board Schedule, at present £442 per annum. Candidates must have had a thorough practical engineering training and be experienced in the operation of high pressure boilers, the auxiliary plant, and the operation of a modern generating station. Candidates must hold the London City and Guilds Higher National Certificate or be Corporate Members of the Institution of Electrical Engineers and/or the Institution of Mechanical Engineers.

(2) SWITCHBOARD ATTENDANT, Class F, Grade 9a, of the National Joint Board Schedule, at present £327 per annum. Candidates must have had sound technical training and practical experience in the control of H.T. and L.T. switchgear. Preference will be given to candidates possessing the National Certificate.

The successful candidates will, if satisfactory, have the opportunity of being transferred to the new Accrington Huncoat Generating Station when the same is ready for commissioning.

Both appointments will be subject to the provisions of the Local Government Superannuation Act, 1937, and the selected candidates will be required to pass a medical examination.

Applications, stating age, full particulars of training and experience, accompanied by copies of three recent testimonials, should reach me not later than Monday, November 24th, 1947. Canvassing, either directly or indirectly, will disqualify.

P. D. WADSWORTH,
Town Clerk.

Town Hall,
ACCRINGTON. (322)

CITY OF LINCOLN ELECTRICITY DEPARTMENT.

APPLICATIONS are invited from suitably qualified persons for the following positions :—

(1) SHIFT CHARGE ENGINEERS.

Candidates must have had a thorough technical and practical engineering training and be experienced in the operation of large steam turbo-alternators, switchgear, high pressure boilers and auxiliary plant in a modern generating station.

(2) POWER STATION DRAUGHTSMAN.

Candidates must have had a sound technical and practical engineering training, and be experienced in the design, construction and layout of modern mechanical and electrical power station plant, including pipework arrangements and details. Experience of building construction will be an additional recommendation.

The salary and conditions of employment for the appointments are in accordance with the National Joint Board Agreement, Class G, Grade 8, at present £467, rising to £476 per annum.

The selected candidates will be required to pass a medical examination and to contribute to a Superannuation Scheme under the provisions of the Local Government Superannuation Act, 1937.

Forms of application may be obtained from F. Newey, M.I.E.E., City Electrical Engineer and Manager, Electricity Offices, Brayford Side North, Lincoln, and must be returned to him, together with copies of not more than three recent testimonials, not later than November 29th, 1947, and enclosed in a sealed envelope appropriately endorsed. Canvassing, either directly or indirectly, will be a disqualification.

This advertisement is published by permission of the Ministry of Labour and National Service under the Control of Engagement Order, 1947.

J. H. SMITH,
Town Clerk.

Corporation Offices,
Silver Street,
LINCOLN.
November 7th, 1947. (355)

ACTIVE and experienced Representative required to develop the sale of all types of Rubber Insulated Cable in the North Eastern Area, location Newcastle.—Applications, detailing training and experience, should be sent to : The Employment and Welfare Officer, Johnson & Phillips Ltd., Victoria Works, Charlton, S.E.7. (284)

SITUATIONS VACANT

Ref. No. ICI/X/34.

This advertisement is published by permission of the Ministry of Labour and National Service under the Contro of Engagement Order, 1947.

IMPERIAL CHEMICAL INDUSTRIES LTD., Wilton Works, near Redcar, Yorks, require **DRAUGHTSMEN** to assist with the design and detailing of a large new works. Successful candidates will be appointed to the established staff.

Preference will be given to applicants who hold the Higher National Certificate or higher qualification and have the appropriate experience as follows :—

DRAUGHTSMEN.

ARCHITECTURAL. Design of offices, laboratories, houses, welfare and general industrial buildings.

Order No. D.31.

CIVIL. Design of roads, railways, drains and water services.

Order No. D.27.

STRUCTURAL. Design of buildings and structures, and design and detailing of reinforced concrete work for industrial buildings.

Order No. D.28.

MECHANICAL. Design of pipework for steam, gas and water, compressed air stations, layout of chemical plant, etc.

Order No. D.29.

POWER STATION. Design and layout of modern H.P. boiler plant and power plant.

Order No. D.227.

ELECTRICAL. Layout of plant electrical installations, including motors, starters, distribution boards, cables and lighting, and necessary calculations.

Order No. D.30.

INSTRUMENT. Layout of mechanical and electrical instrument installations for chemical plant. Preference for men experienced in modern automatic control and measurement instruments for temperature pressure and flow.

Order No. D.239.

Applications, giving full details and quoting advertisement reference ICI/X/34 and the Order No. should be addressed to the Manager, Employment Exchange, South Bank, Yorks.

LM/RH.
November 4th, 1947. (329)

METROPOLITAN BOROUGH OF ISLINGTON ELECTRICITY DEPARTMENT.

APPLICATIONS are invited for the permanent position of SHIFT CHARGE ENGINEER at the Council's Generating Station from persons who are not at present normally employed in agriculture or coalmining.

Salary and conditions of service will be in accordance with the National Joint Board Agreement, Class G, Grade 8, at present £490 7s., rising to £499 16s. inclusive.

Applicants should have had a sound general education and technical training, and experience in the control and operation of steam generating plant and main switchgear.

The appointment will be subject to the provisions of the Local Government Superannuation Act, 1937, and the successful candidate will be required to pass a medical examination. Candidates are required to disclose in writing whether to their knowledge they are related to any member of, or holder of any senior office under, the Council. Canvassing, either directly or indirectly, will be a disqualification. The Council are unable to make any arrangements for the provision of housing accommodation for the successful candidate.

Application forms, which may be obtained from the Engineer and General Manager, Electricity Department, 341-343, Holloway Road, N.7, should be completed and returned to him, together with copies of recent testimonials, in appropriately endorsed envelopes, by not later than December 1st, 1947.

This advertisement is issued by permission of the Ministry of Labour and National Service under the Control of Engagement Order, 1947.

H. DIXON CLARK,
Acting Town Clerk.

Town Hall,
Upper Street,
N.1. (357)

SITUATIONS VACANT

MINISTRY OF LABOUR AND NATIONAL SERVICE.

VACANCIES FOR ELECTRICAL INSPECTORS OF FACTORIES.

THE Minister of Labour and National Service invites applications from men and women for six permanent pensionable appointments as Electrical Inspectors of Factories.

In London the inclusive salary scale is £800 x £30—£1 100 x £35—£1 270 per annum (men) and £675 x £25—£800 x £30—£1 100 (women); deductions ranging from £15-£78 are made for posts outside London. The minimum of the scale will be linked to age 37 : £30 for men and £25 for women will be deducted for each year of age below 37 down to age 35, and added for each year of age above 37 up to age 41. Candidates should be at least 30 years of age on January 1st, 1948.

The duties of the Electrical Inspectors involve a sound knowledge of the general scheme and conditions of electric supply in this country and of the products of electrical manufacturers. The Electrical Inspectors are expected to administer the Electricity (Factories Act) Special Regulations, 1908 and 1944, in factories, taking account of any special conditions which obtain, and notifying occupiers of contraventions. Candidates must be Associated members of the Institution of Electrical Engineers with several years' professional experience or must produce other evidence of thorough training and experience in electrical engineering. Responsible experience in large electricity supply undertakings or electrical manufacturing works will carry special weight. Successful candidates will be required to devote their whole time to the work of the Ministry and must be prepared to work in any part of Great Britain if required to do so.

Forms of application, together with further particulars of the appointments, may be obtained from the Secretary, Ministry of Labour and National Service, O.E.11(A), 15, Portman Square, London, W.1, by written application on a postcard. Completed application forms should be returned not later than December 18th, 1947. (330)

SHEFFIELD CORPORATION

ELECTRICITY DEPARTMENT.

APPLICATIONS are invited for the following positions :—

ASSISTANT MAINS ENGINEER.

Applicants must possess an engineering degree or equivalent technical qualifications admitting to corporate membership of the Institution of Electrical Engineers, must have had a thorough engineering training, including experience in the mains department of a large supply undertaking, and be capable of taking charge of 33 kV, 11 kV and L.T. mains construction and maintenance work in one half of this Undertaking's area of supply.

The salary will be in accordance with Class M, Grade 8, of the N.J.B. Schedule, commencing at £635 per annum.

CHIEF RECORDS DRAUGHTSMAN.

Applicants must have had a sound technical training and must have had experience of the working of an extensive mains records system, the preparation of sub-station layout drawings, mains extension drawings and electrical network diagrams, and be a competent draughtsman capable of taking charge of the drawing office in the distribution department of this Undertaking.

The salary will be in accordance with Class M, Grade 8, of the N.J.B. Schedule, commencing at £635 per annum.

The appointments will be subject to the provisions of the Local Government Superannuation Act, 1937. Applicants must preferably be not more than 40 years of age or have had previous local authority service carrying transfer value within the meaning of the Act. The selected applicants will be required to pass a medical examination.

Applications, on forms to be obtained from the undersigned, are to be returned to me not later than November 24, 1947, accompanied by copies of not more than three recent testimonials. When applying for application forms, state for which appointment a form is required.

J. R. STRUTHERS,
General Manager and Engineer.

Commercial Street,
SHEFFIELD, 1.
October, 1947. (321)

SITUATIONS VACANT

ELECTRONIC Circuit and Electro-mechanical Engineers required for research and development work ; good academic qualifications essential ; apprenticeship or industrial or research experience desirable. Knowledge of any of the following subjects would be of assistance : Radar and television pulse techniques ; centrimetric components ; time-base generators ; A.C. and D.C. amplifiers ; feedback amplifiers ; servors, especially low power electro-mechanical ; stabilised power supply units ; data transmission systems ; gyroscopic applications ; table form layouts. Some mathematical ability is desirable.—Write, with full details of qualifications, experience, age and salary required, to : The Personnel Manager, Sperry Gyroscope Co., Ltd., Great West Road, Brentford, Middlesex. (305)

REQUIRED by firm of Scientific Instrument Makers in West London area Engineers with experience of precision mechanical design, good academic qualifications essential, and apprenticeship or industrial experience desirable. Knowledge of any of the following subjects would be of assistance : Mechanical systems of fire control computation ; balistics precision gearing ; gyroscopic designs ; hydraulics ; data transmission systems ; modern production methods of precision mechanical components. Some mathematical knowledge desirable.—Write, with full details of qualifications, experience, age and salary required, to : The Personnel Manager, Sperry Gyroscope Co., Ltd., Great West Road, Brentford, Middlesex. (304)

SITUATIONS WANTED

No. 1 ELECTRICIAN Officer, Merchant Navy, age 24, two years full charge of ship's electrical system (hospital ship), soon to be released, seeks post of responsibility with prospects, Assistant or Senior Maintenance Electrician. Experience general maintenance and engine room with turbo and Diesel engines.—Box L.H.M., "THE ELECTRICIAN," 154, Fleet Street, London, E.C.4. (298)

SALES BY AUCTION

G. R.

By Direction of the Minister of Supply.
Second Sale.

EXETER, DEVON.

A large quantity of Miscellaneous Surplus

GOVERNMENT STORES, INCLUDING ELECTRICAL, RADIO AND RADAR EQUIPMENT,

1 500 000 razor blades, 8 500 smokers' pipes, tobacco pouches, pipe cleaners, cigarette papers, safety matches, lighter fuel.

Toilet requisites, hair combs, tooth brushes, pocket mirrors, razor sets, hair oil and tonic, deodorant, tooth paste and powder, etc.

Stationery, carbon paper, inks, mucilage, typewriter accessories and office stores.

Telescopes, compasses, microscope, overalls, rubber gloves, ex-naval clothing.

Tools, axes, augers, bits, blades, cutters, dies, drills, grindstones, hammers, hand saws, knives, spirit levels, shovels, sprayers, vices, wrenches, wire nails, nuts and bolts, washers.

To be sold by Auction, from Catalogue, without Reserve, by

RIPPON, BOSWELL & CO., F.A.I.,

at

THE LOWER BALLROOM, THE ROUGEMONT HOTEL, EXETER,

on

TUESDAY, WEDNESDAY, THURSDAY and FRIDAY, NOVEMBER 25th, 26th, 27th and 28th, 1947, at 11 a.m. each day.

On View, by Catalogue only, at M.O.S. Depot, 156 (Royal Naval Store Depot), Topsham Road, Countess Wear, Exeter, November 19th, 20th, 21st and 24th, 9.30 a.m. to 1 p.m., and 2 p.m. to 4 p.m. each day.

Catalogues (price 6d. each), admitting one person to Sale Room and two for viewing, obtainable from the Auctioneers : 8, QUEEN STREET, EXETER. Telephone 3204 or 3592. (338)

FOR SALE

ALUMINIUM Sheets, Dural and Pure, 8 ft. × 4 ft., 6 ft. × 3 ft., 16-22 gauge. Alloy Mouldings. "Perspex." Unlicensed.—Henry Moat & Son Ltd., Atom Works, Newcastle-on-Tyne, 1. (332)

ALTERNATOR Sets, brand new, Diesel driven, 50 and 30 kVA, 400/230 v., 3-phase, 50 cycles, radiator fan cooled and electric starting. Delivery December.—R.S. & Engrs. (Surbiton) Ltd., 8, Claremont Road, Surbiton. Elmbridge 5095. (320)

AMMETERS, Voltmeters and Wattmeters, switchboard/portable pattern, first grade accuracy. Sizes varying from 2 in. dial to 6 in. dial inclusive. Short delivery. —Write for price and literature to: Measuring Instruments (Pullin) Ltd., Electrin Works, Winchester Street, Acton, London, W.3. (247)

BRITISH Electric Co. (Beco) Ltd. can supply most types of A.C. and D.C. Motors from stock.—British Electric Co. (Beco) Ltd., Electra House, 25-29, Lower Road, Rotherhithe, S.E.16. Bermondsey 3449. (20)

COMMUTATORS for Johnston Chore Horse. 25 segments. $\frac{7}{8}$ in. shaft (parallel). $2\frac{3}{16}$ in. diameter × $\frac{3}{4}$ brush space. Sample, 12s. 6d., carriage paid. Wire single black. 44/.012 V.I.R. new maker's Coils, 1,000 yards £10. —Ambleside, Braintree, Essex. (353)

D.C. to A.C. Motor Alternators, 110 volts D.C. input. 220 volts, 50 cycles, single-phase A.C. output at 250 watts, screen protected, ball-bearings, £12 10s. each. 1 000 watts output, as above, £20 each. As above, but 24 volts D.C. input, 150 watts output, suitable for mobile public address, etc., £7 10s. each.—Johnson Engineering, 319, Kennington Road, S.E.11. Reliance 1412-3. (349)

ELECTRIC HOIST BLOCKS, capacity 5 cwt. to 7 tons. Reasonable delivery.—A. Morgan and Co., 50, Wilkin Street, London, N.W.5. Telephone: GUL. 1147. (24)

ELECTRIC MOTORS, $\frac{1}{3}$ h.p. and $\frac{1}{2}$ h.p. Also 500 guaranteed Motors up to 20 h.p.—Victa Engineering Company Maidenhead. (336)

ELECTRIC MOTORS, $\frac{1}{3}$ h.p., 3,000 r.p.m., D.C., 200-250 v. Also 110 N. Stock delivery, £6 each.—JOHN E. STEEL, Bingley, Yorks. Phone 1066. (TC113)

ELECTRIC MOTORS, A.C. and D.C. We supply all types and sizes of Electrical Machinery: Slow Speed Reduction Gears can be supplied to customers' requirements with short deliveries.—Send your enquiries to The Electropower Co., Ltd., 3, Retreat Close, Kenton, Middlesex. Tel.: WORdsworth 4928. (14)

ENGINES, 1 h.p. to 6 h.p., Alternators (5 kVA), Lighting Plants, Charging Sets, Motors, etc. 1000 in stock.—Victa Engineering, Cordwallis Estate, Maidenhead. (326)

FLUORESCENT Lighting. 4 ft. and 5 ft. single, double and triple lamp fittings manufactured by B.T.-H., G.E.C. Siemens, Ediswan, Crompton, etc., complete with ring gear and lamps, supplied immediately from stock ready for installation, or can be installed by us (in London area only). All fittings and gear fully guaranteed. Full range demonstrated in our showrooms.—Apex Industries Limited, 27, North Audley Street, W.1 (near Selfridges), Mayfair 0618-8960. (89)

FLUORESCENT LIGHTING UNITS, 5 ft. Reflector or Swallow, £5 18s.; 4 ft. Reflector, £4 18s. 6d.; 4 ft. Batten, £4 9s. 6d. All self-contained and complete with new tubes. Call or write for September lists. Also 80 watt silent tapped Chokes, 27s. 6d.; 40 watt ditto, 25s. Bi-pin Holders, P/F Condensers, 4 ft. Tubes.—MOSS BROS., 53, Goodge Street, W.1. Mus. 5385. (TC114)

FOR SALE. 25 yards .3 L.T. 4-core super insulated covered Cable, unused. Reasonable offer accepted, —Apply: Peggy Page Ltd., 7, Church Street, Edmonton. N.9. (337)

FOR SALE

FOR SALE from stock. New Lundberg SWITCHES, 2 in. × $1\frac{1}{2}$ in. × 1 in. Adhesive Tapes, white, 1 in. and $1\frac{1}{2}$ in.—For particulars and price apply: E. S. Mashal, 86, Alie Street, E.1. Phone: Royal 4405/6. (264)

GENERATING Sets. 10 kVA Petrol-driven Alternating Sets 400/440 volts, 3-phase, 50 cycles, 4-wire; complete with switchboard and Isenthal voltage regulator self-contained units. Delivery November. Restricted number available. 5 kVA Petrol engine driven Alternating Sets suitable for a supply voltage of 230 volts single phase 50 cycles, complete with switchboard; incorporating automatic voltage regulator. Limited number available for November-December delivery.—Berry Hill Plant Division, Cheadle, Stoke-on-Trent, Staffs. Phone Cheadle 2181 and 2261. (341)

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