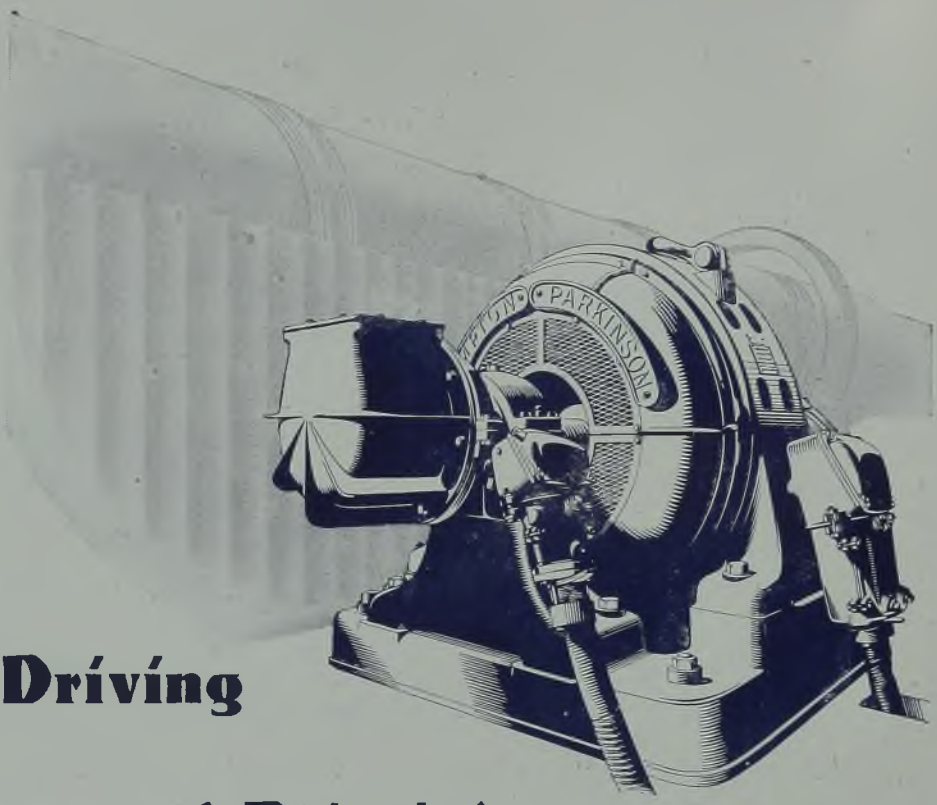
ELECTRICAL REVIEW
FOUNDED 1872

Vol. CXXXVII No. 3532 AUGUST 3, 1945 9d. WEEKLY



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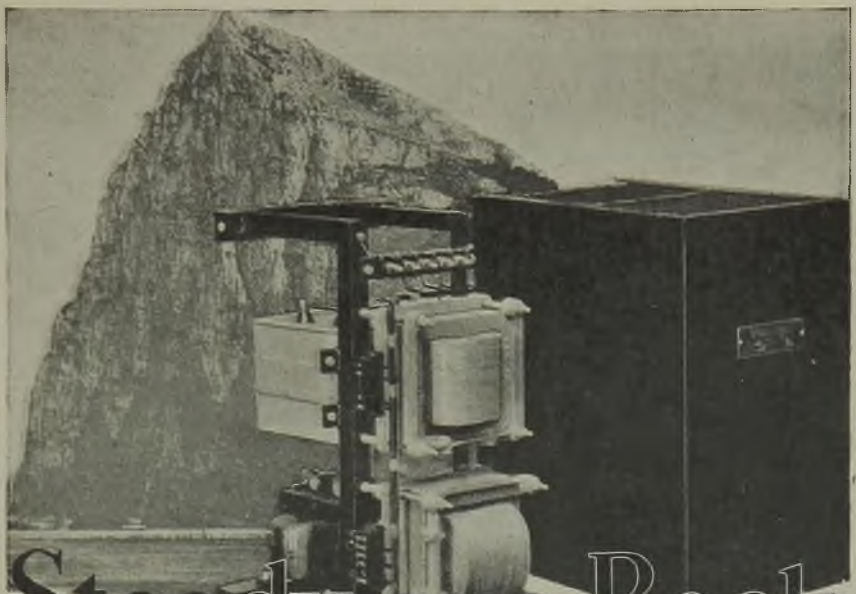

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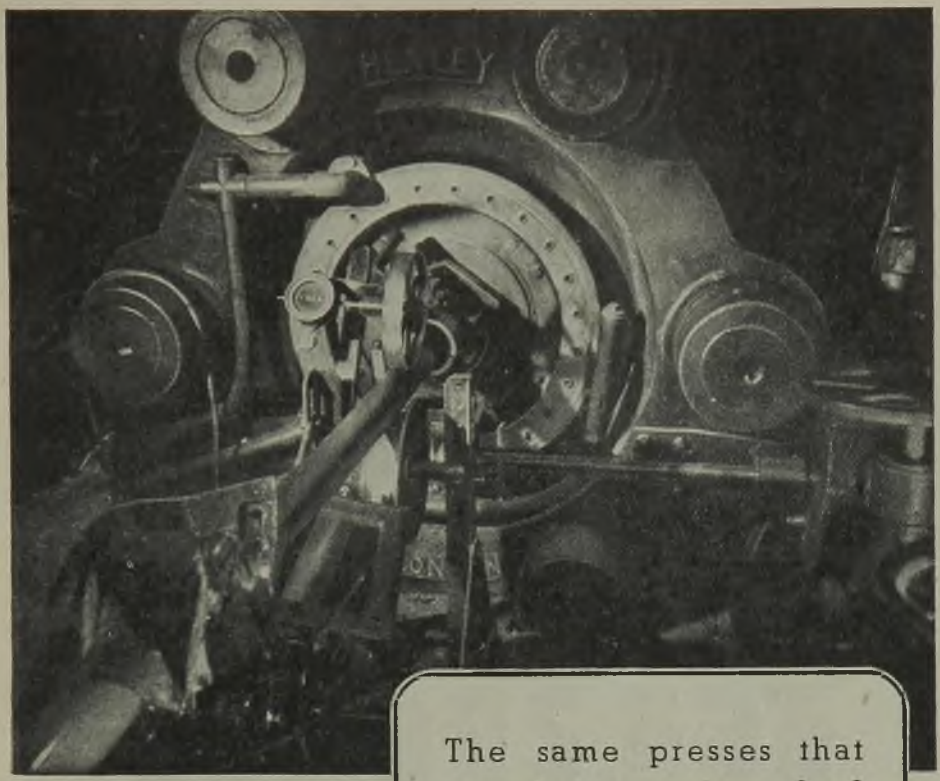

Lead alloy tubing for operation "Pluto" being extruded on the Henley Straight Through Lead Press.

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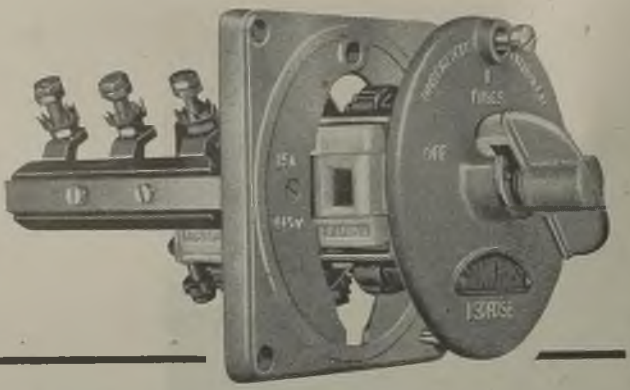

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ELECTRICAL REVIEW

August 3, 1945

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ELECTRICAL REVIEW

THE OLDEST ELECTRICAL PAPER — ESTABLISHED 1872

Vol. CXXXVII. No. 3532. AUGUST 3, 1945 9d. WEEKLY

Labour and Electricity

Awaiting the New Government's Policy

THE General Election has brought about a situation unique in this country. Although we have already had two Labour Governments the party has never had the majority over all others which it has now gained. It seems to follow from this that the new Government's line of action will be much more socialistic than the previous Labour Governments found possible. What the effects of this tendency will be remain to be seen—particularly the effects upon the electricity supply industry, which occupied a fairly prominent place in the Labour Party's election programme.

Improvement—not Upheaval

We feel, however, that no attempt will be made to transform the electricity supply system overnight. As we have consistently maintained, there is little wrong radically with this system, although it cannot be gainsaid that improvements are possible—more particularly in the direction of expediting certain natural trends, some of which (*e.g.*, distribution voltages and domestic tariffs) call for a greater degree of standardisation as between different areas.

Defects that now exist, where these are not a legacy of early legislative short-sightedness are, in the main, inevitable results of an evolutionary process that has necessitated taking account of scientific and technical developments as and when research has made them available. We are far from accepting at face value criticisms that have been levelled against the electricity supply industry in the heat of political conflict. In regard to one aspect of the latter, these criticisms appear somewhat beside the point. Approximately two-thirds of the electricity sold to consumers is produced by publicly-owned undertakings, which have vied with the companies in keenness to provide the great and efficient public service that this country enjoys.

The contribution towards winning the war made by individual undertakings is one of which the whole electrical industry may justly be proud and for which the public should be deeply grateful. There has been a good deal more in it than the epic story of supplies maintained or quickly restored during and after enemy damage to power stations and distribution networks; there has been the ready ability to supply any amount of electricity for all munition works, no matter how remotely located—enough in itself to furnish proof of the flexibility that is a sure sign of an effectual organisation.

Favourable Prices

In addition there has arisen out of war conditions an unprecedented demand for electricity in agriculture, which could not have been coped with in the way that it has been in the vast majority of cases unless rural electrification had reached a stage at which, taken as a whole, it was well in advance of Continental practice. As regards the price per kWh sold for all purposes, the comparison again has been generally in favour of Great Britain, except for some long-hour loads in water-power countries. Despite increasing costs of coal,

its raw material, electricity is one of the few commodities in which before the war there was a progressive decline each year in average retail charges and in which, since then, charges have been increased by very little. As there are so many more important matters with greater claim on the new Government's attention there will, in our view, be ample time for consideration and discussion of this subject. And there is also the possibility that by the time its turn arrives it may have ceased to be a political issue.

Contractors' Report

IN what might be termed his valedictory address after a seven-year term as president of the Electrical Contractors' Association, Mr. Walter Riggs was able to report a continuance of the good relationships which have existed for years between his Association and the Electrical Trades Union which, with the parallel conditions in the electricity supply industry, have contributed a good deal to electrical progress. Another important matter touched upon by the president was the training of apprentices. Hitherto the E.C.A. has been represented on the Building Apprenticeship and Training Council; this is probably of too general a character for the specialised electrical contracting industry and more satisfactory results should arise from the separate council which the Association has suggested to the Ministry of Works.

New Zealand Market

THE trend towards self-sufficiency in manufactured goods, electrical equipment among them, has been an outstanding feature of the economies of all the Dominions in recent years. Possibly in none of them is that trend now so strong as in New Zealand. This is confirmed by some remarks made last week by Mr. C. W. Bridgen (Ferranti) who has recently returned from that country. He pointed out that there was an absolute prohibition on the import of electrical equipment such as cookers and heaters and radio sets because all these things were now made in New Zealand. He considered that most of the home-produced articles compared very unfavourably with their English counterparts. Whether this situation will continue is not certain. It may be recalled that some time ago Mr. Nash, the Finance Minister, promised that there would be no attempt to bolster up uneconomic secondary industries by means of import restrictions.

Electricity in Eire

IF water-power is cheaper than coal it is less reliable, as experience in Eire has proved. The dependence of the Electricity Supply Board upon favourable climatic conditions is shown by curves included in its 1944-45 report and by a statement in the report that the dry spring and summer necessitated severe rationing throughout the summer, although conditions improved later. The output of the Shannon station fell during the year but that of the Pigeon House (steam) station decreased to a much greater extent due to the limited quantity and poor quality of coal available. The financial results, in spite of increased charges (raising the average price from 1·68d. to 1·85d. per kWh) was a further loss of £324,353; the accumulated deficit is now £529,539. Sanction to a further increase in prices is being sought.

Importance of Research

FURTHER evidence of the importance of encouraging research was given by Sir Harry Railing in his review of the General Electric Co.'s war work at the company's annual meeting last week. Without the availability of the facilities of the research departments of the G.E.C. and other large industrial concerns the development and production of many of the war-winning weapons such as radar, ultra-short-wave valves, cathode-ray tubes, etc., would have been an impossibility. Both from the point of view of our future safety and of our hoped-for improved standard of living any money spent on expanding this side of manufacturers' activities may be considered well spent.

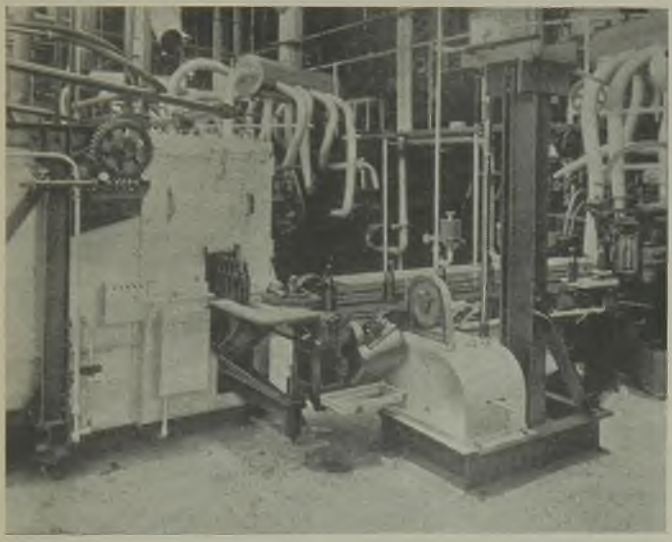
Electric Vehicles

IT is disappointing to hear from the Electric Vehicle Association that facilities for the production of 500 prototype vehicles has had to be suspended. (Why 500 " prototypes," by the way?) The Association says it has " had to accept the position that the time is not propitious for the production of a national standard electric vehicle." The trouble seems from the Association's report to have been lack of materials—labour is not mentioned. Surely the time should be " propitious " very soon.

Industry in Ayrshire—II

Load Building Results and Prospects

THERE is much of interest in the chemical world in this part of Scotland; the article "Making T.N.T." in the *Electrical Review* of February 2nd, 1945, presented an example of what may be seen in more than one district. A factory which commenced making nitro-glycerine in 1873 with an area of 100 acres now produces all manner of high explosives and propellant powders and employs 2,400 people on a factory area of 1,200 acres.



Bottle factory of the Portland Glass Co., Ltd., Irvine, which employs an electrically-heated annealing lehr

Whisky blending is another notable industry in the area, and one of the largest and most important undertakings handling this product is "still going strong" with its headquarters in Kilmarnock. The load is a considerable one and valuable on account of its long hours. Considerable quantities of electricity are also taken by the potteries and earthenware industries at Kilmarnock, Hurlford and Dreghorn where high-grade sanitary ware, sinks, cisterns, fireplaces, sewage pipes, fire bricks and wall tiles are produced extensively. In one factory alone 404,000 kWh is consumed yearly.

The principal ports are Ardrossan, Ayr, Irvine, and Troon, and each of them is equipped with cargo cranes of from 3 to 40 tons capacity, hoists and up-to-date electrical conveyors for the coaling of vessels and railway sidings alongside the steamer berths. The vessels bring in raw materials and export coal, steel, fireclay, and so on, and to the electrical eye it is obvious that the respective inputs and outputs would be very much lower without the aid of electricity. Ayr is the county town and has a romantic history, linked with Robert the Bruce in the far distant past and Robert Burns more

At the works of the Hosiery Manufacturing Co., Ltd.; sewing machines in finishing shop

recently. It has a population of nearly 40,000, and since the formation of the Ayrshire Electricity Board its consumers and load have risen from about 1,200 to 6,800 kW.

Ardrossan, to which a supply was first given in 1923, occupies a splendid position with magnificent views of the Firth of Clyde. Among its industries are oilskins, sawmilling, bitumen, lubricants and pre-cast concrete slabs, all of which show evidence of the work of the load builders.

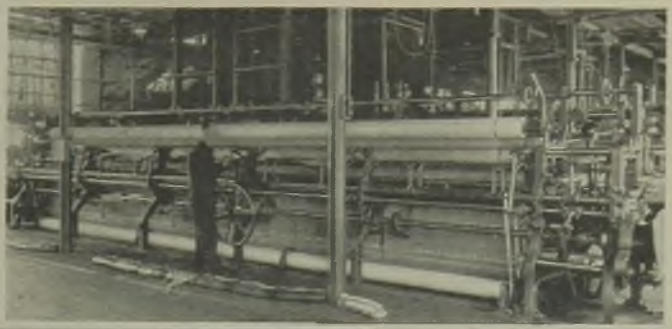
All-electric excavator at rock face of Hillhouse Quarries, the first industrial consumer of the Board

Irvine stands at the mouth of the river of the same name and presents a fine harbour. It first had an electricity supply in 1914. It is rich in industrial life and one of the factories we visited in the town is the bottle factory of the Portland Glass Co., Ltd., where an outstanding point of electrical interest is an electrically-heated lehr employed for annealing bottles produced in a nearby moulding machine. From the moulding machine the bottles are chain-belt fed to the lehr which is loaded at 15 kW and thermostatically controlled. There is something like 370 kW of installed plant at this factory and the load factor is good because it is desirable to run the furnace for long periods. Also at Irvine we saw in the block works of Laird & Son, Ltd., a 1½-ton electrically driven stamping hammer contributing towards the production of ships' fittings, hooks and pulley blocks, etc. The works consumption is about 2,250,000 kWh per year. Again in this versatile community, we saw all classes of knitwear in production at the works of the Hosiery Manufacturing Co., Ltd. At the time of our visit 11,000 pairs of army socks were being produced per week. The whole of the factory is electrically driven and the annual consumption is of the order of 60,000 kWh.

Near Troon, with its famous golf courses, are the quarries of Hillhouse Estates, Ltd., the first industrial consumer of the Ayrshire Electricity Board. It produces the famous Ayrshire blue basalt in all sizes from 2½ in. to superdust, either clean or treated with tar, etc. The stone is particularly suitable for road making. At the rock face we saw the blasted material directly loaded into wagons by an all-electric Ruston Bucyrus excavator. The material is crushed and screened by modern plant which is capable of producing 1,000 tons of macadam daily, and after drying and cleaning the rock is conveyed

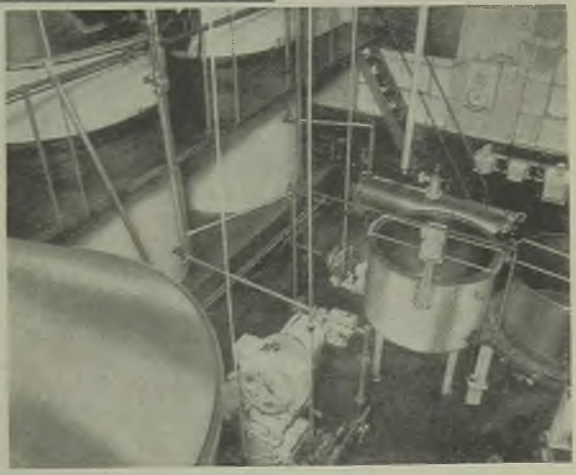
New swimming pool at Kilmarnock equipped with electrically driven wave-producing machinery

to storage bins by endless belt conveyors. In addition to a 500-ton per day tarmacadam plant there are three special plants for the production of asphalt carpeting, and macadam and chippings treated with bitumen at high temperatures. The heavy peaks of the excavator and crushing machinery have little or no effect on the supply conditions. The consumption of the quarry and its associate workings is 1,000,000 kWh per annum. About 2,000 kW of electrical plant has been installed.



In the works of A. J. Muir & Co., Ltd., exceptionally wide looms are normally engaged in manufacturing lace curtains

Above: Polishing curling stones at Mauchline.
Right: Plant at the Mauchline powdered milk factory, including horizontal tubular milk heater, sugar boiler and small jacketed milk tank, milk pumps and drying chamber (front left)



Kilmarnock may be described as the industrial capital of Ayrshire. With a total population of 40,000 it is the largest burgh in the county, and engineering in its widest sense is probably its most outstanding industry. Among other things it is the home of Glenfield & Kennedy, Ltd., whose products are familiar to power station men.

At Kilmarnock there is a new swimming pool which is equipped with artificial wave-production apparatus manufactured by Glenfield & Kennedy, who presented it to the Corporation. It is electrically driven, of course, and by means of stroke variations in the driving mechanism it generates waves of continuously changing shape. Many medical men have declared that the massage effect of the waves breaking against the body and of the aeration of the water in the pool caused by the breakers have a beneficial effect on the health of the bathers; so the wave machine must be a good "load builder."

Newmilns and Darvel are two towns situated close to each other in the beautiful Irvine valley; they have similar industrial interests which lie in a world reputation for

high-grade laces, brocades, madras, nets and muslins, etc. Our investigations took us into the works of A. J. Muir & Co., Ltd., where we saw exceptionally wide looms which are normally engaged in the manufacture of lace curtains. There is about 100 kW of load at this factory and the annual consumption is about 65,200 kWh. One of the most ancient burghs in Scotland is Prestwick, whose value as a future load-building development ground depends largely on its promise as an air port. During wartime the aerodrome has certainly made very extensive demands on the electricity undertaking.

Mauchline is the home of a famous old industry and a notable new industry. The first is the production of curling stones at the works of Andrew Kay & Co., Ltd. These stones are the implements of an ice sport which flourishes in Scotland and Canada : the Dominion represents the largest market for the stones. The raw material is rough granite from Ailsa Craig, and blocks of this, roughly circular in shape, are chipped by hand and then subjected to lathe cutting and cupping before being ground on carborundum blocks. Finally they are polished whilst revolving in suitable heads under polishing mediums held down by weighted levers. Two 10-HP motor group drives in this factory have replaced a 46-HP gas engine. The factory normally consumes about 10,000 kWh and turns out about 2,000 pairs of stones per year.

The new industry is the production of powdered milk at the factory of the Scottish Milk Powder Co., Ltd. In peacetime this factory handles by-products such as skimmed milk and butter milk, and the process is the Gray Jenson spray-drying one. The whole of the plant is of stainless steel, and the main electrical application is the driving of pumps. The milk is first pumped to storage tanks and then heated by steam tubes and so pre-condensed. The condensed milk is sprayed into a drying chamber. Heated air is simultaneously supplied to the drying chamber by a motor-driven fan, the hot air mingling with the sprayed milk to produce instantaneous drying. The powder falls to the bottom of the conical drying chamber and is sucked out by fans and delivered to hoppers. The factory consumes about 200,000 kWh per year.

At Galston, a little town in the centre of the rich agricultural district east of Kilmarnock, there is the busy blanket works of the Scottish Co-operative Wholesale Society, Ltd. The first group of processes there are similar to those in most textile factories and consist of wool blending, willeying, oiling and teasing, carding, spinning, winding, warping and weaving. Finishing involves cleansing and de-greasing and carbonising by which the blanket is treated in vitriol to burn the vegetable matter without affecting the wool. After drying, following this treatment, the blankets are passed through pressure rollers which grind out all the carbonised matter. The vitriol is then neutralised by treatment of the blanket in a strong solution of soda to preserve the colour. Shrinking in a soap solution and rinsing in cold water are followed by hanging out the blankets in a sulphur atmosphere to bring out the colour and introduce a protective agent. After final drying, blankets for the English market are fluffed up on a raising machine, while the blankets for the sterner Scottish breed are left unraised. In this factory there is about 145 HP of motors installed and the consumption is about 125,000 kWh per year.

Blanket making at Galston : shrinking machine rear left, centrifugal dryer, right front, picking out knots and loose ends from blanket, rear right

At Kilbirnie, where is situated the Spout of Garnock, said to be the finest cascade in Ayrshire, we saw something of another well-established Ayrshire industry, thread making, at the works of W. & J. Knox, Ltd. Of out-

standing interest at this factory is the hackling machine which combs out partly-processed flax. Bundles of the flax are held in reciprocating members on either side of the machine which lower and raise the flax between rollers carrying pins. The flax is then passed on to spinning machines similar to those in a modern textile factory. The loading and consumption of this factory are about 1,300 kW and 2,000,000 kWh per year, respectively.

Hackling machine at Kilbirnie which combs out flax for thread making

The many industries referred to in this article represent only a cross section of the whole, with a view to depicting the varied nature of the ground on which the load builders have to work. With such a diversity of interest the electricity undertaking staff cannot specialise to such an extent as in areas where one industry predominates. Load building in Ayrshire involves the hard work of personal interviews, largely by the district superintendents, coupled with goodwill and a full appreciation of the technical background conditions at the power station and on the distribution system.

In the domestic field the absence of local showrooms in the rather scattered districts is compensated for by the use of a mobile showroom in the form of a converted petrol bus, well appointed with the usual domestic showroom equipment, including cookers, wash boilers and water heaters. The following figures represent, respectively for each item, the connected apparatus hired out by the undertaking and the privately-owned connected apparatus.—Cookers 2,323 and 3,200; water heaters 237 and 830; wash boilers 60 and 970; fires 870 and 24,650.

Because of the very great personal attention necessary to obtain permission from so many consumers for us to visit their factories, we feel that the usual acknowledgment of help and facilities is quite inadequate. We can only hope that the enthusiasm of Mr. William C. Bexon, the chief engineer and manager, has been reflected in what we have written.

Somerset Rating Decision

THE South Somerset and District Electricity Co., Ltd., succeeded before the Rating Appeals Committee of Somerset Quarter Sessions at Taunton last week when it was respondent to an appeal brought by the Somerset County Valuation Committee against the decision of the Yeovil Area Assessment Committee in respect of the rating of the company's undertaking in that area. Mr. G. D. Squibb for the County Valuation Committee, said there was a cumulo valuation of the whole undertaking on a profit basis which was agreed, subject to the point at issue, at £15,042. The point at issue was that the Excess Profits Tax paid by the company should be deducted from the gross receipts in order to arrive at the net receipts figure for rating purposes, but it was submitted for the County Valuation Committee that E.P.T. was indistinguishable for rating purposes from income tax and should not for the purpose of rating be deducted from gross receipts. It was stated that the cumulo rating figure before the County Valuation Officer's new assessment in 1943 was £7,453.

Mr. Comyns Carr, K.C., for the Electricity Company, said the appellants were seeking to take advantage of the increased profit-making ability of an electricity undertaking, which at present went to the Government, and put it into the pockets of the ratepayers. He argued that the company's point that E.P.T. should be deducted before arriving at the net receipts for rating, which had been accepted by the Assessment Committee, was the correct interpretation of the matter. The Committee confirmed the Assessment Committee's decision and dismissed the Valuation Committee's appeal with costs.

Views on the News

Reflections on Current Topics

REFUTING an accusation that his company had been dilatory in developing supply in its area, Mr. W. R. T. Skinner, general manager of the North Lincs. & Howdenshire Co., has told the Caistor R.D.C. that 43 out of 44 villages with a population of over 500 are now receiving a supply, 40 out of 58 with populations of between 250 and 500, and 51 out of 134 with populations below 250.

But apparently company undertakings can never do right for a member of the Council said:—"The large villages pay them jolly well and they have probably done very well there. But we have to remember the wider responsibilities in the whole rural district." It seems to me that the companies generally are dealing with their responsibilities "jolly well" in not very encouraging circumstances.

* * *

A pointer to the growing popularity of electricity for domestic purposes is given by results of a questionnaire sent by the Billingham-on-Tees Urban District Council to local residents on the subject of the use of electricity or gas in future Council houses. One hundred and nine persons preferred electricity for cooking and forty-seven gas. Those in favour of electric washing facilities numbered 111, while those who wanted gas were forty-five. Electric fires received 124 votes, gas only twenty. It is not surprising therefore that the Council has decided to have their future houses all-electric. Many other councils would probably come to the same conclusion if they took the trouble to discover the wishes of their tenants.

* * *

As a sequel to its reference (which I mentioned the other week) to the ingenious consumer who used an electric kettle to heat her bath, "Contact" (the staff journal of Central London Electricity, Ltd.) now tells of a small shopkeeper who wished to leave his window lighting on till late in the evening, although he did not live on the premises. He had an ordinary alarm clock with the bell taken off and the clapper attached to the trip lever of a break-back mousetrap by a piece of strong thread. The clock was on a small shelf and the mousetrap was screwed on to the wall. At night, on leaving the shop, he set the trap, with a piece of whipcord from the trap to the dolly lever of the light switch, which was pulled up when the trap was sprung by the clock. He said it never failed, and the contraption cost him only 4s. 3s., including 3s. 11d. for the alarm clock. With the present difficulty in obtaining alarm clocks and their increased price there is not so much to be gained over the use of the more conventional form of time switch, but I had better remind those who wish to employ this device that the restrictions regarding shop-window lighting still apply.

* * *

In last week's *Electrical Review* it was reported that the Liverpool Electric Power & Lighting Committee was seeking the City Council's sanction to the employment of German prisoners of war in the laying of cables to temporary houses. At its last week's meeting the Council debated the general question of the employment of prisoners on housing estates and decided that they should be used only if British labour was not available. The Ministry of Works is to be asked to press for the early release of building workers from the Forces. A member of the Council proposed that prisoners should not be employed on cable laying but, I am sorry to see, the Council was counted out during the discussion and the subject was shelved until the September meeting.

* * *

The Board of Trade announcement relating to the continuing of the trading and industrial estates in "Development Areas" and the establishment of new ones is of particular interest to manufacturers or prospective manufacturers of electrical appliances, especially the lighter types of domestic apparatus. The estates are especially suitable for the establishment of factories for producing this type of equipment and although a few electrical firms have already availed themselves of the facilities offered at existing estates I have always been surprised that there have not been more. The shortage of labour anticipated for some time to come adds an additional point in favour of the estates, the sites of which have of course been selected with a view to eliminating unemployment in areas most likely to become "depressed." Altogether the existing and proposed estates aim at giving employment to over 100,000.

* * *

I read recently of a case at Henley in which a lady described as a Brazilian diplomat's wife was summoned for the non-payment of an electricity account. She pleaded "diplomatic privilege" but the unsympathetic magistrates nevertheless made an order for payment. This seems to be akin to a revival of the "benefit of clergy" plea which was once considered a good enough way out from all sorts of trouble—even murder.

—REFLECTOR

Ring-Main Calculations

Accelerated Trial and Error Approach

By P. J. Ryle, B.Sc(Eng.), M.I.E.E.

IN calculations of voltage conditions round a projected ring main some degree of trial and error approach is usually unavoidable. The division of the total current from the supply busbar between the two limbs of the ring is, of course, the prime unknown. It appears to be customary, as the first step, simply to assume some likely value for one of these currents, and from this to work round the ring and to find the errors which result from the assumption. A new adjusted value for the limb current is then taken, and trial and error methods are continued until a sufficient degree of agreement with the stated conditions is reached.

The first (and also subsequent) approaches to the correct value of current along the chosen limb may, however, be calculated directly and rationally by the following method, which will generally result in a much quicker convergence to the correct answer. It is assumed that line charging current is negligible.

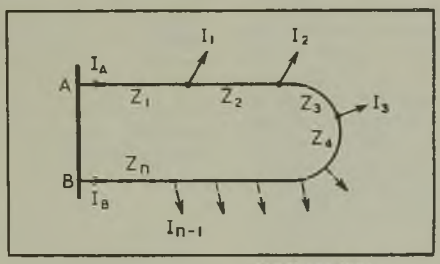


Fig. 1.—Ring main of "n" sections

Referring to Fig. 1, representing a ring of "n" sections, let I_1, I_2, I_3.....I_{n-1} be the various tap-point currents, I_A and I_B the limb currents from the supply busbar AB, Z_1, Z_2, Z_3.....Z_n the impedances of the various sections of the ring between tap points, and Z=the sum of Z_1, Z_2..... Z_n = total impedance round the ring. All the above are complex quantities.

Then, starting from A, the total vector voltage drop round the ring from A to B is $I_A Z_1 + (I_A - I_1) Z_2 + (I_A - I_1 - I_2) Z_3 + \ldots\ldots + (I_A - I_1 - I_2 - \ldots\ldots - I_{n-1}) Z_n$. This must be zero, since A and B are on the same busbar. Therefore, rearranging $I_A (Z_1 + Z_2 + \ldots\ldots + Z_n) = I_1 (Z_2 + Z_3 + \ldots\ldots + Z_n) + I_2 (Z_3 + Z_4 + \ldots\ldots + Z_n) + \ldots\ldots + I_{n-1} Z_n$ whence

$$I_A = \frac{I_1 \Sigma(Z_2 \ldots Z_n) + I_2 \Sigma(Z_3 \ldots Z_n) + \ldots + I_{n-1} Z_n}{Z} \quad (1)$$

and, of course, $I_B = \Sigma(I_1 + I_2 + \ldots + I_{n-1}) - I_A$.

If a ring problem were presented in this form, with definite given tap currents, equation (1) would directly give I_A and thus, by straightforward calculation, the correct voltage drops to all the tap points. Unfortunately almost invariably in practice the busbar voltage is given and the tap demands are simply in the form of kW or kVA at some power factor. In order to initiate calculation it is necessary to convert the tap demands to currents and therefore to make initial assumptions as to the voltages at the tap points. Since the assumed tap voltages will be incorrect, the values of the tap currents assumed will also be incorrect, so that one or two subsequent approach calculations become necessary.

As an example take a 33-kV busbar feeding ring consisting of four sections of overhead line as follows:—Z_1, 10 miles of 0·15 sq. in. line, total impedance 2·9 + j6 ohms; Z_2, 15 miles of 0·1 sq. in. line, total impedance 6·6 + j9·45 ohms; Z_3, 10 miles of 0·1 sq. in. line, total impedance 4·4 + j6·3 ohms; Z_4, 15 miles of 0·15 sq. in. line, total impedance 4·35 + j9 ohms. Z = 18·25 + j30·75 ohms, $Z_2 + Z_3 + Z_4$ = 15·35 + j24·75 ohms, and $Z_3 + Z_4$ = 8·75 + j15·3 ohms. Loads at tapping points: P_1 = 6,000 kVA at 0·85 power factor lag; P_2 = 3,000 kVA at 0·95 power factor lag; P_3 = 4,500 kVA at 0·9 power factor lag.

For the first step, since nothing is known as to the actual voltages at the tap points, assume the voltage at all taps to be equal in magnitude and phase to the bus voltage.

Then, taking bus voltage as reference vector, 19060 V (star), I_1 = 89·8 − j55·7 A, I_2 = 50 − j16·4 A, I_3 = 71·1 − j34·5 A, $I_1 + I_2 + I_3$ = 210·9 − j106·6 A. And from equation (1)

$$I_A = (89{\cdot}8 - j55{\cdot}7)(15{\cdot}35 + j24{\cdot}75) + (50 - j16{\cdot}4)(8{\cdot}75 + j15{\cdot}3) + (71{\cdot}1 - j34{\cdot}5)(4{\cdot}35 + j9)/18{\cdot}25 + j30{\cdot}75 = \frac{4066 + j2475^*}{18{\cdot}25 + j30{\cdot}75}$$

*The method of dividing one complex quantity by another involves the removal of imaginary quantities from the divisor. This is done by multiplying both numerator and denominator of the original fraction by the original denominator with the sign of its imaginary part reversed. Thus

$$\frac{5 + j8}{4 + j3} = \frac{(5 + j8)(4 - j3)}{(4 + j3)(4 - j3)} = \frac{44 + j17}{4^2 + 3^2} = \frac{44 + j17}{25} = 1{\cdot}76 + j{\cdot}68$$

$= 117{\cdot}6 - j62{\cdot}4$ A, and $I_B = I_1 + I_2 + I_3 - I_A = 93{\cdot}3 - j44{\cdot}2$ A.

From this first approach, the voltages at the tap points can be calculated as follows: Drop to tap point $1 = I_A Z_1 = (117{\cdot}6 - j62{\cdot}4)(2{\cdot}9 + j6) = 715 + j525$ V. Star voltage at tap point 1, $V_1 = 19{,}060 - (715 + j525) = 18345 - j525 = 18350$ V $= 96{\cdot}3$ per cent. of bus voltage.

Drop to tap point $2 = I_A Z_1 + (I_A - I_1) Z_2 = 715 + j525 + (27{\cdot}8 - j6{\cdot}7)(6{\cdot}6 + j9{\cdot}45) = 962 + j744$ V. Star voltage at tap point 2, $V_2 = 19{,}060 - (962 + j744) = 18098 - j744 = 18120$ V $= 95{\cdot}1$ per cent. of bus voltage. Similarly (omitting steps), star voltage at tap point 3, $V_3 = 18270$ V $= 95{\cdot}9$ per cent. of bus voltage.

(Checks of the current and voltage calculations can be obtained by working round the ring in the opposite direction, starting with I_B instead of I_A.)

Ignoring Phase Differences

For most practical ring calculations it is sufficiently accurate (at any rate in the first steps) to ignore phase differences between the bus voltage and the tap voltages and to take account only of the voltage magnitudes. The three tap voltages obtained above are all below bus voltage and therefore since the tap demands are given in kVA, the tap currents must be adjusted upwards; try upward adjustments inversely proportional to the voltages. The tap current values for the next approach are then:—

$$I_1 = \frac{1}{\cdot 963}(89{\cdot}8 - j55{\cdot}7) = 93{\cdot}3 - j57{\cdot}9 \text{ A},$$

$$I_2 = \frac{1}{\cdot 951}(50 - j16{\cdot}4) = 52{\cdot}6 - j17{\cdot}2 \text{ A, and}$$

$$I_3 = \frac{1}{\cdot 959}(71{\cdot}1 - j34{\cdot}5) = 74{\cdot}2 - j36 \text{ A.}$$

From these, omitting the calculations, $I_A = 123 - j64{\cdot}8$ A and $I_B = 97{\cdot}1 - j46{\cdot}3$ A. V_1, V_2 and $V_3 = 96{\cdot}1$, $94{\cdot}8$ and $95{\cdot}7$ per cent. of bus voltage.

These voltages now differ little from those obtained at the first approach, so that the results may be considered sufficiently accurate. If not, further similar steps must be worked out, taking, if necessary, account of differences in phase as well as magnitude between the tap voltages and the bus voltage.

However, the type of investigation considered usually concerns projected mains for which the line route lengths and therefore impedances may be doubtful by several per cent. and the tap load magnitudes and power factors are based on estimates of future requirements and are therefore doubtful by appreciable percentages. A high degree of accuracy is therefore rarely justifiable. For very many practical problems (i.e., those in which voltage regulation is nowhere excessive) a quite adequate degree of accuracy may be obtained as follows:—

(1) Calculate only the first approach, as above, on the initial assumption that all tap point voltages are equal to bus voltage, and thus arrive at first approximations to the voltage regulation at each tap point.

(2) If first approach regulation at any particular tap point is p per cent., take the final regulation at that point as $p \times \frac{100}{100 - p}$. Thus, if the first approach were to give the regulation at some tap point as 8 per cent., take as the final result for this point $8 \times \frac{100}{100 - 8} = 8{\cdot}7$ per cent.

The calculations for I_A and I_B can be made somewhat less laborious when the ring consists entirely of one type and size of line. Thus, if the ring consists entirely of lines of impedance $(r + jx)$ ohms per mile, all the impedances Z_1, Z_2, etc., and Z may be written in the form $(r + jx)L$, where L is the corresponding length in miles. The term $(r + jx)$ therefore cancels out in the numerator and denominator of the fraction in equation (1) and

$$I_A = I_1 (L_2 + L_3 + \ldots + L_n) + I_2 (L_3 + L_4 + \ldots + L_n) + \ldots + L_{n-1}(L_n) / L_1 + L_2 + \ldots + L_n \quad \ldots\ldots (2)$$

The denominator of the fraction is here free from imaginary quantities.

If the ring includes sections of double-circuit line (of the same size as other single-circuit sections), the lengths of such sections can simply be written in equation (2) at half their true route lengths.

Same Tap-load Power Factors Assumed

Considerable further shortening of calculation is also possible if all the tap-load power factors are the same, an assumption often justifiable for many somewhat conjectural future supplies. If this power factor is $\cos\phi$ (lag) and I'_1, I'_2, I'_3, etc., are the total tap point load currents (in scalar amps) corresponding to the given values of kVA, then, for constant line size, equation (2) becomes

$$I_A = (\cos\phi - j \sin\phi) \cdot I'_1 (L_2 + L_3 + \ldots + L_n) + I'_2 (L_3 + L_4 + \ldots + L_n) + \ldots + I'_{n-1} (L_n) / L_1 + L_2 + \ldots + L_n \quad \ldots\ldots (3)$$

and the numerator and denominator of the fraction itself are both free of imaginary quantities.

PERSONAL and SOCIAL

News of Men and Women of the Industry

The General Election.—In the big swing-over to the Labour Party revealed by the declaration of the General Election figures last week former members having associations with the electrical industry had varying fortunes. Sir Arnold Gridley (Balfour, Beatty) retained Stockport; Sir Peter Bennett (Joseph Lucas, Ltd.) held Edgbaston, Birmingham, where he succeeded the late Mr. Neville Chamberlain in 1940; Lt.-Col. Sir Cuthbert Headlam, Bt. (Northmet Co.) was again successful at Newcastle North; Sir W. W. Wakefield (Radio & Electrical Developments, Ltd.) remains member for St. Marylebone; and Sir Andrew Duncan is still one of the members for the City of London. On the other hand Mr. Walter Higgs (Higgs Motors, Ltd.) was defeated at West Birmingham; Sir Oliver Simmonds (head of the Simmonds Group) at Duddeston (Birmingham); Lord Dunglass (County of London Co.) at Lanark; Sir A. G. Erskine Hill (Balfour, Beatty) at North Edinburgh; and Capt. L. F. Plugge at Chatham.

Mr. R. R. Stokes (Ransomes & Rapier, Ltd.) held Ipswich for Labour. Among the new Labour members are Mr. A. M. F. Palmer, A.M.I.E.E. (Wimbledon), author of the Fabian Society's pamphlet on "The Future of Electricity Supply"; Lt.-Col. L. J. Edwards (Blackburn) secretary of the G.P.O. Engineering Union; Mr. H. W. Wallace (Walthamstow, E.), Mr. W. R. Williams (Heston and Isleworth) and Mr. H. E. Randall (Clitheroe), Post Office Workers' Union; Mr. F. Lee (Hulme, Manchester), chairman of the Metropolitan-Vickers Works Committee; Mr. C. R. Hobson (Wembley) a power station engineer; Mr. F. A. Cobb (Elland, Yorks.), a radio engineer; and Mr. T. F. Cook (Dundee), an electrician.

Major G. Lloyd George, the former Minister of Fuel and Power retained his seat at Pembroke as a Liberal.

Ministerial Appointments.—Mr. Attlee, the Prime Minister, announced the first appointments in the new Government last week-end. They included the names of Mr. Hugh Dalton, who becomes Chancellor of the Exchequer, and Sir Stafford Cripps, President of the Board of Trade. Mr. Dalton was President of the Board of Trade in the National Government and Sir Stafford Cripps was Minister of Aircraft Production.

Sir Eugene Ramsden, a director of British Insulated Callender's Cables, Ltd., the Yorkshire Electric Power Co. and the North Lincolnshire & Howdenshire Electricity Co., Ltd., who was created a baron in the King's Birthday Honours List in June, takes the title of Baron Ramsden of Birkenshaw.

Sir John Dalton is relinquishing the position of Regional Controller of Fuel and Power for London and South-East England to resume his duties with the County of London Electric Supply Co., Ltd., of which he is a director and manager and secretary. Sir John will continue to act as chairman of the Public Utilities Coal Committee.

Mr. Leslie Gordon, clerk and solicitor to the London and Home Counties Joint Electricity Authority, is due to retire on superannuation on August 18th, but has agreed to continue his service for a period not exceeding twelve months.

Mr. R. H. M. Drake is the new president of the Electrical Contractors' Association; he succeeds Mr. W. Riggs, who has served as president throughout the whole term of the war in Europe. Mr. Drake, who is chairman of Drake & Gorham, Ltd., has occupied the office before—in 1936-37.

Mr. W. M. Craig, B.Sc.(Eng.), A.M.I.E.E., A.M.I.Mech.E., has relinquished his position as assistant chief engineer to High Duty Alloys, Ltd., which he has held since 1940, to become a director of Holliday, Hall & Stinson, Ltd., electrical engineers and contractors. His activities will be chiefly concerned with plant installation in the heavy industries. Mr. Craig commenced his engineering career with the English Electric Co., Ltd., at the Stafford Works, and from there was transferred to the company's Bedford office as technical sales engineer.

Mr. W. M. Craig

Alderman Robert John Hall, J.P., has been appointed a director of British Insulated Callender's Cables, Ltd. Alderman Hall is a member of the Mersey Docks and Harbour Board and chairman of the Overhead Railway Co. He was Lord Mayor of Liverpool in 1935-36.

Dr. S. Wernick has been elected president of the Electrodepositors' Technical Society in succession to **Dr. J. R. I. Hepburn.** Dr. Wernick has been honorary secretary and editor of the Society for many years past.

Mr. E. C. Best is retiring from the position of district electrical assistant, Nottingham, to the London and North-Eastern Railway.

Mr. Frederick Colin Burstall has been appointed to the board of the Automatic Telephone & Electric Co., Ltd. Before joining the company in 1931 Mr. Burstall was Deputy Inspector

General of the Egyptian State Railways, Posts and Telegraphs, to whom he was seconded from the British Post Office in 1925. Mr. Burstall was educated at Magdalen College School, Oxford, and commenced his career in telecommunications with the National Telephone Co. in 1904. He is chairman of Hivac, Ltd., and a director of Elexcel, Ltd.

Mr. W. H. Metcalfe, A.M.I.E.E., who as announced recently has been appointed engineer and manager of the Morley Electricity Department, has been engineer and manager of the Bacup undertaking since 1931. Born in Highbury in 1897, Mr. Metcalfe went to Wakefield Academy and the Institution of Technology, Wakefield, completing his training with the Wakefield Light Railway and the Yorkshire (W.R.) Electric Tramways Co. After serving in the Forces from 1915 to 1919, he became engineer assistant to the latter company, and two years later was appointed resident engineer to the Pontefract Electricity Supply, a position he held until going to Bacup. Mr. Metcalfe has served on the N.W. England and N. Wales Area Committee of E.D.A. since 1937, and is at present chairman of the committee and representative on the E.D.A. Council. He has represented the employers' side for Group E on the N.W. Area of the D.J.B. for the Electricity Supply Industry since 1942, and is a representative of the J.M.E.A. on the local Advisory Committee of the National Register of Electrical Installation Contractors.

Mr. W. H. Metcalfe

At a recent meeting of the Wallasey Electricity Committee the chairman referred in sympathetic terms to the illness of **Mr. B. T. Hawkins,** the electrical engineer and manager and to his impending retirement at the end of the month. The Committee placed on record its appreciation of his services over a period of twenty-four years. As we recently reported, Mr. Hawkins is being succeeded by **Mr. R. E. Golding,** deputy borough electrical engineer of Great Yarmouth.

Grimsby Corporation is inviting applications for the post of borough electrical engineer in succession to **Mr. G. W. Parker,** who is retiring.

Mr. G. E. Collier, A.M.I.E.E., assistant sales manager, Edinburgh Electricity Department, has been appointed consumers' engineer in the Stafford Electricity Department. Mr. Collier who has been at Edinburgh for seventeen years will take up his new duties in September.

Mr. L. W. G. Russell, meter superintendent in the Hackney Electricity Department, has been re-designated " meter and test superintendent " and transferred from Grade 8 of the N.J.B. Schedule to Grade 5.

Mr. F. Aust, M.Sc., A.M.Inst.C.E., A.M.I.E.E., who has been head of the Electrical Engineering Department of Rugby College of Technology and Arts since 1923, will retire at the end of the present term. He will be succeeded by **Mr. A. Draper,** B.Sc., A.M.I.E.E., who has been chief lecturer in the Department since 1929.

Bradford Corporation has recorded appreciation of the services of **Mr. G. Flett,** power station superintendent, who has retired after thirty-two years' service.

Mr. E. N. Evans, A.M.I.E.E., has joined Hocking & Orchard, Ltd., Bristol, as technical engineer, and will handle the products of Lancashire Dynamo & Crypto, Ltd., and their associated companies, in the West of England. Mr. Evans has been associated with Spillers, Ltd., millers, since 1925, being appointed chief electrical engineer at the company's Avonmouth Mills in 1936. He takes up his new duties on August 15th.

Mr. Thomas Poad, of A. Reyrolle & Co., Ltd., is shortly leaving the Construction Department of the company to join the London contracts staff as a sales engineer. He has been responsible for the completion of many of the firm's major projects, principally in connection with the South-East England grid scheme, including the substation at Little Barford.

Mr. Ernest Taylor, B.Sc., A.M.I.E.E., who joined the technical staff of the South-East England District of the Central Electricity Board in 1935, is shortly to take up an appointment as electrical engineer with Simon Carves, Ltd., being responsible for the electrical side of the company's contracts. Mr. Taylor was a student of Manchester University and, after a period with the Lancashire Electric Power Co., spent four years at the Willesden works of the B.T.H. Co. At a gathering of the C.E.B. Technical Department at Aldwych House on July 27th, Mr. Taylor was presented with a cheque by Mr. J. Williams, technical engineer for South-East England.

Mr. E. R. Wilkinson, M.I.E.E., commercial manager of the Central Electricity Board, is to serve as president of the Association of Supervising Electrical Engineers for a further year. He will deliver his presidential address at the Association's meeting on October 16th, at the Lighting Service Bureau, Savoy Hill, E.C.2.

Mr. James S. Clinton has resigned from the position of city electrical engineer of Salisbury, Rhodesia, to take up consulting work.

Mr. C. E. Tavener has been appointed a director of the Globe Telegraph & Trust Co., Ltd.

Messrs. M. G. and R. W. Weekes, chartered civil engineers, have amalgamated their consulting practice with that of Howard Humphreys & Sons, of 17, Victoria Street, Westminster, S.W.1, in whose name the joint practice will be carried on in the future. Mr. M. G. Weekes is retiring for reasons of health and Mr. R. W.

Weekes is resigning from the practice, having been elected to the board of the Harland Engineering Co., Ltd., with whom he has decided to continue his wartime association.

Sheffield Corporation is advertising in this issue for a deputy to the general manager and engineer at a commencing salary of £1,100. The vacancy arises from the recent appointment of **Mr. R. H. Coates** as engineer and manager of the Portsmouth undertaking.

Blackburn Corporation is advertising a further vacancy—that of technical superintendent (salary £664). The Corporation is already seeking a deputy electrical engineer, a consumers' engineer and an assistant station engineer.

Miss C. Haslett has returned by air from a four-week visit to the Middle East where she has been lecturing to Forces men and women in the big cities and desert camps.

Obituary

Mr. Walter William Cole, who had been on the staff of the Newcastle Electric Supply Co. for over thirty years, died on July 23rd. He joined the company from the forerunner of the British Electrical Development Association, the Joint Electricity Supply Publicity Committee, having been its first paid official, and having charge of its offices in Tudor Street. In the 1914-18 war he served in the Royal Engineers (wireless section).

Mr. O. S. Pratt, B.A., of the Mullard Radio Valve Co., died on July 22nd. Upon leaving Sidney Sussex College, Cambridge, he joined the company at Balham in 1924 as chemist, and in 1934 became head of the Technical Department. In 1937 he also took control of the experimental and final test departments, becoming chief valve engineer in 1938. Since 1943, Mr. Pratt had been technical adviser on valves, and was largely engaged on liaison work with Government Departments and on Government committees.

Mr. A. G. Cutts, chief electrical engineer at the Hawarden Bridge Ironworks of John Summers & Sons, Ltd., died a few days ago at the Chester Royal Infirmary. He was fifty-nine.

Mr. R. C. Porter, formerly senior lecturer in mechanical engineering and director of the power station at Birmingham University, died on July 27th, at the age of seventy-three.

Mr. G. O. Craib.—The death, in London, of Mr. George Oliphant Craib, secretary of the Midland Counties Electric Supply Co., Ltd., is reported.

Flight-Sergt. P. J. N. Eve.—We regret to learn of the death on active service in the Far East of Flight-Sergeant P. J. N. Eve, son of Mr. J. L. Eve (J. L. Eve Construction Co., Ltd.).

Reinstatement in Employment

City of London Co. Case

THE Umpire under the Reinstatement in Civil Employment Act, 1944, has given a decision in favour of the City of London Electric Lighting Co., Ltd., in a case brought against it by a former employee. This employee, Mr. G. A. Spacey, a substation attendant who had been in the company's employ for fifteen years, left for war service on August 5th, 1943. His war service ended on February 2nd this year at the beginning of 56 days' leave pending discharge, during which period he was available for civil employment.

Having failed to obtain employment on oral application he made a formal application for reinstatement through his Local Office. The company replied that owing to loss of business through enemy action it had no employment to offer him, whereupon Mr. Spacey, on February 28th, applied to the Reinstatement Committee under the Act alleging that his rights were being denied to him. On April 19th the Committee ordered the employers to make employment available to the applicant and made a further order for the payment to him of compensation amounting to £26 for the loss suffered, or likely to be suffered, by the applicant by reason of their default.

Leave to appeal was given. The first ground of appeal was that at the time of the Committee's decision it was not reasonable or practicable to re-employ the applicant without discharging some other employee and this was illegal without the permission of the National Service Officer under the Essential Work (General Provisions) Order; the decision on an application made by the company for this permission had not been received at the date of the hearing.

Umpire's Views

In the Umpire's opinion there is no reason to doubt the sincerity of the desire of the company to perform its obligations and to reinstate the applicant at the first opportunity. There was a short delay before the company applied to the National Service Officer for permission to discharge another man and that application was in respect of one man only. Nevertheless it is considered that there is no reason for inferring that this militated against the earlier employment of the applicant. On the evidence the Umpire finds that the company has discharged the onus of proving that it took the applicant into employment at the first reasonable and practicable opportunity and he disagrees with the implied finding of the Reinstatement Commlttee that this was not the case. He decides that the company's appeal shall be allowed and the orders made by the Reinstatement Committee set aside.

CORRESPONDENCE

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for correspondents' opinions.

Nameplate Information

IN many factories plant is continually being moved on account of alterations to improve output and because new designs need different machinery. Electrical equipment supplied for certain duties consequently becomes temporarily " stores stock " or has to be remounted.

When the factory engineer has this work to do he is often faced with the problem of providing new foundations and lifting tackle capacity. Would it not be useful to have the weight of apparatus stamped on the nameplate, particularly in the case of motors which are often mounted on wall brackets ?

HEAVY WEIGHT.

Treasurers and Engineers

MAY I add a note to my letter in the *Electrical Review* of July 20th on "Engineers and the Public." The Newcastle-on-Tyne City Council has decided to put the administration of trading departments into the hands of the treasurer and this will be used as a lever to augment the status of the treasurers in other towns in a similar manner. The treasurers have been hammering away at this for some forty years mainly by maintaining that tariffs have too much variety. The idea in their minds is that a unit is a unit and it is as absurd to make different charges for a unit as it would be to make different charges per lb. for tea taken from the same canister. Talk to them and finance committees about load factor, power factor, diversity factor and other such matters and they do not understand it and in private conversation the treasurer will probably explain that these are engineers' ideas and can be disregarded.

The splendid results obtained by electricity departments with low charges and big contributions to the rates are forgotten. Cases have happened where the town has promoted a costly Bill in Parliament and some thousands of pounds have been debited to electricity because two or three unneeded electrical clauses were inserted in it. The proposals now being put forward would reduce the electricity departments to the status of a Government Department. If a man wishes to introduce a new industry into a town and requires special terms he will be told to take the tariff or leave it. The present method by which electrical men eagerly go after new business must cease. It is this eagerness which has so puzzled men with official minds, for while it had led to prosperity it has also produced variety in tariffs and to the official type uniformity is more important than increased business and reduced charges. It will be no good ringing up the treasurer's secretary to see if anything can be done to bring in new business by varying the tariff, he will reply that the treasurer has something else to do than to run after the electrical engineer. Which is true enough and a sufficient reason for leaving electrical administration to experts who understand their business.

Tynemouth. C. TURNBULL.

Electric Vehicle Association

THOUGH its main work has been in the direction of planning for the future the Electric Vehicle Association of Great Britain, Ltd., can claim solid progress in several directions during 1944. Its annual report records that Crossley Motors have joined the Association and that the applications of certain other concerns are under consideration. As a result of advertising and other activities 149 inquiries have been dealt with during the year.

A specially useful piece of work accomplished was the production by E.D.A. of a summary of the current battery charging tariffs of 250 electricity supply undertakings, and steps to secure further information of this kind are to be taken. Some of the battery manufacturers are willing to co-operate in the production of a standard type of battery and it only remains for the final design to be settled. The British Standards Institution has been asked to set up a panel to reconsider the standardisation of fittings and accessories for electric vehicles.

Negotiations with the Ministry of Supply for facilities to produce 500 prototype electric vehicles have had to be suspended and the Association has had to accept the position that the present time is not propitious for the production of a national standard electric vehicle. However, contact with the Ministry is being maintained with the view to ensuring that the materials will become available for the production of vehicles as soon as possible, and steps are being taken to enlist the interest and support of other Government Departments. Contact has been established with the Automatic Transportation Co. of New York to secure data on electric vehicles in the U.S.A.

Electronic Ohmmeter

For Insulation Tests and Measuring Resistivity of Fluids

AN electronic ohmmeter that is described as being suitable for various kinds of insulation tests as well as for measuring the resistivity of fluids, with the aid of appropriate electrodes and associated equipment, is announced by Jackson Automatic Electric Controls, Ltd., Windsor House, Victoria Street, London, S.W.1. The instrument is

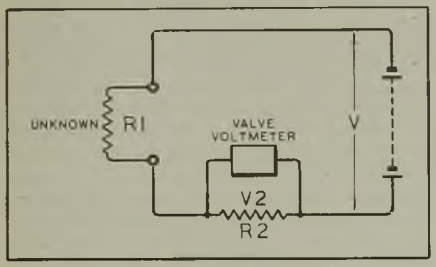


Fig. 1.—Diagram illustrating operating principle

mains energised, AC 200-250 V, and it has three ranges extending from 0·3 to 50,000 megohms, which may be increased if desired.

The principle of operation is impression of DC on the unknown and standard resistances in series. The voltage drop across the standard is a function of the current through the unknown resistance, the voltage drop being measured by a valve voltmeter. Provided the input impedance of the meter is high compared with the standard resistance, then, as Fig. 1 indicates, $R_1 = R_2\left(\frac{V}{V_2} - 1\right)$.

The voltmeter consists of a remote cut-off pentode to give a suitable scale law and a negative feed back circuit to ensure reasonable freedom from supply voltage variations and changed valve parameters. The plate circuit is operated on AC with resultant economy in cost, space and weight due to the omission of rectifying and smoothing circuits. A second valve provides a test voltage of 500 V DC which is smoothed. If specified, different test voltages can be provided, in which case a selector switch permitting immediate availability of a number of different test voltages would be incorporated.

The live terminal is negative with respect to the earth terminal and the circuit is arranged so that on short circuit a large negative bias is applied to the amplifying valve. Moreover, the resistances incorporated in the test circuit limit the current to a safe value on short circuit. No damage can therefore be caused by inadvertent operation.

The calibration of the instrument may be regarded as almost independent of valve replacement. Both valves operate well within their rating and long life is assured.

Three standard resistors, one for each range, are in series with the resistance under test and give multiplying range factors of 1, 10 and 100. These resistors are of the cracked carbon film high stability type and are accurate to within 2 per cent., possessing low temperature coefficients.

For portable meters or where mains supply is not available the instrument may be energised from a small battery and sealed-in type of vibrator, eliminating the cranked generator and slipping coupling. This feature is of great value to electrical contractors as all that is necessary is to close the switch for the test voltage to be available.

Special safety prods or crocodile clips can be supplied as may be required. It is sometimes preferable to incorporate a switch in the test lead circuit to ensure that the prods are not alive before application of the equipment to be tested. This switch may be incorporated in the instrument or in the prod leads themselves.

The meter is provided with a moving-coil 270 deg. scale instrument which increases the accuracy of reading. Alternatively a modern

Fig. 2.—Second prototype electronic ohmmeter

square case precision meter with 120 deg. scale can be provided. This type of instrument adds to the general appearance and the choice is a matter of the customer's preference. The total power consumption is 10 W and a pilot lamp is fitted to indicate when the meter is energised.

NEW BOOKS

Radio Test Instruments. Protective Gear Systems.

Radio Service Test Gear. By W. H. Cazaly. Pp. 89; figs. 46. Sir Isaac Pitman & Sons, Ltd., Parker Street, Kingsway, London, W.C.2. Price 6s.

This book is almost completely based on articles by the author which have appeared in the *Wireless World*. In general it may be said that its contents cover a rather wider field than the title would indicate. " Radio service " is generally taken to mean the repair of radio equipment which presumably operated satisfactorily in the first place; the design of radio receivers is quite a different proposition, and while certain instruments are common to the repairer and the designer, the latter makes use of many additional pieces of gear.

Mr. Cazaly has included information on a number of instruments not commonly found in the repair shop at the present time. It may be that such instruments ought to have a place there, and in any case, their inclusion adds to the value of the book. It is surprising, however, to find no reference to that more versatile tool of the designer and repairer alike, the cathode-ray oscillograph. The omission may have been deliberate, but in view of the increasing popularity of this instrument, one would have expected a chapter to be devoted to it.

After an opening chapter on the assessing of receiver performance, the author deals with standard signal generators and test oscillators. Output meters and attenuators are described in the next chapter, which is followed by one on valve voltmeters. Audio-frequency testers and bridges for inductance and capacitance are next dealt with, with a separate chapter on radio-frequency measurement of the same properties, together with electrolytic condenser testing. Beat frequency AF oscillators have a chapter to themselves. Valve testers are described in some detail, and both the elementary total emission type and the more commonly used mutual conductance variety are covered. The final chapter deals with the multivibrator type of generator.

Throughout the book reference to proprietary equipment has been excluded; circuit diagrams are provided, but no constructional details, or, in most cases, component values, are given. The author, in a preface, hopes that readers will attempt the construction of instruments, and rather provokingly states " Design data for *all* the instruments mentioned are to be found in a large number of technical books and periodicals if people take the trouble to search for themselves—which is far better for their own radio education than being told exactly where to look." As one who has wasted much time in searches, often unsuccessful, of this very type, the reviewer cannot endorse the author's suggestion that his radio education has thereby been noticeably improved. Apart from this difference of opinion, it is felt that the book does contain much useful information which would otherwise be difficult to acquire.—W. E. M.

The Protective Gear Handbook. By M. Kaufmann. (298 pp.; 184 figs.) Sir Isaac Pitman & Sons, Ltd. Price 30s.

This book forms a companion volume to " The Switchgear Handbook," but the author remarks in his preface that it is also intended to serve as a general textbook which will be of assistance to students as well as to engineers responsible for the design or maintenance of protective gear systems. The book opens with an introductory chapter giving definitions of protective gear terms, and dealing with system earthing and current transformer characteristics. The following five chapters describe fully most of the well-known methods of protecting feeders, busbars, transformers, and generators. The final chapter is on testing and maintenance.

The author, a protective gear engineer with Metropolitan-Vickers, has had extensive first-hand experience of protective gear work, and the book is full of valuable practical data which will be of assistance to the protective gear engineer in choosing a new system, or in operating an existing system to its best advantage. The book is clearly written and fully illustrated, and little knowledge is assumed on the part of the reader.

It should be mentioned, however, that the book is concerned almost exclusively with Metropolitan-Vickers systems and apparatus. There is little specific information, for example, on distance systems of the reactance type, or on neutral displacement protection, and certain systems developed within the last few years are not included. Carrier current protection is not treated as fully as its importance warrants.

No mention is made of the great utility of automatic fault recording instruments in diagnosing the cause of protective gear mal-operation; such instruments give a record of the current and voltage conditions on the system during a fault, and thus enable these conditions to be reproduced subsequently when the relays are tested.

A bibliography would have been useful to readers wishing to study further certain parts of the subject; in particular, references might have been given to a number of useful papers in the *I.E.E. Journal*. Although the book has just been published, the preface is dated October 31st, 1943, so that it appears to have been written some time ago. This may account for some of the omissions which it is hoped will be remedied in a second edition.—J.S.F.

Production Plant Maintenance

Attracting the Right Kind of Men

By H. Greaves, A.M.I.I.A.

AT a meeting I attended some time ago the maintenance department came under discussion and the expression "non-productive" was applied to the department as a whole, not in any derogatory sense, but as a simple statement of fact.

When it is considered that a man, or woman, can be taken from an unskilled occupation and within a very short time gain proficiency in the control of a semi- or fully-automatic machine, thus becoming "productive," the position is rather bewildering. This machine may be a highly complicated appliance from an electrical point of view and has probably cost several thousand pounds. For example, it may incorporate a time-delay device comprising a transformer, valve, potentiometer, resistor and capacitor. Thus any man who is called upon to maintain the machine must have a knowledge of the theory of its operation and be something more than a "fool with a pair of pliers in his pocket."

This simple instance is cited to show how the duties of the maintenance electrician have changed since the days of single motor drive with line shafting and lines of belt-driven machines. Furthermore, without the aid of these electrical devices, the volume of production we see to-day could not have been reached, a fact which is proved by the small amount of "fitting" required in modern factories, both removal of metal and correct surface finish having been satisfactorily carried out by the machine. In the future scientific mechanisation will play a great part in reducing man-hours required, and the value of efficient maintenance will be even more important.

Skill and Status

When a machine is installed, the representative of the firm supplying it (especially if it comes from the United States), being little more than a demonstrator, often has to enlist the advice and services of the maintenance department in order to get the machine into production. Although electrical maintenance engineers, by tracing and rectifying the most stubborn and mystifying faults, have made a valuable contribution to production during the war, they are ludicrously classed as "non-productive," a sort of necessary evil. So long as employers think in these terms, the status of the maintenance electrician will not be improved. His rating is usually the lowest of all engaged on this class of work, and payment for his skill seems to be in inverse proportion to his value to production. Is the real reason for the low estimation of the value of electrical maintenance that the decline of the apprenticeship system has focused attention to such a degree on planning and methods of production that individual skill is considered of minor importance?

Maximum Machine-Hours

In computing non-productive costs the expression "machine-hours" is taken into account, as this is of necessity of more importance than man-hours, especially when we consider the initial cost of the machine and amount of time in which it may stand idle—often as much as half the working day. If we are to recover our position in world trade machines must be in operation for the maximum time each day, calling for efficient planning and just as efficient maintenance, in order to minimise the price of the finished product.

Another point which requires consideration is supervision. The modern production foreman is of the "functional" type; he need not have had an engineering training so long as he can get the work done and possesses the ability to secure discipline with firmness and tact. Such qualifications are not enough in a maintenance foreman, who must also possess the skill necessary to locate the most elusive fault and in addition possess organising ability to a high degree; he does not require anyone to plan his work, but must exercise eternal vigilance in order to avoid major breakdowns.

The decline of the craftsman has produced the machine minder with little or no mechanical knowledge who is able to augment his or her wages by bonus payable for a better than average performance. It is difficult to adapt such methods to the plant maintenance staff, and attempts to reward individuals cause dissatisfaction and the quality of work suffers. The remedy is to set a standard for

maintenance men and to engage only men who can achieve this standard, paying them at a sufficiently high rate to attract the right kind. The result would be a definite improvement in the quality of work carried out, for one of the reasons for the low rate of pay considered appropriate for this work is probably the low grade of man who is allowed to enter this class.

Engineers responsible for the engagement of labour can do much to bring about an improvement, when the present shortage of skilled men is past. The method of engagement should not present much difficulty, for it is not so much skill in the manipulation of tools that is needed but rather a sound knowledge of principles of operation of electrical machines. Such knowledge can be gained by attendance at a technical college, by correspondence course or by reading books on the subject, and the cost of acquiring it is within reach of anyone.

Electricity in Eire

Increased Revenue from Lower Sales

ALTHOUGH the sales of electricity by the Eire Electricity Supply Board fell in the year ended March 31st last from 346,938,333 kWh to 319,010,297 kWh, the gross revenue was £44,098 higher at £2,477,901 due to alteration in prices at the close of 1943. Working expenditure, however, also showed an increase from £1,705,078 to £1,850,459, as did interest, repayment of advances and discharge of capital liabilities acquired with local authorities (from £924,847 to £951,795), so that there was an adverse balance of £324,353 (against £196,120), raising the accumulated deficit to £539,539. A sum of £315,000 for depreciation charged to revenue account brings the total made available towards wasting capital assets to £4,683,630. Capital invested in additional plant placed in commission during the year, including a portion of the Liffey works, was £980,616, as compared with £470,888 in the preceding year, the aggregate total expenditure at March 31st was £18,108,332.

The limited quantity and poor quality of available coal, combined with the effects of an unusually dry spring and summer during the first six months of the year necessitated severe rationing of all classes of consumers throughout the summer, but later in the year the situation was eased through heavy rainfall. Of the reduced output of 406 million kWh (compared with 443 million kWh) the hydro-electric stations generated 282 million kWh. In view of the amount of the deficiency for the year ended March 31st, 1944, and the indication from estimates that, with increased expenditure on coal and maintenance, the deficiency in the year under review would be substantially higher, it was decided to press again the application for sanction to increase prices, but this had not been received at the close of the year.

At March 31st the number of consumers was 228,008, which was 5,995 more than a year before. Generation costs per kWh rose from 1·31d. to 1·45d., the price per kWh sold being 1·85d. (1·68d.). Of the 319 million kWh sold (8 per cent. decrease), 116 million kWh was used for domestic purposes (10·2 per cent. decrease), 32 million kWh for general lighting (7·6 per cent. decrease), 36 million for general heating, cooking and water heating (7·4 per cent. decrease), 128 million kWh for motive power (5·6 per cent. decrease), 8 million kWh for public lighting (6·4 per cent. increase), 4 million kWh for traction (37·5 per cent. decrease) and 4 million kWh for miscellaneous purposes (6·0 per cent. decrease).

Contracts were placed for a 12,500–kW turbo-alternator set and two boilers of 125,000 lb. per hr. for the Portarlington peat fuel station. An investigation into the possibility of providing additional steam generating stations using peat as fuel was carried out and a suitable site for a second station was tentatively decided upon. To improve the boiler capacity in the Pigeon House (Dublin) station a contract was entered into for the installation of two boiler units, each of 100,000 lb. per hr. The first of the two main generating sets in the Pollaphouca station on the Liffey was placed in temporary commission in December, 1944, and produced 15 million kWh. The erection of the second set proceeded as the deliveries of materials allowed. Both the Pollaphouca and Golden Falls stations are working with improvised switch and control gear pending delivery of the complete equipment.

Schemes for the hydro-electric development of the Lower River Erne and the Lower River Liffey have been prepared for submission to the Minister for Industry and Commerce.

As a result of the limitation on sales of appliances the turnover shown in the Merchandise Trading Account decreased from £37,643 to £24,778 with a gross profit on sales of 23·6 per cent. The account incurred a loss of £250, having been charged with overhead expenses and interest on working capital. On the Installations Trading Account the credit taken for contracts completed and invoiced work carried out by the Department was £62,897 (against £74,561). The rate of gross profit was 28·4 per cent. and after the debiting of overhead expenses and interest on capital there was a net profit of £4,457.

Transformers in Parallel

Graphical Construction for Division of Load

By J. E. Macfarlane,
B.Sc.(Eng.), M.I.E.E., A.M.I.Mech.E.

A TRANSFORMER can be represented by a resistance and reactance in series, if the parallel portion of the equivalent circuit which allows for the no-load current is neglected. If another transformer of similar voltage ratio is connected in parallel to the primary and secondary busbars, the voltages are common and the load current will divide between the two transformers inversely as their impedances. With any given load and power-factor the magnitude and direction of the vector representing the total current is fixed and to some other scale represents the total kVA, as the voltage is common. The division of load may be calculated from the equivalent resistance and reactance of the transformer to either the primary or secondary side or similar results obtained from suitable test figures.

Method of Procedure

A graphical method is often preferred where mathematical experience is not sufficiently developed. Such a method, which requires the use of only a pair of compasses and suitable scales, is illustrated in the following examples.

Example 1. Two 60-kVA 3,000/230-V single - phase transformers have to operate in parallel and share a load of 100-kW at 0·8 power - factor lagging. A short-circuit test was taken on each transformer with the same current in the primary windings.

The figures then obtained, with the secondaries short-circuited, were: Transformer A, 100 V, 16 A, 640 W; transformer B, 80 V, 16 A, 1,020 W. Obtain the respective primary currents and power-factors, neglecting the effect of the no-load currents. The method is to calculate the short-circuit power-factor of each transformer, the total current on the primary side and the short-circuit current of transformer B at the same test voltage as A.

Transformer A, power-factor $= \frac{640}{100 \times 16} =$ 0·4. Transformer B, power-factor $= \frac{1020}{80 \times 16}$ $= 0{\cdot}8$. Short-circuit current of B with same test voltage as A $= \frac{100}{80} \times 16 = 20$ A.

Total load current $= \frac{100 \times 1000}{3000 \times 0{\cdot}8} = 41{\cdot}7$ A.

In constructing Fig. 1 draw a horizontal scale OP for power-factor and with O as centre describe the power-factor quadrant PQ. To a convenient scale lay off OA equal to 16 A, at a power-factor of 0·4, and to the same scale lay off OB equal to 20 A, at a power-factor of 0·8. Draw OC the resultant of OA and OB and measure its length to the short-circuit current scale, which is 34·8 A. To some other scale OC represents the total load current, but the phase angle POC is not 0·8 power-factor as required. If OC is swung round to OC_1 which is 0·8 power-factor, the relative positions of the two component currents will be unchanged. To fix their positions, take the arc DB and mark it off on the power-factor quadrant at the intersections of OA and OB produced, that is at OA_1 produced and OB_1. The vertical ordinates from these points of intersection give the respective power-factors of Transformers A and B. But OC_1 equals 41·7 A, to the load current scale, hence to the same scale $OA_1 = \frac{16}{34{\cdot}8} \times 41{\cdot}7 = 19{\cdot}2$ A at 0·6 power-factor and $OB_1 = \frac{20}{34{\cdot}8} \times 41{\cdot}7 = 24$ A at 0·915 power-factor.

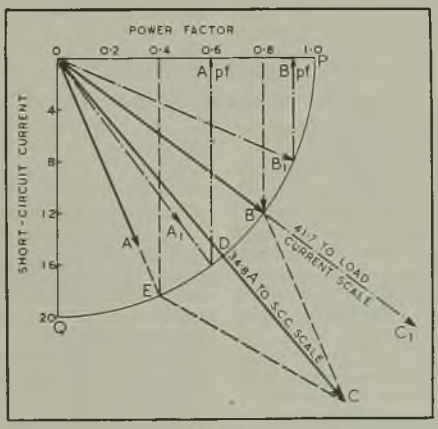


Fig. 1

If the resistance and reactance of each

transformer is known, either in ohms or as a percentage value, a similar construction is used but with an admittance instead of a current scale. With transformers of different ratings these values are adjusted to a common base as shown in the following example.

Example 2. Two transformers of the same voltage ratio share a load of 900 kW at 0·9 power-factor lagging. Transformer A is 800 kVA and has 2 per cent. resistance and 5 per cent. reactance drop on full-load whilst transformer B is 400 kVA and has 3 per cent. resistance and 4 per cent. reactance drop on full-load. Determine the kVA and power-factor of each transformer, having the following characteristics:—Transformer A: 800 kVA; impedance $(Z_A) = \sqrt{2^2 + 5^2} = 5{\cdot}385$ per cent.; admittance $= \frac{1}{Z_A} = 0{\cdot}186$; short-circuit power-factor $= \frac{2}{5{\cdot}385} = 0{\cdot}371$. Transformer B: 400 kVA to 800 kVA base; R = 6 per cent.; X = 8 per cent.; impedance $(Z_B) = \sqrt{6^2 + 8^2} = 10$ per cent.; admittance $= \frac{1}{Z_B} = 0{\cdot}1$; short-circuit power-factor $= \frac{6}{10} = 0{\cdot}6$. Total load $= \frac{900}{0{\cdot}9} = 1{,}000$ kVA.

In Fig. 2, OA is 0·186 and OB is 0·1, to the short-circuit admittance scale, which gives a resultant admittance of OC which scales 0·2825. The construction is as before, OC being swung round to OC_1 at 0·9 power-factor lagging. Similarly OA moves to OA_1 and OB to OB_1, the respective projections on to the power-factor quadrant indicate the power-factors, whilst the lengths relative

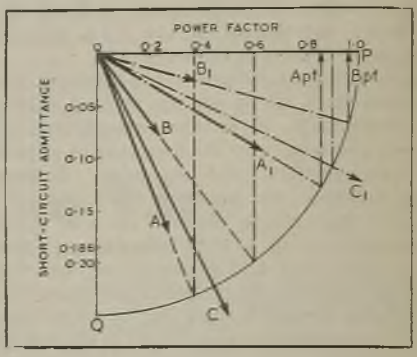


Fig. 2

to OC_1 give the kVA. The results are:—Transformer A 658 kVA at 0·855 power-factor; Transformer B 354 kVA at 0·96 power-factor.

This diagram can be used for any total load at any power-factor after the characteristic quadrilateral OECB (Fig. 1) has been constructed, though the p.f. quadrant may have to be extended above the horizontal OP for leading power-factors.

Australian Notes

From Our Australian Correspondent

THE new power station to be erected at South Fremantle will generate at a frequency of 50 cycles in conformity with the standard adopted by all other Australian stations with the exception of the East Perth station, where the frequency is 40 cycles. The Western Australian State Government has now decided to convert the East Perth station to 50 cycles, and has secured from the Commonwealth Government a grant on a £1 for £1 basis up to a total of £300,000. The Perth Chamber of Commerce, however, has greeted the news with mixed feelings, and is asking the Premier (Mr. Willcock) whether the State will bear the cost of conversion of all the electric motors used throughout Western Australia for industry and commerce.

Mr. Willcock says that the estimated savings to the community over the next twenty years will be (at present value): system losses, £93,000; transformer costs, £39,000; future motor costs, £154,000; total, £286,000.

A plan to make Victoria entirely self-supporting for power and fuel supplies is being put into action, and £7,000,000 will be spent for the development of the new open cut at the Ayllour briquetting factory and other works for the State Electricity Commission. The twenty-fifth annual report of the Commission shows a total revenue for the year 1943–44 of £5,628,780, an increase of £138,692 on the previous year. Expenditure was £5,503,908, showing an accumulated profit of £129,727. Tramway losses were: Ballarat, £2,762; Bendigo, £17,350; and Geelong, £4,158.

A conference of Hunter Valley councils and industrial organisations recently supported the nationalisation of the coal industry, the co-ordination of the electricity supply, and the co-operation of local government bodies to provide cheap power throughout the district. The conference also recommended the establishment of a factory at Cessnock for producing electrical appliances.

The Merredin (W.A.) Road Board has decided to proceed immediately with the conversion of its present 220-V DC supply to 50-cycle three-phase.

COMMERCE and INDUSTRY

Electricity for Farms. Undertakings' Building Work.

Newcastle Farm Week

A VERY good opportunity for demonstrating rural uses of electricity will be provided during the special "Farm Week" which is to be held on the Town Moor, Newcastle-upon-Tyne, from August 25th to September 1st. An area of 25 acres is being laid out to represent, as nearly as possible under present restricted conditions, a working farm with steading including byres, barns, etc., a grazing area, and an actual cultivation area. In addition one part is devoted to machinery displays, and others to rural crafts, education, etc., the underlying idea being to show townspeople the life and habits of the country.

The North-Eastern Electric Supply Co., Ltd., is taking a great interest in the exhibition, and it has undertaken to provide, free of charge, a substation and low-voltage network to supply all the machinery and any lighting and is also not charging for electricity used. It is assisting in the layout of all machinery, and is lending any which is not being shown as an exhibit. The farm steading will be virtually all-electric, the only exception being that there will be a traction engine, a tractor, and an electric motor to drive the thresher, so that the old and new methods can be compared. The dairy will, of course, be all-electric. Unfortunately, it has not been possible to erect a farmhouse or farm cottage, but to get round the difficulty of showing domestic apparatus which would be suitable in such buildings, the company is erecting a marquee and putting into it one of the new E.D.A. post-war kitchens, as well as other domestic electrical appliances.

Part of the domestic appliance section at the Bovey Tracey exhibition

Hexton Electrical Exhibition

A recent electrical exhibition arranged by the Northmet Power Co. at the Village Hall, Hexton, included a display of electrical apparatus for use on the farm and in the home. The farm apparatus included an electric welder, milking machine, farm steriliser, churn stool, washing tank, a model of the well-known Essex mill, a model grain dryer and conveyor, a plant irradiator, soil heating cable, greenhouse heating, etc. Cookers, washing machines, wash boilers, water heaters, kettles and irons were among the domestic appliances on view.

Bovey Tracey Farm Display

Every farmer and landowner in the 100 sq. mile area served by the Teignmouth Electric Lighting Co., Ltd., and the Dawlish Electric Light & Power Co., Ltd., was invited to an exhibition organised jointly by the two companies at Bovey Tracey recently. A representative selection of domestic apparatus included Jackson and G.E.C. cookers, "Sadia" water heaters, refrigerators, small appliances, and "Osram" and "Mazda" discharge lighting apparatus. A joint display by the War Agricultural Committee and Seale-Hayne College dealt with soil and livestock improvement, cereal varieties, plant disease and pest control, improvement of grassland and modern milk production. Sound films on topical and modern farming subjects were shown each evening. Demonstrations were given of machinery and appliances of farming interest, notably an Essex mill, Godwin and Beresford pumping sets, Gascoigne milking and G.E.C. sterilising equipment, Frigidaire commercial refrigerators, "Sadia" and other water heating appliances for dairies, portable motors, Wolseley shearers and clippers, portable tools, farm wiring systems, etc. E.D.A. kitchen models were also displayed and cooking demonstrations were given three times daily.

Engineering Training

This is the title of a well-illustrated brochure produced by Babcock & Wilcox, Ltd., for the guidance of young men embarking upon an engineering career. In an introduction the chairman of the company, Lt.-Col. Sir John Greenly, says that the main object of the training schemes outlined is the best possible and most efficient training for the graduate engineer and the student apprentice who may enter the company's service. The opportunities which that service gives for acquiring a thorough and up-to-date knowledge in combustion and steam generation are stressed in the opening notes which show the wide range of the company's activities.

An outline of the desirable preliminary training for candidates is then given and after some pages dealing with the company's works there follows a description of the training courses which are for graduate engineers and student apprentices. Graduate engineers undergo a probationary period of eight months at the end of which they proceed on a 28-month course on the production, engineering or sales sides of the business. Then if they are selected for positions with the company they have

a finishing course of one year abroad. Student apprentices serve a probationary period of nine months, followed by a 39-month training on the engineering side and (if selected for employment by the company) a year abroad.

During training students are expected to carry their studies to Higher National Certificate standard or to attain a full university degree. Generous remuneration is provided for their subsistence. Copies of the brochure are obtainable from Babcock House, Farringdon Street, E.C.4.

Transporting a Wireless Station

A complete wireless station, weighing 700 tons and requiring five special trains comprising 183 wagons has been moved by the L.M.S. Railway from Cleckheaton to Immingham *en route* to India.

Back to Normal

The accompanying picture sent to us by Mr. H. Pryce-Jones, engineer and manager of the Brighton Electricity Department, shows one of the advertisements that his undertaking is now displaying on buses and trolley-buses. It is interesting as indicating the return to normal trading activities after a long period of repression.

Electricity advertised again on a Brighton trolley-bus

Trade with New Zealand

At a meeting of the Manchester Branch of the Institute of Export last week, Mr. C. W. Bridgen (Ferranti, Ltd.) expressed what the *Manchester Guardian* calls " an interesting but hardly encouraging view " of the Australian and New Zealand import markets. He said that the Act of Import Selection passed by the New Zealand Government to foster the Dominion's secondary industries prevented the import of articles of a class manufactured in New Zealand and this often meant that the New Zealander had to be content with inferior products. There was practically nothing on the free list for household or personal use. There was an absolute prohibition on the import of small apparatus used in house, office or factory and electrical equipment such as cookers and heaters and radio sets. Mr. Bridgen considered that unless many of the restrictions were removed New Zealand would suffer.

In his reference to Australia Mr. Bridgen said that the Commonwealth had almost everything it needed, except rubber and cotton. Nothing was left available for import except textiles, special apparatus and heavy machinery.

Supply Undertakings' Building Work

Under the Control of Building Operations (No. 5) Order, 1945 (S.R. & O. 1945 No. 802; Stationery Office, price 1d.) a limitation is imposed upon the carrying out of building work costing more than £10 except under authorisation. The new Order is applicable, *inter alia*, to building and civil engineering works undertaken by statutory undertakers, but does not affect the present position with regard to the repair and maintenance of existing building and civil engineering works.

In the application of the Order to the execution of works by electricity undertakers, the Electricity Commissioners, as the authorising authority, have authorised all undertakers to carry out the construction, reconstruction or alteration of building and civil engineering works essential for the purposes of their undertakings and costing more than £10 but not exceeding £500 on the conditions that the undertaking furnishes to the Commissioners, not later than ten days after the expiration of each month, a return giving particulars of each job carried out under this authorisation during the preceding month; and that the Commissioners reserve the right to review or withdraw this authorisation at any time. Prior individual application will still be necessary for authorisation to execute building and civil engineering work in excess of £500.

Trading Estates

In addition to sponsoring the building of new factories, and the disposal of surplus Government factories, in accordance with the Government's general distribution of industry policy, the Board of Trade is to continue the trading and industrial estates in Development Areas and establish new ones. These will normally be operated through trading estate companies financed by the Government. The new estates will be at South Shields, Hartlepool, Swansea, Newhouse (Lanarkshire), Greenock and Port Glasgow, Dundee, and Salterbeck, Workington. In addition the Royal Ordnance Factories at Aycliffe, Spennymoor, Hirwaun and Bridgend are to be taken over and operated as trading estates.

Steel Company Fined

Sheffield magistrates last week imposed a fine of £100, with £11 costs, on the English Steel Corporation, Ltd., for not having an electric overhead travelling crane properly maintained. An inspector of factories stated that after delivering

a tool in the stamp shop the crane was started and the pulley block fell off, striking a man and causing him fatal injury. It was found that part of the guard of the pulley block to keep the rope in position was missing. If the guard had been in position the block could not have fallen off. For the defence it was contended that there was nothing in the Factory Acts to compel the maintenance of guards on the pulley blocks, but because it was the custom the company had them. The crane was inspected at intervals.

Purchase Tax on Electrical Apparatus

The London and Home Counties Joint Electricity Authority is suggesting to electricity undertakings in its district that they should make representations direct to the Board of Trade and through their Parliamentary representatives, regarding the imposition of purchase tax on domestic electrical apparatus, insisting that the subject should receive further consideration by the Treasury.

Queen Mary College

Queen Mary College (University of London) has moved to Mile End Road, London, E.1 (telephone: Advance 4211-4).

North Western Fuel Luncheon Club

The North Western Fuel Luncheon Club has been formed to function on generally similar lines to the London Fuel Luncheon Club. Details are available from the hon. organising secretary, Mr. R. Baker, Selas Works, City Road, Manchester. The first luncheon meeting is provisionally fixed for October.

Fatal Accidents to Children

An inquest was held last week at Oxford into the death of a 21-month old child, Angela Luckett, who was found in a garden clutching a bare cable charged at 230-V. Her grandfather stated in evidence that he had fitted up a motor-driven lathe in a shed at the bottom of the garden to which he had run a length of insulated wire. The little girl was watching him trying the lathe and later he heard her scream and he found her kneeling on the ground with the wire in her hand. About an inch of the wire was bare. A representative of the Wessex Electricity Co. said that no permission to install the wire had been sought and in any event it would have been refused. The Coroner returned a verdict of accidental death.

At Burnley recently Audrey Barber, aged 12, was found lying dead in the kitchen of her home, having apparently received an electric shock from the wiring of an electric clock.

At the inquest Mr. W. Westall, installation inspector for the Corporation Electricity Department, said that the wiring had been jointed in an unskilled manner. There was an attempt to insulate it by a rubber band, which had slipped out of position.

A.T.S. at Birmingham Exhibition

A week or two ago an exhibition of domestic electrical appliances was specially arranged for the benefit of members of the A.T.S. at the Paradise Street showrooms of the Birmingham Electric Supply Department. On the first day a party of officers and other ranks from a Midland Army Educational Centre paid a visit and were encouraged to ask questions about the operation and cost of appliances. The next day the show was inspected by a party from an Army Domestic Science School near Birmingham.

An A.T.S. party at the Birmingham showrooms

Trade Publications

Metropolitan-Vickers Electrical Co., Ltd., 1, Kingsway, London, W.C.2.—Abridged list announcing price reductions of certain "Cosmos" general service lamps.

Acru Electric Tool Manufacturing Co., Ltd., 123, Hyde Road, Ardwick, Manchester, 12.—Illustrated leaflet describing vest-pocket neon testers, two-pole model and single-pole with screwdriver attachment.

Frank Whitelegg, 90, Robin Hood Lane, Sutton, Surrey.—Leaflet (list GNA) illustrating eight types of coil and wire winding machines.

Ransomes & Rapier, Ltd., Waterside Works, Ipswich.—Publication No. 453 illustrating and giving brief particulars of the Rapier "14R" concrete paver.

Applicants for copies of these publications should write on business letter-headings.

Trade Announcements

Woodhall & Partners (1929), Ltd., have moved to St. Mary's Square, Swansea (telephone: Swansea 2088-9).

The London office of Newalls Insulation Co., Ltd., is now at Everite House, 59½, Southwark Street, London, S.E.1 (telephone: Waterloo 6421). The Washington Chemical Co., Ltd., has also moved to Everite House.

The works and offices of the Ray Engineering Co., Ltd., are closed for annual holidays until August 13th. A small staff will be in attendance from August 8th to deal with urgent matters.

ELECTRICITY SUPPLY

Bournemouth Purchase Move. Luton Rural Plan.

Bedford.—ELECTRICITY PROSPECTS.—In the report and summary of accounts of the Electricity Department (engineer, Mr. P. G. Campling) for the four years 1941-44, it is stated that all the resources of the undertaking will be needed to meet the demands of the future. The Rural Demonstration Scheme which has been wound up shows a total accumulated deficit for the eleven years' working of £29,009 and the sum of £5,000 has been paid by the Corporation to the Development Commissioners in full satisfaction of the outstanding amount of loan. On the subject of charges it is pointed out that while the average price obtained for lighting, heating and domestic two-part tariff supplies fell from 1·338d. to 1·292d. in the four years, the figure for power rose from 0·736d. to 0·958d. in consequence of the coal clause. It is considered that some adjustment will have to be made to rectify this anomaly.

Birkenhead. — GENERATING STATION EXTENSION.—The Electricity Committee reports that Merz & McLellan, the consultants, have submitted plans and estimates for the extension of the power station by the installation of a further 50,000-kW set in the second section, the estimated cost being £1,851,000.

Bournemouth. — PROPOSED ACQUISITION OF UNDERTAKING.—At a recent meeting of the Borough Council an interim report upon the purchase of the undertaking of the Bournemouth & Poole Electricity Supply Co. in the town was considered and a resolution was adopted in favour of the acquisition, it being pointed out that the next opportunity for purchase would not arise until 1953. Similar resolutions have been passed by the Poole and Christchurch Town Councils in whose areas the company also operates.

Bradford.—HYDRO-ELECTRIC STATION PROPOSED.—At a meeting of the Corporation Reconstruction Committee the chairman stated that he was in consultation with the electrical engineer regarding a suggestion to construct a hydro-electric station at Apperley Bridge.

Brighton.—H.V. SYSTEM EXTENSIONS.—The Corporation Public Utilities Committee is to extend the 33-kV system from the power station to a substation to be erected at Withdean at a cost of £72,814.

Cardiff.—POWER STATION EXTENSION. — A deputation has been appointed by the Corporation Electricity Committee to discuss with the Central Electricity Board the question of the future extension of Roath power station.

HIRE AND HIRE-PURCHASE.—The Committee is seeking authority to utilise £10,000 of surplus revenue for supplying electric cookers and water heaters on hire and hire-purchase.

THE PENARTH UNDERTAKING.—The Parliamentary Committee has been asked to include in the new Parliamentary Bill provisions empowering the Corporation to acquire the electricity undertaking of the Penarth U.D.C.

STREET LIGHTING CONVERSION.—The Corporation Works Committee is seeking sanction to borrow £40,000 for the conversion of street gas lamps to electricity.

Falmouth.—PUBLIC LIGHTING.—A proposal by the Town Council to light the streets by electricity is to remain in abeyance for six months and for the present 100 existing lamps are to be prepared for gas lighting as from September 1st. This decision was reached at the last meeting of the Council when a letter was read from the manager of the gas company saying he thought it grossly unfair that the Council should contemplate using electricity without giving the gas company an opportunity to quote.

Grimsby. — HIGHER CHARGES? — Since the beginning of the war the electricity undertaking has had to pay £100,000 more to meet increases in the cost of coal. Alderman W. H. Thickett, chairman of the Electricity Committee, stated at a meeting of the Town Council that this would probably necessitate an increase in the price of electricity. The annual report shows that sales of electricity at 63,762,569 kWh are over 7 million kWh higher than in any previous year. The gross revenue rose from £258,112 to £292,080, the surplus balance being £5,351 (£1,772).

High Wycombe. — ALTERNATIVE SUPPLY SCHEME.—The Wessex Electricity Co. is to construct an additional main transmission line from Reading and Marlow to operate with the existing line as a ring. The company is also to construct on behalf of the Town Council a new line from Marlow to the Wycombe boundary at Cressex and to sell to the Council the existing lines, at an estimated price of £18,124. Application is to be made for sanction to borrow £200,000 to cover the cost and possible contingencies.

Jersey. — REDUCED CHARGES. — The Jersey Electricity Co., Ltd., announces that after the September quarter its charges will be reduced from 10½d. to 7d. per kWh for lighting and from 7½d. to 4d. per kWh for heating, cooking and power. The "unit" charge for two-part tariffs is also reduced from 6½d. to 3d. No charge will in future be made for meters.

Hull.—NET PROFIT.—The annual report of the Electricity Department submitted by the general manager (Mr. D. Bellamy) to the Electricity Committee shows a net profit of £27,997.

Leeds.—DEARER POWER SUPPLIES.—Charges for electricity for power purposes have been increased by 5 per cent. Domestic consumers are not affected.

Luton. — RURAL SUPPLIES. — Mr. H. W. Grimmitt, of the Electricity Commission, was among the speakers at a recent conference on rural electrification held at Dunstable Town Hall. Councillor A. W. Gregory presided and the delegates, numbering about 100, included representatives of the rural district and parish councils within the area of supply of the Luton Electricity Department, and many members of the National Farmers' Union. Mr. Grimmitt said that before the war there was considerable hesitation among farmers in taking a supply of electricity; now, however,

the demand was universal. He understood it was the object of the Luton undertaking to bring country prices as near as possible to those in the towns. The farmers in the area were fortunate in obtaining electricity at a price that was less than in most other areas in the country. In fact, in the undertaking as a whole the price was two-thirds of the national average.

Mr. C. T. Melling, borough electrical engineer, outlined the plans of the undertaking. He said that a supply was already available to all villages and hamlets with a normal population of more than about 50, which was much in advance of the recommendations of the Scott Report, and in the ten-year programme it would be possible, with few exceptions to supply every hamlet of more than 25 inhabitants. Nearly 200 of the 500 farms in the area already used electricity.

Nottingham. — YEAR'S PROFIT. — The accounts of the electricity undertaking for the past year show a net profit of £11,312 against £12,211 for 1943-44. The total quantity of electricity sold was 2 per cent. higher at 217·3 million kWh.

DOMESTIC INSTALLATIONS.—The Electricity Committee is considering the wiring of houses for power points on the same lines as the assisted wiring scheme. The electrical engineer is to report on the provision of all kinds of electrical appliances for use in working-class homes as a post-war reconstruction scheme.

Oldham. — COOKERS ON HIRE-PURCHASE. — Mr. E. Binns, borough electrical engineer, stated at a recent meeting of the Electricity Committee that he hoped that it would be possible to renew hire-purchase of cookers as soon as supplies became available.

Romsey.—ELECTRIC STREET LIGHTING. — The streets were lighted by electricity for the first time a few days ago. A contract for gas lighting expired early in the war.

Southwark.—DEFICIT ON UNDERTAKING.—The Borough Council Electricity Committee reports a net deficit of £7,948 for the past year.

Tynemouth. — TRANSFER OF PART OF UNDERTAKING.—The Corporation Electricity Committee is to discuss with the North-Eastern Electric Supply Co., Ltd., the question of the proposed purchase of that part of the company's undertaking within the borough at New York.

LIGHTING CONTROL.—The Corporation Electricity Committee recommends a scheme estimated to cost £7,574, for the installation of an electric lighting control system of the type manufactured by Standard Telephones & Cables, Ltd.

TRANSPORT

Edinburgh.—RECORD TRAFFIC.—Tram and bus passengers for the year ending May 31st numbered 252,168,468, an increase of 7,385,543 as compared with the previous year. The combined revenue from the trams and buses was £1,635,025, an increase of £54,214.

Hyde. — ABANDONMENT OF TRAMS. — The Stalybridge, Hyde, Mossley and Dukinfield Transport and Electricity Board is to abandon tramways in Hyde from Lewis Street to Market Street.

South Shields.—TROLLEY-BUS EXTENSIONS.—An unsuccessful move to refer back the plan for spending a further £13,000 on trolley-bus extensions was made at a recent meeting of Town Council. Councillor Hardesty asserted that within ten years trolley-buses would be obsolete, and he also complained that the streets were not suitable for them; he advocated the use of motor buses.

Simplified Light Metals Control

A SIMPLIFIED procedure for the control of raw and fabricated light metals was introduced as from August 1st. The general intention is to permit a return to free competition and the normal commercial relationship between consumer and producer, except in special cases.

The Control of Aluminium (Nos. 5-6) Orders, 1940-45, and the Light Metals and Alloys, Fabrication (No. 1) Order, will remain in force but under the new procedure running licences will be granted so that users of raw material will be free to purchase and use it in any desired amounts, for any purpose, and from any domestic supplier (except for virgin aluminium, where the Ministry of Aircraft Production will continue to be the sole trader). New users will need to apply to the Light Metals Control, Banbury, for licences. Exporters of unwrought aluminium and aluminium alloys will still need to apply for individual licences authorising them to dispose of material to persons outside the United Kingdom. Users of sheet, extrusions, castings, forgings, or other forms of fabricated aluminium, will be free to place orders direct with fabricators. Fabricators will be free to accept Service, civil and export orders without reference to the Control.

The Control of Magnesium (No. 4) Order, 1942, will also remain in force. No change is contemplated in the present procedure covering monthly licences for acquisition and use of raw material. Users and producers of fabricated magnesium will have the same freedom of action as for fabricated aluminium.

The Control of Silicon (No. 1) Order, 1940, is to be revoked, whereupon it will cease to be necessary to apply for licences to acquire and use metallic silicon. The M.A.P. will continue to trade as at present, and any person wishing to acquire silicon will simply send his order to the Light Metals Control.

The Headquarters of the Light Metals Control will continue to be at Banbury. The four Fabrication Controls (Sheet & Strip, Extrusions, Castings, and Forging & Stampings) will continue to operate from their present offices during August, but from September 1st they will be amalgamated into one section, operating from the following address: Ministry of Aircraft Production, Light Metals Control, Section LM2, The Vale, Edgbaston Park Road, Birmingham, 15. Although the principal functions of the Fabrication Controls, notably the allocation and approval of orders and the routine progressing of deliveries will be discontinued, the simplified control organisation will continue to render assistance in obtaining supplies for urgent needs, and in ensuring deliveries of materials against Government contracts in cases of difficulty.

FINANCIAL SECTION

Company News. Stock Exchange Activities.

Reports and Dividends

The General Electric Co., Ltd.—Some idea of the immensity of the G.E.C.'s war effort was given by Sir Harry Railing, the chairman, at the annual general meeting on Thursday last week. The claim made nearly sixty years ago to supply "everything electrical" still stood. The Government had found in the G.E.C. an organisation ready and prepared to tackle practically every electrical problem, as well as many mechanical ones, making it possible to execute the many rush programmes for new devices or increased production.

The great volume of war work had necessitated largely increased production facilities. The adaptability and flexibility of their organisation was well illustrated by their contribution to the "Mulberry," "Pluto" and "Fido" projects and they could claim to have played a leading part in every step of the development of radar. Well over 100,000 of their telephone and radio sets had been used by the Services. The production of a new form of mine "sweep" urgently needed for "D" Day resulted in almost impossible production schedules being fulfilled. To meet the enormous demand for radiolocation and wireless apparatus the output of iron powder had been increased eightfold and that of crystals three-hundred-fold.

Over 50 per cent. of the national requirements for "Asdic" submarine detection devices were undertaken, and in a critical period of five weeks in 1940 over one million yards of degaussing cable was produced to meet the magnetic mine menace. They had manufactured equipment for every aircraft carrier in the British Navy, the plant including generators, motors and control gear. A large share of the electric propelling equipment for submarines had been built by the company, together with considerable numbers of machines and switchboards for destroyers and corvettes. The equipment of several graving and floating docks in different parts of the world had also been undertaken.

Turbo-alternators had been built for the U.S.S.R. some of which were combined with switchgear and transformers to form transportable power units. Large motor generator sets for chemical purposes, and over 3,000 flameproof motors had also been made for our Allies. More than 25,000 generators had gone to the Ministry of Supply and the Air Ministry, many of them as part of mobile equipment such as landmark beacons, portable floodlights and Army X-ray units. Small electrical machines and motor-driven appliances for the Services totalled over three quarters of a million.

For the Admiralty alone more than 300 types of lamps had been supplied, the total for all the Services exceeding 85 million. Facilities for instrument development and production were increased by the building of many shadow factories, and by the end of 1944 the company had been responsible for making half a million instruments covering about 200 different types and patterns. They included A.A. predictors, gunsights, range finders, compasses, tank telescopes, speed indicators, altimeters, gyroscopes and instruments for testing radio and allied equipment. The output of cable and wire exceeded 1,100,000,000 core yd. including 2,000,000 yd. of very-high-frequency cable. The first cable harnesses for large aircraft were designed by the company. Their output of carbons exceeded one thousand million pieces, while battery units totalled one hundred million and moulded insulation parts exceeded three hundred million. Mobile rectifier units, ship welding equipments, electro-magnets, photo-electric appliances, infra-red and high-frequency heating apparatus and furnaces for special purposes, mines, bombs and shells were also constructed.

Research work covered ultra-short-wave valves, cathode-ray tubes, drilling machines for diamond dies, artificial sapphires for bearings and the development of the highest power searchlight in the world so far constructed of 1,000,000,000 candle power.

The change-over from war activity to peace would not be easy and he hoped that the country would understand the circumstances and the part the G.E.C. had been called upon to play during the national emergency.

The Electric Development & Securities Trust, Ltd., a subsidiary of the General Electric Co., Ltd., reports a revenue for the year ended March 31st amounting to £80,787. A sum of £17,512 was brought in and a dividend of 8 per cent., tax free, is to be paid, leaving £18,299 to be carried forward.

The Telephone Mfg. Co., Ltd.—Indications of the important part played by the company in the war effort were given by Mr. Fred. T. Jackson, the chairman and managing director, at the recent annual general meeting. Among the principal items manufactured were 1,300,000 microphones, 1,200,000 receivers, 920,000 telephone sets, 70,000 switchboards of all sizes up to 200 lines, the component parts including 11,500,000 condensers; 1,000,000 iron dust cores; 2,000,000 key switches; 2,500,000 plugs; 2,250,000 jacks; and 15,000,000 coils of various sorts. As a result of this war work the company had not been able to proceed with research and development work for post-war activities. There was plenty of space at their St. Mary Cray factory which could be built on to meet expansion of peace-time demands.

Greenwood & Batley, Ltd., show a net profit of £43,864 for the year ended March 31st, after providing for E.P.T. and income tax. In the previous year the figure was £44,992. A sum of £7,500 (£10,000) goes to contingencies and a final dividend of 10 per cent. maintains the dividend at 15 per cent., leaving £45,334 (£38,614) to be carried forward.

Thomas De La Rue & Co., Ltd., record a trading profit for the year ended March 31st last amounting to £486,062, as compared with £275,372 in the previous year. Adding income from properties sub-let and £22,000 (£60,000) from subsidiaries, the total was £509,701 (£336,470). The net profit was £478,683 (£311,629), depreciation

account receiving £19,062 (£8,759). Provision for taxes requires £377,500 (£185,000), while general reserve receives £20,000 (£50,000). The dividend is maintained at 40 per cent., leaving £87,170 (£75,387).

Ultra Electric (Holdings), Ltd.—The company's contribution to the war effort in the development and manufacture of radiolocation and electrical equipment and airframe components for the Stirling, Mosquito and Warwick aircraft was referred to by Mr. E. E. Rosen (chairman) at the annual meeting. He said that the company continued to occupy dispersal factories under requisition and to operate them entirely on war contracts. During the past few months, however, it had been possible to devote some attention to a resumption of normal business and it was hoped to have Ultra products on the market before the end of 1945. Contact with their subsidiary in Belgium had been re-established.

The Engineering & Lighting Equipment Co., Ltd., is paying a final dividend on the ordinary shares of 5 per cent. (against 6 per cent.). The dividend for the full year is thus reduced from 10 to 8 per cent. The net profit to March 31st last was £21,356 (against £21,454).

Belliss & Morcom, Ltd., report a trading profit of £69,352 for the past year (against £68,813) and a net profit of £51,478 (£50,886). The dividend is maintained at 14 per cent. and £166,958 is carried forward.

The Globe Telegraph & Trust Co., Ltd., reports a net revenue for the year ended June 30th last, amounting to £183,444, as compared with £182,442 in the previous year. A final dividend of 2 per cent. makes the total distribution 5 per cent., tax free (same) and £142,143 (£134,812) is carried forward.

The Brazilian Traction Light & Power Co., Ltd., in its report for 1944, states that all its services, except gas, continue to show expansion in spite of restrictions in materials available, shortage of man-power and other conditions arising from the war. Both gross revenue and net earnings are the highest in the company's history.

The Kalgoorlie Electric Power & Lighting Cpn., Ltd., is again to pay a dividend of 5 per cent. Profits for 1944 totalled £25,500 (£31,578). Depreciation again receives £16,000 and U.K. taxation £2,791 (£6,392) after crediting £1,913 adjustments from previous years. The carry-forward is £9,405 (£9,727).

The Colombo Electric Tramways & Lighting Co., Ltd.—It is proposed that the company should be wound up and its contract department transferred to the parent company, the United Planters' Co. of Ceylon. The lighting business was sold in 1927 and the tramway undertaking a year or so ago.

H. J. Baldwin, Ltd., report a profit for the year ended March 31st amounting to £21,517 (£22,517). The dividend is maintained at 10 per cent. and £20,112 (£16,695) is carried forward.

The London Passenger Transport Board is again to pay 1¼ per cent. on account of interest on London Transport "C" stock.

The Metropolitan Electric Supply Co., Ltd., is maintaining its interim dividend at 3 per cent.

Companies' Returns

Increases of Capital

Steels Electrical Products, Ltd.—The nominal capital has been increased by the addition of £34,900 in 34,900 shares of £1 each, ranking *pari passu* with the existing shares, beyond the registered capital of £100. £29,900 of the increase is with a view to the acquisition of certain assets of Steel & Co., Ltd.

Rheostatic Co., Ltd.—The nominal capital has been increased by the addition of £130,000 beyond the registered capital of £120,000. The additional capital is divided into £100,000 6 per cent. cum. preference shares of 10s. and 400,000 ordinary shares of 4s.

Robdor Radio & Electrical Appliances, Ltd.—The nominal capital has been increased by the addition of £2,000 in 2,000 ordinary shares of £1, beyond the registered capital of £2,000.

Lacrinoid Products, Ltd.—The nominal capital has been increased by the addition of £50,000 in 500,000 ordinary shares of 2s., beyond the registered capital of £100,000.

Mortgages and Charges

Strand Electric Engineering Co., Ltd.—Satisfaction in full on April 23, 1945, of Land Registry Charges, all dated March 20, 1939, and registered March 29, 1939.

Volta Electric, Ltd.—Charge dated June 28th on land and Park Works, Barnack Road, Stamford, to secure £10,000. Holders: Industrial Finance & Investment Corporation, Ltd.

Liquidations

B. & B. Batteries, Ltd., Caxton Road, Wimbledon.—Under the compulsory liquidation of this company the first meetings of creditors and contributories were held on July 24th at the Board of Trade offices, Columbia House, Aldwych, London, W.C.

A draft statement of affairs had been lodged showing assets valued at £1,722, against liabilities of £7,240, made up of unsecured claims £5,594; preferential £1,146; and debenture £500. Mr. F. R. Brooks, the promoter of the company, attributed the failure to the effects of the flying-bomb attacks, competition, and to improvements in street lighting. A resolution was passed appointing Mr. A. E. Attwood, 90, Queen Street, London, E.C., as liquidator, with a committee of inspection.

Bankruptcies

C. H. Boot, radio and electrical engineer, formerly carrying on business at 29, Lyndon Road, Rubery, near Bromsgrove.—First meeting held August 1st at the Official Receiver's Office, Somerset House, 37, Temple Street, Birmingham. Public examination September 25th at the New City Court, Birdport, Worcester

J. Boult and **J. H. Bolt**, carrying on business as John Boult, electricians, 3, Grosvenor Street, Chester (separate application of J. H. Bolt).—Order made June 5th for discharge subject to bankrupt consenting to judgment being entered against him for £145. (£145 paid to Official Receiver in lieu of entering up judgment.)

STOCKS AND SHARES

TUESDAY EVENING.

STOCK Exchange markets suffered a sharp shake out as a result of the unexpected issue of the General Election. It had been taken as a foregone conclusion that Mr. Churchill would be returned, although probably with a reduced majority. Few people, if any, in the Stock Exchange anticipated the sweeping majority obtained by the Labour Party. In markets where anything of a speculative position existed, a general fall occurred. The decline extended more gradually to other parts of the House. Prices of purely investment stocks became affected, but a partial recovery took place as bargain hunters went round trying to pick up cheap stock. This cleared the market of what weak stock there was and the support thus rendered brought about a rally from the lowest prices reached.

Electricity Supply

The one market in the Stock Exchange that can be relied upon to withstand disagreeable shocks is that for the Home electricity supply shares. Preference and ordinary shares in this department afford meagre rates of interest upon money invested in them at to-day's prices, but they do hold their ground at times when many other markets are disturbed by nervous apprehensions. Nevertheless on this occasion there were falls in most supply companies' shares both last week and again on Monday, reducing prices by from 6d. to as much as 3s. on the week.

In the Overseas group, Victoria Falls Power are $\frac{1}{16}$ up at 90s. The Indian shares have gone back a trifle, Calcutta Electrics to 57s. 6d., Cawnpores to 59s. and Madras to 39s. 6d., the last-named being a florin down. By comparison with falls in other industrial markets, these declines are of trifling extent.

Looking Back

Cable & Wireless preference fell 4 to 111. The ordinary stock has also been a dull market and the price at 88 is 5 points down. At this, the yield on the money is £4 11s. per cent., without allowing for the reduced rate of income tax at 9s. 2d. in the £. The present price, by the way, compares with 49 at the end of August, 1939, at which date Globe Telegraph & Trust ordinary shares stood at 29s. 9d. To-day they are 44s. Siemens were a guinea when war broke out, comparing with 38s. to-day, and Johnson & Phillips have come up from 38s. to about 78s. Another substantial rise has been in Telegraph Constructions which, standing at 38s. on the eve of the outbreak of war, are now quoted at about 64s.

Miscellaneous Movements

Walsall Conduits have put on 3s. at 2$\frac{1}{4}$. Gains of 1s. lifted Automatic Telephones to 70s. 6d. and British Thermostat to 20s. 9d. British Aluminium at 45s. 6d. but later there was a certain reduction. Crabtrees at 43s., and W. T. Henley's at 27s. 6d. are 6d. down. Laurence Scott hardened to 13s. 6d. Other changes in the manufacturing and equipment section are mostly downward, the falls including Associated Electrical 56s., English Electric 54s., Mather & Platt 52s. 6d., Metal Industries " B " 49s. 6d., Revo 44s., and Thorn Electrics 28s. 9d. Newman Industries are easier at 7s. 6d., and Rothermels at 3s. 1$\frac{1}{2}$d.

Radio companies' shares are lower, in company with most of the popular speculative descriptions. Cossors have been vulnerable to the political conditions; the price at 38s. 9d. is 2s. 9d. down. E.M.I. at about 32s. have fallen by 2s. 6d. E. K. Cole at 37s. 6d. lost 2s. 6d., of which 4$\frac{1}{2}$d. is represented by the dividend deduction from the price. McMichaels at 8s. are 6d. down.

L.P.T.B.

The London Passenger Transport Board has announced a dividend of 1$\frac{1}{4}$ per cent. actual on its " C " stock, the payment to be made on August 24th. This is the same rate as that of last year. Six months ago, the dividend for the year was raised to 3 per cent. by the payment of a final dividend of 1$\frac{1}{4}$ per cent.—a disappointment to the market, which had anticipated a repetition of the previously-paid 3$\frac{1}{4}$ per cent. The Transport Board is included in the agreement made between the other four railway companies and the Government, whereby the railways receive a certain fixed sum in respect of earnings, this agreement running for one year after the termination of war.

Transport " C " Stock gives a much lower yield on the money than do any of the other junior stocks of the home railways. The reason is that expectation looks for the time when the Transport Board will be free to operate on its own account once more. It is generally assumed that a better dividend than 3 per cent. will be paid. What is called the standard rate of dividend on the stock is 5$\frac{1}{2}$ per cent., but it needs a good deal of optimism to expect anything like this for some years to come. The prior-charges of the Board are gilt-edged securities, their prices moving in sympathy with the fluctuations in British Government and similar stocks. The 5 per cent. " B " stock at 119$\frac{1}{2}$ is a point down.

Globe Telegraph

Globe Telegraph & Trust ordinary shares have recently improved to 44s., moving independently of the fluctuations in Cable & Wireless ordinary stock. As a rule, the two prices follow each other in their movements very closely. But while Cable ordinary has declined from its recent best, Globe ordinary shares now stand at almost the highest price reached since the £5 shares were converted into £1 stock in 1937. The lowest during the interval, it may be of interest to recall, was a guinea, in the dark days of 1940.

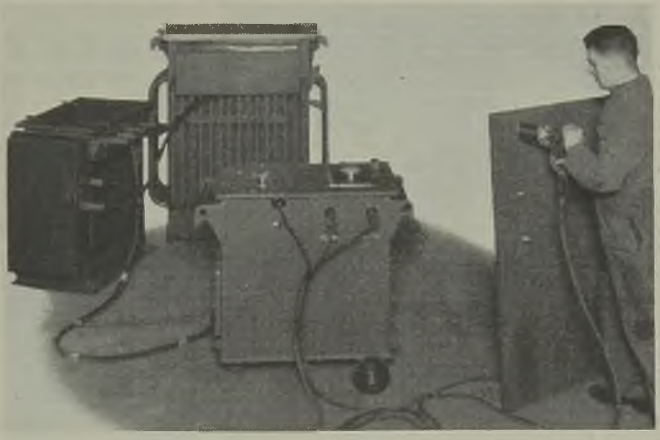
Stud Welding

English Electric Demonstration

A DEVELOPMENT of the arc process in the form of stud welding by the English Electric Co., Ltd., was recently demonstrated at Yoker, Scotland, by permission of the Clyde Valley Electrical Power Co. The principle is not entirely new, but it is the application of established principles in a different form that is likely to effect saving in time and costs. Ability to arc weld studs to plates and structures obviates drilling, tapping and inserting the bolt, or blanking the plates, and bolting through, the latter necessitating welding round the head of the bolt when sealing is required against gas, oil, water, etc.

High speed of operation is attained by using a pistol-grip tool for the control of the stud. Power input from existing mains is through double-wound transformers stepping down to approximately 100 V on the secondary side.

A porcelain ferrule surrounding the base of the stud is usually incorporated in order to prevent contamination of the weld metal by the air and also to prevent arc splatter. The tool is operated by means of a trigger switch; once the latter is closed the remainder of the operation is automatically controlled by a motor-driven camshaft timing device. The current required for a given size of stud is obtained by adjustment of a rotary tapping switch on the current regulator and the necessary timing for this operation is also easily pre-set by means of a rotary handle on the timing mechanism.



Rectified AC stud-welding equipment

On the base of the stud is a small pip in order to initiate the arc. The stud is pushed against the plate by means of the tool and when the pip is fused by the passage of the welding current, the stud is held in suspension to allow arcing to take place for a predetermined time, at the end of which time period the stud is plunged into the molten pool. The complete operation takes less than one second. The plunging of the stud forces out surplus metal from the pool, which forms into a collar contained by the ferrule. The collar metal can be removed by means of a hollow cutter without impairing the strength of the weld.

A combined flash damper and ferrule locator is incorporated in the tool to eliminate external arc flash and splatter so that the operator is not required to be protected; the parent metal is left clean and nearby personnel are in no way inconvenienced.

As the complete cycle of operations is automatically taken care of once the " trigger " on the tool is closed and no skill is required either to load or locate the stud, the process is so simplified that no difficulty should be experienced in using the equipment, which is designed on robust lines for operation outdoors in shipyards or on constructional work as well as in heavy and light industries. In general the main equipment remains stationary whilst the tool may be taken anywhere within range of the cable.

There are two types of plant. The straight AC equipment is completely self-contained and oil-immersed, comprising a transformer, a reactor, timing unit (not in oil), and a primary contactor, single-phase for 380/440 V input, mounted on wheels. Protection on the primary side by a 100-A double-pole fuse switch is recommended. This equipment is designed to weld studs up to ½ in. diameter when using secondary leads not more than 50-70 ft. long. The limitation of cable is necessitated by the high reactive drop in long cables due to the fairly heavy instantaneous currents employed.

The rectified AC equipment is designed to operate from the secondary side of any standard multi-operator (three-phase) arc-welding transformer (usually available on site) the three-phase oil-immersed static rectifier tank also containing the source of 50-V DC for operating

E

the auxiliaries. A third unit (which is mounted on wheels) comprises the current control regulator and the timing device. It is admirably suited to shipyard work as the transformer and rectifier can be on shore, or at ground level, while the control unit may be taken on to the deck, thus complying with the regulations concerning voltages allowed on a ship, namely circuit DC at approximately 100 V. When using 0·15 sq. in. cable, $\frac{5}{8}$ in. diameter studs can be welded 200 ft. from the transformer; $\frac{3}{4}$ in. diameter studs reduce the distance to about 120 ft. while smaller sizes allow up to perhaps 500 ft. if necessary for $\frac{1}{4}$ in. studs.

Electrical Contractors

President's Address and Report

ADDRESSING the recent annual meeting of the Electrical Contractors' Association and its allied organisations, the president (Mr. W. Riggs, M.B.E., M.I.E.E.) said that after continuing in office throughout the war he was handing over to Mr. R. H. M. Drake. The president stressed the need for industry to make all necessary adjustments in existing practices in order to secure commercial efficiency. He said that the Fair Trading Council was giving consideration to the wholesale distribution side. Too often wholesalers primarily connected with another industry introduced themselves into the electrical industry and it was they who accorded trade terms to retailers who were not qualified under the terms of the Fair Trading Policy, a diversion of trade which did not benefit either the general public or the electrical industry.

Mr. Riggs said that the agreements between the Association and groups of manufacturers had continued and he made a strong plea for mutual support between organised trading associations and for the support of their appropriate organisations by members of the industry. After a mention of the new "N.E.C.T.A." sign, Mr. Riggs said that the Association was making a big drive to secure that the qualified electrical contractor and retailer should be the recognised source of supply of current-consuming devices. There were great opportunities and the contractor and retailer would fail in his duty to the community, and to himself, if he did not take full advantage of these opportunities.

The Association favoured the compulsory registration of electrical contractors and operatives as a means, not of restriction, but of ensuring good service to the public. He had been disappointed that B.E.A.M.A. had not supported the scheme so much as it might have done, but the National Register of Electrical Installation Contractors had advocated the adoption of compulsion.

Good relations with the Electrical Trades Union had been maintained during the year and progress had been made towards the operation of national working rules, as distinct from local rules. The holidays-with-pay scheme was working smoothly. A new agreement had been made between the National Federated Electrical Association and the Association of Supervising Electrical Engineers.

The E.C.A. had participated in the Building Apprenticeship and Training Council but representations were now being made to the Ministry of Works for the establishment of a recognised separate Council especially designed to meet the needs of the electrical contracting industry.

During the past year the membership had increased from 1,653 to 1,731; before the war it was 1,897 and in 1943 it fell to 1,597.

I.M.E.A. Centre Meeting

AT the annual meeting of the South-West England and South Wales Centre of the I.M.E.A. held at Bristol recently, Alderman W. J. Lewis (Portsmouth) was elected chairman in succession to Mr. Edward Jones, chief electrical engineer and manager, Cardiff. Alderman Lewis said he considered it a compliment to himself and his authority to be the first local authority member to fill this office. He paid a tribute to the retiring chairman for the manner in which he had expedited the work of the Centre since his election in 1943. Mr. Dawson Thomas, chief electrical engineer and manager, Abertillery, was elected vice-chairman. The retiring members of the Executive Committee were re-elected. They were Mr. G. J. Hollyer (Torquay); Mr. L. V. Turner (Taunton); Mr. H. Jackson (Cardiff); and Mr. T. R. Evans, hon. secretary and treasurer of the Centre (Rhondda).

Alderman W. J. Lewis

The centre has 56 constituent members (undertakings) covering the Central Electricity Board grid area, 39 being in "A" Group, 11 in "B" Group and 6 in "C" Group. The retiring chairman in his report stated that a number of executive meetings and two special general meetings had been held since the last annual general meeting, one special meeting being addressed by Mr. Lilwall, President of the I.M.E.A., who was accompanied by Mr. J. W. Simpson, the general secretary.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (1s. each) may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

AKT.-GES. Brown, Boveri & Cie.—" Device for the sparkless interruption of a multi-phase circuit." 15428/43. October 9th, 1942. (570526.)

Automatic Telephone & Electric Co., Ltd.—" Impulse senders for use in telephone or like systems." 21271/43. December 21st, 1942. (570612.)

Birmingham Electric Furnaces, Ltd., A. G. Lobley and P. F. Hancock.—" Nitriding processes." 2706. February 18th, 1943. (570570.)

R. V. Boardman.—" Electric arc lamps." 19520. November 22nd, 1943. (570607.)

E. R. Booth and S. Marks.—" Multi-way electric switches." Cognate applications 279/44 and 8464/44. January 6th, 1944. (570579.)

British Thermostat Co., Ltd., E. McGowan and W. F. F. Martin-Hurst.—" Thermostatic expansion valves." 19294. November 18th, 1943. (570604.)

British Thomson-Houston Co., Ltd.—" Resinous condensation products." 15255/42. November 1st, 1941. (570520.) " Resinous condensation products prepared from aldehydes and diazine derivatives." 18114/42. December 31st, 1941. (570569.) " Electric valve circuits." 10267/43. June 29th, 1942. (570591.)

British Thomson-Houston Co., Ltd. (General Electric Co.).—" Methods of drying plastic materials formed of powdered metal and a plasticising medium." 16360. October 6th, 1943. (570535.)

British Thomson-Houston Co., Ltd., and A. P. Castellain.—" Screens for stereoscopic projectors." 11341. July 13th, 1943. (570594.)

British Thomson-Houston Co., Ltd., and C. O. Titley.—" Control and testing circuits using gas-discharge tubes." 13808. August 24th, 1943. (570502.)

British Thomson-Houston Co., Ltd., and T. W. Wilcox.—" Gas-blast electric circuit-breakers." 12832. August 9th, 1943. (570496.)

British Thomson-Houston Co., Ltd., M. G. Clarke and H. R. Ruff.—" Thermal responsive electric switches." 16939. October 15th, 1943. (570622.)

F. Caldwell and Metropolitan-Vickers Electrical Co., Ltd.—" Shaping machines." 6724. April 28th, 1943. (570490.)

Cinema-Television, Ltd., G. A. R. Tomes and W. Blackman.—" Photo-electric cells." 8506. July 5th, 1941. (570553.)

Compagnie Générale de Télégraphie sans Fil.—" Radiators of radio electric waves." 12051/42. June 15th, 1940. (570568.)

Concordia Electric Wire Co., Ltd., and G. N. Fox.—" Method of forming a die for coating wires." 16968. October 15th, 1943. (570623.)

R. Cruickshank, Ltd., E. A. Ollard and S. Potts.—" Apparatus for use in electrically or otherwise treating the surfaces of metal or other articles." 16521. October 8th, 1943. (570538.)

E. A. Hinksman.—" Alternating current voltage regulating transformers." 18361. November 5th, 1943. (570509.)

P. L. Hunting, F. C. Bowring and R. H. F. Boot.—" Underwater welding." 21056. December 15th, 1943. (570512.)

Igranic Electric Co., Ltd., and J. R. Taylor.—" Control systems and apparatus for three-phase induction motors." 17352. October 21st, 1943. (570632.)

H. W. K. Jennings (B. F. Sturtevant Co.).—" Electrostatic precipitators." 17197. October 19th, 1943. (570630.)

Landis & Gyr Soc. Anon.—" Short-circuiting device for electrical terminals." 6841/43. June 27th, 1942. (570576.)

Marconi's Wireless Telegraph Co., Ltd., and C. P. Beanland.—" Tuning arrangements for radio receivers." 17441. October 22nd, 1943. (570636.)

Marconi's Wireless Telegraph Co., Ltd., and C. P. Fagan.—" Electrolyte for secondary electrical batteries." 11560. September 9th, 1941. (570559.)

Maschinenfabrik Oerlikon.—" High-tension transformers." 3405/44. March 15th, 1943. (570550.)

A. Morgan.—" Electrically operated hoist gear." 14193. August 31st, 1943. (570599.)

Mullard Radio Valve Co., Ltd., and R. W. Kersey.—" Photo-electric cells and to control circuits incorporating such cells." 14582. September 6th, 1943. (570601.)

Patentverwertungs-Patelhold & Elektro-Holding Akt.-Ges.—" Systems for the secret electrical transmission of speech." 4286/43. December 20th, 1941. (570488.)

Precision Developments Co., Ltd., and G. Olah. — " Contacts in electrical switching devices." 6791. April 29th, 1943. (570521.)

T. Price & Son (Stampers), Ltd., and E. E. Price.—" Electrically-heated cooking vessels and kettles." 14967. September 13th, 1943. (570525.)

E. S. Russell.—" Electromagnetic switches for effecting repeated timed interruption of circuits." 17371. October 21st, 1943. (570634.)

Siemens Electric Lamps & Supplies, Ltd., and J. N. Aldington.—" Metal vapour electric discharge lamps." 6467. May 20th, 1941. (570583.)

Soc. d'Electricité Mors.—" Regulating device for fluid-operated systems." 22282/39. August 2nd, 1938. (570487.)

H. Sonnenfeld.—" Power cable and means for producing it." 17587. October 26th, 1943. (570640.)

R. L. Taylor and Crompton Parkinson, Ltd.—" DC generators." 13154. August 13th, 1943. (570497.)

H. H. Thompson, A. E. Davies and M. D. Thompson.—" Magnetic separators." 21868. December 30th, 1943. (570515.)

W. B. Whitney and British Electrical & Allied Industries Research Association.—" Gas-blast AC arc-rupturing devices." 20979. December 14th, 1943. (570511.)

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Bradford.—August 29th. Corporation, Static transformers. (See this issue.)

Brighouse.—August 31st. Town Council. Transformers and switchgear. (See this issue.)

Chichester.—August 17th. City Council. About 20 miles of 11-kV and control cables and accessories. (July 13th.)

Glasgow.—August 31st. Corporation Lighting Department. 500 lanterns for 300-1,500-W electric lamps. Specs. etc., from the Lighting Department, 20, Trongate.

Manchester. — August 11th. Transport Department. Trolley-bus overhead equipment materials. Particulars from general manager, 55, Piccadilly.

Sheffield. — August 27th. Electricity Department. Three 1,000-kVA 11,200 3,300-V transformers. (See this issue.)

Wilton.—August 25th. Borough Council. Supply and erection of a public lighting installation in the borough. Borough surveyor, Municipal Offices, Fugglestone House, Wilton.

Orders Placed

Birmingham. — Electricity Committee. Accepted. Moto generator set.—Metropolitan-Vickers. Reconditioning of five additional oil cooler tube nests.—C. A. Parsons & Co. Automatic fire protection equipment at Hams Hall "B" power station.—Pyrene Co.

Salvage Committee. Accepted. Electric vehicle batteries.—D.P. Battery Co., Chloride Electrical Storage Co., Britannia Batteries and Tudor Accumulator Co.

Bradford.—Electricity Committee. Recommended. Boiler.—Babcock & Wilcox. Grit and flue dust extraction plant.—British Vacuum Cleaner & Engineering Co., Ltd. 6·6-kV metal-clad switchgear.—A. Reyrolle & Co. Electrically-operated circulating water valve.—J. Blakeborough & Sons.

Brighton.—Public Utilities Committee. Accepted. Switchgear (£7,633).—Allen West.

Manchester. — Electricity Committee. Accepted. 33-kV switchgear extensions at Barton power station.—B.T.H. Co. High-pressure steam and feed-water pipework, Stuart Street generating station.—Babcock & Wilcox. Do. valves.—Hopkinsons. Cable tee boxes (twelve months' requirements).—W. Lucy & Co. Bowl refractors for street lighting.—Veritys.

Rawtenstall. — Electricity Committee. Accepted. Cables.—Henley's.

Sheffield. — Electricity Committee. Accepted. Ash-handling plant for Neepsend power station (£59,207).—Stirling Boiler Co.

Warrington. — Electricity Committee. Accepted. Air insulated switch unit (£259).—Ferguson Pailin. Repacking condenser tubes (£850-£900).—English Electric Co.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Aberdeen. — Houses (1,500) for Stewarts Estates (Aberdeen), Ltd.; Jenkins & Marr, civil engineers and architects.

Ancoats.—Additions, Hospital, Upper Kirby Street; T. Worthington, architect, 178, Oxford Road, Manchester, 13.

Ashton-under-Lyne.—Electrification of sewage works; manager.

Bangor.—Extensions, Caernarvonshire and Anglesey Infirmary (£100,000); Board of Management.

Belper.—Houses (42); R.D.C. building surveyor, Wellington House.

Bolton. — Catholic schools; Rev. Father Chronnell, St. Edmund's Rectory.

Coventry.—Primary school, Sadler Road, Keresley; city architect, 1a, Warwick Row.

Edmonton. — Maternity accommodation, Chase Farm Hospital (£51,650); Middlesex county architect.

Exeter.—Houses (176), Wonford estate and temporary shops (£50,000); city architect.

Hove.—Houses (54), The Knoll, for B.C.; borough surveyor, Town Hall.

Kilmarnock.—Kitchens and dining rooms for school meals (£9,000); county clerk, Ayr.

Manchester.—Factory, Fitzgeorge Street, Collyhurst; P. Cummings, architect, 16, Oxford Street.

Middlesex. — Temporary and permanent school extensions (£175,000); county architect.

Newbury.—Houses (22), Valley Road; A. J. Chivers.

Newcastle-under-Lyme. — Houses (101), Beasley Farm Estate, Chesterton; town clerk, District Bank House, Penkhull Street.

Northwood.—Conversion of Ryefield Court as health centre, with electrical work; Middlesex county architect.

Scunthorpe. — Laundry; Scunthorpe Co-operative Society, Ltd., High Street.

Smethwick.—Houses (134); borough engineer, Council House.

South Shields. — Factory, Riverside Estate, for Shaffer, Ltd.; H. E. Pitt, Ltd., builders, Leopold Street, Millfield, Sunderland.

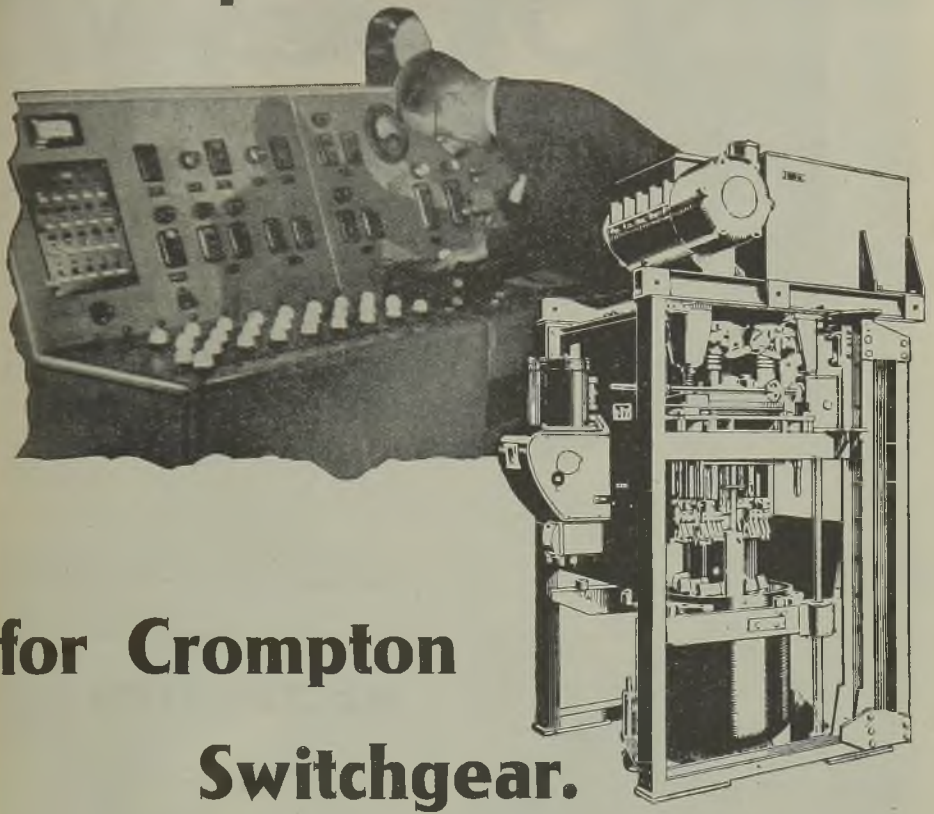
Stretford.—Saw mills, etc., Barton Dock Road; Reif and Son, Ltd., timber merchants, Barton Dock Road.

Swinton.—Extensions; Weston Evans and Co., lubricating engineers, Manchester Road, Clifton.

Thurso.—Harbour improvements (£60,000); clerk to Harbour Trust.

Wigton.—Factory; Larma, Ltd., Queen Street, Aspatria.

Exact performance data—

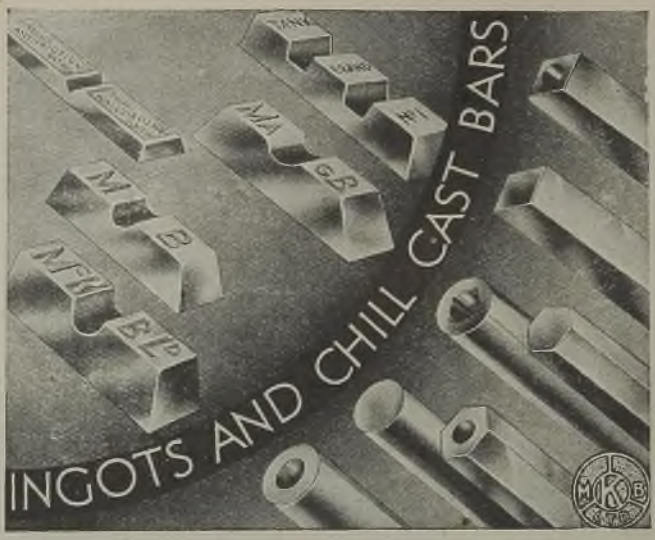


for Crompton Switchgear.

Switchgear performance can be analysed exactly in the Short-circuit Testing Station. Crompton Parkinson are members of the Association of Short-Circuit Testing Authorities, the members of which can issue certificates of rating when tests, in accordance with the appropriate specifications, have been complied with. The Crompton Short-circuit Testing Station is capable of testing up to 350 MVA at 11 kV and 75 MVA at 400 volts. The rated performance and dependable operation of Crompton Switchgear is thus assured.

CROMPTON PARKINSON
LIMITED

ELECTRA HOUSE, VICTORIA EMBANKMENT, LONDON, W.C.2 *and Branches.*



McKechnie Non-Ferrous Ingots are uniform in composition and therefore easier to melt and handle. Produced by a perfect plant under constant supervision to the correct analysis, the McKechnie range of Non-Ferrous Ingots covers the entire need of the Brass Foundry. McKechnie Chill Cast Bars are closer in structure than Sand Cast Bars and possess greater homogeneity and resistance with an absence of segregation. They are clean, concentric and sound.

Apart from the saving on tool costs and labour which naturally follows the use of Chill Cast as against Sand Cast Bars the saving in scrap and turnings is very considerable.

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BIRMINGHAM	8, Snow Hill
BRISTOL	7, Broad Quay and 3, Augustine's Parade
NEWPORT	81, High Street
SWANSEA	93, Brynymor Road and 1, Northampton Place

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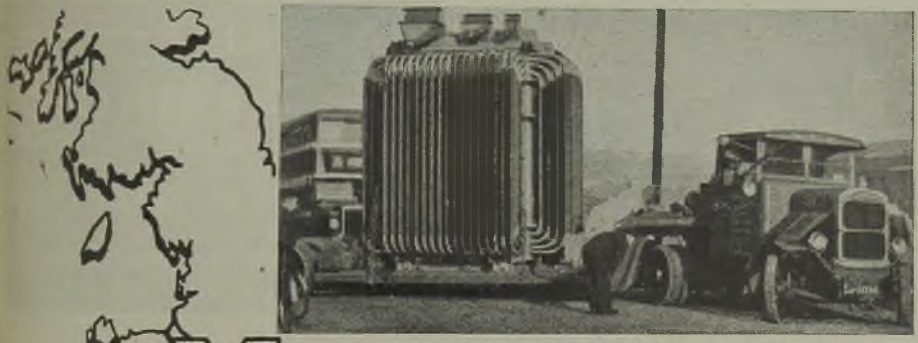
RP-436C



CLASSIFIED ADVERTISEMENTS

ADVERTISEMENTS for insertion in the following Friday's issue are accepted up to **First Post on Monday**, at Dorset House, Stamford Street, London, S.E.1. *(For August 10th issue see notice below.)*

THE CHARGE for advertisements in this section is 2/- per line (approx. 8 words) per insertion, minimum 2 lines 4/-, or for display advertisements 30/- per inch, with a minimum of one inch. Where the advertisement includes a Box Number there is an additional charge of 6d. for postage of replies.

SITUATIONS WANTED. — Three insertions under this heading can be obtained for the price of two if ordered and prepaid with the first insertion.

REPLIES TO advertisements published under a Box Number if not to be delivered to any particular firm or individual should be accompanied by instructions to this effect, addressed to the Manager of the ELECTRICAL REVIEW. Letters of applicants in such cases cannot be returned to them. The name of an advertiser using a Box Number will not be disclosed. All replies to Box Numbers should be addressed to the Box Number in the advertisement, c/o ELECTRICAL REVIEW, Dorset House, Stamford Street, London, S.E.1. Cheques and Postal Orders should be made payable to ELECTRICAL REVIEW LTD. and crossed.

Original testimonials should not be sent with applications for employment.

AUGUST 10th ISSUE

Classified Advertisements for the above issue closed for press first post on **FRIDAY, AUGUST 3**

OFFICIAL NOTICES, TENDERS, ETC.

SHEFFIELD CORPORATION ELECTRICITY DEPT.

Contract No. 705—Transformers

THE Electricity Committee are prepared to receive tenders for the supply and delivery of the undermentioned Transformers:—

Three 1,000 kVA. 11,200/3,300 volts, 3-phase, 50 cycles.

Contractors desiring to submit tenders may obtain specification and form of tender at this office on and after 30th July, 1945, on making a deposit of £2 2s., which sum will be refunded on receipt of a bona fide tender.

To meet the convenience of contractors two copies of the specification will be furnished; additional copies may be purchased at a cost of £1 1s. per copy.

Any person or firm sending in a tender will be required to comply with the Standing Orders of the Council relating to the "Prevention of Corruption" and to the standard rates of wages and proper hours and conditions of labour. A print of the Standing Orders may be obtained from the Department.

The tender and accompanying documents, filled up as directed, must be enclosed in the official envelope supplied with the specification, which shall not bear any name or mark indicating the sender, to be delivered to the Town Clerk, Town Hall, Sheffield, 1, not later than the first post on Monday, 27th August, 1945. Tenders received after the time stipulated herein will not be considered.

The Committee do not bind themselves to accept the lowest or any tender.

JOHN R. STRUTHERS,
General Manager and Engineer.

Commercial Street,
Sheffield, 1. 2452

BOROUGH OF BRIGHOUSE

Transformers, Switchgear and Equipment

TENDERS are invited for the supply and delivery of two 300-kVA Transformers, and two sets of E.H.T. Switchgear, suitable for use in substations.

Specifications and particulars may be obtained on application to the Electrical Engineer, Huddersfield Road, Brighouse.

Tenders in plain sealed envelopes endorsed "Switchgear and Transformers" should be delivered to the undersigned not later than the first post on Friday the 31st August, 1945.

ERNEST H. CLEGG,
Town Clerk.

Town Hall,
Brighouse 2461

CITY OF BRADFORD

Three-Phase Static Transformers

THE Bradford Corporation invite Tenders for the supply and delivery of:—
THREE-PHASE STATIC TRANSFORMERS—
Contract "C.31."

Copies of the Conditions of Contract, Specification and Form of Tender may be obtained from Mr. T. H. Carr, A.M.Inst.C.E., M.I.Mech.E., M.I.E.E., Electrical Engineer and Manager, City of Bradford Electricity Department, 27, Bolton Road, Bradford.

Tenders on the forms provided must be delivered to the undersigned not later than 10 a.m. on Wednesday, the 29th August, 1945, and no tender will be received unless enclosed in a plain, sealed envelope bearing the words "Tender for Transformers—Contract 'C.31.'" but not bearing any name or mark indicating the sender.

The Contract will be let subject to the Fair Contracts Clauses of the Corporation, which may be seen at the office of the undersigned.

The lowest or any tender will not necessarily be accepted.

N. L. FLEMING,
Town Clerk.

Town Hall, Bradford.
27th July, 1945 2480

SITUATIONS VACANT

None of the vacancies for women advertised in these columns relates to a woman between 18 and 40 unless such woman (a) has living with her a child of hers under the age of 14, or (b) is registered under the Blind Persons Acts, or (c) has a Ministry of Labour permit to allow her to obtain employment by individual effort.

NORTH-EASTERN ELECTRIC SUPPLY CO. LTD.

Power Station Shift Control Engineers

APPLICATIONS are invited for positions as POWER STATION SHIFT CONTROL ENGINEERS. The duties include the operation of High Voltage Switchboards, the control of Electrical Output, working out results and giving general electrical assistance in the operation of the Station. The vacancies exist in the Tyneside and Tees-side areas. The salary will be in accordance with Grade 10, Class G, of the National Joint Board Schedule, the commencing salary being £280 per annum.

Experience with a manufacturer of electrical equipment or with an electricity undertaking is essential and preference will be given to applicants holding a Technical Qualification or who can show that they are in the course of obtaining such qualification. Suitable Shift Control Engineers will be considered for promotion to Technical Assistants in due course.

Full details of practical and theoretical training, present employers and age should be addressed to:—

The Secretary,
North-Eastern Electric Supply Co. Ltd.
G.P.O. Box No. 117.
Carliol House,
Newcastle-upon-Tyne.

The Ministry of Labour and National Service Technical and Scientific Register have given permission under the Control of Engagement Order, 1945, for the advertisement of these vacancies. 2465

SHEFFIELD CORPORATION

Electricity Department

Appointment of Deputy General Manager and Engineer

APPLICATIONS are invited for the position of Deputy to the General Manager and Engineer at a commencing salary of £1,100 per annum, rising to £1,400 per annum by three annual increments of £100.

The appointment will be subject to the provisions of the Local Government Superannuation Act, 1937, and candidates must have previous Local Authority Service carrying a transfer value within the meaning of the Act, or otherwise be not more than 40 years of age. The selected candidate will be required to pass a medical examination.

Candidates should be Corporate Members of the Institution of Electrical Engineers, and should have had a sound training in mechanical and electrical engineering. They should be experienced in the construction, operation and control of a large Electricity Supply Undertaking, and have a sound technical knowledge of both modern steam practice and the latest developments of electrical practice.

Applications, which must be made on the application form, copies of which may be obtained (with particulars of the duties, terms and conditions of appointment) from the undersigned, must be received by the undersigned by the first post on Tuesday, the 28th August, 1945.

Canvassing or any communication with members of the City Council, either directly or indirectly, is prohibited and will be a disqualification.

This advertisement is published by permission of the Ministry of Labour and National Service under the Control of Engagement Order, 1945.

JOHN HEYS,
Town Clerk.

Town Hall,
Sheffield, 1.
27th July, 1945. 2493

COUNTY BOROUGH OF PRESTON

Electricity Undertaking

Appointment of Power Station Electrical Maintenance Engineer

APPLICATIONS are invited for the position of Electrical Maintenance Engineer at the Ribble Generating Station from suitably qualified engineers.

Candidates must have had extensive practical experience in the maintenance of the whole of the electrical plant and equipment of a modern Power Station and the person appointed will be responsible for preparing and maintaining a complete programme of inspection, testing and repairs for such plant. The duties of the post may also include the general supervision of constructional work by electrical plant contractors.

Applicants should preferably be Corporate Members of The Institution of Electrical Engineers.

The salary and conditions of service will be in accordance with the National Joint Board Schedule, Class "J," Grade 7 (at present £509-534 per annum.).

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

Applications, stating age and giving full particulars of technical qualifications, training and experience, accompanied by not more than three testimonials, are to be endorsed "Maintenance Engineer" and received by the undersigned not later than Saturday, 18th August, 1945.

The Ministry of Labour and National Service, A9(D), have given permission under the Control of Engagement Order, 1945, for the advertisement of this vacancy.

C. A. ROBERTSON, M.Sc.(Tech.),
M.I.E.E., A.M.I.Mech.E.
Borough Electrical Engineer.

July, 1945. 2477

ELECTRICAL ENGINEER AND MANAGER

REQUIRED for eventual service in Far East, having good experience electrical contracting, cable laying, etc., capable organising and managing large contracting business. Reply, in first instance with full particulars of experience, to—Box 2391, c/o The Electrical Review.

COUNTY BOROUGH OF BLACKBURN

Electricity Undertaking

APPLICATIONS are invited for the following positions, and preference will be given to applications received from Chartered Electrical Engineers:—

Deputy Electrical Engineer

Applicants for this post must have had a sound technical and practical training in mechanical and electrical engineering and possess considerable experience in the construction, maintenance and operation in all forms of public supply work comprising the following:—

1. Transmission and distribution.
2. Modern power station work involving the operation of high pressure plant.
3. Sales development and commercial organisation.

Salary and conditions of employment in accordance with the National Joint Board Schedule, Grade 1, Class H, present rate £852 per annum.

Consumers' Engineer

Applicants for this post must have had experience in the following branches of supply work, full details of which must be given in the application:—

1. Showroom organisation and sales.
2. Load development (industrial and domestic).
3. Preparation of specifications and estimates for wiring, etc.
4. Carrying out of installation work on consumers' premises.

Salary and conditions of employment in accordance with the National Joint Board Schedule, Grade 4, Class H, at present commencing at £608 per annum.

Assistant Station Engineer

Applicants must have had a sound technical and practical training and be conversant with 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 Schedule, Grade 5, Class H, present rate £564 per annum.

All the above appointments will be subject to the provisions of the Local Government Act, 1937, and persons appointed respectively will be required to pass a medical examination.

Applications, stating age and giving full particulars as above, technical training and qualifications, accompanied by copies of not more than three recent testimonials, must be forwarded to R. H. Harral, M.I.E.E., Engineer and Manager, Electricity Offices, Jubilee Street, Blackburn, appropriately endorsed and delivered not later than Saturday, August 11th, 1945.

The Ministry of Labour and National Service have given permission under the Control of Engagement Order, 1945, for the advertising of the above vacancies.

CHAS. S. ROBINSON, Town Clerk.

2444

CITY OF BATH

Appointment of City Electrical Engineer

THE Council invite applications for the appointment of City Electrical Engineer from applicants who are Members or Associate Members of the Institution of Electrical Engineers and experienced in the management and administration of an Electricity Undertaking, at a salary of £1,300 per annum rising by annual increments of £100 to £1,500 per annum, plus war bonus (at present £59 16s. per annum). The salary will be reviewed after a period of 4 years' service with the Council, and regard will be had to all the circumstances prevailing at that time.

The appointment will be subject to the provisions of the Local Government Superannuation Act, 1937, and to determination by three months' notice in writing on either side.

The successful candidate will be required to pass a medical examination.

Applications (on a form to be obtained from me) must be delivered to me not later than 12 noon on the 22nd August, 1945, and must be accompanied by copies of two testimonials.

Canvassing either directly or indirectly will be a disqualification.

J. BASIL OGDEN,
Town Clerk.

Guildhall,
Bath.
20th July, 1945. 2449

COUNTY BOROUGH OF GRIMSBY

Appointment of Borough Electrical Engineer

APPLICATIONS are invited for the position of Engineer and Manager of the Corporation's Electricity Undertaking.

Applicants must have experience in the operation of a selected generating station as well as in the administration and management of an electricity undertaking, and must be corporate members of the Institution of Electrical Engineers or of equivalent qualification.

The person appointed will be required to devote the whole of his time to the duties of the office.

The salary will be in accordance with the scale of the National Joint Committee of Local Authorities and Chief Electrical Engineers (which on the present sales amounts to £1,649 per annum).

In accordance with the agreement the salary for the first year will be 85% and for the second year 92½% of the full scale salary.

The appointment will be subject to the provisions of the Local Superannuation Act, 1937, and will be terminable by three months' notice given by either party.

The successful candidate will be required to pass a medical examination.

Canvassing either directly or indirectly will be a disqualification.

Candidates for the appointment must, when making application, disclose in writing whether to their knowledge they are related to any member of or the holder of any senior office under the Council. Failure to do this will disqualify the candidate for the appointment.

Applications, stating age, education, training, qualifications, particulars of experience, present appointment and accompanied by copies of three recent testimonials, are to be received by the undersigned not later than 10 a.m. on Friday, 24th August, 1945, endorsed "Borough Electrical Engineer and Manager."

L. W. HEELER,
Town Clerk.

Municipal Offices,
Grimsby.
24th July, 1945 2497

COUNTY BOROUGH OF WEST BROMWICH

Electricity Department

Senior Mains Assistant

APPLICATIONS are invited for the above appointment at a salary in accordance with the N.J.B. scale, class H, Grade 6 (at present £517 per annum.). Candidates should have a sound technical and practical training on the installation, maintenance and operation of H.T. and L.T. overhead and underground distribution systems, including the preparation of estimates and the changeover of supplies from D.C. to A.C.

Age, qualifications and details of technical and practical experience should be stated in applications, accompanied by copies of recent testimonials, to reach the undersigned not later than Wednesday, August 15th, 1945.

The Ministry of Labour and National Service Technical and Scientific Register have given permission under the Control of Engagement Order, 1945, for the advertisement of this vacancy.

G. O. EDWARDS.
Borough Electrical Engineer and Manager.

Electric House,
296/298, High Street, West Bromwich 2464

SUSSEX ELECTRICITY SUPPLY COMPANY LTD.

Superintendent, Class A, Single-Phase Testing Dept.

APPLICATIONS are invited for the above position. Salary and conditions of employment will be in accordance with the N.J.B. Schedule, Class C, Grade 6, to commence.

Applicants must have had a thorough practical and technical training in meter engineering, and should hold a position of responsibility in a polyphase station. Sound experience in testing and maintenance of general domestic equipment will be an advantage.

Applications, stating age, present appointment and salary and details of qualifications and experience, should be sent in endorsed "Meter Engineer" to the Head Office of the company at "Silverlands," 37, Alexandra Road, Epsom, Surrey.

The Ministry of Labour and National Service has given permission under the Control of Engagement Order, 1945, for the advertisement of this vacancy. 2446

COUNTY BOROUGH OF BLACKBURN

Electricity Undertaking

Appointment of Technical Superintendent

APPLICATIONS are invited for the above position from Engineers who have had considerable experience in the construction, operation and maintenance of modern electricity supply undertakings.

Applicants must also have had experience in the design, layout and operation of modern power stations, and be corporate members of the Institution of Electrical Engineers and/or the Institution of Mechanical Engineers.

The conditions of employment will be in accordance with the National Joint Board Schedule, and the salary will be Class H, Grade 3, at present £664 per annum.

The appointment will be subject to the provision of the Local Government Act, 1937, and the person appointed will require to pass a medical examination.

Applications, stating age and giving full particulars as above, technical training and qualifications, accompanied by copies of not more than three recent testimonials, must be forwarded to:—

R. H. Harral, M.I.E.E.,
Engineer and Manager,
Electricity Offices,
Jubilee Street,
Blackburn,

appropriately endorsed and delivered not later than Saturday, August 18th, 1945.

The Ministry of Labour and National Service have given permission under the Control of Engagement Order, 1945, for the advertising of the above vacancy.

CHAS. S. ROBINSON,
Town Clerk.

Town Hall,
Blackburn. 2496

COUNTY BOROUGH OF HALIFAX

Appointment of Chief Inspector, Public Lighting Department

APPLICATIONS are invited for the appointment of CHIEF INSPECTOR in the PUBLIC LIGHTING DEPARTMENT.

Salary £250 per annum, rising by four annual increments of £12 10s. to £300 per annum., plus current War Bonus (at present £59 16s. per annum.).

Applicants should have experience in the maintenance of public lamps, gas and electricity supply systems, the control of men and in administrative and clerical matters.

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.

Applications giving particulars of age, experience and position as regards National Service, accompanied by copies of two testimonials, and endorsed "Chief Inspector, Public Lighting Department" must be delivered to the undersigned not later than 18th August, 1945.

W. USHER,
Town Clerk.

Town Hall,
Halifax.
24th July, 1945. 2472

ALTRINCHAM ELECTRIC SUPPLY LTD.

Mains Assistant

APPLICATIONS are invited for the above appointment from qualified engineers experienced in:—(1) The control of workmen; (2) The laying, jointing and testing of high and low tension cables; (3) The location of faults and (4) The general operation of a distribution system.

Salary and conditions of employment in accordance with the N.J.B. Schedule, Class F, Grade 6, at present commencing at £459 p.a. It is a further condition of employment that all employees shall become members of the Company's Contributory Pension and Life Assurance Scheme.

Applications, stating age, details of training and experience and accompanied by copies of three testimonials or references, must be delivered not later than 31st August, 1945, to:—R. R. H. Matthews, Engineer and Manager, Altrincham Electric Supply Ltd., 60, Stamford New Road, Altrincham, Cheshire.

The Ministry of Labour and National Service have given permission under the Control of Engagements Order, 1945, for the advertisement of this vacancy. 2502

THE LANCASHIRE ELECTRIC POWER COMPANY

Generation Department

APPLICATIONS are invited for the position of ASSISTANT CHARGE ENGINEER at Kearsley Power Station.

Conditions of service and rate of pay will be in accordance with the National Joint Board Schedule. Class K, Grade 8B.

The Ministry of Labour and National Service A.9(D) have given permission under the Control of Engagement Order, 1945, for the advertisement of this vacancy.

Applications should be addressed to:—

The Engineer—Generation Department,
Kearsley Power Station,
Stoneclough, near Manchester,

and must be received not later than 18th August, 1945.

2482

FIRST GARDEN CITY LIMITED

Electricity Undertaking

CONTROL Engineer required to operate modern E.H.T. and D.C. switchboard at generating station, N.J.I.C. schedule (No. 9 area) rate, 2s. 4½d. per hour: state experience, age, married or single, as there is an acute housing shortage in the area.

The Ministry of Labour and National Service have given permission under the Control of Engagement Order, 1945, for the advertisement of this vacancy.

CHARLES GOULD, M.I.E.E.,
Works Road, Engineer and Manager.
Letchworth, Hertfordshire. 2436

ASSOCIATED MUNICIPAL ELECTRICAL ENGINEERS
(Great Britain and Ireland)
and the
ELECTRICAL POWER ENGINEERS' ASSOCIATION

NOTICE

Bath Corporation—Appointment of City Electrical Engineer

THE Standing Joint Committee of the above Associations desire to point out that all applicants for the above advertised post should stipulate a salary in accordance with Clause 10 of the Agreement made by the National Joint Committee of Local Authorities and Chief Electrical Engineers (Electricity Supply Industry), under which clause the latest available data (subject to any adjustment which may be necessary under the interpretation of the Agreement) indicates a commencing salary of £1,512 per annum for the first year rising to £1,778 the third year and thereafter subject to adjustment above or below in accordance with the National Agreement.

ALL ENGINEERS, WHETHER ENGAGED IN THE ELECTRICITY SUPPLY INDUSTRY OR NOT, ARE URGENTLY REQUESTED TO INCLUDE THE ABOVE CONDITION IN ANY APPLICATION MADE FOR THE APPOINTMENT REFERRED TO.

W. ARTHUR JONES, A.M.I.E.E.,
Secretary,
Standing Joint Committee,
A.M.E.E.—E.P.E.A.

2450

A Practical Designer for Lighting Fittings is required by a large Electrical Engineering Company for the position of Production Manager. Good experience of all modern types of electric light fittings, including discharge lamps and fluorescent tubes is necessary. Experience of design of auxiliaries would be an added advantage. Applications giving full details of training and experience to—Box 2411, c/o The Electrical Review.

APPLICATIONS are invited from men over 51 or Class "A" ex-Service men only, for the post of Assistant Sub-station Attendant. Applicants must have experience in the control of High and Low Tension Switchboards, and in the operation of Rotary Convertor Plant. Conditions of service and rates of pay in accordance with D.J.I.C. No. 11 Area—present rate £4 17s. 6d. per week. Applications, stating age, details of experience, and enclosing copies of two testimonials to be addressed to the undersigned not later than 11th August, 1945.—F. Swarbrick, Engineer & Manager, Hove Corporation Electricity Department, Hove Street, Hove, 3, Sussex 2491

APPLICATIONS for an experienced Electrical Plant Engineer (Managerial) are invited by large industrial undertaking employing over 10,000 in South Midlands. He must have extensive practical experience in the layout, installation and maintenance of A.C. and D.C. electrical equipment as installed in a large industrial factory. Able to control skilled and unskilled labour. Age preferably under 42. Applications, which must be in writing, stating date of birth, full details of qualifications and experience, salary expected, should be addressed to—Box 2402, c/o The Electrical Review.

APPLICATIONS for an experienced Mechanical Plant Engineer (Managerial) are invited by large industrial undertaking employing over 10,000 in South Midlands. He must have extensive practical experience of the installation of all types of machine tools, conveyor equipment, compressors and general plant maintenance. Sound technical education required and able to handle skilled and unskilled labour. Good prospects. Age preferably under 42. Applications, which must be in writing, stating date of birth, full details of qualifications and experience, salary expected, should be addressed to—Box 2401, c/o The Electrical Review.

BOOK-keeper, used to Engineering Accounts, costing, wages, P.A.Y.E., preparing monthly trial balance, etc., applications from those over 51 or Class A ex-servicemen. State age, salary.—Box 2473, c/o The Electrical Review.

CHIEF Draughtsman. Progressive company employing 1,500 requires experienced man having extensive background in similar capacity with well-established firm in the light mechanical electrical industries to reorganise and take charge of D.O., including jig and tool design. Write details and salary required to—Box 2406, c/o The Electrical Review.

CHIEF Inspector required by progressive light electrical mechanical engineering firm, S.W. London district. Applicants must have pronounced administrative ability, extensive previous experience, satisfactory electrical qualifications to recognised standards, and be thoroughly conversant with usual Government inspectional procedure. Write, giving full particulars and salary required, to—Box 2403, c/o The Electrical Review.

CLERICAL Assistant, Class A. Ex-Serviceman, for Stores Office. Must have thorough knowledge of all electrical material. Apply—London Electrical Company, 92, Blackfriars Road, S.E.1 2324

DRAUGHTSMAN required for Electrical Machines. North Kent district. State experience and salary required. Applicants should be over 51 years of age, Class A ex-service men, or otherwise exempt from M.O.L. control.—Box 2383, c/o The Electrical Review.

ELECTRICIAN required immediately by Electrical Contractors, London, permanency to suitable man. Class "A" ex-Service man or man over 51. Apply, giving full particulars to—Box 2422, c/o The Electrical Review.

ELECTRICIANS wanted by Central London Contractors, Class "A" ex-Service men only, or over 51.—Box 7383, c/o The Electrical Review.

ELECTRICIANS wanted by Electrical Contractors in Warrington, Lancashire. Permanency to good men. Class "A" ex-Service men or over 51.—Box No. 2494, c/o The Electrical Review.

ENGINEER required by large firm in the Manchester area for dealing with enquiries and orders for Electric Motors, Generators, etc. Applicants over 51 or Class "A" ex-Servicemen only. State age, experience and salary required. Box 2407, c/o The Electrical Review.

EXPANDING London Company engaged in development of new electrical instruments requires immediately executive to co-ordinate research and development work and small-run production prior to sub-contracting for large-scale manufacture. The position is one of considerable scope, requiring knowledge of scheduling, time-planning, purchasing, and calls for ability to co-ordinate the activities of technical personnel, but does not necessitate technical qualifications. Write full details of qualifications, etc. to—Box 2499, c/o The Electrical Review.

FOREMAN required for Electrical Instrument department, sound knowledge and practical experience with moving coil instrument production, scaling, calibrating, training female labour. Permanent post with good prospects. Over 51 or Class A ex-service man only.—Box 2398, c/o The Electrical Review.

HEAD Foreman required by company engaged on essential work, S.W. London district, to take charge of assembly shop. Applicants must have previous and thorough experience in similar capacity with firms manufacturing light electro-mechanical equipment. Write, giving full particulars and salary required, to—Box 2404, c/o The Electrical Review.

INVOICE Clerk (Female) required for electrical wholesalers, Hammersmith district, good at figures and preferably with knowledge of E.L.M.A. discounts, etc. Permanent and progressive position to suitable applicant. State full particulars of experience, age and wages required in confidence to—Box 2454, c/o The Electrical Review.

JUNIOR Engineer with technical training to degree standard required by an Electric Supply Authority. Experience in the design, installation and maintenance of protective gear an advantage. Preference given to ex-servicemen. Commencing salary £385 per annum, including bonus. The Ministry of Labour and National Service Technical and Scientific Register have given permission under the Control of Engagement Order, 1945, for the advertisement of this vacancy.—Box 2463, c/o The Electrical Review.

LARGE Company in North-West Area has vacancies for Senior Electrical Designers, immediately the present restriction on employment is removed. Applications are now required, and applicants should have experience in design of A.C. and D.C. Dynamo-Electric Machines of all types and sizes. State age, experience, and salary required.—Box 2495, c/o The Electrical Review.

LIFT Engineers. Old-established firm requires experienced man as General Manager. Salary and participation in profits. Applications accompanied by details of experience will be considered in confidence.—Box 2456, c/o The Electrical Review.

MANAGER required to take charge of technical development in the design and production of small electric motors. Please send full details of experience and salary required.—Box 2424, c/o The Electrical Review.

MANAGER required, with general experience in the manufacture of lead storage batteries. State experience and salary required. Box 76, c/o The Electrical Review.

NORTH East firm have executive vacancy for man with initiative thoroughly experienced in designing and constructing all domestic electrical appliances. Salary commensurate with ability. Appointment will not be made until present labour restrictions are relaxed.—Box 2479, c/o The Electrical Review.

OVERSEAS Employment: Nigerian Electric Supply Corporation Limited—Assistant Engineer. Applicants should be Grad. I.E.E. or I.Mech.E. or Members of Association of Mining Elec. and Mech. Engineers, or equivalent qualifications. Duties will include operation and maintenance of Hydro-Electric Power Stations, Transmission Lines and Substations. Engagement for two tours of eighteen months with three months leave each. Free travel, free quarters, good allowances. Salary £40 to £50 per month, A.T.Q. Age preferably 25—45 years. Superannuation Fund maturing at age 55 years. Write quoting D.1297XA, to Ministry of Labour and National Service, Technical and Scientific Register, Room 670, York House, Kingsway, London, W.C.2, for application form which must be returned completed by 29th August, 1945. 2466

REPRESENTATIVES wanted with a connection amongst wholesalers and manufacturers, by North-West firm manufacturing Rectifying Equipment and Transformers. Replies should state area covered and details of existing representations.—Box 7388, c/o The Electrical Review.

SALES Manager required for well-known company with headquarters in London to sell through the trade Vacuum Cleaners of national reputation; other electrical appliances may also be sold later. Applicants must have had successful administrative experience and be well known to electrical supply companies, leading electrical firms and stores. Excellent opportunity for energetic man with necessary qualifications. Applicants should state age, previous experience and salary required to—Box 2460, c/o The Electrical Review.

SALESWOMAN required for Electrical Contractors Showroom. (Only applicants having held similar position need apply). Write giving full particulars, wages required, etc. W. T. Clarke & Co. Ltd., Sicilian Avenue, Southampton Row, W.C.1. 2421

SHIFT Engineer required for modern high industrial power plant. Over 51 or from Class A ex-service men only. Salary and conditions according to N.J.B. Schedule, Grade 8, Class C (at present £329 p.a.). Appointment subject to passing of medical examination. Applications, stating full particulars of training, experience and age, to be submitted to—Personnel Manager, Boots Pure Drug Co. Ltd., Nottingham. 2457

TRANSFORMER Assembler 10-200 kVA. Must be capable of complete assembly from drawings. Good progress for efficient man in new department. Applications only from those over 51 or Class A ex-servicemen.—Reply Box 2474, c/o The Electrical Review.

SWITCHBOARD Attendant, experienced in operating E.H.T. Switchgear, synchronising and control of turbine alternators, for Iron and Steel Works, North East Coast. Salary £330 per annum. T.U. Permanent position. The Ministry of Labour and National Service have given permission under the Control of Engagement Order, 1945, for this advertisement. Apply Box 2487, c/o The Electrical Review.

TECHNICAL Assistant. Must be university graduate in electrical engineering and able to deal with the problems arising in electric power supply. Salary £300-£450 per annum according to qualifications. The Ministry of Labour and National Service, Technical and Scientific Register, have given permission under the Control of Engagement Order, 1945, for the advertisement of this vacancy. Apply to—Chief Engineer, Newcastle & District Electric Lighting Co. Ltd., 81, Westgate Road, Newcastle-upon-Tyne. 2455

WANTED, Storekeeper. Good prospects for efficient and responsible man. Must be over 51 or Class "A" ex-Service man.—Box 2500, c/o The Electrical Review.

WELL-known Electrical Engineering Company have vacancies for suitable lads, under 18 years of age, with matriculation or general school certificate, for apprenticeship in the above industry. Good rates of pay and living accommodation provided.—Box 2245, c/o The Electrical Review.

WELL-known Firm in the Manchester District will require Engineers immediately after removal of present restriction of employment, for handling of enquiries or orders for Electric Motors, Generators and Allied Equipment. State age, experience and salary required.—Box 2488, c/o The Electrical Review.

WIREMAN wanted, London, over 51 or otherwise free to take position. Best conditions. Reply—Box 2344, c/o The Electrical Review.

WORKS Manager required by leading cable manufacturers, London area; sound managerial qualifications essential, together with experience of manufacture of rubber and thermoplastic insulated cables; experience of wire-drawing and other operations an advantage; age 35/45; first-class opportunity for the right man. Write in confidence, stating experience and salary required, to—Box 2458, c/o The Electrical Review.

WORKS Manager required for small Control Gear and Switchgear Works in the North-West of England. Applicants should have had experience in similar manufacture and must give full particulars of age, experience and salary required. Address to—Box 2462, c/o The Electrical Review.

WORKS Manager wanted for a Midland Works employing about 1,000 employees engaged in the manufacture of laminations for all types of Electrical Machinery. Candidates must have a knowledge of the principles of design of electrical equipment, and have experience in modern tooling and production methods, and of Works management, production control, and the handling of labour. Apply, stating age, qualifications and when free, to—Box 2490, c/o The Electrical Review.

WORKS Superintendent. Progressive company employing 1,500, manufacturing light electrical mechanical equipment, S.W. London district, requires man with extensive experience in similar capacity. Applicants must be competent to control labour, all grades, have thorough knowledge latest manufacturing methods and layout. Capable of supervising large quantity production on economical basis to give results. Write, giving full particulars and salary required, to—Box 2405, c/o The Electrical Review.

APPOINTMENTS FILLED

Dissatisfaction having been so often expressed that unsuccessful applicants are left in ignorance of the fact that the position applied for has been filled, may we suggest that Advertisers notify us to that effect when they have arrived at a decision? We will then insert a notice free of charge under this heading.

BOX 7327—Engineer; Croydon Corporation—Control Engineer

SITUATIONS WANTED

ADVERTISER (21), Higher Nat. Cert., City & Guilds Final, 5 yrs.' engineering apprentice, desires a post in electronics, radio or sound reproduction. Exempt military service.—Box 7337, c/o The Electrical Review.

ADVERTISER (50), experienced in all branches sales-office organisation, many years administrative position methodical and efficient controller, seeks change.—Box 7382, c/o The Electrical Review.

ASSISTANT-Engineer (27) Patentee, seeks post in Electronics or Aeronautics where initiative and new ideas are required. Good workshop, drawing office, sales experience.—Box 7397, c/o The Electrical Review.

BUYER. A.M.P.O.A. Age 35. Ten years with leading firm Domestic Electrical Appliance Manufacturers; still so employed. Desires change to Company engaged on similar light engineering activities. London area or South.—Box 7355, c/o The Electrical Review.

CHIEF Colliery Electrical Engineer (35), A.M.I.E.E. etc., works trained, D.O. experience, accustomed all types mining equipt., surface and underground, own generation or power supply, skip winding, American methods, etc., planning, installation, maintenance, desires executive position in colliery group, large works or as manufacturer's technical representative, home or abroad. Box 7390, c/o The Electrical Review.

ELECTRICAL and Mechanical Engineer, M.Sc., expert, electrical instruments, motors, generators, also A.C. commutator machines, 16 years' experience, seeks suitable position.—Box 7335, c/o The Electrical Review.

ELECTRICAL Engineer, I.E.E., age 44, desires works maintenance.—H. H., Devonshire House, Woodstock, Oxon. 7385

ELECTRICAL Test Engineer (27), on release from M.N., desires progressive post with transformer manufacturers or similar concern. Six years' experience in assembling, erecting and testing all types of power and H.T. units. Write—Box 7324, c/o The Electrical Review.

ENGINEER, B.Sc., A.M.I.E.E., age 32, experienced in manufacture, design and development of relays, control gear, motors, generators and light engineering products. Conversant with modern production practices. Will consider senior position—London area.—Box 7396, c/o The Electrical Review.

EXPORT. Electrical Engineer with sound mechanical, field, office, construction and maintenance experience in Great Britain, Switzerland, Chile, Brazil, British West Africa, British West Indies on Electric Traction, Public Utility, Open and Underground Mining, Oil Field and Refinery, War Office and Air Ministry, offers his services to manufacturers of repute who are desirous of opening up their export markets. Age 43. Public School. A.I.E.E., languages spoken, French, Spanish, Portuguese, with slight knowledge German, Italian.—Box 2481, c/o The Electrical Review.

EX-service man (Class A), prof. el. engineer, with wide experience in high and low voltage machinery and installations of all kinds, seeks appointment or partnership with el. contractor or consulting engineer firm.—Box M.37, Scripps's, South Molton st., W.1. 7339

FOREMAN, Radio Production, 18 years' experience, knowledge motion, time study systems, used to large staff, can train new operators, desires change.—Box 7387, c/o The Electrical Review.

GRADUATE I.E.E., aged 29, captain in Royal Engineers, free in October, seeks technical or administrative post with prospects.—Box 7329, c/o The Electrical Review.

KEEN young man (27), at present serving H.M. forces, seeks progressive post. Qualifications include City and Guilds and Higher National certificates, Student M.I.E.E., 6 yrs.' experience general contracting plus 6 yrs. as electrician R.A.F. Release group number 25.—Box 7386, c/o The Electrical Review.

PLUMBER-Jointer, married, requires situation, North-West Coast preferred; 10 years' experience with supply undertaking.—Box 7379, c/o The Electrical Review.

PRODUCTION Engineer, fully conversant manufacture high standards, electrical instruments and mechanisms, experimental, prototypes. Present position assistant chief engineer and responsible for development eminent electrical equipment manufacturers. Release granted one month's notice, age 41. Within 20 miles London only, residing S.W. area.—Box 7389, c/o The Electrical Review.

PROFESSIONAL Electrical Engineer, at present free, seeks position. Salary £800.—Box 7371, c/o The Electrical Review.

QUALIFIED Electrical and Mechanical Engineer widely travelled, seeks executive appointment, capable organiser, comprehensive knowledge of production and managerial duties together with consultancy on technical matters. Replies giving details of position and salary offered.—Box 7411, c/o The Electrical Review.

FOR SALE

Traders buying and selling hereunder must observe the Restriction of Resale Order, S. R. & O. 1942 No. 958.

A.C. and D.C. House Service Meters, all sizes, quarterly and prepayment, reconditioned, guaranteed one year. Repairs and recalibrations.—The Victa Electrical Co., 47 Battersea High Street, S.W.11. Tel. Battersea 0780. 19

GEORGE COHEN, SONS & CO. LTD.

for

GUARANTEED ELECTRICAL

PLANT.

MOTORS, GENERATORS,

SWITCHGEAR,

etc.

WOOD LANE, LONDON, W.12.
Telephone: Shepherds Bush 2070
and
STANNINGLEY, NEAR LEEDS.
Telephone: Pudsey 2241.
Established 1834.

27

SALE

OWING to recent and large purchases we can offer at extraordinary low price:

(1) D.C. MOTORS.
from ¼-300 h.p., large variety in speed and voltage.

(2) A.C. MOTORS.
single and three-phase, ranging up to 100 h.p., nearly new.

(3) VARIOUS PLANT,
such as Generators, Convertors, Transformers, M-G sets, Switchgear of all descriptions.

(4) ENGINES AND SETS,
comprising Gas, Oil, Steam Engines and many combined A.C. and D.C. sets.

IMMEDIATE DELIVERY.

Please send enquiries to:

THE ELECTROPLANT CO.
Est. 1912.
Wembley, Middx. 2469

REBUILT MOTORS AND GENERATORS

LONG deliveries can often be avoided by purchasing rebuilt secondhand plant. We can redesign or replace surplus plant of any size.

SEND US YOUR ENQUIRIES.

OVER 1,000 RATINGS ACTUALLY IN STOCK HERE.

DYNAMO & MOTOR REPAIRS LTD.,
Wembley Park, Middlesex.
Telephone: Wembley 3121 (4 lines).

Also at Phœnix Works, Belgrave Terrace, Soho Road, Handsworth, Birmingham.
Telephone: Northern 0898.

26

WATER TUBE BOILERS IN STOCK

Two	25,000 lbs.	evaporation,	250 lbs. W.P.
Two	25,000 lbs.	,,	175 lbs. ,,
Three	20,000 lbs.	,,	175 lbs. ,,
One	12,000 lbs.	,,	200 lbs. ,,
One	12,000 lbs.	,,	160 lbs. ,,
One	9/10,000 lbs.	,,	200 lbs. ,,

We install complete, including brickwork. Economisers, Pumps, Piping Valves, Generating Sets and Motors in stock. Please send us your enquiries; we can give immediate delivery.

BURFORD, TAYLOR & CO. LTD.,
Boiler Specialists, Middlesbrough.
Telephone: Middlesbrough 2622.

32

DIESEL GENERATING PLANT

300 b.h.p. RUSTON HORIZONTAL SIX-CYLINDER COLD STARTING DIESEL; new 1927, 300 r.p.m., direct coupled to 275 kVA, 440-volts, 3-phase, 50-cycles METRO-VICK, Alternator.

280-b.h.p. PETTER VERTICAL 4-CYLINDER COLD STARTING "ATOMIC" DIESEL; new 1944, 300 r.p.m., direct coupled to 200-kW METRO-VICK 400-volts, 3-phase, 50-cycles Alternator.

250-b.h.p. RUSTON HORNSBY VERTICAL FOUR-CYLINDER COLD STARTING DIESEL; new 1929, direct coupled to 130-kW L.D.C. 400-volts, 3-phase, 50-cycles Alternator.

168-b.h.p. PETTER VERTICAL 3-CYLINDER COLD STARTING ATOMIC DIESEL; new 1932, 400 r.p.m., direct coupled to 100-kW, 220-volt D.C. Generator.

120-h.p. RUSTON VERTICAL TWIN-CYLINDER COLD STARTING DIESEL; new 1930, 333 r.p.m., direct coupled to 85-kW, 400-volts, 3-phase, 50-cycles Alternator.

60-h.p. RUSTON VERTICAL 3-CYLINDER COLD START DIESEL; new 1936, 500 r.p.m., direct coupled to 50-kW CROMPTON 250-volt D.C. Generator.

60-h.p. BLACKSTONE HORIZONTAL SINGLE-CYLINDER COLD START DIESEL; new 1934, 240 r.p.m., direct coupled to 35-kW E.C.C. 220/230-volt D.C. Generator.

60-h.p. FIELDING & PLATT HORIZONTAL SINGLE CYLINDER COLD START DIESEL; new 1931, direct coupled to 35-kW E.C.C. 230-volt D.C. Generator.

49-h.p. CROSSLEY HORIZONTAL SINGLE-CYLINDER COLD START DIESEL; 240 r.p.m., new 1932, belt driving 25-kW, 400-volts, 3-phase, 50 cycles Alternator, 750 r.p.m.

37½/42-h.p. CROSSLEY VERTICAL SINGLE-CYLINDER COLD START DIESEL; new 1935, 500 r.p.m., direct coupled to 20-kW, 400-volts, 3-phase, 50-cycles Alternator.

30-h.p. RUSTON VERTICAL 3-CYLINDER ELECTRIC START DIESEL; new 1939, 1,000 r.p.m., direct coupled to 20-kW BULL 430/215-volt D.C. Generator (2 available).

22-h.p. BLACKSTONE HORIZONTAL SINGLE-CYLINDER HAND STARTING DIESEL; new 1942, 600 r.p.m., belt driving 17.5-kW NEWTON 220-volt D.C. Generator, 540 r.p.m.

17-h.p. NATIONAL HORIZONTAL SINGLE-CYLINDER HAND STARTING DIESEL; new 1934, belt driving 10-kW CROMPTON 230-volt D.C. Generator.

9-h.p. LISTER VERTICAL SINGLE-CYLINDER HAND STARTING DIESEL; new 1937, 1,000 r.p.m., direct coupled to 4.5-kW, 110-volt D.C. Generator.

All the above offered in first-class condition complete with all accessories.

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Electricity Department

THE Borough Council invite offers for the purchase of the machines described hereunder:—

Peebles-La Coeur Motor Converters. One 1,500 kW and two 500 kW, 6,000 volts, 3-phase, 50 cycles to 500/550 volts D.C. Stator and rotor of 1,500-kW machine require repair. 500-kW machines in running order. All complete with D.C. Control Panel and starting equipment.

Also Four 1,000-kVA single-phase oil-immersed type Transformers, 50 cycles, 6,070/3,460 volts.

The above can be viewed on application to the Borough Electrical Engineer, 18/24, Lower Clapton Road, E.5. Telephone, Amherst 2361.

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1,000-watt, 240-volt spirals.
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A.C. and D.C. Motors, all sizes, large stocks, fully guaranteed.—Milo Engineering Works, Milo Road, East Dulwich, S.E.22 (Forest Hill 4422). 6781

A.C. Motors, 1/50th h.p. to 10 h.p., from stock. Also D.C.—The Johnson Engineering Co., 86, Great Portland Street, London, W.1. Tel.: Museum 6373. 57

ACETATE Sheet. Transparent and non-inflammable. Suitable for manufacture of Lampshades.—Collingridge & Co. Ltd. Riverside Road, Watford. Phone, Watford 5963. 2426

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CHLORIDE Keepalite Equipment, with or without battery, condition indistinguishable from new. Particulars from—E. Powell Ltd., 39, High Street, Tunbridge Wells. 7394

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LEAD-covered and Armoured Cables, P.I. and V.I.R., various special lines at low prices.—Edwardes Bros., 20, Blackfriars Road, London, S.E.1. 7405

LESLIE Dixon & Co. for Dynamos, Motors, Switchgear, Chargers and Telephones.—214, Queenstown Road, Battersea, S.W.8. Telephone, MACaulay 2159. Nearest Rly. Sta.: Queen's Road, Battersea (S.R.). 18

MEGGER, Evershed Vignoles, with separate generator, good condition, £12 or near offer. Phone Hop 2692 to view.—Box 2453, c/o The Electrical Review.

MONOMARK. Permanent London address. Letters redirected. 5s. p.a. Write—BM/MONO53, W.C.1 68

MOTOR Generator Sets and Convertors, all sizes and voltages from ½ kW up to 500 kW in stock.—Britannia Manufacturing Co. Ltd., 22/26, Britannia Walk, City Road, London, N.1. Telephone, Clerkenwell 5512, 5513 & 5514. 28

NAMEPLATES, Engraving, Diesinking, Stencils, Steel Punches.—Stilwell & Sons Ltd., 152, Far Gosford Street, Coventry. 14

ONE new totally enclosed vertical Lancashire Dynamo 8-h.p. Fan Motor, for 200 v., 2-ph., 50 cys., with four facings, without feet, shaft 2¼" dia., 10" long, keyway 6" long, with starter complete. Ex stock. For price apply—H. J. H. King & Co. Ltd., Engineers, Nailsworth, Glos. 71

ONE Parkinson Electric Motor, A.C., 35 h.p., 725 r.p.m., 3-phase, 50 cycles, 400 volts, 48 amps.; also one Westinghouse D.C. Shunt Wound Motor, 11 h.p., 460 volts, 760 r.p.m. In perfect condition. Can be seen running any time. Apply—W. Sykes & Sons, 74, Bondgate, Darlington. 2498

PHONE 98 Staines. 60-kW Allen Crude Oil Set, 220 vo. D.C.; 130-kW Diesel Set, 110 vo. D.C. (now running); Three-throw High Pressure Pump, 3½" × 6", 700 lbs. w.p.; 34-kW Steam Generating Set, 220 vo. D.C.; 20-h.p. Ruston Oil Engine and 7/9-kW, 110-vo. Dynamo; 50-kW Steam Generating Set, 440/220 vo. D.C.—Harry H. Gardam & Co. Ltd., Staines. 60

PHOTOMETER Head by Kruz (Lummer Broden type), Single Stage Rotary Oil Vacuum Pump, Gaede Mercury Pump (without mercury). 1 h.p. 230-volt Motor A.C., Counter Shaft Pump Bench (incomplete), McLeod Gauge, H.T. Coil, many H.P. Gas Burners, Small Hand Winding Machine, etc.; £45 the lot, in London.—Box 7360, c/o The Electrical Review.

PLATING Motor Generator Sets with 400-volt, 3-phase, 50-cycles driving motors: 4 1,000 amps., 6 volts capacity; 1 3,000 amps., 6 volts; 1 3,000 amps., 10 volts; 1 1,000 amps., 10 volts; 1 500 amps., 6 volts. With or without switchgear.—Newman Industries Limited, Yate.

PORCELAIN Cleats, 2 and 3 groove, various sizes ex stock, price list.—Edwardes Bros., 20, Blackfriars Road, London, S.E.1. 7406

PORCELAIN Insulators, various sizes in stock, galv. spindles.—Edwardes Bros., 20, Blackfriars Road, London, S.E.1. 7407

ROTARY Converters in stock, all sizes; enquiries invited.—Universal Electrical, 221, City Road, London, E.C.1. 16

SEVERAL Telescopic Tower Ladders ready for essential work. Extensions, Trestles and Steps to order.—Shaftesbury Ladders Ltd., 453, Katherine Road, E.7. Grangewood 3363. 15

SPECIAL line, Bell and Telephone Wires, also screened wires, large quantity, cheap.—Edwardes Bros., 20, Blackfriars Road, London, S.E.1. 7408

STAFF Time Checking and Job Costing Time Recorders (all makes) for quick cash sale. Exceptional condition. Write—Box 528, Smiths, 100, Fleet Street, London, E.C.4. 31

STEAM Engine for sale, twin cylinder, horizontal condensing type by Robey, 120 h.h.p., installed new in 1923, cost £2,000, suitable for steam pressure 50/60 lbs. sq. in. In perfect condition, may be seen running at any time by appointment. Engine redundant through electrification. £200 or nearest offer for quick sale as space is urgently required. Also considerable quantity of all sizes leather and composition belting, new and secondhand, for sale cheap.—J. J. Williamson & Sons (Canterbury) Ltd., St. Mildred's Tannery, Canterbury, Kent. 2362

SUN-ray equipment suitable for Works Welfare Centre. Equipment by Watson & Sons, includes two Sun-ray Clinic Lamps, 3,500 for 200/210 volt., A.C. and two Treatment Timers, etc.—J. Sankey & Sons, Ltd., Albert Street, Bilston. 2475

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SWITCHBOARDS suitable for dynamos and alternators, all sizes from 100 amp. up to 1,500 amp.—Britannia Manufacturing Co. Ltd., 22/26, Britannia Walk, London, N.1. 25

THE Committee of Management, Holloway Sanatorium, Virginia Water, have for disposal, due to changing over to electricity company's supply, 1 9½" × 15" × 8" Enclosed Compound Steam Engine by Peter Brotherhood direct coupled to 60-kW Bull Compound D.C. Generator, 110/120 volts, steam pressure 125 lbs. sq. in. The plant is in good working order and can be seen on application to the Medical Supt. Price £300. 2476

THE following electricity prepayment meters are for sale:—70 2½ amp., 250 v., Ferranti; 12 2½ amp., 250 v., type B. C. & H.; 5 10 amp., 250 v., type E. P Aron; 3 5 amp., 250 v., A.E.G.—Slough Estates Ltd., Trading Estate, Slough, Bucks. 2439

TRANSFORMER Lead-in Wire, 7/38 and 14/38 s.w.g., Insu-Glass finished, various colours, stock.—Saxonia, Greenwich, S.E.10. 34

T.R.S. Cables and Flexibles, Welding Cables, supplied to M.O.S. requirements.—Edwardes Bros., 20, Blackfriars Road, London, S.E.1. 7410

5-h.p. Petter Diesel Set, 200/220 v. A.C.; Pelapone Set, 100/140 v., 11 a., and panel; 20-kW Steam Turbo Sets, 120 v. D.C.; Kohler Sets, rebuilt, 5 kW, 2 kW, 220 v.; 5-h.p. Oil Engine.—E. Binns, 156a, Falsgrave Road, Scarborough. 7399

7½-h.p. Blackstone Crude Oil Horizontal Engine, complete with water-cooling tank, filter and silencer, and fuel tank and fuel storage tank, 5 ft. long × 3 ft. 6 ins. diameter, direct coupled to a "Bull" Dynamo, 23 amps., 100/160 volts, 320 r.p.m., fitted with a series/shunt switch. The complete unit is in a first-class condition. Best offers to—Messrs. T. S. Bell & Co., 35, Tangier Street, Whitehaven, Cumberland. 49

100-h.p. "Laurence Scott" Slipring Motor, 400/3/50, screen protected, ball bearing, 930 r.p.m. Complete with "Allen West" oil immersed Starter. Date 1941.—Stewart Thomson & Sons, Fort Road, Seaforth, Liverpool, 21, 55

140-kVA Belliss/Crompton Alternator, 400/3/50, 4-wire. Seen running.—Stewart Thomson & Sons, Fort Road, Seaforth, Liverpool, 21. 47

150-h.p., 420-volt D.C Motor by English Electric Co., oil ring bearings, 716 r.p.m., compound interpole, C.I. bedplate, 3rd pedestal bearing, pulley 21" × 21", and slide rails. "Igranic" floor type starter panel with volt- and ammeter. This motor is in excellent condition and is being changed due to an A.C. supply being taken. Best offers to—Messrs. T. S. Bell & Co., 35, Tangier St., Whitehaven, Cumberland. 48

250-kVA Alternator, 400 volts, 3-phase, 50 cycles, 750 revs., with direct-coupled exciter; also two 250-kW Rotary Converters, with transformers and switchgear, input 6,600 volts, 3-phase, 50 cycles, output 420/210 volts D.C.—Midland Counties Electrical Engineering Co. Ltd., Grice Street, Spon Lane, West Bromwich. 36

300 18" Benjamin Distributing Reflector Fittings, 200/300-watt type, perfect condition, any quantity.—Hywood, Elect. Eng., 40, Coram St., W.C.1. 2396

500 Electric Motors, Dynamos, Transformers, Converters, etc., etc., at low prices.—S. C. Bilsby, A.M.I.C.E., A.M.I.E.E., Crosswells Road, Langley, near Birmingham. Phone, Broadwell 1359. 21

500 v. Megger, Bakelite, Evershed & Vignoles, 5" × 4" with case. Offers to 81, Lifstan Way, Southend. Marine 67594. 7393

1,000-amps. Circuit Breaker, iron clad, double pole, floor mounting; also 8-way iron clad Busbar Unit, floor mounting, 150 amps. per way; each with ammeter, all modern English Electric 230-volts D.C. equipment. Inspection at our works. Further details from—Dynamo & Motor Repairs Ltd., Wembley Park, Middlesex. Telephone, Wembley 3121. 2459

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ACCUMULATOR Plates (old) and lead Peroxide; as actual smelters we pay top price. Also old storage batteries, transformers and whole installations purchased.—Elton, Levy & Co. Ltd., 18 St. Thomas Street, S.E.1. Hop 2825-6. 39

COIL Winding Machines wanted for essential work.—Box 63, c/o The Electrical Review.

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MERCURY (Quicksilver) wanted. Write for packing instructions. Gold, Silver and Platinum also purchased.—Collingridge & Co. Ltd., Riverside Works, Riverside Road, Watford (Tel. 5963). 20

MOTOR, 6 h.p., 230 v. D.C., 1,200 r.p.m., preferably totally enclosed; Motor, 7 h.p. 220 v. D.C., 2,000 r.p.m.; Motor, 15 h.p., 440 v. D.C., 1,450 r.p.m., series wound, crane rated. With or without control gear.—Fyfe, Wilson & Co. Ltd., Bishop's Stortford. 2486

ONE Motor Generator set 110 D.C. input 230/250 volt single phase, output approx. 3 kVA, 50 periods. One Self Excited Alternator, 2 to 3 kVA, 200/250 volts, single phase 50 periods.—Geoffrey R. Burton, Grove Street, Retford. 2467

REELS and Drums required in fairly large quantities by wire manufacturers. Capacity 2 lbs. to 1 cwt. Details to—Box 2363, c/o The Electrical Review.

ROTARY Converters, 50/230 D.C. input, output ¼ to 6 kVA, 230/1/50; also 3/5-kVA Transformer, ratio 100/230/1/50.—Hywood, 40, Coram Street, London, W.C.1. 2397

WANTED, Crypton "Constant Potential" Battery Charging Equipment, complete, 100 amp., capacity for 12-volt batteries.—Particulars, etc., to C. S. Ltd., Staffa Road, Leyton, E.10. 2468

WANTED, Megger Testing Set, 500 volt.—47, May avenue, Eastbourne, Sussex. 7401

WANTED, Rotary Converters, any size.—Universal, 221, City Road, London, E.C.1. 22

WANTED, Secondhand Kohler Plant, 1,500 w. reasonable, also Plating Dynamos, 500 to 2,500 amps. —Box 7398, c/o The Electrical Review.

WANTED, 1/6-h.p., 240/1/50, 1,440-r.p.m., R.I. Motor, preferably resilient mounted for Frig.—Box 2484, c/o The Electrical Review.

WESTINGHOUSE Rectifier. Output 110 volts, 30 amps. approx. Input, 230 volts, 1 phase, or 400 volts, 3 phase. Higher Voltage Output would do.—Exeter Ignition Co. Ltd. Summerland Street, Exeter, Devon. 2489

1½ kW Generator Set wanted. Complete with Cells, Switchboard. Preferably 110 volts. Particulars and price to—Edwards, "Bridgedale," Roxwell Road, Writtle, Chelmsford. 7400

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SMALL Armatures, etc., winding or re-winding, in quantity. High-class work, prompt delivery.—Southern Ignition Co. Ltd., 190, Thornton Road, Croydon. 59

SMALL Firm Instrument Makers (London) are in a position to undertake work to Customers' own drawings or patterns.—Box 7378, c/o The Electrical Review.

TRANSFORMERS, single and three-phase. All types up to 10 kVA.—Woden Transformer Co. (Phone, Bilston 41959), Moxley Road, Bilston, Staffs. 11

VITREOUS enamelling capacity available shortly. All interested firms write—Box 2478, c/o The Electrical Review.

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AGENCIES required for London, South of England, for the following: (1) Domestic electrical appliances; (2) Brass electrical accessories, switch plugs, etc.; (3) Conduit. Advertisers have clientele with every wholesaler in the territory mentioned. Immediate turnover can be guaranteed. Either commission or buying basis. Post-war arrangements considered. — Box 64, c/o The Electrical Review.

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EXPORT to India: An export house with well-established connections in the Indian market desires to hear from manufacturers of Electrical Accessories. Household Appliances, Refrigerators, etc., who seek to expand their export business. Write, giving full details, to the Empire Export & Import Company, 2, Broad Street Place, London, E.C.2. 70

LONDON Representation. Manufacturers of Transformers not represented in London and Southern England who would like to avail themselves of an experienced organisation (established 1907) having good connections with Government departments, corporations and other large buyers, and offering an opportunity for a provincial firm to establish a London office, should write in confidence—Box 2359, c/o The Electrical Review.

MANUFACTURERS' Agents, covering the whole of Great Britain and Colonies, are desirous of contacting manufacturers with a view to sole selling rights (either commission or buying), post-war arrangements considered. —Box 23, c/o The Electrical Review.

WANTED, Agencies for British India, Burma, Ceylon for A.C. and D.C. Motors, Fractional H.P. Motors, Alternators, Generator Sets, Switchgear, Pumping Sets, Arc Welding Units, Power Tools, Cables, Meters, Transformers, Convertors, Fans (Table, Exhaust and Ceiling), A.C. and D.C. Cinema Carbons and Sound Equipments for theatres, Radios, Lamps, Fittings, with all accessories, by a well-organised firm, throughout above areas. Five offices, with sub-agents in all towns. Sound business guaranteed. Apply Havells Electrical Sales Corpn., 59, Forbes Street, Fort, Bombay, with prices, catalogues and terms. 2188

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35, Temple Bar House, London, E.C.4. 77

EDUCATIONAL NOTICES—*Continued*

COMPANY MEETINGS

BROADCAST RELAY SERVICE

Steady Progress and Encouraging Prospects

THE 17th Annual General Meeting of Broadcast Relay Service Ltd. was held on July 31st in London.

Mr. Allan Miller (Chairman & Joint Managing Director) said that the balance of trading account amounted to £135,439, approximately the same as last year. Provision had been made for the dividend on the Preference shares now redeemed, the interim dividend on the Ordinary stock and the proposed final dividend on this stock at the same rate as last year.

He was pleased to state that Mr. F. P. Bishop had joined the company as Joint Managing Director. Mr. Bishop had been concerned with the management of one of our greatest newspapers for many years and brought to the management an experience which would be of inestimable value to the company.

The steady progress maintained throughout the undertaking was a cause of satisfaction, and he was glad to be able to add that the prospects of future development appeared equally encouraging.

Referring to the war service of their companies, the Chairman said that their manufactures include equipment for communication and navigational purposes, apparatus used in conjunction with the development of large bombs and devices for anti-submarine warfare. A large variety of other equipment was made by the company, such as specialised types of motors and generators for use on land, sea and in the air, also synthetic air training equipment for aircraft crews. As a typical example he was now permitted to disclose the rediffusion trainer. This was a device by which bomber crews were trained on the ground to deal with all conditions they had to meet in operational flights. This apparatus was a striking instance of the successful application of rediffusion technique to an urgent practical war problem, and no doubt had been the means of saving many gallant lives, conserving aircraft and petrol, and speeding up the training.

The company had a comprehensive programme of designs on hand for peace-time production which would employ a substantial part of their manufacturing facilities. A department had been established for industrial radio heating apparatus, and their equipment was meeting with widespread acceptance for industrial processes.

The rediffusion services operated by ther subsidiary companies in 35 towns had been maintained throughout the war, despite the fact that many of their towns had been subjected to the heaviest bombing. Their industrial communications service operated by their subsidiary, Central Rediffusion Services Ltd., performed a valuable task in equipping factories for " Music while you Work." They had conducted extensive research on this subject and many factories had been equipped with their system. When properly done " Music while you Work " was an important aid to certain types of production, and it was much appreciated by workpeople in factories. They believed that this type of service would continue to expand in the future.

Referring to business projects, the Chairman said that the company maintained a research staff who were constantly seeking to discover ways and means to improve the service. They had made considerable technical advances under the spur of war, which had enabled them not only to improve the quality of the service, but also to achieve important economies in working. They were planning to give their subscribers a choice of three alternative programme circuits instead of two, and they hoped in spite of continuing difficulties in manpower and equipment that the necessary installations would be completed within a short time after the third programme promised by the B.B.C. had come into operation.

Meanwhile there was ample scope for expansion, not only in many of the areas they already served, but also in new areas at home and overseas. Despite the fact that anything in the nature of sales effort had necessarily been at a minimum, the number of subscribers was growing steadily. The demand for rediffusion service came from many quarters and they were preparing themselves to meet that demand.

The report was adopted and the payment of a final dividend of 3½%, making 7%, free of tax, for the year on the ordinary stock was approved. 2501

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