ELECTRICAL REVIEW

FOUNDED 1872

Vol. CXXXVII. No. 3548 NOVEMBER 23, 1945 9d. WEEKLY

There are many situations in which a moderate degree of diffusion is required in the lighting, either to provide a suitable degree of visibility in complex objects where the light has to penetrate beyond obstructions, or to show up surface details, or to avoid indirect glare. There are also occasions when lamps up to 500 watt have to be used, and for these purposes the Glassteel Diffuser provides an excellent medium.

The Benjamin Glassteel Diffuser consists of a Crysteel porcelain enamelled reflector with an opal glass diffusing globe fitted inside it so that the lamp itself is not directly visible. There are apertures in the reflector which allow a limited proportion of the light to pass upwards to relieve darkness overhead. They are available with the Saaflux system of construction for lamps up to 500 w. or 250 w. E.D.

Benjamin Illuminating Engineering Service will advise you on your lighting problems.

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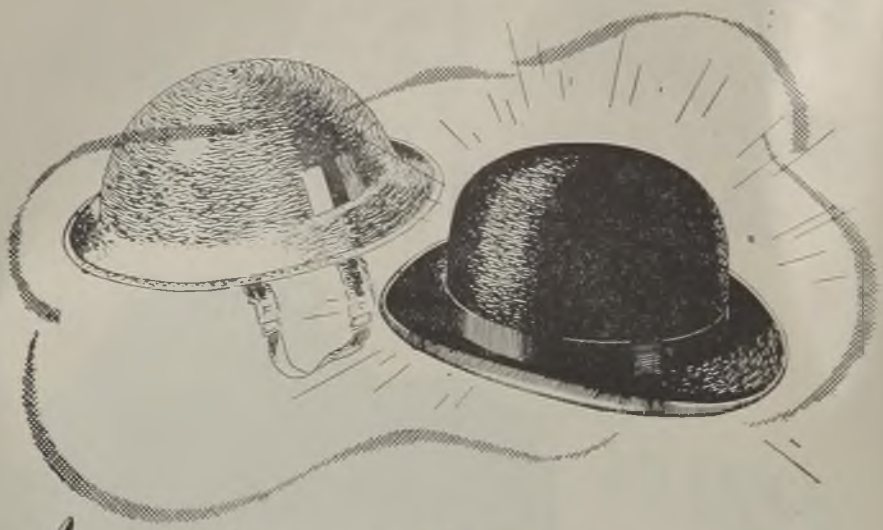

changing over . . .

Changing over from war time engagements to normal Premier production is no easy task however carefully planned, and we ask our friends who are anxiously awaiting supplies of Premier Fine Quality appliances to bear with us, while this operation is in progress. Meanwhile, we assure them that as supplies become available they will be distributed as fairly as possible.

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Insulated with

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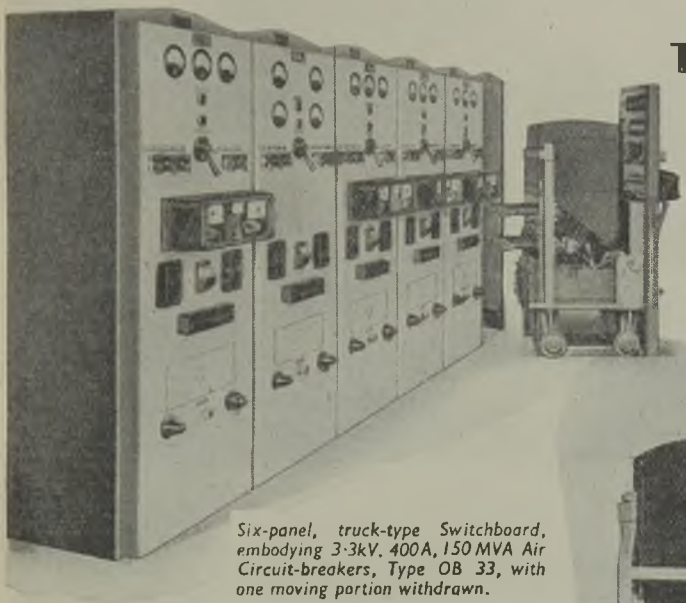
'ENGLISH ELECTRIC'

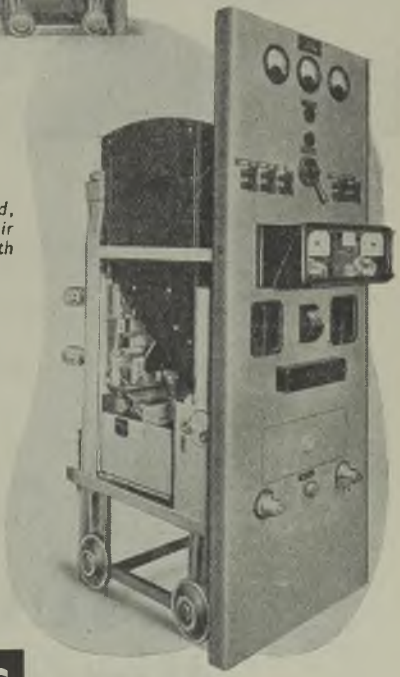
HIGH-BREAKING-CAPACITY · HIGH-VOLTAGE

AIR-BREAK SWITCHGEAR



Six-panel, truck-type Switchboard, embodying 3·3kV. 400A, 150 MVA Air Circuit-breakers, Type OB 33, with one moving portion withdrawn.

TYPE OB33
FOR VOLTAGES UP TO 3·3kV.



'English Electric' Switchgear, Type OB 33 is particularly suitable for use on high-voltage circuits with breaking-capacities up to 150 MVA, at 3·3kV.

IMPORTANT FEATURES

- Elimination of oil fire risk.
- High-pressure silver-faced butt contacts.
- Non-pitting arcing contacts.
- De-ionising arc splitters.
- Electrical operation, manual if desired.
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Larger view of a moving portion.

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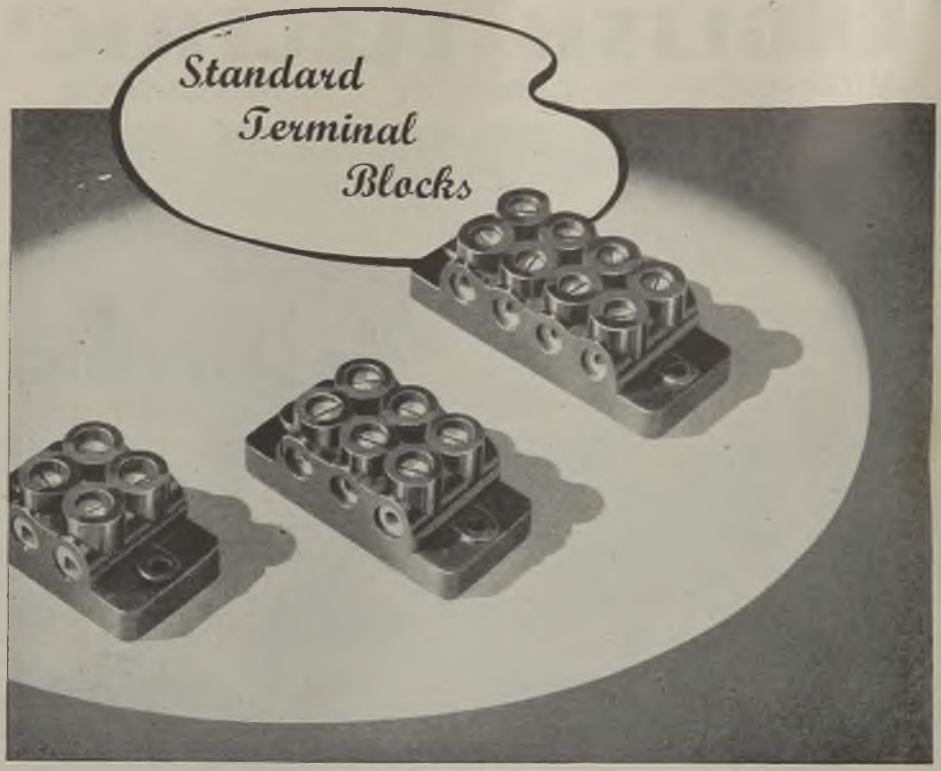

As Plastic Moulders with unrivalled experience in the Electrical and Wireless Trades, we look forward to the opportunity of employing the extensive knowledge gained from working to exacting war-time specifications in assisting you to solve your post-war Plastic problems.

INSULATORS LTD

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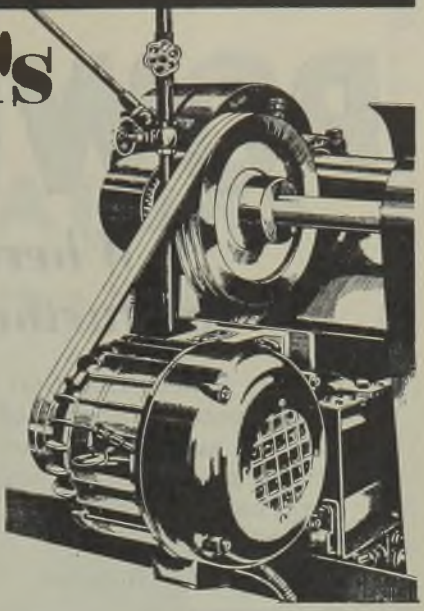
TOTALLY ENCLOSED
SURFACE COOLED
Brook Motors

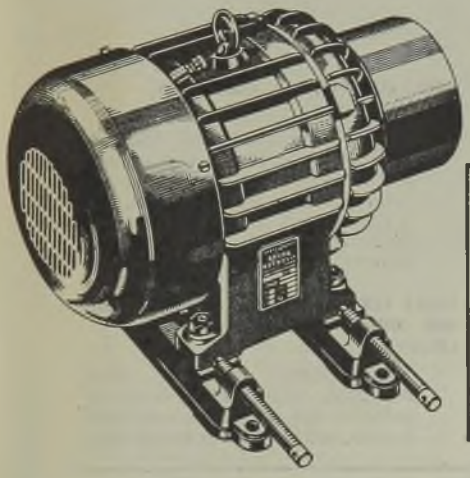


USES

Surface-cooled motors are designed to work under atmospheric conditions too severe for protected types, e.g. saw-mills, flour mills, cement works, etc. They work well in the open, and resist the action of acids, dirt, damp and grit. These motors are not waterproof, and should not be used in positions where they are likely to be submerged

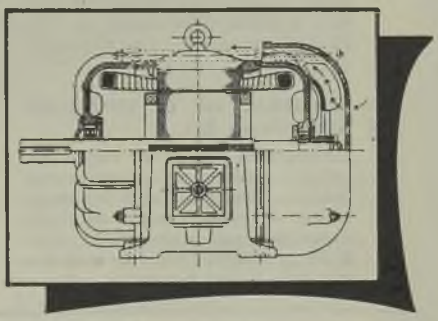
FEATURES

Straight-through oversize shaft without weakening shoulders. There are no pipes or ducts to impede the flow of cooling air. The design is such that the stator stampings are in direct contact with the cooling air. In the cage motor the rear shaft extension carries a pressed steel fan, while in the slipring type the fan is mounted at the pulley end to avoid interference with the slip-rings. The fan draws cooling air through the mesh in the bell-shaped cover and directs it, at high velocity, over the yoke of the motor. On load the temperature rise does not exceed 90 deg. F. The carcass is provided with condensation holes underneath. Alternative types of surface-cooled machines which can be offered are Standard with feet, Flange with feet, and Flange without feet, cage type only.

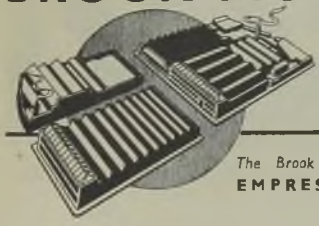


OUTPUTS

½ to 120 h.p. for single, two or three phase, alternating current supply.



BROOK MOTORS LTD • Huddersfield



Specialists in the manufacture of Alternating Current Motors in Squirrel Cage and Slip Ring types from 1/3rd to 200 h.p. 20,000 h.p. speed types are listed for every industrial use, and thousands of these motors in all types have been supplied to various countries. Brook Motors are the largest exclusive Alternating Current Motor Manufacturers in the world.

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The better use of POWER

Where to look for further economies

YOU MAY HAVE DECIDED that you have reached the limit of improvement in efficiency of power usage. But are you sure? Why not make doubly sure by going through these Bulletins *point by point?* If your search reveals only a single possibility it will have been well worth while. The probability is that you will find many.

Turn up these Bulletins:

FUEL ECONOMY BY SAVING ELECTRICITY (*Bulletin No.* 13)

A rapid survey of the possibilities. Brief, practical pointers that take you straight to sources of substantial economy in electricity consumption.

THE INDUSTRIAL USE OF COMPRESSED AIR (*Bulletin No.* 29)

Compressed air is a very convenient medium of power transmission. But it can also be a great waster of power unless carefully supervised and maintained. This Bulletin tells you what to look for and how to put it right.

FUEL ECONOMY AT COLLIERIES (*Bulletin No.* 32)

The colliery official will find this Bulletin a real boon. It is a guide to the economical operation of colliery compressed air plant, but it also contains a brief summary of hints on steam boilers, prime movers, fans, pumps and so on.

SMALL VERTICAL BOILERS, STEAM CRANES AND SHUNTING ENGINES (*Bulletin No.* 37)

These power units are often neglected. How fuel losses can be reduced and operation improved is explained in a very practical way.

UNTIL YOU HAVE looked into the possibilities of every recommendation in these Bulletins you ought not to decide that your power is being used efficiently. If you haven't all the Bulletins ready at hand, please ask for the copies you need from the Regional Office of the Ministry of Fuel and Power.

ISSUED BY THE MINISTRY OF FUEL AND POWER

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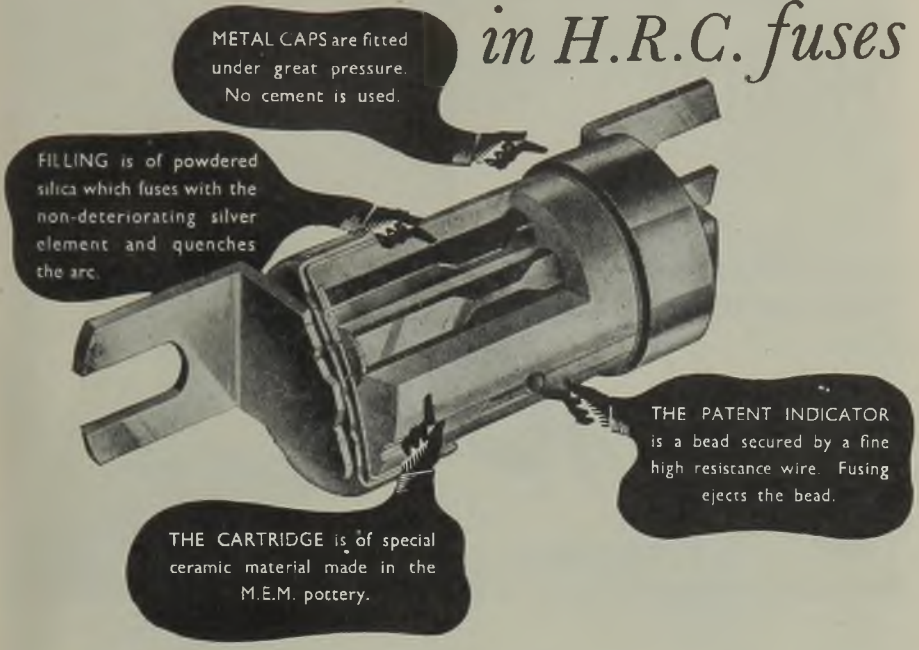
. . . *Here's something good in H.R.C. fuses*



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M.E.M. "Kantark" H.R.C. Fuses are exceptional in that they can be used in existing M.E.M. fuseboards, thus making conversion to H.R.C. fusing easy. Types are available for use in fuse carriers of other makes.

A wide range is available in ratings from 5 to 200 amps. for voltages up to 440 A.C. and 500 D.C.

★ **WRITE FOR LIST No. 270**
It gives all particulars with details of the comprehensive tests applied.

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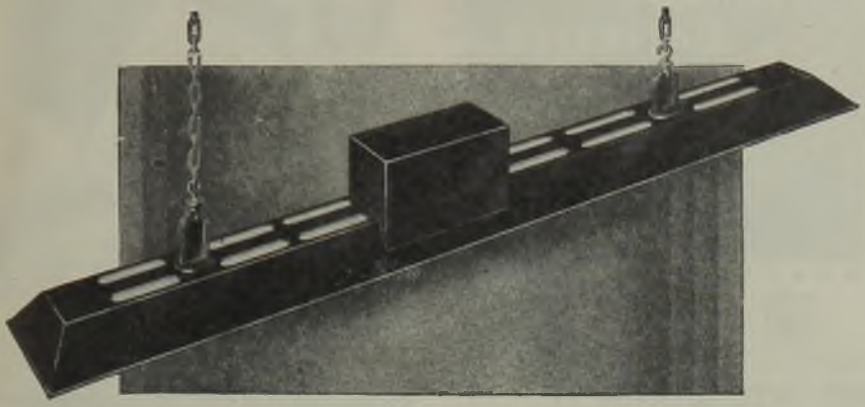

WITH SLOTS FOR UPWARD ILLUMINATION

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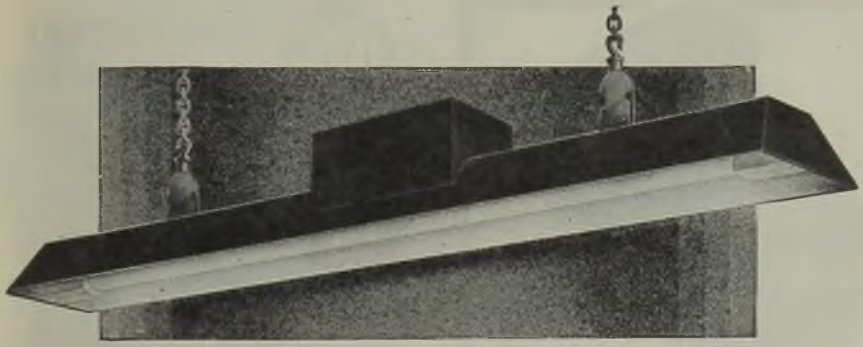
1749 1 Lamp without Box **2 7 6** + 25%



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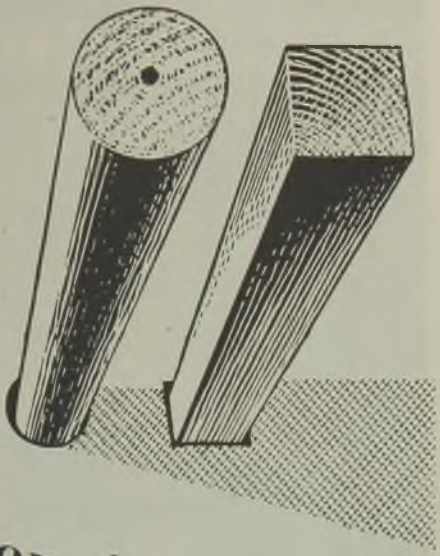

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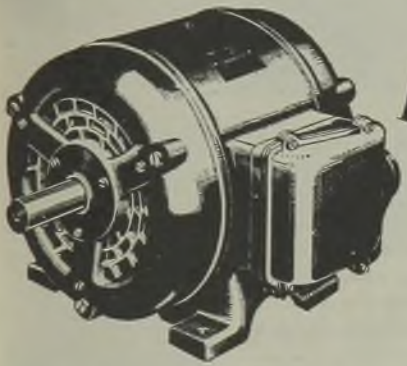

There need be no risk of square peg motors doing round hole jobs if you have the Crompton Parkinson catalogue on your desk. There, in the standard range of over 2,000 types, you will find the correct motor for almost every need.

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ELECTRICAL REVIEW

November 23, 1945

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ELECTRICAL REVIEW

THE OLDEST ELECTRICAL PAPER — ESTABLISHED 1872

Vol. CXXXVII. No. 3548. NOVEMBER 23, 1945 9d. WEEKLY

Investment Control

Application to the Electricity Supply Industry

ECONOMISTS have devoted much thought to possible methods of avoiding industrial booms and slumps. It has seemed impossible to solve the problem without a great deal of interference with free enterprise, but even the most ardent advocates of this freedom have realised the desirability of smoothing out the production curve. About eighteen months ago the National Government issued a White Paper which outlined plans for securing full and stable employment. It was stated in this that the Government was prepared to accept in future the responsibility for taking action at the earliest stage to arrest a threatened slump.

Governing Factors

It was recognised that the position was governed mainly by three factors: Private investment expenditure; public investment expenditure; and the foreign balance. The first and last of these elements were seen to be most difficult to control. Nevertheless the intention was to do everything possible to limit dangerous swings in private investment and, by encouraging export trade, avoid an unfavourable foreign balance. The remaining factor—public investment—was considered to be the most susceptible to control and the Government proposed to plan this to offset unavoidable fluctuations in private investment.

Since the White Paper appeared the Government has changed, but as the policy which it set out is largely in line with Socialist ideas the new Government is beginning to explore the possibilities of investment control, and the first manifestation of this to affect the electrical industry is a request circulated to electricity supply undertakings to state in broad detail their probable capital expenditure during the next three years. So far as the municipal authorities are concerned this relates to a supervision of public expenditure which is already exercised, but the companies are also brought into it, thus impinging upon the field of private enterprise, albeit a specialised part of this field.

Urgently-Needed Plant

The position is complicated by a number of other considerations the chief of which are the pressing need, here and overseas, for all the generating plant that can be produced, and the speeding-up of electrification of industry to improve production. Undertakings were asked early last year to state their requirements in the first five post-war years with a view to making the best use of the country's industrial resources which were likely to be overtaxed during that period. The new call for similar information raises a rather different aspect. Can investment in capital plant of this kind be controlled (in a restrictive sense) during the period immediately ahead if reconstruction is to be carried out successfully?

It was recognised in the White Paper that "a large part of the capital expenditure of public authorities, for example on housing, schools and hospitals, is dictated by urgent, public needs, the satisfaction of which cannot readily be postponed to serve the purposes of employment policy."

But there is other expenditure which cannot be postponed if the purposes of employment policy are to be served. It seems to us that it would be more useful to call for estimates at a later date, say in three years' time, when investment control might be usefully applied to this industry to even out production—a move which, incidentally, plant manufacturers would welcome.

Government as Manufacturers

UNTIL further details are available of the Government's intentions it will not be possible to gauge the effect upon the electrical industry of the latest proposals with regard to the equipment of new houses. As is reported on another page, a Building Supplies and Housing Bill has been introduced which, among other things, empowers the Treasury to make funds available for the purchase of building materials and equipment and the Ministry of Works to sell them to local authorities or install them on their behalf. But in addition to this it is announced that it is intended to turn over twenty Royal Ordnance factories to the production of building supplies and equipment, including various kinds of electrical apparatus. Does this mean that labour is to be retained at or directed to these factories while established manufacturers of such equipment are left high and dry?

Farm Transformers

DISCUSSIONS on the supply to isolated farms usually turn on capital expenditure. Less is heard of the iron and copper losses of the individual transformers and 400-V lines up to perhaps 800 yd. installed for the purpose. Yet, as Mr. L. Douglass states in our Correspondence section, the value of these losses may exceed the capital charges on the extensions. In Carlisle (see *Electrical Review*, October 12th) a surcharge of 15 per cent. on the urban tariff is made for rural supplies, but experience in the Isle of Man is that this is not nearly enough to cover losses.

Construction and Maintenance

SEPARATE sectional organisations for dealing with constructional and maintenance work are generally held to be desirable, if economically feasible. One good reason is that the two classes of work call for men of different temperaments. Another mentioned by Mr. A. Haddock (chairman, I.E.E. Sheffield Sub-Centre) is that maintenance might otherwise be repeatedly deferred because of pressing needs of construction. To have some apparent justification for yielding to this temptation might prevent conformity with a scheme for systematic periodical maintenance, which is a corrective to the natural inclination to regard anything that seems to be working well as likely to continue to do so.

Transformer Oil

CONTRARY to what we believe to be the experience of most electrical engineers, to which support was given recently by Mr. A. Kelso at the I.E.E. North-West Midlands Centre, much more trouble has been given to Mr. J. B. Lancaster (chairman, Tees-side Sub-Centre) by Grade B (pool) transformer oil than by Grade A, which he used until war needs vetoed the use of the latter. Acidity having become more of a bane than sludge, the consensus of opinion appears to be that the removal of anti-oxidants in the extra-refining undergone by Grade A was detrimental. Possibly at the high load factors prevailing at the I.C.I. works, sludging is the more important factor there.

Tummel-Garry Scheme

THE House of Commons last week rejected a "prayer" for the annulment of the Constructional Scheme No. 2 Confirmation Order, 1945, after a long debate. This is the Order covering the Tummel-Garry development about which Scottish authorities and individuals have very divided opinions. This scheme is the largest and most remunerative of the Board's projects and is designed to "carry" a number of distribution schemes which in themselves are "uneconomic." Ostensibly the dispute has been between beauty and utility, although properly-planned hydro-electric works can be both beautiful and useful.

Passing Copies On

IT is some time since we last appealed to readers to pass on their copies of the *Electrical Review* to men in the Forces but the need still persists. We have just heard from an education officer with the M.E.F. that he is anxious to obtain technical and trade journals for the vocational information rooms which are being set up.

Lime for the Land

Electrical Applications to Limestone Mining and Preparation

IN the early days of the war it was found that the land of this country was generally deficient in lime. Earlier, burned lime had been used for liming the land, but this was in short supply and the Ministry of Agriculture took steps to increase the production of ground limestone, the use of which for the land had found considerable favour abroad. Six grinding mills were obtained from America and one of these was purchased and installed at the Halkyn (North Wales) workings

Limestone mined from the Halkyn mountain is fed from the stope down the vertical chutes at the bottom of which it is collected in the cars (centre). Trains of cars are hauled to the shaft bottom by electric locomotives (right)

of the Halkyn District United Mines, Ltd., by whose courtesy we recently visited the workings to obtain the information and photographs for this article.

The workings are in the Halkyn mountain, which is virtually limestone. A number of quarries have obtained limestone from this source in the past, but now the material is produced from underground workings and hoisted up a vertical shaft some 900 ft. deep to the preparation plant above ground. The actual winning of the rock is effected in a " stope," an underground excavation which is about 30 ft. wide and at present about 200 ft. high. The stope floor is at a level above that of the mine bottom, and communication up to the stope is by vertical channels and chutes cut through the rock. After release by drilling and

blasting the rock is fed down the vertical chutes, at the bottom of which it is collected in 18 cu. ft. capacity haulage cars.

Compressed air for the pneumatic drills is provided by two Belliss & Morcom two-stage compressors, each having a capacity of 500 cu. ft. of air per minute at 100 lb. per sq. in., and being driven by a 108-HP 365-RPM directly coupled 400-V Lancashire Dynamo s.r. motor with Brookhirst control gear. Although the pressure of the external air system is maintained nearly constant by the automatic operation of the compressor valves with variations of the pressure, the compressors and their driving motors run constantly during service hours and just idle at no-load times. Other underground applications of the air from these motor-driven compressors are to air-driven fans for ventilating the workings, air-driven loaders for the haulage cars, and to "air lamps" for lighting the underground roads, etc. Each of the Davis "air lamps" comprises an ordinary electric lamp in a well-glass type of fitting. In the head of the fitting is a tiny air-turbine driven dynamo which produces current for the lamp.

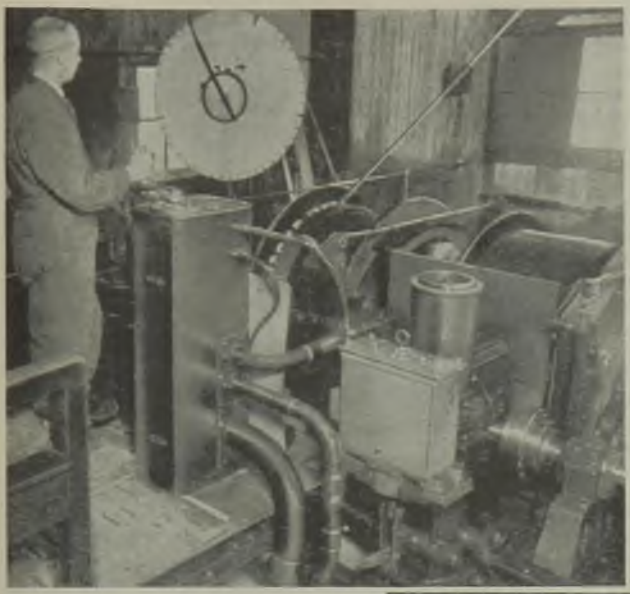
Adequate arrangements are provided for charging the locomotive batteries underground

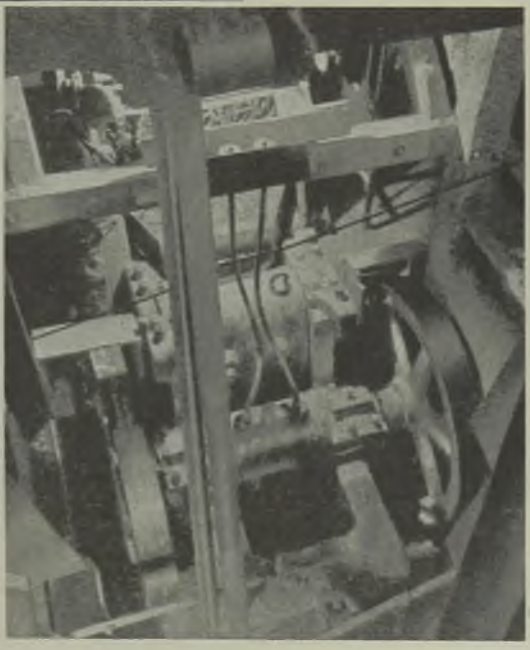
The cars run on a 22½-in. gauge railway and usually take their loads of limestone to the shaft bottom in trains of 20 to 40 cars hauled by electric locomotives. These are B.E.V. (Wingrove & Rogers) equipments, some having a total capacity of 8 HP and some of 6 HP. Each locomotive has twin 60-V motors, one at the back and one at the front in the main body of the vehicle, and each motor drives separately to a corresponding axle, back or front, with transmission by worm gearing. There are two 30-V, 100-Ah storage batteries on each locomotive, resting on the main body, one at each end, so that they are easily removable for charging purposes. The batteries are connected in series and supply both motors at 60 V. The space between the two batteries constitutes the driver's platform which is equipped with a tramway-type controller for the driving motors.

The cars are hoisted up the twin-cage shaft by a surface winder; shaft bottom

Adequate arrangements are provided for charging the batteries in a room hewn out of

the rock to which a branch line is extended so that during charging the batteries remain on the bogies. The 30-V batteries are charged in pairs from 60-V circuits. There are two outlets from each circuit, so as to provide plug-in connections to the batteries individually, but the outlets are so wired in the conduit system as to provide for the necessary series connection of the two batteries. The normal charging rate is from 48A at starting, down to a finishing load of 20A.





Above : The double-drum winder is driven by a 120-HP motor with double spur gear transmission
Right : The primary crusher reduces the limestone to about 2·5 inch cubes; jaws photographed from above

Four charging circuits (eight outlets) are provided from an open-type charging board which is equipped with a face-plate rheostat and an ironclad switch-fuse for each circuit, as well as a main switch-fuse which is supplied direct from the DC generator of a 15-kW Metropolitan-Vickers m.g. set which has a 400-V s.r. directly coupled motor.

The m.g. set is supplied with AC from a distribution board which also provides for some lighting circuits and is served from a 3,000/400-V Ferranti transformer fed through B.T.H. oil circuit-breakers from a 3,000-V cable which runs down the mine shaft. All the 3,000-V equipment underground is mining gear, although the atmospheric conditions in this case do not call for flameproof apparatus.

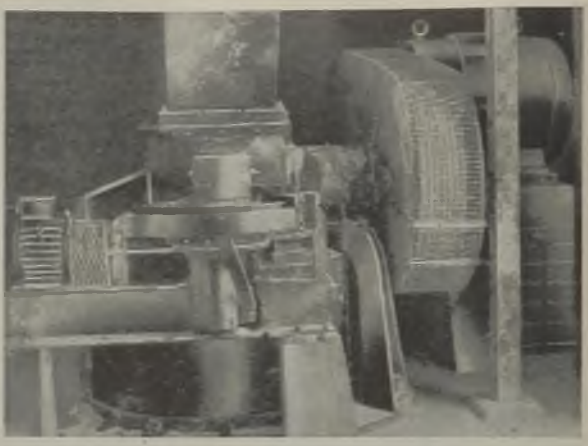
The cars are hoisted up the twin-cage mine-shaft in normal-type rope-suspended cages by a double-drum winder at the surface. The drums are locked on the same shaft and are so wound that when one cage is raised up the shaft the other is lowered. The diameter of the drums is about 5 ft., length 3 ft., and the peripheral speed, *i.e.*, the cage speed, about 12 ft. per second. The winder is driven by a B.T.H. 120-HP 970-RPM 400-V s.r. motor, and the transmission system is double spur gears with an intermediate shaft. The overall speed reduction ratio

from the motor shaft to the drum shaft is about 20 to 1. The motor is operated by a normal rotor-resistance drum-type controller and direct-on stator switching.

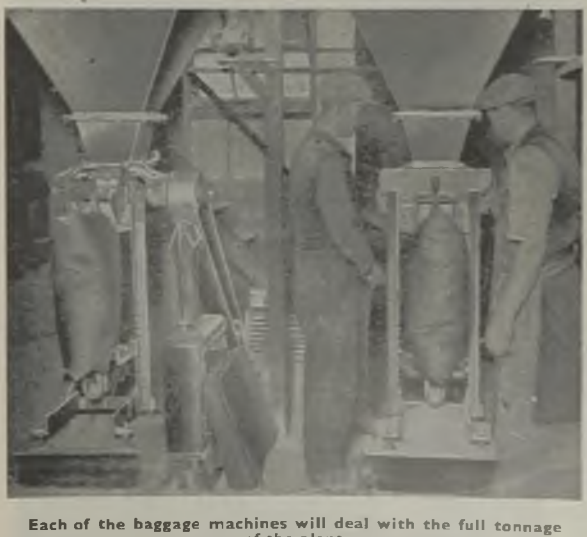
The drums are fitted with brake shoes which are normally mechanically operated at stopping and starting by means of a foot lever. The shoes can, however, be magnetically operated in case of emergency, when the magnet solenoid is energised by means of a trip switch on an overload device.

On arrival at the surface the cars are taken from the cages and passed up an incline creeper with a 4-HP drive to an automatic rotary tippler in which each car is turned through 360 deg., thus discharging its load into a 50-ton hopper. The Norton rotary tippler is served by a 50-HP Crypto motor with a first-stage wormgear transmission with an actual reduction of 710 to 73 RPM, and a second-stage pinion transmission with a reduction ratio of about 3 to 1. During service periods the motor runs constantly, driving a set of rolls with which the tippler engages and disengages automatically by mechanism which is operated by the movements of the cars. The empty cars are released on a declined line which carries them to the pit head ready to be taken underground again ready for refilling.

The limestone is passed from the 50-ton hopper to a primary crusher by means of a Ross feeder. This crusher is a Broadbent machine of the Blake type with 30-in. by 16-in. jaws, and it reduces the size of the limestone from about 12-in. cubes to about 2·5 in. cubes. The crusher is driven by a 55-HP Lancashire Dynamo s.r. motor which is served by an Ellison drum-type rotor-resistance controller and a direct-on stator circuit breaker, but in the belt transmission system a few auxiliary drives are taken from the same source, including screens.



The 30-HP motor-driven granulator reduces the rock size to minus 1 inch; note drive for feeder table



Each of the baggage machines will deal with the full tonnage of the plant

After leaving the crusher the limestone is carried by a 3-HP motor-driven inclined conveyor, which has a magnetic separator on the head pulley for the removal of tramp iron, to a Mansfield granulator which further reduces the size of the rock from 2·5 in. to minus 1 in. This is a hammer-type mill and is driven by a 30-HP 960-RPM motor with multi-V-belt transmission of almost even ratio to the crusher shaft. The limestone from the granulator falls on to a conveyor belt which carries it

for about 50 yards on a slight incline to a 200-ton storage hopper. The belt is 5-ply and 18 in. wide, and it has a speed of about 240 ft. per min. Transmission to the head drum from the 5-HP, 705-RPM driving motor is by a spur wheel and pinion.

Up to the 200-ton storage hopper the whole of the plant is operated on day-shift only, but the large storage capacity permits the grinding plant, to which the limestone is next fed and which has a capacity of 10 tons an hour, to work throughout the 24 hours, with stoppages for oiling, etc. The crushed limestone from the storage hopper is fed to a Bradley Pulverizer Co.'s "Junior Hercules" 3-roll grinding mill *via* a revolving feeder table which is worm driven from a small motor mounted at the table level and on the grinder housing. The grinder driving unit is a 100-HP motor, and the simple multi-V-belt transmission system effects an actual speed reduction of from 730 RPM at the motor shaft to 375 RPM at the grinder shaft.

The "Junior Hercules" mill is equipped for automatic electric control by means of Brookhirst apparatus. Thus, when the mill is loaded beyond its capacity, the power rises on the main driving motor and feed control is brought into action, cutting off the motor driving the feeder until such time as the mill is operating at a predetermined horse-power. This eliminates manual control and assures running of the mill at continuous maximum output.

Dispatch Arrangements

The ground limestone now has a fineness of 50 per cent. passing a 100 mesh, and is carried by a screw conveyor, either to two small hoppers over a pair of bagging machines, or to 1·5-ton cars which are unloaded into 6-ton hoppers which serve road or rail vehicles for direct dispatch as loose material. The screw conveyor is driven by a 7·5-HP motor located below the floor level of the grinding house, and transmission is by Renold chain and Texrope.

Each of the bagging machines is capable of dealing with the full tonnage of the plant and is driven by its own 7·5-HP Lancashire Dynamo motor with even-ratio belt transmission to a shaft at the bottom of the feeding hopper, giving the shaft a speed of about 1,450 RPM. On the shaft of each machine is a 5-blade impeller which "throws" the lime powder through a filler tube on which the bag is suspended and which has a downward outlet into the bag. At the same time a jet of compressed air is blown into the tube, so as to prevent choking. The compressed air is supplied separately by a small motor-driven compressor situated nearby.

The bagged material is put on stillages worked by Collis 1·5-ton lifting trucks by which it is taken to storage or to lorries, and from storage to road or rail dispatch vehicles as required. Some of the loose ground limestone is delivered direct to special road vehicles fitted with self-operating spreading mechanism. These vehicles take the ground product to where it is required, and distribute it directly on to the land in the required quantities per acre.

We are indebted to Mr. R. Pettigrew, general manager, Halkyn District United Mines, Ltd., Mr. M. A. Hammer, mill superintendent, and Mr. A. P. Newall, chief metallurgist (acting under the general authorisation of the company's managing director, Mr. E. Noel Humphreys) for their help in obtaining the information upon which this article is based and taking the accompanying photographs.

I.M.E.A. Centre Meeting

THE chairman of the South-West England and South Wales Centre of the I.M.E.A., Alderman W. J. Lewis (Portsmouth), invited the president of the I.M.E.A., Alderman Sir William Walker, J.P., M.I.E.E., to a special general meeting of the Centre held at the Grand Hotel, Bristol, on November 6th.

Sir William was accorded a civic reception by the Lord Mayor of Bristol, Councillor W. F. Cottrell, J.P., and later attended a luncheon at the Grand Hotel, at which the Lord Mayor, members of the Executive Committee and guests were present. The guests included Mr. J. W. Simpson, general secretary of the I.M.E.A., Mr. J. T. H. Legge, Central Electricity Board, Mr. A. J. Newman, Bristol, Mr. W. J. Bache, Cheltenham, and Mr. E. C. Willis, general manager of the Bristol Corporation Electricity Department.

Sir William Walker in an informal address reviewed the many activities of the electricity supply industry and laid great stress on the continuity of supplies to war factories all over the country despite the damage caused by the effects of bombing.

Electrical Travellers' Association

The Electrical Trades Commercial Travellers' Association held its annual general meeting on November 9th at the Feathers Hotel, Broadway, S.W.1. Mr. F. Winstanley (G.E.C.) was elected president for the coming year, Mr. B. E. Crow (G.E.C.) chairman, and Mr. H. Potton (B.T.H.) vice-chairman. Victory and the twenty-first year of the Association will be celebrated at a luncheon in the Connaught Rooms on February 15th, 1946.

Views on the News

Reflections on Current Topics

ARRANGEMENTS are in hand for the first post-war convention of the Incorporated Municipal Electrical Association to be held at Blackpool from June 24th to 29th next year. Mr. J. W. Simpson, the secretary of the I.M.E.A., tells me that in spite of staff shortage the very considerable amount of work involved has been embarked upon. Accommodation is, of course, going to be the main problem. Two hotels which are being released by the Government shortly have been booked and these will go a long way towards meeting the demand. Pre-war lines will be followed as nearly as possible. It is proposed to have three papers for discussion and there will again be an exhibition, the organisation of which will be in the hands of E.D.A. Given good weather the Jubilee Convention (as this is) should be as successful as its forerunners.

* * *

In all the discussions about atomic energy there seems to have been an assumption that Russia possessed little knowledge of the secrets of the processes which led up to the production of the atomic bomb. But I have always remembered that Dr. Peter Kapitza, who worked with the late Lord Rutherford and Dr. J. D. Cockcroft at the Cavendish Laboratory, must have known a good deal about the subject. Dr. Kapitza returned to Russia some time before the war and his work appears to have continued there, for it is now reported that he has been responsible for important discoveries in the field of atomic science at the Mount Alegos research station in Armenia, although the reports have not made it very clear what these discoveries are.

* * *

It is claimed by the British Electrical Development Association that fully 55 per cent. of the temporary houses now being erected will be "all-electric." To many of the tenants electrical equipment will be something of a novelty and so to help them to get the best results from their electrical appliances E.D.A. has produced an attractive illustrated booklet (E.D.A. 1626) describing the services which they will find in their houses and advising them how to operate the appliances. It commences with the service entry and the main switch and controls and goes on to the plug points. Next the cooker is dealt with, but I note that no reference is made to the use of residual heat, which chiefly differentiates electric from gas cooking. In dealing with the water heater the booklet wisely recommends that the consumer should not always rely entirely on the operation of the thermostat; I have found this a frequent cause of complaints of the expensiveness of electric water heating. This consideration does not, of course, apply in the case of the refrigerator. The correct use of the wash-boiler is explained and there are hints on lighting. The booklet winds up with a number of useful hints on the care of the installation and appliances with notes on costs.

* * *

A strange story was told by the chairman at the annual meeting of Solus Teoranta, the Irish lamp-making concern in which the Eireann Government is interested. He said that the curtailment of electricity consumption in Eire had led to a severe fall in sales of the company's lamps and so it switched its glass making plant over to the production of tumblers—then rather scarce. No sooner had this been done when there was a flood of "sea-green English glass" into the country which drove the dearer (and superior) Irish tumblers off the market. Thereupon the company transferred its efforts to England and in one day sold 600,000 tumblers in London at a satisfactory price and secured a promise to purchase the whole of the next year's output. The chairman went on to say that with heavy dumping of lamps and the company's unbought production there was now a huge surplus in Eire. They were, however, discussing a very large foreign order which, in favourable circumstances, would keep them occupied for the next year or two.

* * *

Having read the articles by Messrs. A. H. Dykes and E. A. Pinto on the subject of registration of electrical contractors, and the subsequent correspondence, readers may be wondering how the National Committee on the subject is progressing. I have found upon inquiry that little is happening at the moment as the Committee has referred the matter to the Ministry of Fuel and Power. It is probable that the Ministry's attitude will be that consideration of registration must await the reorganisation of the electricity supply industry.

* * *

I read in the *Electrical World* (New York) that in the course of a recent strike in Texas the International Brotherhood of Electrical Workers cut off the power to twenty-four large towns, fifty rural communities, three army camps and 25,000 customers of "co-operatives." Not so brotherly I think.

—REFLECTOR.

Short-Circuit Calculations

Alternative to the Common-kVA Basis

By T. A. Ledward, A.M.I.E.E.

IN determining the maximum possible fault kVA at a point in a supply network, the usual method is to calculate the equivalent percentage reactance of each generator, transformer, etc., on a common arbitrary kVA basis and by this means to determine the total percentage reactance to the point in question.

Time may be saved in many cases by modifying this procedure. Where we are concerned with a number of supply sources in parallel only, a much quicker and more straightforward method is first to determine the short-circuit kVA for each power source separately and then simply add the figures together.

For example, consider the case of three generators of 70,000, 60,000 and 75,000 kVA with corresponding individual reactances of 13, 20 and 15 per cent. On a basis of 10,000 kVA, the equivalent percentage reactances of the generators are: A, $\frac{10,000}{70,000} \times 18 = 2{\cdot}57$; B, $\frac{10,000}{60,000} \times 20 = 3{\cdot}33$; C, $\frac{10,000}{75,000} \times 15 = 2$. Percentage reactance at fault, F, $= \frac{2{\cdot}57 \times 3{\cdot}33 \times 2}{(2{\cdot}57 \times 3{\cdot}33) + (2{\cdot}57 \times 2) + (3{\cdot}33 \times 2)} = 0{\cdot}84$. Short-circuit kVA at F $= \frac{10,000 \times 100}{0{\cdot}84} = 1,190,000$.

By the quicker method, the short-circuit kVA is: For A, $\frac{70,000 \times 100}{18} = 390,000$; B, $\frac{60,000 \times 100}{20} = 300,000$; C, $\frac{7,500 \times 100}{15} = 500,000$; total = 1,190,000 kVA.

A more complicated case is shown in Fig. 1 where a network section is connected to the busbar fed by the same generators. The effect is to introduce both series and parallel reactances. In dealing with transformers and lines solely by the simplified method, a short-circuit kVA figure is calculated for each unit on the assumption that the transformer or line is fed by a power source of zero impedance. Where units are in parallel the kVA figures are added; where in series, reciprocals of the separate kVA.

Short-circuit kVA for transformers 1 and 2 $= \frac{60,000 \times 100}{10} = 600,000$ in each case or 1,200,000 for the two. Short-circuit kVA for each 33-kV line $= \frac{33,000^2}{1,000 \times 5} = 218,000$ or 436,000 total. Short-circuit kVA for transformer 3 $= \frac{40,000 \times 100}{10} = 400,000$.

Total short-circuit kVA at F $= \frac{1}{\frac{1}{1,190,000} + \frac{1}{1,200,000} + \frac{1}{436,000} + \frac{1}{400,000}} = 154,500$.

If there is objection to the use of the reciprocal law for the final calculation of the series kVA, then a combination of the two methods is indicated: *i.e.*, first calculate separate short-circuit kVA figures for each piece of apparatus and then for each parallel group add together the separate figures. The short-circuit kVA values thus obtained for each parallel group may be converted to percentage reactances on a common kVA basis. Then proceed as in the standard method; *i.e.*, add together the percentage reactances of the groups in series and convert the total percentage reactance so obtained to total short-circuit kVA.

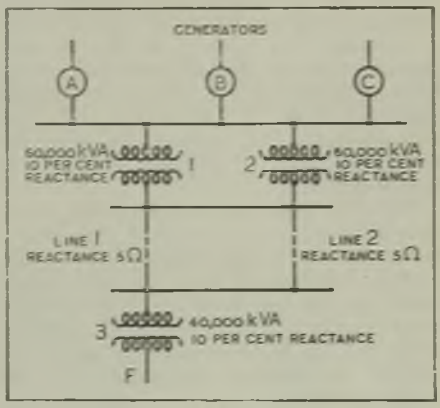


Fig. 1

Applying this procedure to the last stage of the example given the equivalent percentage reactances on a 10,000-kVA basis would be:

Generators A, B and C $= \frac{10{,}000 \times 100}{1{,}190{,}000} =$ 0·84; transformers 1 and 2 $= \frac{10{,}000 \times 100}{1{,}200{,}000} =$ 0·834; lines 1 and 2 $= \frac{10{,}000 \times 100}{436{,}000} = 2{\cdot}3$; transformer 3 $= \frac{10{,}000 \times 10}{40{,}000} = 2{\cdot}5$; total percentage reactance = 6·474. Total short-circuit kVA $= \frac{10{,}000 \times 100}{6{\cdot}474} =$ 154,500. This figure can be checked by using the standard procedure throughout and the effort required in each case can be compared.

Where the network includes not only series and parallel groups but also closed

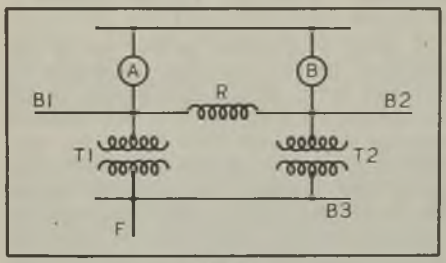


Fig. 2

meshes, the calculations can still be made without converting percentage reactances to a common kVA basis. In Fig. 2, two generators A and B feed separate busbars B1 and B2, which are connected together through a reactor R. Transformers T1 and T2, connected to busbars B1 and B2 respectively, feed a common bar B3. A fault is shown at F.

Fig. 3 (a) shows the corresponding reactance diagram. Assume A, B, R, T1 and T2 to denote the short-circuit kVA of the corresponding units, then the kVA mesh ABR may be converted to the equivalent star CDE of Fig. 3 (b) which, by the addition of T1 and T2, forms an easily solved series-parallel arrangement equivalent to the original network.

Such a conversion from mesh to star grouping is used in similar cases when the percentage reactance method is used for their solution, but where the short-circuit kVA values are dealt with in place of percentage reactances, the conversion formula is, of course, modified. To convert ABR, Fig. 3 (a), to CDE, Fig. 3 (b): $C = AB\left(\frac{1}{A} + \frac{1}{B} + \frac{1}{R}\right)$,

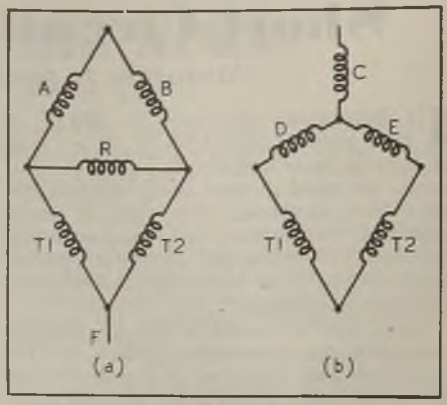


Fig. 3

$D = AR\left(\frac{1}{A} + \frac{1}{B} + \frac{1}{R}\right)$, $E = RB\left(\frac{1}{A} + \frac{1}{B} + \frac{1}{R}\right)$.

In the type of example so far dealt with, the assumption that resistance was negligible as compared with reactance was justified, but even where both reactance and resistance must be taken into account, as for cables, the modified procedure may still be used.

In Fig. 4 generator G feeds two busbars B1 and B2 through reactors BR1 and BR2. Ring main feeders 1, 2 and 3 connect the two bars. A short-circuit occurs at F. Following the modified procedure, a short-circuit figure is determined for each unit in the network. Where large amounts of power are being dealt with—and this applies, of course, equally well to the foregoing examples as to the present one — it is

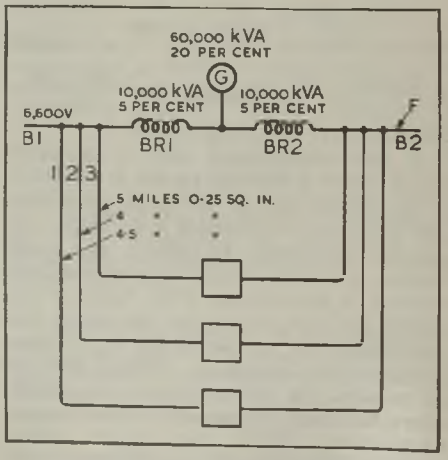


Fig. 4

usually more convenient to work in MVA than kVA. Thus short-circuit MVA for generator G $= \frac{60 \times 100}{20} = 300$ and for BR1 + BR2 $= \frac{10 \times 100}{5} = 200$ in each case.

From a table of cable characteristics it is found that 0·25 sq. in. 6,600-V cable has a resistance of 0·0974 ohm and a reactance of 0·0696 ohm per 1,000 yd. The impedance per mile, expressed as a complex quantity, is therefore $Z = (0{\cdot}0975 + j0{\cdot}0696) \times \frac{1760}{1000} = 0{\cdot}1714 + j0{\cdot}1225$. The short-circuit MVA for one mile of cable is $\frac{V^2}{10^6 Z} = \frac{6{,}600^2}{10^6 (0{\cdot}1714 + j0{\cdot}1225)} = 168{\cdot}2 - j120{\cdot}2$.

The short-circuit MVA is inversely proportional to the length of cable. Therefore, the short-circuit MVA for feeder No. 1 $= \frac{168{\cdot}2 - j120{\cdot}2}{4{\cdot}5} = 37{\cdot}37 - j26{\cdot}71$; for feeder No. 2 $= \frac{168{\cdot}2 - j120{\cdot}2}{4} = 42{\cdot}05 - j30{\cdot}05$ and for feeder No. 3 $= \frac{168{\cdot}2 - j120{\cdot}2}{5} = 33{\cdot}60 - j24{\cdot}04$, a total of $113{\cdot}06 - j80{\cdot}80$.

The short-circuit MVA shown as complex quantities are given in Fig. 5. The total value for BR1 and feeders is $\frac{-j200\,(113{\cdot}06 - j80{\cdot}8)}{-j200 + (113{\cdot}06 - j808)} = 49{\cdot}33 - j77{\cdot}4$. Adding BR2, we get $49{\cdot}33 - j77{\cdot}4 - j200 = 49{\cdot}33 - j277{\cdot}4$. Finally, the total short-circuit MVA, including the generator, is $\frac{-j300\,(49{\cdot}33 - j277{\cdot}4)}{-j300 + (49{\cdot}33 - j277{\cdot}4)} = 13{\cdot}21 - j145{\cdot}2$ $\sqrt{13{\cdot}21^2 - 145{\cdot}2^2} = 145{\cdot}8$ MVA.

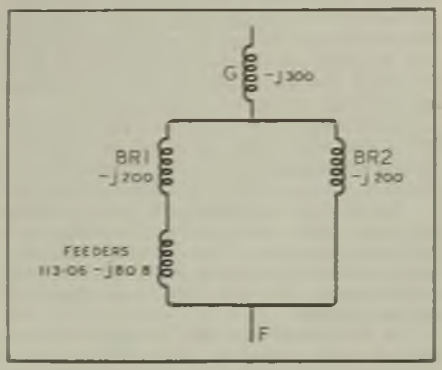


Fig. 5

Palestine Imports

Considerable Expansion in 1944

IN the electrical import trade of Palestine last year there was a substantial advance, amounting to 50 per cent. or more in many groups and 300 per cent. in lamps. There was no noteworthy decrease. At the same time it has to be kept in mind that during the previous year there was a steep decline all round. The accompanying table gives the values in 1944, with notes of increases and decreases compared with 1943, as recorded in the official statistics issued in Jerusalem.

Palestine has developed a small export trade, notably in dry batteries to the value of £11,770 in 1944 (£2,900 in 1943); insulated cable not exceeding 9 sq. mm. cross section, £2,070 (nil); lamps, £400 (£250); and other electrical goods, £10,000 (£3,270).

As was pointed out by Viscount Samuel at the last general meeting of the Palestine Electric Corporation, business there during the war developed in a remarkable degree. During 1944 fifty-three transformers with a total capacity of 5,665 kVA were put into commission, and 46 km. were added to the transmission and distribution system. Much deferred maintenance has to be made up, and Lord Samuel reported that a sum of £P30,000 had been set aside in the accounts of the corporation towards this expenditure.

ELECTRICAL IMPORTS INTO PALESTINE

Class	1944 £P	Inc. or dec. on 1943 £P
Insulated pipes and lead pipes for electric wiring	1,100	+ 1,100
Dry batteries	240	+ 160
Insulated cable and wire—lead covered	1,320	— 70
Ditto, other, not exceeding 9 sq. mm. cross section	8,960	+ 3,500
Ditto, other, exceeding 9 sq. mm. cross section	6,870	+ 4,490
Electric glow lamps	26,730	+ 17,790
Elec. light fittings made wholly or mainly of metal	360	+ 280
Elec. lamps, glow, gas-filled or vacuum not exceeding 16 V	2,980	+ 2,460
Elec. meters	3,100	+ 2,140
Elec. refrigerators	1,660	+ 820
Ditto parts	6,500	+ 2,450
Radio sets	7,240	+ 2,670
Ditto parts	8,120	+ 290
Elec. apparatus n.e.s.	2,730	— 2,630
Electrical goods, other	27,820	+ 9,910
Power plant	27,640	+ 15,590

Bulk Supply of Equipment

Plans for New Buildings

ON Wednesday last week the Minister of Health (Mr. Aneurin Bevan) moved the first reading of the Building Materials and Housing Bill the purpose of which is " to make financial provision for the purpose of facilitating the production, equipment, repair, alteration and acquisition of houses and other buildings and to make provision for limiting the price for which certain houses may be sold and the rent at which certain houses may be let."

The financial memorandum attached to the Bill states that " the Minister of Works is making arrangements for the production and distribution of, and in certain cases, may find it necessary to purchase in bulk building materials and components (including prefabricated houses). The Minister will also, when requested, prepare housing sites and erect prefabricated or other houses on behalf of ocal authorities."

The Bill empowers the Treasury to make advances not exceeding £100 million, up to December 31st, 1947, for these purposes and the Ministry of Works will establish a fund for dealing with these advances. Under Section 3 the Minister of Health can, in effect, purchase building materials and equipment from the Minister of Works, paying the money for this purpose into the fund.

" Building materials " are stated to include " any product which, or a derivative of which, is capable of being used to form part of a building or of any works preparatory or incidental to the provision of a building, or of being used for preserving or finishing a building or a part of a building, and including any structure ready for erection as a building or part of a building." The term " permanent equipment for buildings " means " any article which is intended to be provided for permanent enjoyment with a particular building."

At a press conference last week the Director-General of Housing Supplies (Mr. A. A. Saunders) gave some particulars of the Government's intentions in the matter of the supply of equipment for new houses. He said that about twenty Royal Ordnance factories would be devoted to the production of this equipment but the bulk of it would be produced by private industry. When the immediate requirements had been met it might be possible to take small private orders and to export standardised components.

Standardisation was one of the principal aims of the scheme and the Ministry of Fuel and Power had been consulted with regard to the standardisation of cookers and other fuel-consuming apparatus. Among the classes of goods which would be produced were electrical wiring accessories, switches and fuses, cookers, fires, immersion heaters, motors, wash-boilers and auxiliary water heaters. Gas equipment was also to come under the scheme.

Tummel-Garry Project

Annulment Motion Defeated

IN the House of Commons last week a "prayer" for the annulment of the Constructional Scheme No. 2 (Tummel-Garry) of the North of Scotland Hydro-electric Board was rejected by 263 votes to 45.

Moving the annulment, Mr. Snadden (Kinross and Western) said that no one wanted to see more than he did the rapid development of electricity supplies throughout rural Scotland. His case was that the price to be extracted in loss of amenity from one of the loveliest parts of Scotland was too high. He refused to believe that no alternative could be found. The scheme was rejected by the specially appointed Amenity Committee, by the Perthshire County Council and by the National Trust for Scotland and a host of other people and organisations.

Colonel A. G. Duncan (Perth and Kinross) seconding the motion, asked the Government to withdraw the scheme temporarily and go into the details on behalf of the people of Scotland. The question which the House had to decide was whether Parliament or the Electricity Commissioners should be paramount.

Mr. Cook (Dundee) considered that all the talk about amenity was so much balderdash. It so often meant glens darkened and villages desolate.

Mr. A. Anderson (Motherwell) thought that the Central Electricity Board had been most maladroit in its conduct with local authorities and other bodies. It had been dictatorial, non-conciliatory, and tactless; if this had not been the case a great deal of the opposition could have been avoided.

Mr. Reid (Glasgow, Hillhead) was convinced that this was a good scheme and that its benefits would much outweigh any possible damage.

Commander Galbraith (Glasgow, Pollok) said that in passing the Hydro-electric Development Act the House had believed that it would operate for the benefit in large measure of the Highlands. The whole object of the present scheme was to provide electricity for the country at large and the interests of the Highlands were of very secondary importance.

Mr. MacMillan (Western Isles) said he did not want to see women having to go out and cart peat for fuel to cook their food. It was essential that the Highlands and the islands should have electricity.

Mr. Buchanan, Under Secretary for Scotland, could not understand why Scottish members who were constantly calling for exports should criticise the export of electricity to England. As a matter of fact, however, he did not think the Board would require to export a single unit because by the time the scheme came into operation the demand for electricity in Scotland itself would be such as to exhaust the supply.

If this scheme were abandoned the Secretary for Scotland would be compelled to resign and the Government would stand or fall by it.

Mr. Watlington to Retire

Fifty Years in the Electrical Industry

ONE of the most onerous and exacting jobs in the electrical industry is the directorship of the British Electrical and Allied Manufacturers' Association and it is one which only a man of high qualities and unremitting energy can adequately fill. It is generally agreed that Mr. V. Watlington possesses these qualifications and there will be much regret that he has decided to retire some time next year.

Mr. V. Watlington

Mr. Watlington's connection with the electrical industry began about fifty years ago when, after education at the Bedford Grammar School and the Central Technical College (he is an A.C.G.I.) he joined Blackwell & Co., specialists in the design and construction of electric tramways, in 1896. Ten years later he set up on his own account as Watlington & Co., in the supply of tramway materials; the business was successful and was acquired in 1911 by Dick, Kerr & Co., the leading concern in traction engineering, who had offered him the position of sales manager. He retained this position with the English Electric Co., Ltd., when it was formed in 1919 to merge Dick, Kerr and other concerns and, in 1925 he was appointed managing director of the English Electric Co.

For many years Mr. Watlington had taken a keen interest in the work of the B.E.A.M.A.; he was an active member of nearly every important section and chairman of several committees, including the Revising Committee which is responsible to the Council for the accuracy of all legal texts. He became a member of the Council in 1925 and was elected chairman in 1929. In the same year he was appointed a member of the Advisory Panel of the D.O.T. Overseas Trade Development Council.

It was during his period as chairman that the British Empire Trade Exhibition was held in Buenos Aires. The electrical industry played an important part in this and Mr. Watlington went to Argentina as chairman of the F.B.I. delegation. One result of this visit was that he realised the importance of strengthening the contacts between this country and Argentina and it was largely due to him that the decision was taken to appoint an "electrical ambassador" in Buenos Aires, a position to which Mr. H. C. Siddeley was appointed.

Mr. Watlington continued to devote more and more time to the work of B.E.A.M.A. and in 1932 became joint director with the late Mr. D. N. Dunlop; when Mr. Dunlop died in 1935 Mr. Watlington was appointed sole director. Since that time there has been a steady growth in the scope and intensity of the Association's activities, and during the war, particularly, Mr. Watlington and his colleagues have had to shoulder added responsibilities. But the way in which these have been handled has increased the regard of the industry for the Association and has greatly facilitated the work of the Government Departments concerned with electrical production and export.

Mr. Watlington became an associate of the Institution of Electrical Engineers in 1899 and has been a member since 1917; he has served on the I.E.E. Council and Finance Committee. For his services in connection with the production of flying boats during the 1914-18 war he was awarded the M.B.E. and he was one of the British delegates to the Berlin World Power Conference in 1930.

All sections of the electrical industry will wish Mr. Watlington many years of well-deserved rest after his long period of valuable service.

All-welded Tanker

Hundred-Ton Assemblies

THE principal characteristics of an all-welded oil tanker named *S.S. Phoenix*, which is claimed to have a larger carrying capacity than any other ship of its class constructed in that way, are described in a paper submitted by MR. W. A. STEWART (Sir Joseph W. Isherwood & Co., Ltd.) to the North-East Coast Institution of Engineers and Shipbuilders.

The vessel is owned by the National Bulk Carriers, Inc., of New York, and was built at the Welding Shipyards, Inc., of Norfolk, Virginia, after experiments with models made to Isherwood design had been conducted at the National Physical Laboratory, Teddington.

The tanker has a longitudinal framing system with corrugated plates on the bulkheads and spliced brackets throughout the tank space. Large assemblies weighing up to 100 tons were prefabricated complete on the ground and lifted into position. The only welding that was done within the ship was the actual joining-up of those assemblies. Construction proceeded from the engine room bulkhead forward and aft simultaneously.

The vessel is 541 ft. long, 80 ft. broad and 40 ft. deep, of 23,600 tons deadweight and 29,270 tons displacement. She has carried a cargo equivalent to 183,650 barrels of oil, or 21,300 tons. The single propulsion shaft is driven through double reduction gearing by steam turbines of 13,200 SHP.

PERSONAL and SOCIAL

News of Men and Women of the Industry

THE Central Electricity Board announces that **Mr. V. A. Pask** will relinquish his present post of district manager for the Mid-East England and North-East England Grid Scheme Areas at the end of the year in order to take up a new appointment at head office as personal assistant to the general manager. The Board has appointed **Mr. W. M. Lapper,** operation engineer for North-West England and North Wales, to succeed Mr. Pask.

Mr. V. A. Pask

Mr. Pask, who is a native of Manchester, received his early education and engineering training in Preston and afterwards held appointments at Paisley, Hull and Bootle before becoming deputy general manager and engineer of the Newcastle and District undertaking. Subsequently he was for eight years city electrical engineer of Norwich, and he joined the Central Board in 1940 as district manager for Mid-East England. Four years later he also took over the managership of North-East England when the two areas were combined for administrative purposes.

Mr. Lapper, who was born at Stoke-on-Trent in 1893, was educated at the Stoke High School and Technical College. After experience with the Potteries Electric Traction Co., he held generating station appointments at Perth, Falkirk, Doncaster and Wolverhampton, having been for five years station superintendent at Wolverhampton and in charge of the West Midlands main control centre before joining the Central Board's staff in 1934 as an assistant operation engineer for Central England. Later he went to the Board's Manchester office and became operation engineer for North-West England and North Wales. Mr. Lapper was "lent" by the Board to the Allied Control Commission for Italy and, after the landings in 1943, he took charge of the Public Utilities Division and was responsible for the restoration and organisation of electricity supplies throughout Italy.

On Tuesday last week the Newbury central office staff of the Wessex Electricity Co., together with the sixteen area managers bade farewell to **Mr. H. B. Style,** the general manager. Mr. Style, after three years with the company, is leaving shortly to take up an important appointment in South America. In the afternoon there was a gathering in the club-house under the chairmanship of Mr. L. H. Parkinson, assistant secretary. Mr. Bushroyd, the Oxford area manager, presented Mr. Style, on behalf of the company's staff, with a Georgian silver coffee pot and book of autographs, whilst Miss Marshall presented Mrs. Style with a silver jewel casket. Mr. Brandreth, Mr. Style's predecessor, wished Mr. Style every success in his new position. In the evening, Mr. Style entertained the senior staff at the Chequers Hotel, Newbury. Mr. Style's successor is **Mr. R. R. B. Brown,** who was deputy general manager up to the time he joined the Forces.

Mr. S. O. Grant, who has just returned to the Rheostatic Co., Ltd., from the Admiralty, is now resident engineer at the company's London office for the London area, East Anglia and Kent. **Mr. H. R. Henderson** is leaving London to take charge of an area extending from the West of London to the West of England.

The photograph which we reproduce was sent to us by Mr. T. H. Carr, electrical engineer and manager; it was taken at a recent meeting of the generation and power station superintendents at the Valley power station of the Bradford Electricity Department.

Mr. T. H. Carr (Bradford) with members of his staff.

Mr. T. A. Robinson, station engineer, Dalmarnock power station, has retired after forty years' service, **Mr. A. C. Lindsay,** assistant station engineer, succeeding him at a salary of £833 per annum.

Professor B. F. J. Schonland has been awarded the Hughes Medal by the Royal Society for his distinguished work on atmospheric electricity and other physical researches.

The Minister of Labour and National Service has nominated **Mr. H. E. Chastency,** one of H.M. Deputy Chief Inspectors of Factories, to be Chief Inspector in succession to **Sir Wilfrid Garrett,** who is retiring from the service in January next.

We reproduce herewith photographs of **Mr. W. Horsfall, Mr. F. Lonsdale, Mr. R. E. Robinson** and **Mr. W. H. Williams,** who, as we announced last week, have just been appointed directors of the General Electric Co., Ltd.

Mr. W. Horsfall

Mr. F. Lonsdale

Mr. R. E. Robinson

Mr. W. H. Williams

Dr. Abdel Aziz Bey Ahmed, chairman of the Hydro-Electric Power Commission in Cairo, accompanied by another member of the Commission, **Mustafa Fathy Bey,** has arrived in London for discussions on specifications shortly to be issued for the hydro-electric plant at Aswan.

Squadron-Leader H. Clements has been released from the Royal Air Force to join Silentbloc, Ltd., and its subsidiary, the Andre Rubber Co., Ltd. He will be concerned with technical and commercial developments of the companies' products in the North of England and Scotland.

Mr. C. G. Morley New, Electricity Commissioner, is one of the members of a goodwill mission which is going to Egypt under the auspices of the Department of Overseas Trade.

Sir Edward Appleton, F.R.S., has been appointed Rede Lecturer for 1946 by the Vice-Chancellor of Cambridge University.

Sir Thomas Gardiner, Director-General of the Post Office, is retiring at the end of the year. He will be succeeded by **Sir Raymond Birchall,** who has been Deputy Director-General since 1936.

Mr. J. M. Shannon, of the Glasgow branch of the Simplex Electric Co., Ltd., has been appointed manager of that branch. Mr. Shannon, who has been with the Simplex Co. for eighteen years, has just returned from six years' service in the R.E.M.E. having spent a considerable time overseas; he was twice mentioned in despatches. **Mr. H. G. Barrett** remains manager for Scotland and is responsible for the general direction of the Glasgow and Edinburgh branches.

Rawtenstall Corporation Electricity Committee recommends the appointment of **Mr. Thomas Stockwell** as electrical engineer at a salary of £750 per annum.

Gravesend Town Council advertises in this issue, for a borough electrical engineer (£1,422) to succeed Mr. F. S. Naylor who has been appointed borough electrical engineer of Islington. The Heston and Isleworth Council is seeking a deputy borough electrical engineer and manager (salary £600 plus bonus—at present about £60 and motor-car allowance).

Major Stanley M. Mohr, managing director of the Micanite & Insulators Co., Ltd., has been elected president of the Institute of the Plastics Industry for 1945-1946. Major Mohr was chairman of the British Plastics Federation from 1939 until 1944.

Mr. T. Whitehouse, deputy electrical engineer at Mansfield, has been appointed borough electrical engineer of Weymouth in succession to Mr. G. Nicholson, who is retiring. Mr. Whitehouse is a Wolverhampton man and was educated at the local technical college and in the Corporation Electricity Department, becoming an engineering assistant in that department in 1931. Four years later he transferred to Eastbourne in a similar capacity, being appointed to the Mansfield post in 1938. He is an associate member of the Institution of Electrical Engineers.

Mr. T. Whitehouse

Obituary

Mr. F. C. Raphael.—We report with regret the death on November 17th of Mr. Francis Charles Raphael, consulting electrical engineer and a well-known writer on electrical subjects. Mr. Raphael, who was seventy-four years of age, was educated at the Central Technical College and after serving with various cable manu-

facturers and engineering concerns, was for a time editor of the *Electrician* and, later, *Electrical Engineering*. There followed a period with the Edison Swan Electric Co., and in 1921 Mr. Raphael set up a consulting practice and acted for a number of public institutions. He was a member of the Institution of Electrical Engineers and of the Association of Consulting Engineers.

Mr. W. Merrilees.—We regret to report that Mr. W. Merrilees, manager of the Newcastle branch of W. T. Henley's Telegraph Works Co., Ltd., died suddenly on November 12th after a short illness. The interment took place on November 15th at Benton Parish Church, Northumberland. Mr. Merrilees, who was fifty-four years of age, joined Henley's in 1914 as a clerk in the Newcastle office. He was appointed traveller for the Newcastle area in 1932, and in 1936 became branch manager.

Mr. John Ellson.—The funeral took place at Leicester this week of Mr. John Ellson, who retired in May, 1943, aged sixty-five, from the position of assistant general manager of the Leicester City Transport Department after forty-two years' service with the undertaking. He acted as general manager following the retirement of Mr. H. Pool and the departure of Mr. Ben England.

Lady Walker.—We regret to learn that Lady (Priscilla) Walker, wife of Alderman Sir William Walker, president of the I.M.E.A., died at her home, Burn Banks, Penrith, last week.

Mr. A. E. Logsdon, F.C.I.S., whose death is reported, was managing director and secretary of the Farnham Gas & Electricity Co.

I.E.E. Liverpool Dinner

A FURTHER account of the good work done by electrical engineers during the war was given by Dr. P. Dunsheath, President of the I.E.E., at the annual dinner of the Mersey and North Wales Centre of the Institution at Liverpool last Monday. Dr. Dunsheath in the course of his remarks mentioned that 30 million valves had been produced for the Services in the D-day year and that the Post Office had established stations to interfere with the enemy's communications system with the tanks advancing on Dunkirk. He felt that electrical engineers could fairly accept the tribute paid to them by Alderman A. Critchley, chairman of the Liverpool Electricity Committee.

The Lord Mayor of Liverpool (Alderman L. Hogan), responding to a toast proposed by Mr. J. Eccles, the Liverpool city electrical engineer and manager, said that whatever happened with regard to political control the electricity supply industry would continue to advance.

Mr. W. K. Brasher, secretary of the I.E.E., congratulated the Centre on being the first to hold a post-war dinner. Mr. J. O. Knowles, chairman of the Centre, presided.

Police Radio

THE initial development of a method of increasing the range, or improving the coverage, of very-high-frequency communication systems of the type used by the police force is described in a paper read by Mr. J. R. BRINKLEY (Directorate of Communications, Home Office) before the I.E.E. Radio Section.

The system is based on the simultaneous amplitude modulation of a number of carriers so closely spaced in frequency as to be within the band-width of the receiver, without producing audible interaction of any importance. Two-carrier schemes employing separate transmitters at the same site have improved the coverage, while two or three carrier schemes utilising separate sites have greatly increased the range. The wider band made available by multi-carrier amplitude modulation is used for circuit improvement. The extra width is employed to accommodate the common modulation of several transmitters and thus increase the signal/noise ratios, or enlarge the area covered.

The apparatus referred to in the paper was designed and manufactured by the General Electric Co., Ltd. The site-testing work was initially done by the Radio Department of the G.P.O. on behalf of the Directorate of Communications, Home Office, which later undertook its own multi-station investigations.

Engineering and the British Council

ACCOMPANYING the Report of the British Council for the year ended March 31st, 1945, is an outline of the work of its Science Department. In this an account is given of the activities of the Engineering Panel (chairman, Sir William Larke) in the training of overseas students. These include the award of scholarships, mostly post-graduate, consultation with authorities abroad on the appointment of British professors, on systems of technical education in various countries and on the academic and practical training of foreign students in the United Kingdom. In this connection Professor S. J. Davies (director and secretary of the Panel) in two tours in the Middle East advised on the lay-out and equipment of laboratories for several projected engineering schools and the provision of British text-books and technical periodicals at colleges and institutes. The opportunity was taken to inculcate a proper understanding of the engineering qualifications granted by the major British engineering institutions.

Other services covered the distribution of films, the provision of technical articles, the publication in foreign languages of the *Science in Britain* series of booklets, which include biographies of eminent British engineers, and the dissemination and translation of British Standards.

CORRESPONDENCE

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

Supplies to Farms

I HAVE read with great interest your articles on rural electrification that have appeared from time to time, especially those recently written on the Carlisle area and Ontario. I have not seen any reference to transformer losses in these schemes which presumably, in many cases, call for separate transformers for each farm. Are these losses considered to be a serious item, and how are they met?

I have had in mind a 15 per cent. tariff increase for our sparsely populated areas, but this does not by any means cover the losses. I have recently completed a survey of an extension of our lines to serve 336 farms, and find that while the capital cost, £72,000, is a big enough problem, the losses are a far greater one.

We shall require 162 new transformers (we are fortunate in averaging two farms per transformer), 70 miles of high-voltage transmission and 50 miles of lower-voltage lines. The calculated annual transformer losses are 441,000 kWh and the line losses 109,000 kWh giving a total of 550,000 kWh, representing a total cost to us of £2,300 or £6 17s. 6d. per consumer. These losses go on for ever, and cannot be met, as capital can be to some extent, by contribution from the consumer.

In this undertaking the present losses cost us 25s. per consumer, and we are therefore hesitant to reach out to the farms on a large scale and thus endanger the stability of the undertaking as a whole. What answer can we give the farmers who are making electricity supplies to their holdings a major political issue in the Island?

Douglas. L. DOUGLASS,
Engineer and Secretary,
Isle of Man Electricity Board.

Calling-up of Skilled Men

THE correspondence which has recently appeared in the *Electrical Review*, on this subject, has been both interesting and timely. The matter was recently raised in the Commons, and the reply given was that the Man Power Board knew more about the matter than anyone else, so had to be trusted.

But, apparently, the trouble is that these Ministries do not know the difference between an armature winder who can hold his job in a repair shop, and one employed by a manufacturer, and so they sail gaily into the business and call up these key men (to use a sadly overworked phrase), and tell us that we can get replacements from the Forces, when they are demobilised.

We have not found that training a man for six years to kill with his bare hands has made a marked improvement in his capabilities as an armature winder.

TYNE & WEAR ELEC. CO., LTD.
East Boldon, ROD. J. MORGAN,
Co. Durham. *Managing Director.*

Motor Protection

IN connection with Messrs. Shipton and Shreeve's letter in your issue of November 2nd, I would like to emphasise that B.S. 142 does not cater properly for the thermal overload relay. In the new relay described in your issue of July 13th, the point they make that the relay characteristic should match the motor, has been expressly covered, and I would strongly endorse their views.

With regard to single-phasing, it is not necessary to connect the new relay inside the delta, and it is often not convenient to do so with direct-on started motors. In the relay described this has been made unnecessary as positive protection is given to the motor against single-phasing at all loads by comparing the difference in current in the three lines using three compensated normalised spirals separately heated and a system of substantial contacts as described in the above article.

*London, S.W.*1. L. B. S. GOLDS.

Consumers' Meters

YOUR comments on the "low esteem in which testing of consumers' meters is sometimes held" deserve attention.

A neighbour of mine with a slot meter received a letter from his supplier stating:—"You are in default 3s. 0½d. . . . if you have not paid this within a week your supply will be cut off." I advised sending in a reply that Section 22 of the 1882 Act, provides for up to five years' penal servitude for interference with a supply; and an offer to answer a summons to be issued by supplier. In preparation for the summons, I examined

two slot meters in other homes and found the first had delivered (on its dial) 21 kWh less than the coins put in during the past year, and the second had delivered 9 kWh less than paid for in six months.

The supplier declined to make adjustments of the overcharges more than three months old.

Consumers should check coins put in against units consumed to ensure getting value for money. " M.I.E.E."

Trolley-Buses in South America

IN the *Electrical Review* of October 19th, it was reported that a trolley-bus system to be installed in Sao Paulo would be the first to operate in South America. Whilst this statement may be true of Brazil, you may be interested to know that Venezuela can claim to have had a trolley-bus system in operation for the past eight years.

This company operates an extensive tramway system in Caracas, Venezuela, and on July 9th, 1937, a trolley-bus service was put into operation. From time to time the system has been extended.

*London, W.C.*2. UNITED ELECTRIC TRAMWAYS COMPANY OF CARACAS, LTD.
S. M. WRIGHT, *Secretary*.

Registration of Contractors

WHILST I am in complete agreement with the views of Mr. Alex. Milne, I consider that the whole of the trouble lies in the fact that all types of electrical material can be purchased in chain stores, retail shops and also from many electrical contractors. Until electrical work carried out by amateurs is prohibited, we shall still have the present jumble in the electrical contracting industry.

Gorton, Manchester. WILLIAM J. RIGG.

IN my opinion the standard of installations would improve if the inspector was granted his proper status and remuneration, and inspection during progress was enforced. It would also attract higher skilled technicians to the job.

An advertisement in a recent issue of your periodical, where an " installation inspector " was required, offered the munificent sum of 26·1d. per hour, in the region of 10s. per week less than the wireman. I understand the N.J.I.C. fixes these wages and it appears to be an " operative-minded " body or it would not risk such comparisons.

If the contracting industry is in such a state as recent letters suggest, here is where a start could be made. " CONTRACTOR."

Services in Buildings

Code of Practice Draft

THE Codes of Practice Committee has issued for comment draft Chapter VII, Services (CP(B)502), of the Code of Functional Requirements of Buildings. (British Standards Institution, 28, Victoria Street, S.W.1., 2s. net.) This document contains recommendations for water supply, cooking installations, refrigeration, laundering, telecommunications, sanitation and drainage, and sewage and refuse disposal.

For non-industrial purposes the minimum consumption of water per head in gal. per day is taken as: Flats, 20; houses, 30; hostels, 20; hotels, 20 and upwards; hospitals (including laundry). per bed, 30 and upwards, staff on duty, 20, nurses' home and medical quarters, 20; schools, day 10, boarding 30; offices, 10; factories, 10; restaurants, 1½ and upwards (per meal).

Normal temperatures for domestic hot water are stated as follows: Wash basins and baths, 110 deg. F. minimum; kitchen and scullery sink, 140 deg. F. minimum; household laundry work, maximum 212 deg. F. Minimum rates of flow of hot water in gal. per min. at taps in storage installations should be: Bath, 5; sink, 4; basin, 1½; shower nozzle, 1½.

For a family of four 160 to 250 gal. of hot water per week at 140 deg. F. is needed, *viz.*: Bath, 70 to 100 gal.; basin, 20 to 40 gal.; sink and other purposes, 70 to 100 gal. In houses and flats, in order to allow individual choice in the type of cooking appliances and fuel, connections should be provided at the construction stage with both gas and electric mains, even though the appliance chosen may use solid or liquid fuel. Space should be provided for a refrigerator of 3-cu. ft. capacity in residences up to the three-bedroom type.

Spacing of Cables

A steam supply for public kitchens providing for less than 500 persons is not recommended, unless readily available from mains serving other purposes. Working pressure should not exceed 15 lb. per sq. in., reduced to 5 lb. per sq. in. for wet steam ovens. Where telecommunication cables are led into a building at the same point as electricity cables and gas and water pipes, at least 2 in. should be allowed between them and any of the other services by the provision of a fillet. Where high-voltage cables run adjacent to telecommunication cables, a separation in air of 12 in. is recommended, with 6 in. as a minimum; otherwise separation should be effected by means of a layer of concrete at least 2 in. thick.

Brazil Railway Electrified. — The newly electrified line of the Central Brazil Railway on the Campo Grande to Santa Cruz section was inaugurated by the President of the Republic on October 14th.—*Reuter's Trade Service.*

New Lighting Code

Variations from the Original I.E.S. Document

THE well-known code of the Illuminating Engineering Society, which has hitherto been chiefly concerned with values of artificial light, has been thoroughly revised and considerably expanded. The new version, which is issued under the title of "I.E.S. Code of Practice for Good Lighting of Building Interiors," represents departures in at least three distinct respects. First, it now deals to some extent with both natural as well as artificial lighting. Secondly, it affords an insight into the basis on which illumination values are determined and illustrates with the aid of a special chart how such values should increase geometrically with the apparent size of the object to be seen, duly taking into account the contrasts involved. Thirdly, it removes what has long been felt to be a weakness of the original document, by including recommendations in respect of the quality of the light to be provided in addition to its intensity, incidentally now specified in "lumens per square foot" in preference to "foot-candles."

There are also notes on the assessment of the amount of light required and on the use of illumination charts together with a schedule of pre-determined values recommended for many specified visual tasks.

The new code was discussed at this month's meeting of the I.E.S. at which Mr. H. C. Weston (president) explained that it is primarily intended for the guidance of those professionally engaged in planning and installing lighting, whose experience and skill will usually be required in applying its recommendations. It will also guide the consumer in formulating his lighting requirements, or he may require compliance with it as a condition of any contract given for lighting.

The Code defines "good lighting" in terms of amenity and utility. Lighting is good if it is suitable, in quality and quantity, both for creating agreeable environmental brightness and for permitting high efficiency in seeing what it is essential should be seen in any particular case. Informative diagrams included in the Code refer to the duration of adequate daylight throughout the year, to the chief characteristics of different systems of lighting, to the permissible brightness of lighting units within specified angles of view, and to the determination of recommended values of illumination according to the nature of the "visual task" with the aid of two charts respectively tabulating values of daylight factors and artificial lighting. These values form a geometric series, such that, by six steps, the illumination is multiplied tenfold. Another important section deals with the quality of lighting and, in particular, with the avoidance of glare. The provisions are based on the results of numerous scientific investigations and, for this reason, the Code is an authoritative document.

"In a Good Light"

Joint A.S.E.E.—I.E.I.C. Meeting

THIS year's joint annual meeting of the Association of Supervising Electrical Engineers and the Institution of Engineers-in-Charge was the twentieth of the series and as it was the first post-war meeting the General Electric Co., Ltd., invited members to celebrate it at a Victory luncheon. This was held at the Connaught Rooms on Saturday last. Mr. F. Winstanley, a director of the G.E.C., took the chair and there were about 300 present.

Following the loyal toast Mr. Winstanley proposed the toast of "The Association and the Institution." He expressed regret that Sir Alexander Gibb, the president of the I.E.I.C. was unable to be present but welcomed Sir John Kennedy, a past-president of both bodies, in his place, and Mr. E. R. Wilkinson, president of the A.S.E.E. Mr. Winstanley mentioned that this year the I.E.I.C. celebrated its fiftieth birthday. He read a list of the subjects which had been presented at the previous meetings to show the wide variety of interests covered.

In his reply Mr. Wilkinson spoke of the continuity of the meetings throughout the war and emphasised the great opportunities now presented to the electrical industry. These lay largely in the modernisation of other industries which was essential if we were to compete in world markets. He

referred to the high quality of the membership of the two organisations and to the Swann Diploma which, he said, was not confined to members of the A.S.E.E.

Sir John Kennedy, who also responded to the toast, thanked the G.E.C. for the help it had afforded the two bodies. From its great resources it had been able to provide first-class lecturers on many subjects. Referring to the activities of the members of the two organisations he quoted a saying of the late Lord Hirst that full pleasure could only be gained from work which was of service to mankind.

After the luncheon Mr. R. O. Ackerley, manager of the Illuminating Engineering Department of the G.E.C. gave a lecture on "Illuminating Engineering: or Putting Things in a Good Light." Mr. Ackerley began by stating that the lighting engineer's job was not merely to specify the amount and position of lighting: he was concerned with the background or surroundings too, and particularly with colour. The subject of the lecture was quality not quantity and he detailed the physical and visual factors which entered into the design of an installation. Physical factors included texture and finish of illuminated objects, colour, elevation and operative processes. Under the heading "visual" there fell such matters as shading, colour contrast, obstruction shadow, etc.

By means of an excellent series of lantern slides Mr. Ackerley demonstrated each point of his remarks and the interest which he aroused was reflected in the subsequent questions put to him by members of his audience.

Rural Electricity Supplies

E.D.A. Advisory Committee Starts Work

IT is announced that Mr. H. W. Grimmitt (Electricity Commission) has been appointed chairman of the Rural Electrification Advisory Committee, recently set up by the British Electrical Development Association. Professor H. G. Robinson (principal, Midland Agricultural College, Sutton Bonnington) has been elected vice-chairman. Membership of the Committee consists of representatives of the Ministry of Agriculture and Fisheries, the Royal Agricultural Society of England, the National Farmers' Union, the Milk Marketing Board, the British Dairy Farmers' Association, the National Poultry Farmers' Association, the Institution of British Agricultural Engineers, the Electricity Commission, the Electrical Contractors' Association, electricity supply undertakings, and E.D.A. area committees.

At the first meeting of the Policy Sub-Committee, Mr. Grimmitt was appointed chairman and Mr. S. E. Britton (Chester Electricity Department) vice-chairman. The sub-committee decided to ask the Ministry of Agriculture to give a definition of what constitutes a "farm." It also expressed the opinion that the electricity supply industry generally was agreed that electricity should be available in all parts of the country where it was practicable to develop an economic supply. Mr. Grimmitt pointed out that, although development had been held up by the war, some 2,000 to 3,000 farms a year had been connected during the war years. The total of 290,000 farms in England and Wales included many agricultural holdings with no houses, but of that total 25 per cent. had been connected. Of the farms of over 1,000 acres, 64 per cent. had been connected. It was agreed that supply undertakings should be encouraged to formulate schemes for supply to undeveloped rural areas. The sub-committee is to prepare information advising how the areas should be zoned where not fully electrified, giving the basis of probable revenue for different sizes and classes of farms and other consumers and other concrete suggestions for development.

Mr. V. A. H. Clements (North-Eastern Electric Supply Co., Ltd.) was appointed chairman and Mr. F. J. Elliott (Wolverhampton Electricity Department) vice-chairman of the Publicity and Exhibitions Sub-Committee. This sub-committee has agreed to produce two new publications. One is intended for distribution to the inhabitants of rural areas without a supply of electricity, showing, by practical examples, how by a community effort the supply authority can be assisted in undertaking extensions of mains. The second publication will be a comprehensive handbook on all farm applications of electricity for distribution to farmers who already have an electricity supply.

The Technical Sub-Committee appointed Mr. C. A. Cameron Brown (Edmundsons Electricity Corporation, Ltd.) and Mr. F. E. Rowland (General Electric Co., Ltd.) as its chairman and vice-chairman. The sub-committee agreed that practical advice on installation, lay-out and utilisation of electricity on farms should be given to supply authorities, contractors and farmers, by means of illustrated talks, booklets, and contributions to the N.F.U. journal. It was also agreed that architects required guidance in the designing of new farm buildings so that full advantage could be taken of the possibilities of electric power for labour saving in horizontal and vertical transport.

Grid Improvements

Comments on Central Board's Practice

MODIFIED design and changes in construction of overhead power lines forming the grid system were discussed at a meeting of the Transmission Section of the Institution of Electrical Engineers, following the reading of the paper on the subject by Mr. W. J. Nicholls (*Electrical Review*, November 16th, p. 710).

MR. E. AMBROSE (Highfield & Roger Smith), opening the discussion, remarked that he had hoped to hear why in some areas the towers were constructed of copper-bearing steel whereas the majority of the others were plain mild steel galvanised. The original conductors were supplied in drum lengths, which meant that frequently it was necessary to have mid-span joints. Latterly, however, this had been avoided.

Freedom of Information

MR. R. W. MOUNTAIN (Kennedy & Donkin), who represented the Structural Building Engineering Division of the Institution of Civil Engineers (members of which were welcomed to the meeting), said a great debt was owing to the C.E.B. for the manner in which it allowed papers to be read on all branches of its work, a practice that had enabled this country to establish a level of design which had already been made use of in other countries. With reference to corrosion and alternative conductor materials, he asked if consideration had been given to aluminium alloys such as that used in Switzerland some fifteen years ago. He also inquired whether experience of the double earth wire since 1938 had shown that type to afford improved protection against lightning.

MR. H. W. GRIMMITT (Electricity Commission) said that the additional cost of having conductors of the right length to avoid mid-span joints would have been more than counterbalanced by the money involved in the use of mid-span joints. He considered that there must be some tension at which vibration did not arise. For 33- and 66-kV lines wood poles were far superior to the lavish towers that had been used in the past; wood lasted for sixty years. There was a tendency in America to revert to wooden poles for such lines.

MR. D. P. SAYERS (Birmingham Electric Supply Dept.) said that the author had rather minimised the disadvantages of s.c.a. conductors; from inquiries he had made some time ago it seemed that the consensus of opinion was very much against them. The only advantage at the moment was in price, but that was probably due to the price control of copper. There was more in the story regarding insulators than had been told in the paper. Glass was coming into very much more popular favour than might be inferred and he was under the impression that the C.E.B. was carrying out replacements with glass insulators.

Disparity in Prices

MR. E. C. NEATE (Riley & Neate, Ltd.) suggested that the statement in the paper that in the early days troubles had been experienced with cone-type joints due to bad workmanship should be withdrawn in justice to the men concerned. He drew attention to the great disparity between the prices of various conductors. At present a single 0·175 sq. in. steel core aluminium conductor cost £162 per mile, a corresponding cadmium-copper conductor cost £216 and a hard-drawn copper conductor only £143 per mile. Provided difficulties of sag and spacing could be overcome, the cost of an ordinary line having copper conductor would be much cheaper than the two alternatives adopted by the Board for 33- and 66-kV grid construction. With copper conductors vibration troubles were almost entirely eliminated, line joints were simple and reliable and corrosion troubles, which appeared to loom large when any composite conductor was used, were obviated.

Vibration and Icing

MR. P. J. RYLE (Merz & McLellan) maintained that conductors vibrated for 95 per cent. of their life, but whether that mattered or not depended on what was called "every-day" tension. For instance, the ice and wind equivalent tension of 3,450 lb. in still air at 40 deg. F. only applied to the normal 900-ft. span and it rose sharply with shorter spans; for 500-ft. spans the figure was 5,000 lb. Regarding schemes for circulating current to melt ice, he pointed out that if ice could not be kept off the earth

conductor it would sag differently from the main conductors and swing about non-synchronously.

MR. G. R. MCCULLAGH (J. L. Eve Construction Co., Ltd.) said that the author's claim that there had been no foundation failures seemed to suggest some relaxation of the regulations for the less important grid lines. MR. N. E. P. HARRIS (Bullers, Ltd.) commented on the manufacture of small components.

MR. C. H. E. RIDPATH (British Aluminium Co.) suggested consideration of the use of two dampers per span. He was not satisfied that at normal temperature, up to 100 deg. C., there was any "flow" under pressure in aluminium conductor joints. The oxide film on the conductor had a natural thickness of the order of one-millionth of a centimetre and, while he agreed that at high temperature the film would grow to a thickness which would become insulating, it was wrong to suppose that this would happen at normal temperatures. The tendency after about fourteen days was for growth to cease.

MR. NICHOLLS, in reply, said the Board was investigating the possibilities of aluminium alloys for conductors, but the prospects were not very hopeful at the moment. There was as yet no positive experience that the double earth wire was no good. There had been a weight saving of some 10 per cent. on some lines compared with some of the earlier types. He agreed that wood poles were cheap for certain lines. The Board was using glass insulators in considerable quantities. As to the condition of galvanised steel towers after fifteen years, well over 50 per cent. had reasonably good galvanising left. In the case of about another 15 per cent., in industrial areas, the galvanising was not good at the moment and their life in those situations was about ten years; in very bad areas it was less. He could not agree that the regulations for foundations should be eased.

Discovery of X-Rays

Celebration of Fiftieth Anniversary

ONE of the series of meetings and lectures arranged this month by a number of societies in celebration of the fiftieth anniversary of the discovery by Röntgen of X-rays took place at the Institution of Electrical Engineers on November 10th, DR. P. DUNSHEATH presiding, when four speakers dealt largely with historical aspects.

The evolution of equipment for generating energy at high voltage for the excitation of X-ray tubes was outlined by DR. C. C. PATERSON (research director, G.E.C.) who referred also to interlocking systems of control intended to prevent damage to the equipment and means of rendering the apparatus shock-proof. Development in recent years had tended towards simplification of operation and improvement of reliability. Freon at a pressure of about 55 lb. per sq. in. had been used in America for insulating the tube and transformer of a two-million volt outfit; 100 lb. of that gas had approximately the same insulating properties as six tons of oil.

The story of the development of photographic materials was told by DR. H. BAINES (Royal Photographic Society) who stated that still faster films were needed for both medical and industrial radiography. Perhaps the film of the future would enable screens to be dispensed with altogether, although at present only a fraction of one per cent. of the incident X-radiation was absorbed by the photographic emulsion.

Past and present industrial X-ray analysis was contrasted by MR. H. P. ROOKSBY (G.E.C.) who represented the Crystal Analysis Group of the Institute of Physics. He described ionisation spectrometers in some detail and referred to this type of instrument as an alternative to the photographic film.

The growth of industrial radiography was described by MR. W. J. WILTSHIRE (Research Department, Woolwich Arsenal) who represented the Industrial Radiology Group of the Institute of Physics. Nearly 50 one-million volt sets were working in America, but only two in this country. They were fortunate in possessing a "betatron" electron accelerator at Woolwich (circular path, equivalent to 4·5 million volts) but 20 million electron-volts was being used in America. Thus the limit of penetration had jumped from 5 to 15 in. of steel and the useful limit of voltage had probably been reached. Recent developments were bringing non-photographic (electronic) methods much nearer to practical realisation. Cine-radiography had been applied to molten metal flowing into foundry moulds while flash radiography with exposure times of the order of one-millionth of a second had been especially valuable for the study of explosive phenomena.

COMMERCE and INDUSTRY

Negotiations with Ministries. Union's Post-War Plans.

Government and Engineering Industry

WE reported in our issue of November 2nd an announcement by the Prime Minister regarding the allocation of responsibilities between the Board of Trade and the combined Ministry of Supply and Aircraft Production. Mr. Attlee said that the latter Ministry would carry the primary Government responsibility in the field of engineering. The Board of Trade states that this means that trade organisations concerned with the engineering industry and individual firms in that industry will in due course normally make their approaches to the Government through the Ministry instead of through the Board of Trade to which a large part of the engineering industry has hitherto looked for advice and assistance concerned with supplies to the civilian market.

Before this change of procedure can become effective, however, certain re-arrangements of inter-departmental machinery will be necessary. Organisations and firms in the industry should therefore continue until further notice to deal for the civilian side of their work with the departments which they have hitherto been accustomed to approach.

E.T.U. Changes

Prospects of a great expansion in the electrical industry were referred to by Mr. E. W. Bussey, general secretary, at a Rules Revision Conference of the Electrical Trades Union held at Cardiff last week when questions of membership arising from the war and future development were discussed.

Introducing the proposals of the Executive Council, Mr. Bussey said that the Union had many interests to safeguard. They had first of all to ensure that the 25,000 members of the Union who were in the Forces got back their pre-war jobs. Secondly, whilst protecting the interests of the members, they had to be fair to those who had rendered service within the industry during the war and endeavour to fit them in if they desired to stay in the industry. Thirdly, there were large numbers of people in the Forces who had a high degree of electrical training and would have to be given an opportunity of exercising their skill in industry. Finally, there were those who were being trained under the Government's rehabilitation schemes. Mr. Bussey felt that the Executive Council's proposals, with any minor modifications agreed to by the Conference, would enable the Union to deal with these problems and go from strength to strength.

Mr. W. C. Stevens, assistant general secretary, said that for the Government's policy of full employment to come to fruition it was necessary for the Union to see that the labour to carry out the vast schemes of reconstruction was made available.

A motion to give rights of membership to rehabilitated men and civilian personnel was carried, and the Union is to open a resettlement section for the admission of men who have served in the Forces as electrical tradesmen. Over ninety delegates and officials attending the Conference were extended a civic welcome by the Lord Mayor of Cardiff (Alderman Walter R. Wills) and were entertained to tea.

Custodian Payments

The Board of Trade has made an Order (S.R. & O. 1945 No. 1414) modifying in certain circumstances the arrangements for payment of money owed to residents and business people in territory formerly occupied by the enemy.

Mr. Churchill's Aeroplane

Behind the announcement last week that Mr. Winston Churchill has returned to the United States the "Skymaster" aircraft presented to him by President Roosevelt lies the story of British endeavour which produced the most luxuriously appointed air-liner in the world. The aircraft was delivered as a shell and modified and furnished in this country by L. A. Rumbold & Co., Ltd., of Maida Vale, W. The whole of the electrical equipment was manufactured by the General Electric Co., Ltd. and comprises a 5·75 cu. ft. refrigerator, cooker, hot-cupboard, electrically-heated lavatory seat, stewards' luminous call system, cabin lighting fittings, berth lighting fittings, illuminated shaving mirror, hot and cold water system and fans.

Mr. Churchill's "Skymaster." Left: Special refrigerator. Right: Part of the cooking arrangements

The cooking equipment was capable of pro-

viding a four-course hot meal for twenty people. A 1-kW water boiler used primarily for boiling water for tea, etc., has a draw-off capacity of two gallons. Water heaters for the wash-basins provide half a gallon of water at 150 degrees F. in a period of approximately ten minutes. Aluminium was used extensively in the construction of the electrical apparatus, which operated at 24 V.

Oil-spray Collection

Such serious inconvenience was caused in a M.A.P. factory by the oil spray and vapour given off from eight thread-grinding machines, causing bus-bars and plug-in boxes to become

Grinding machine fitted with oil-spray filter

sources of danger, while the mist penetrated the whole building and works offices, that the factory inspector insisted upon preventive measures being taken. General mechanical ventilation did not alleviate the nuisance to any appreciable extent, so Dallow, Lambert & Co., Ltd., of Leicester, designed an individual-type extractor to be supported (as illustrated) above each grinding machine. Each is driven by a ¼-HP motor and contains special impingement type filters, the resulting precipitant draining back into the oil tanks of the machines.

Tests have shown that the oil extracted from the atmosphere per week per machine amounts to 2·15 gallons, or 17·2 gallons per week for the eight machines. No trace of oil was discernible on a piece of clean linen suspended around the cleaned-air discharge pipe for 24 consecutive working hours.

Generation of Electricity in October

The Electricity Commissioners state that 3,179 million kWh was generated by authorised electricity undertakers in Great Britain during October, as compared with the revised figure of 3,332 million kWh for the corresponding month of 1944, representing a decrease of 153 million kWh, or 4·6 per cent.

During the first ten months of 1945 the total amount of electricity generated by authorised undertakers was 30,138 million kWh as compared with the revised figure of 31,014 million kWh for the corresponding period of 1944, representing a decrease of 876 million kWh or 2·8 per cent.

Special War Products

An illustrated brochure has been prepared by Hopkinson Motors & Electric Co., Ltd., describing its war work, which included, in addition to increased supplies of its normal products, high-frequency generators for aircraft' test sets for the M.A.P., special DC motors for the Fleet Air Arm, and a range of single-phase AC repulsion induction motors.

Fuel for Reconstruction

During the war the Ministry of Fuel and Power arranged a series of exhibitions, entitled "Black Diamonds," demonstrating how coal was required for the production of armaments. Now, with the changed conditions, another exhibition called "Other People's Jobs" has been prepared showing how, with coal urgently required for reconstruction of industry, fuel saving is still as vital as ever. Twelve display units relating to various aspects of our economic life include a life-sized photographic cut-out of the worker concerned—the miner, engine-driver, merchant seaman, electrician, gas worker, farmer, steel worker, builder, industrial chemist, mill-hand, nurse and housewife. The display relating to the electrician shows by means of a dial how the various electrical services build up the load of the generating plant, with the sudden heating load of a cold spell causing a shut-down of the plant. A separate working model depicts a pit-head with coal trucks feeding the power station, gas and water works, coal merchant's yard and consumers' goods factory. From these power, gas and water, and household goods and food are supplied to a model "Perspex" house. There is also a working model of a colliery. The exhibition, which was opened by Mr. Shinwell, the Minister of Fuel and Power, will be on view at the Army and Navy Stores, London, until to-morrow (November 24th) and will then be seen in about a dozen provincial towns.

Contract Price Adjustment Formulæ

The latest figures for the B.E.A.M.A. contract price adjustment formulæ are as follows:—Rate of pay for adult male labour at November 10th, 95s. (unchanged). Costs of material: the index figure for intermediate products last published by the Board of Trade on November 10th is 181·8 and is the figure for the month of October. This compares with 182·5 for September.

Welding Developments

On November 29th and 30th, a symposium on the metallurgy of steel welding organised by the British Welding Research Association will be held in London, when leading authorities will discuss current researches. The subjects to be covered are recent researches on the constitution and properties of weld metal; fundamental investigations on cracking in the hardened zone in welded joints in alloy structural steels; and initial researches on the viscosity of welding slags.

Plans are well advanced for dealing in a scientific manner with all questions connected with the application of welding to industry. Property has been acquired near Cambridge by the British Welding Research Association and special laboratories will be built there for

full-scale experiments on welded structures, and other laboratories are being laid out in the London area for metallurgical research. Experiments on welded steel structures are being carried out under the direction of Professor J. F. Baker, Cambridge.

The Association's director of research is Mr. A. Ramsay Moon, who as director-in-charge of the Advisory Service on Welding, Ministry of Supply, took a large part in the extension of welding in shipbuilding, structural engineering, in the production of tanks, aircraft and armaments.

Radio Control Orders Revoked

The Postmaster-General has given notice of new Orders which revoke a number of wartime measures relating to the control of radio and allied apparatus. The Orders revoked are S.R. & O. 1939 No. 1688, regulating the use of wireless transmitters; the Wireless Telegraphy (Possession of Transmitters) Order, 1943 (S.R. & O. 1943 No. 1219); Control of High-Frequency Apparatus Order, 1940 (S.R. & O. 1940 No. 1644), as amended by the Control of High Frequency Apparatus Order, 1942 (S.R. & O. 1942 No. 1564); and S.R. & O. 1939 No. 1689 relating to the control of wireless transmitters and certain other electrical apparatus.

New L.C.C. Houses and Flats

Four new and improved types of houses and flats proposed to be adopted as standards for future housing operations carried out by the London County Council will be provided with electric or gas cookers, constant hot water from slow combustion stoves (and electric immersion heaters for supplying hot water in the summer), rearranged and improved kitchen fittings with space for refrigerator, electric or gas copper in place of solid fuel copper, additional cupboard accommodation, B.S.I. standard dressers and kitchen cupboards, electric or gas fires in place of open fires in first bedrooms and additional electric plug points.

Department of Overseas Trade

The Department of Overseas Trade is returning from Hawkins House, Dolphin Square, S.W.1, to 35, Old Queen Street, Westminster, S.W.1, and all communications should now be sent to the Comptroller-General at that address. Telegrams: Advantage, Parl, London; telephone: Victoria 9040.

Developing a Large Supply Undertaking

A lecture was recently given to over 300 members of the English Electric (Stafford Works) Engineering Society by Mr. F. W. Lawton, chief engineer and manager of the Birmingham Electric Supply Department, on "The Development and Administration of a Large Electric Supply Undertaking." The chair was occupied by Mr. E. B. Banks, deputy commercial manager. Mr. Lawton gave a résumé of the upward trend of Birmingham's electric supply during a period of over fifty years culminating in the erection of Ham's Hall "B" power station, which was designed for an ultimate capacity of 300,000 kW. Details were given respecting generation, distribution, economics of power production, administration, management and the training of personnel. A discussion was opened by Mr. A. R. Blandford, chief engineer and manager, Switchgear Department, and a vote of thanks was proposed by Mr. J. E. Calverley, deputy chief engineer to the company.

World Power Conference

The revival of the constituent national committees of the World Power Conference was discussed at a two-day meeting of the International Executive Council of the Conference which was held this week in London. Delegates attended from Great Britain, all the British Dominions, India, Belgium, Denmark, France, Greece, Luxembourg, the Netherlands, Netherlands East Indies, Poland, Sweden, Switzerland, and the United States. The executive chairman of the World Power Conference is Sir Harold Hartley.

Cables in the "Queen Elizabeth"

Referring to our article on the equipment of the *Queen Elizabeth* in our last issue, W. T. Henley's Telegraph Works Co., Ltd., remind us that they supplied over 600 miles of 250-V and 660-V rubber-insulated cable for the ship—about 40 per cent. of the total.

Dissolution of Partnership

H. Heywood and J. A. Waters, carrying on business as electrical contractors and suppliers of electrical goods, 173, King Street, Oldham, have dissolved partnership as from August 21st,

Trade Announcements

The Hotpoint Electric Appliance Co., Ltd., has closed its depot at Rutland House, Otley, Yorks. Communications from this area should in future be addressed to 99, Corporation Street, Manchester.

The telephone number of the Gray's Inn Road branch office of the Concordia Electric Wire & Cable Co., Ltd., has been changed to Terminus 8538.

Trade Publication

Electrical Conduits, Ltd., Anchor Works, Birch Street, Walsall, Staffs.—Illustrated price list of conduit tubes as well as fittings and accessories.

TRADE MARKS

THE following applications have been made for trade marks. Objections may be entered within a month from November 14th:—

PARTRIDGE and TRANSFORMER (design). No. B634,000, Class 9. Electric current transformers and chokes.—Partridge Transformers, Ltd., 76-78, Petty France, London, S.W.1.

WASP. No. 635,556, Class 9. Apparatus for electrifying wire fencing, and parts thereof not included in other classes.—The Wolseley Sheep Shearing Machine Co., Ltd., Wolseley Works, Electric Avenue, Witton, Birmingham, 6.

NEVELECTOR. No. 635,924, Class 9. Rectifiers for electric current.—Nevelin Electric Co., Ltd., Purley Way, Croydon.

Load Equalisation

Colliery Winding Equipment

By G. Barnard, A.M.I.E.E.

THE need for new pit-shafts with electric winding equipment capable of dealing with large colliery outputs was emphasised in the Reid Committee's Report on Coal Mining, published last March. Where the winder forms a large proportion of the electrical load some system of load equalisation is generally necessary to relieve the power station and/or transmission lines of the sudden peaks on starting it up. The same considerations apply to the use of rolling mills and similar heavy drives.

For this purpose a flywheel set with Ward-Leonard control may be used. Fig. 1 is a schematic diagram of a set in which the driving motor, A, of the slip-ring induction type, drives a variable-voltage generator C, which is electrically connected to the winder-motor, D. The field control and reversing switch for the generator is indicated by COS. The driving motor is started in the usual way by a rotor starter and when up to speed, the winder motor is started. Since the motor generator then takes additional current from the mains, more current flows in the secondary circuits of the current transformers, C.T. These circuits pass through the windings of the torque-motor, T.M., which causes the bar to lift, thus inserting extra resistance in the rotor starter or slip regulator. The driving motor A thereupon loses speed, allowing the flywheel, due to its inertia, to release stored energy, thereby relieving the system of the heavy starting peak load of the winder motor.

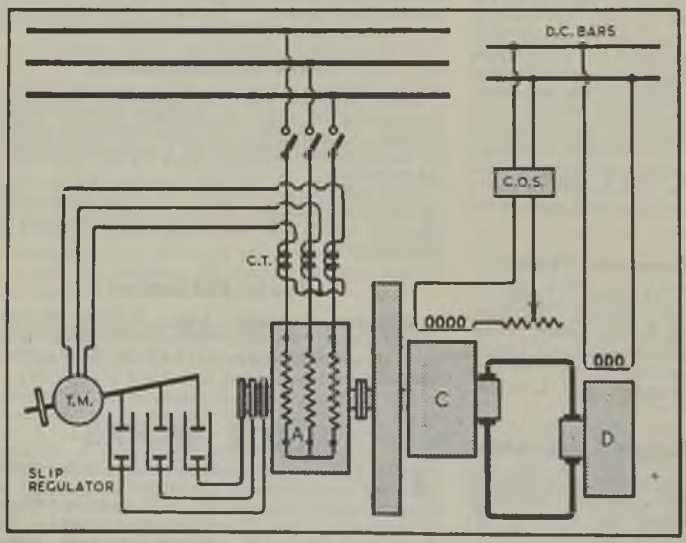


Fig. 1.—Ward-Leonard flywheel set with induction motor and rotor regulator

At one colliery I know of, the power factor of the electrical system was considerably improved by using an over-excited synchronous motor to drive the flywheel set feeding a winder. This, however, raised the problem of arranging for the drop in speed necessary to take advantage of the flywheel inertia whilst keeping the driving motor running at constant synchronous speed. A solution was found in the use of a hydraulic coupling H.C. (Fig. 2) between the synchronous driving motor, A, with its exciter, B, and the remainder of the set.

The coupling consists of an impeller rigidly fixed to the motor shaft and a runner attached to the shaft carrying the flywheel and DC Ward-Leonard generator. Both impeller and runner are in one casing, which is supplied with oil from a pressure tank, P.T. When the coupling is full of oil, the flywheel and generator run on full load at a speed about 2 or 3 per cent. below the speed of the synchronous motor. When the coupling is empty, the flywheel and generator are stationary because they are completely disconnected from the synchronous motor.

By regulating the supply of oil to the coupling, the slip is varied accordingly. The oil passes through a regulating valve V,

the latter being controlled by a torque motor T.M. which, in turn, depends on the loading of the set, because it receives its current from the transformers C.T. By this means the load on the station can be equalised to any predetermined value without altering the speed of the driving motor.

In the Stubbs-Perry system, the Ward-Leonard flywheel set is driven by a steam turbine, the speed of which decreases when peak loads are thrown on the set, thereby allowing the flywheel to give out some of its stored energy. The steam demand on the boilers is therefore kept at a steady value. The turbines usually operate at speeds between 4,000 and 5,000 RPM and drive the generators and flywheels through 6 to 1 gearing.

When a winder is lowering material regenerative braking is used and the regenerated energy is returned to the Ward-Leonard sets to be usefully employed in speeding up the flywheel instead of wasted in heating brakeblocks on the winder drum. An eddy-current brake is fitted to the set to absorb the excess regenerated energy and to hold the speed of the set within safe limits. The eddy-current brake comprises a cast-iron stator in which eddy-currents are induced by a rotor magnetised with DC. It is controlled automatically by the turbine governor, in conjunction with a relay which closes the DC contactors and excites the brake field magnets.

Where a colliery takes public supply in addition to generating electricity, the eddy-current brake can be replaced by an induction motor large enough to drive the set. A clutch is included between the turbine and the remainder of the set so that the turbine may be declutched and the set driven by the induction motor fed from the public mains. This arrangement is flexible and economical, there being no purely standby machines, because while the turbine is at work the induction motor operates as an eddy-current brake by having DC automatically switched through the stator windings during the regenerative periods.

When flywheel sets are used for supplying power to heavy reversing drives, the capacity of the turbine or of the driving motor is determined by the average demand of the reversing drive plus the losses of the entire equipment.

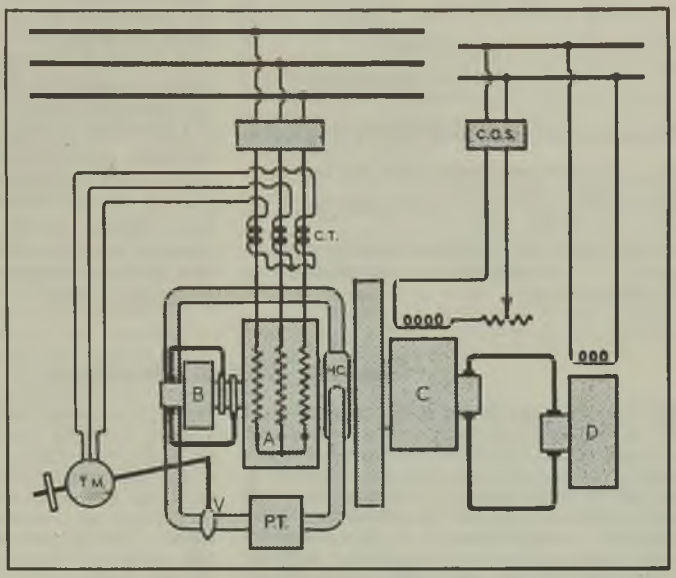


Fig. 2.—Synchronous motor driving Ward-Leonard flywheel set with hydraulic slip regulator

On a large system capable of dealing with the maximum peak loads, a flywheel may not be necessary and it may prove cheaper to use a plain Ward-Leonard equipment having a larger driving motor, which gives a higher overall efficiency, in view of the losses due to windage of the flywheel (generally just over 2 HP per ton), friction, and slip regulation. Since flywheel windage losses increase as the cube of the speed, the highest practicable peripheral speeds are not always adopted. The losses in the hydraulic coupling between the synchronous motor and the W.L. set vary roughly as the slip and are comparable with the power lost in the rotor resistance used for slip regulation with the induction motor and W.L. set.

A flywheel speed variation of 10 to 18 per cent. is generally arranged, depending on requirements. The following example

indicates the method used to determine the performance of a flywheel of a turbo-set, having a mean radius of rotation of 5 ft. and weighing 20 tons. Kinetic energy of a rotating body $= \frac{W\ k^2\ w^2}{2g}$ where k is the radius of gyration and w is the angular velocity in radians per second. At the normal full speed of 750 RPM, $w = \frac{750}{60} \times 2\pi =$ 78·5 and kinetic energy stored $=$ $\frac{20 \times 2240 \times 5^2 \times 78{\cdot}5^2}{2 \times 32} = 108{,}000{,}000$ ft. lb.

When the speed drops to 690 RPM, $w = \frac{690}{60} \times 2\pi = 72$ and kinetic energy has decreased to: $\frac{20 \times 2240 \times 5^2 \times 72^2}{2 \times 32} = 91{,}000{,}000$ ft. lb.

Energy given out by flywheel during drop in speed $=$ 108,000,000 $-$ 91,000,000 $=$ 17,000,000 ft. lb.

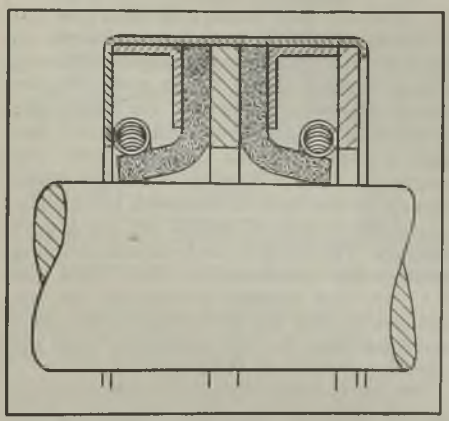
Since the kinetic energy stored at any instant is proportional to the square of the angular speed, at 690 RPM the energy stored is $\frac{690^2}{750^2} \times 108{,}000{,}000 = 91{,}000{,}000$ ft. lb. This calculation serves as a check on the foregoing.

Where the electrical system apart from the winder is large, load fluctuations caused by the operation of the winder may form a small percentage of the total load, in which case it may be worth while to use the same steam turbine for both Ward-Leonard set and remaining load. The set would comprise a 3,000-RPM turbine with a direct-coupled two-pole alternator at one end, and Ward-Leonard set without flywheel coupled through gearing to the turbine at the other end. The turbine would be provided with a constant speed governor. The drawback to this system, however, is that "all the eggs are in one basket."

Sealing Motor Bearings

THE widespread use of grease as a lubricant for ball bearings on electric motors was due primarily to the infrequency of the need for its replenishment and to the material reduction in the risk of short circuits in windings that had been experienced through oil leaking from plain bearings. Grease, however, is not suitable for high speeds or where the temperature is likely to approach 200 deg. and is often unsatisfactory even at 125 deg. F. Mineral oil is now regarded as the best lubricant for ball and roller bearings, provided leakage and the ingress of foreign matter can be prevented.

A simple design of seal that meets the great majority of norml applications incorporates a circular L-shaped packing member encircling the shaft, with which it is kept in light running contact by a spring and which is prevented from revolving with the shaft. The materials used for the seal vary with temperature and peripheral speed. Oak-tanned leather is generally satisfactory up to 148 deg. F. and 730 ft. per min., chrome leather up to 195 deg. and 2,500 ft., Supertan up to 230 deg. and 3,000 ft. and synthetic rubber up to a temperature of 260 deg. and higher speeds.



Dual-type of oil seal

Where the primary purpose is to retain oil in the bearing, the rubbing lip of the packing member is turned to face the bearing. For grit exclusion, however, the lip is pointed away from the bearing. When both conditions are equally important a dual type, as illustrated, can be fitted.

In another variation, for use in narrow spaces, the width of seal can be reduced by omitting the coiled spring and relying upon the resiliency of the material of the packing member to keep the lip in contact with the shaft. Where the last type is adopted, the shaft should if possible be hardened, plunge-ground and polished or lapped to ensure its smoothness. The surface finish for leather packing members should be about 24 micro-inches and for synthetic rubber 10 micro-inches. Any flaw in the surface of the shaft is liable to cut the lip. All edges and corners over which the seal has to be slipped when assembling or taking down the bearing should be chamfered. The above information was supplied by Super Oil Seals & Gaskets, Ltd.

ELECTRICITY SUPPLY

Glasgow District Heating Step. New Wigan Station.

Birkenhead. — SUPPLIES TO HOUSES. — The Electricity Committee is applying for sanction to borrow £2,407 for the laying of l.v. mains to housing sites at Heswall and Irby.

Glasgow.—DISTRICT HEATING. — The Housing Committee has agreed to engage Donald Smith & Partners, consulting engineers, to report on the application of district heating to housing schemes for a consulting fee of £250.

ELECTRIC HEATING FOR SCHOOL. — The Education Committee has arranged for the Electricity Department to install electric heating at Penilee temporary school at a cost of £655.

EXTENSIONS AND CHANGE-OVER. — The Electricity Committee is to extend mains (£6,000) and provide equipment for change-over purposes (£5,000).

Mansfield.—EXTENSION OF AREA.—The Corporation announces its intention of applying to the Electricity Commissioners for a Special Order extending its area of supply to certain parishes in Derbyshire and Nottinghamshire.

Marlow (Bucks).—TENANTS TO CHOOSE. — On the recommendation of the Housing Committee the Urban District Council has accepted amended tenders of the Uxbridge Gas Company and the Wessex Electricity Company for installations in a number of houses. The gas company offered to install its mains to a meter position in each house, together with points for cooker and wash boiler and two gas poker points at no cost to the Council. The electricity company's tender was: service to meter position, no charge; twelve electric lighting points, £16 17s. 6d.; five 5/10-A socket outlets, £9; 2-kW immersion heater, £9; 15-A point for wash boiler, £2; and point for cooker, to be converted to a 15-A outlet in the event of the tenant not wishing to cook by electricity, no charge. The first tenants of the houses are to be allowed to choose between electricity and gas for the cooker and wash boiler, after which any change will be at the tenant's own cost.

Although the chairman of the Council expressed the view that, being an interested party, he had not the right to speak, Councillor L. J. Smith moved that the part of the electricity company's tender relating to immersion heaters should be deleted as he considered the expenditure unjustified. The amendment was, however, defeated, only the mover and seconder voting in favour of it.

Pudsey. — POSTPONEMENT OF PURCHASE DATE.—The Electricity Commissioners have made Orders extending by one year the period ended on September 16th last within twelve months of which the Corporation may give six months' notice of the purchase from the Electrical Distribution of Yorkshire, Ltd., of those parts of its undertaking specified in the Farsley and Calverley Electricity Orders.

Sowerby Bridge. — PURCHASE OPTION. — Application is being made by the Council for an Order further extending the period within which it may give notice to exercise its right to purchase the undertaking authorised by the Sowerby Bridge Electric Lighting Order, 1900 and 1908. The Council recently wrote to the Commissioners asking whether they would be willing to entertain favourably an application for consent to the exercise of the purchase rights. The Commissioners, in reply, referred to the statement of the Minister of Fuel and Power regarding the desirability that there should be the minimum of disturbance in the existing organisation of the undertaking pending a Government pronouncement.

Swinton and Pendlebury. — "ALL-ELECTRIC" HOUSES.—The Electricity Committee is to lay mains for fifty proposed "all-electric" houses in Deans Road, Swinton.

Wigan.—NEW POWER STATION. — At a recent Town Council meeting Councillor Winstanley stated that the Electricity Committee had received a direction from the Central Electricity Board to proceed with a scheme for a new generating station at Westwood.

York.—EXTENSION.—The Electricity Committee is to provide supplies to Cattal Village, South Marton Farm, Stillington and Carlton Farm, Nun Monkton, at a cost of £2,263.

Municipal Reports

Bromley

IN 1944-45 the Bromley Electricity Department (borough electrical engineer, Mr. W. G. Trend) sold 19·0 million kWh, equal to 415 kWh per head of the population. Compared with the previous year sales were up by about a million kWh, the largest increase being under the "all in" business tariff. Revenue from electricity amounted to £136,123 (£133,379), total income being £146,281 (£144,025) and working costs £109,599 (£103,230). After meeting all charges there was a deficit on the year of £6,982 compared with a profit of £503. The average price obtained per kWh sold was 1·722d. (1·776d.) and the total cost 1·861d. (1·875d.).

Oswestry

Approximately 43 per cent. of the premises within the Oswestry undertaking's area are not yet connected to the supply. The borough electrical engineer (Mr. H. Breckell) explains in his report that a large number of these are in very isolated parts of the rural area and some form of national subsidy and/or guaranteed annual income, in addition to kWh sold, is necessary for commercially sound development work.

Sales in 1944-45 amounted to 8·6 million kWh (against 7·3 million), an increase of 18 per cent. Total income from consumers was £55,849 and working expenditure £46,559. Loan charges amounted to £7,691 and £572 was spent on capital works, leaving a net surplus of £1,327. In the quarter ended March 31st last a rebate of 25 per cent. was allowed on quarterly accounts.

PARLIAMENTARY NEWS

By our Special Reporter

No Electricity Supply Inquiry

IN the House of Commons on November 13th Mr. De La Bere asked the Minister of Fuel and Power whether he would hold an official inquiry into the working of the electricity supply companies and particularly into those concerns that were governed and controlled by holding companies.

Mr. Shinwell said that a statement on the future of the electricity industry would be made at an early date. In the circumstances he was unable to agree to the suggestion for a special inquiry.

A War Office Cable

Mr. Dye asked the Minister of Fuel and Power whether he would arrange for the existing cable to the village of Weating, Norfolk, to be used to supply the new council houses about to be erected and also other houses in the village.

Mr. Shinwell said he understood that the East Anglian Electricity Supply Co. was prepared to tap this cable to afford supplies to the houses referred to if satisfactory arrangements could be made with the War Office, which owned the line. He had taken the matter up with the War Office and would communicate with Mr. Dye as soon as possible.

Aid for Farms

Answering Mr. Driberg, Mr. Shinwell said he agreed that wherever practicable electrical plant and equipment hitherto required for military purposes should be used for the development of rural supplies. It had been arranged that Service Departments would notify the Electricity Commissioners of any cases where the local undertaking concerned did not wish to take them over. The Commissioners did everything possible to promote the use of this equipment for civilian purposes.

Peak Load and Capacity

Mr. Cook asked the Minister of Fuel and Power if he would state the peak load requirements in the country of electric power and the supplies available.

Mr. Shinwell said it was estimated that the peak load on the national grid system during the coming winter would be between 8½ and 9 million kW, according to weather conditions. The available capacity of the generating plant was not likely to exceed 8·6 million kW.

In reply to a further question Mr. Shinwell said it was estimated that the peak load on that portion of the grid system in Scotland during the coming winter would be between 775,000 and 825,000 kW according to weather conditions. The available output capacity of the generating plant was not likely to exceed 790,000 kW. It should be observed, however, that the grid system was operated as one unit over the whole country and it was not always possible to treat Scottish supplies separately.

Analysis of Supply

In a written answer to Major Ramsay, Mr. Buchanan, Secretary of State for Scotland, said that the total quantity of electricity (in millions of kWh) produced by public undertakings in Scotland, England and Wales respectively during the last complete year for which figures were available, namely, 1944, was as follows: Scotland, 3,907; England (including Monmouth), 32,282; and Wales, 2,174.

The estimated output of the schemes which the North of Scotland Hydro-Electric Board had in preparation was approximately 934 million kWh, which was approximately equivalent to 24 per cent. of the Scottish, 3 per cent. of the English, and 43 per cent. of the Welsh output for 1944. If projects already surveyed by the Board but not yet the subject of constructional schemes were included the total output of the Board's schemes would be approximately 2,234 million kWh, making the approximate percentages for Scotland 57, England 7, and Wales 103.

Nationalisation Plans

On November 19th Mr. H. Morrison, the Leader of the House, in announcing the Government's plans for the nationalisation of industries, said, "The Government will introduce a Bill during the present Session to nationalise the coal-mining industry. At a later stage in the lifetime of this Parliament the Government intend to introduce measures to bring under national ownership the electricity supply industry and the gas industry. This will implement the concerted plan for the co-ordination of the fuel and power industries which was foreshadowed in the King's Speech." He went on to say that the Government also intended to nationalise the transport services, but not shipping.

With regard to iron and steel, the Government proposed to await the report on the organisation of the industry before coming to a decision. During the interim before the plans could be carried out, all necessary development in the industries concerned must proceed. The compensation payable would have regard to any extent to which an undertaking had not been maintained up to the time of transfer and the Government would naturally take precautions in its legislation to protect the acquiring authority against any transactions entered into in the interim period, whether by way of contract or otherwise, which might prejudice that authority.

Forthcoming Events

Saturday, November 24th. — *Manchester.* — College of Technology, Sackville Street, 6.45 to 10.30 p.m. I.E.E. North-Western Students' Section. Autumn dance.

Monday, November 26th.—*London.*—Institution of Electrical Engineers, 5.30 p.m. Informal meeting. Discussion on "Standardisation of Ripple Control," to be opened by T. R. Rayner.

Birmingham.—Grand Hotel, 6 p.m. I.E.E. South Midland Centre. Thirty-sixth Kelvin Lecture: "Scientific Principles of Radiolocation," by Sir Edward V. Appleton.

Newcastle-upon-Tyne. — Neville Hall, 6.15 p.m. I.E.E. North-Eastern Centre. "Excess-Current Protection by H.R.C. Fuses on Medium-voltage Circuits," by R. T. Lythall, and "Excess-Current Protection by Overcurrent Relays on Medium-voltage Circuits," by A. G. Shreeve and P. J. Shipton.

Cardiff.—At South Wales Institute of Engineers, 6 p.m. I.E.E. Western Centre Installations Group. "Electrical Problems Associated with Aero Engine Testing," by A. N. Irens.

Tuesday, November 27th.—*London.*—Institution of Electrical Engineers, 5.30 p.m. Radio Section. Discussion on "Film Forming Materials Used in Insulation," to be opened by C. R. Pye.

Manchester.—At Engineers' Club, 6 p.m. I.E.E. North-Western Centre and Institution of Post Office Electrical Engineers, Manchester Centre. "Practical Aspects of Telephone Interference Arising from Power Systems," by P. B. Frost and E. F. H. Gould.

Glasgow.—Societies' Room, Royal Technical College, George Street, 6.15 p.m. I.E.E. Scottish Centre. "The Place of Radiant, Dielectric and Eddy-Current Heating in the Process Heating Field," by L. J. C. Connell, G. W. Humphreys and J. L. Rycroft.

Loughborough.—At Loughborough College, 6.30 p.m. I.E.E. East Midland Sub-Centre. Informal paper: "Engineering Standardisation," by J. H. R. Nixon.

Wednesday, November 28th.—*London.*—Institution of Electrical Engineers, 7 p.m. London Students' Section. "Production of X-rays, and Some Electrical Engineering Aspects," by R. A. Briggs.

Rugby.—Electricity Showrooms, 7 p.m. I.E.E. Rugby Sub-Centre. "Recent Progress in the Design of the High-voltage Overhead Lines of the British Grid System," by W. J. Nicholls.

Aberdeen.—Caledonian Hotel, 7.45 p.m. I.E.E. Scottish Centre. As at Glasgow, November 27th.

Thursday, November 29th.—*Bradford.*—Electricity Showrooms, Sunbridge Road, 6.45 p.m. Illuminating Engineering Society. "Industrial Lighting," by D. A. Strachan.

Newton Abbot.—Globe Hotel 3 p.m. I.E.E. Devon and Cornwall Sub-Centre. "Control of Electrical Installation Work," by W. R. Watson.

Crumlin.—Association of Mining Electrical and Mechanical Engineers (South Wales Branch). Visit of Chief Electrical Inspector of Mines (Mr. G. M. Harvey).

Friday, November 30th.—*Newcastle-upon-Tyne.*—At Mining Institute, 6 p.m. North East Coast Institution of Engineers and Shipbuilders. "Electronics: Their Scope in Heavy Engineering," by W. G. Thompson.

Loughborough.—I.E.E. South Midland Students' Section. "Air-blast Circuit-breakers," by J. Humphries.

Saturday, December 1st.—*Manchester.*—At Geographical Society, 16, St. Mary's Parsonage, 2.30 p.m. Junior Institution of Engineers "The Application of Electric Motors and Control Gear," by H. P. Pentelow.

Monday, December 3rd. — *Birmingham.* — James Watt Institute, 6 p.m. I.E.E. South Midland Centre. "Factors Influencing the Design of Electric Lighting Installations for Building Interiors," by R. O. Ackerley.

Liverpool.—Royal Institution, Colquitt Street, 6 p.m. I.E.E. Mersey and North Wales Centre. "Practical Aspects of Telephone Interference Arising from Power Systems," by P. B. Frost and E. F. M. Gould.

Sheffield.—University, Western Bank, 6 p.m. Illuminating Engineering Society. "Public Lighting," by N. Schofield.

Thursday, December 6th.—*London.*—Institution of Electrical Engineers. "The Operation of Large Turbo-Alternators to Reduce Rotor-Winding Deformation," by R. H. Coates and B. C. Pyle. (In lieu of paper previously announced).

Loans Sanctioned

Public Supply Authorities' Needs

DETAILS have been issued by the Electricity Commissioners of the amounts which public authority electricity undertakings and the Central Electricity Board have received sanction to borrow during the last seven and a half years. Commencing with the last pre-war year the annual totals have been as follows, the Central Board's share being given in parentheses: 1938-39 £25,288,803; 1939-40 £19,900,815 (£1,000,000); 1940-41 £18,760,500 (£1,000,000); 1941-42 £10,998,291 (£4,000,000—for war emergency extensions); 1942-43 £18,884,592 (£9,700,000—in respect of grid expenditure, largely pre-war, and the extension of the Earley station); 1943-44 £5,363,953 (£2,250,000); 1944-45 £30,362,818 (£2,025,000, including further extension of Earley station); first six months of 1945-46 (to September 30th last) £20,835,786 (including £3,000,000 for the North of Scotland Hydro-Electric Board). An analysis of the last two totals is appended:—

DETAILS OF SANCTIONED LOANS

ITEM	PERIOD	
	1944-1945	6 months ended 30th Sept. 1945
	£	£
Purchase of property	13,907	52,180
Buildings (generation)	6,711,285	3,320,616
Buildings (distribution)	42,734	100,783
Plant (generation)	20,323,383	11,278,552
Plant (distribution)	593,327	1,203,519
Mains and services	491,422	1,498,672
Meters and instruments	31,249	113,395
Wiring installations	1,107	3,000
Apparatus	24,034	46,500
Other purposes	105,370	3,218,569
Total	28,337,818	20,835,786

FINANCIAL SECTION

Company News. Stock Exchange Activities.

Reports and Dividends

Crabtree Electrical Industries, Ltd.—The accounts of J. A. Crabtree & Co., Ltd. (the operating company) to July 31st last show a trading profit, with other receipts, of £226,987, as compared with £246,431 in the preceding year. Income tax and E.P.T. take £142,351 (£162,451) and after allowing for depreciation, and writing off all capital expenditure incurred during the year, there remains a balance of £77,982 (£72,439). From this £65,000 (same) in tax-free dividends is paid to Crabtree Electrical Industries, £13,000 is set aside for deferred repairs (against £10,000 to reserve) and £76,856 (£76,875) is carried forward. As reported in our November 2nd issue, Crabtree Electrical Industries is paying a final ordinary dividend of 5 per cent. and a cash bonus of 7½ per cent. making, with the 5 per cent. interim dividend, a total of 17½ per cent. (same) for the year.

Burco, Ltd.—The trading profit for the year to September 30th last was £47,255; this compares with £17,838 in the preceding year and £32,208 in 1942-43. With interest received the total available is £47,767 (against £39,993 in 1943-44, including £21,321 E.P.T. credit). Taxation absorbs £22,301 (£19,618) and after deducting fees and depreciation there is a net profit of £21,969 (£16,478). A sum of £11,500 is transferred to general reserve (against £8,000 to dividend equalisation reserve), the ordinary dividend is increased from 15 to 20 per cent. and £20,998 (£21,029) is carried forward.

Tube Investments, Ltd., is making a special distribution of 10 per cent. to the ordinary shareholders out of the £400,000 built up during the war to compensate them for the 3¾ per cent. reduction in dividend since 1941. Apart from this, the ordinary dividend is maintained at 22½ per cent. by the declaration of a final payment of 12½ per cent. Owing to the cancellation of war contracts the profits of the group declined by £69,461 to £2,027,195 and those of the parent company from £143,785 to £136,910. A balance of £211,318 on the contingencies fund is placed to reserve.

Electric Furnace Co., Ltd.—More than 1,500 electric furnaces of all types, having an aggregate capacity of over 300,000 kW, were installed by the company during the war. Recording this in a statement circulated with the report and accounts, Mr. D. F. Campbell (chairman) points out how improvements in the electrical melting and heat treatment of metals have influenced the development of aircraft and aero-engines, the gas turbine, radar equipment, tanks, etc. The company installed almost all the furnaces used to produce cartridge brass, he states. Extensions of brass melting capacity during the war aggregated a potential output of considerably more than 100 tons per hour. Well over 1,100 resistance furnaces with an aggregate capacity exceeding 90,000 kW were supplied for a wide range of industries, many of which will be as active in peace as in war. There has been an outstanding increase in the use of molten salts for processing metals and the company has taken steps to acquire the necessary chemical knowledge and manufacturing rights to take advantage of this development.

After a comparative lull, orders are now coming in and are likely to grow. Several new processes have been examined and arrangements made with Americans for technical co-operation. Export trade is being actively pursued and in this connection he mentions that the company has joined with five other leading manufacturers of metallurgical plant to form a new organisation, the Metallurgical Equipment Export Co., Ltd.

J. Stone & Co., Ltd., are again paying an interim dividend of 10 per cent.

The British Electric Resistance Co., Ltd., is repeating its ordinary dividend of 20 per cent. for the year.

The Broadcast Relay Service, Ltd., announces an interim ordinary dividend of 3½ per cent. tax free, the same as last year.

The Delhi Electric Supply & Traction Co., Ltd., is maintaining its interim ordinary dividend at 4 per cent., tax free.

Max Stone, Ltd., have announced a dividend of 15 per cent., against 10 per cent. last year.

Dictograph Telephones, Ltd.—A meeting is to be held on December 12th to consider resolutions for increasing the capital to £250,000 by the creation of 500,000 additional 2s. shares ranking *pari passu* with the existing shares for dividend, etc. No immediate issue is to be made.

McMichael Radio, Ltd., has declared a dividend of 10 per cent. on the preferred ordinary shares, representing 4 per cent. for the six months to December 31st, 1942, and 6 per cent. for the nine months to Sept. 30th, 1943.

New Companies

Decca Navigator Co., Ltd.—Private company. Registered November 7th. Capital, £500,000. Objects: To acquire the business of manufacturers of, and dealers in, radio transmitting equipment, receivers and dial indicators for navigational purposes hitherto carried on by the Decca Record Co., Ltd. Directors: E. R. Lewis, 2, Bell Moor, Hampstead Heath, N.W.3; H. F. Schwarz (U.S.A.), The Haven, Foxenden Road, Meopham, Kent; W. J. O'Brien, 112, Rodney House, Dolphin Square, S.W.1; Sir Cyril F. Entwistle, 9, Queen's Gate Place Mews, S.W.7; Group Capt. John A. C. Wright, Rectory Lane, Castle Bromwich, Birmingham; and Comdr. Sir Hugh R. Dawson, Burway House, Laleham-on-Thames. Registered office: 1/3, Brixton Road, S.W.9.

G.K.P., Ltd.—Private company. Registered November 6th. Capital, £10,000. Objects: To carry on the business of manufacturers of, and dealers in, and repairers and hirers of, electrical and mechanical apparatus, accessories and components of all kinds, wireless sets, electronic equipment, valves, television sets, etc. Sub-

scribers: G. Harle and G. Glassco, both of 97, Cannon Street, E.C.1. Solicitors: Linklaters & Paines, 97, Cannon Street, E.C.1.

Eagle Electrical Products, Ltd.—Private company. Registered November 6th. Capital, £100. Objects: To carry on the business of manufacturers and distributors of, agents for, and wholesale and retail dealers in, wireless and television sets, sound producing machines of all kinds and components, electrical accumulators, batteries, electrical and other lamps and plant, etc. C. Weinstock, 64, Pryland Road, Highbury, N.5, is the first director. Secretary: Miss J. D. Rowland. Registered office: 139/142, Copthall House, E.C.2.

Lewis Electrical Co. (Ruislip), Ltd.—Private company. Registered November 7th. Capital, £1,000. Objects: To carry on the business of general and electrical engineers, manufacturers of electrical and radio requisites, etc. Directors: L. A. C. Helmer, The White House, High Wych, Sawbridgeworth, Herts and H. R. Lewis, The Elms, Joel Street, Eastcote, Pinner, Middlesex. Registered office: High Wych, Sawbridgeworth, Herts.

Cavendish Radio & Electrical Co., Ltd.—Private company. Registered in Edinburgh November 8th. Capital, £1,000. Objects: To carry on the business of radio, electrical, motor and general engineers, etc. Subscribers: W. V. Wright, 153, Warrender Park Road and W. Brown, 96, Boswell Terrace, both Edinburgh. Registered office: 53, George Street, Edinburgh.

Electronics (Clayton), Ltd.—Private company. Registered November 8th. Capital, £1,000. Objects: To carry on the business of electrical engineers, manufacturers of, and dealers in, electrical and wireless goods, etc. Directors: R. Walsh, 15, Fort Street, Clitheroe, and three others. Registered office: 140, Whalley Road, Clayton-le-Moors, Accrington.

T.R.E., Ltd.—Private company. Registered October 27th. Capital, £500. Objects: To carry on the business of wireless and television manufacturers and service engineers, dealers in all kinds of wireless, electrical, radio, television and telephone appliances, accumulators, stores and supplies, etc. First directors:—C. E. Dyke, 17, Shakespeare Street, Watford, and four others. Registered office: 8, Queen Street, Cheapside, E.C.

Collinson Bros. (Bradford), Ltd.—Private company. Registered October 31st. Capital, £1,000. Objects: To acquire the business of electrical engineers carried on by W. E. Putt and Hubert G. Collinson at 3 & 5, Millergate, Bradford. First directors:—W. E. Putt, 193, Folkestone Street, Bradford, and H. G. Collinson, 13, Glenholme Road, Baildon, Yorks. Registered office: 3 & 5, Millergate, Bradford.

Modernitas, Ltd.—Private company. Registered November 12th. Capital, £100. Objects: To carry on the business of manufacturers and repairers of, and dealers in, dynamos, motors, armatures, magnetos and batteries, etc. Subscribers: R. Harris, and Percy F. Money, both of 3/4, Clement's Inn, W.C.2. Solicitors: Buckeridge & Braune, 3/4, Clement's Inn, W.C.2.

Vickers Elliott & Son, Ltd.—Private company. Registered November 9th. Capital, £100. Objects: To carry on the business of manufacturers and repairers of, agents for, and dealers in, wireless and television sets, accessories and apparatus, artificial lighting apparatus, electrical fittings, etc. Directors: H. B. Elliott (permanent) Sunnyside, The Beeches, Ponteland, Newcastle-on-Tyne, and three others. Registered office: Elvic Works, Ponteland, Newcastle-on-Tyne.

Industrial Electronics, Ltd.—Private company. Registered November 9th. Capital, £1,000. Objects: To carry on the business of electrical, mechanical and general engineers, electricians, workers and dealers in electrical and electronic apparatus, etc. First directors: L. W. Mant, 28, Welbourne Road, Broadgreen, Liverpool, and two others. Registered office: 160, Kensington, Liverpool.

Knightsbridge Radio, Ltd.—Private company. Registered November 12th. Capital, £2,000. Objects: To carry on the business of manufacturers and repairers, importers and exporters of, and wholesale and retail dealers in, radio, television, telegraphic and electrical goods, etc. First directors: J. G. Varley, 35, Holland Street, W.8, and three others. Registered office: 11, William Street, Lowndes Square, S.W.1.

Mortgages and Charges

New Era Time & Telephone Systems, Ltd.—Issue on October 9th, of £5,000 debentures, part of a series already registered.

Hume Atkins & Co., Ltd.—Mortgage on freehold factory and two adjoining cottages, known as Maybury Works, Maybury Road, Woking, dated October 10th, to secure all moneys due or to become due from the company to Midland Bank, Ltd.

Liquidations

Larne Electric Light & Power Co., Ltd.—Particulars of claims to be sent to the liquidator, Mr. S. Boyle, 38, Donegall Place, Belfast, by January 1st. (All creditors have been or will be paid in full.)

Bankruptcies

H. Beaumont, electrical engineer and radio dealer, 207, Luck Lane, Paddock, Huddersfield.—An application for discharge was heard recently at Huddersfield. The receiving order was made in 1940. The liabilities then amounted to £933, but proofs admitted totalled £670, with probable claims of £980. The assets, estimated at £100, realised £167, and a first and final dividend of 3s. 1¾d. in the £ had been paid on proofs for £670. The debtor attributed his failure to loss in connection with a partnership and losses on motor cars and hire purchase transactions. The decision was adjourned *sine die.*

L. H. Lawrence, carrying on business at 43, Canterbury Road, Margate, as Henry F. Lawrence, electrical engineer.—Discharge suspended for fourteen days; date of discharge October 30th.

J. J. Symons, carrying on business as the Zodiac Peerless Electric Lamp Co., 25, Denmark Street, Charing Cross Road, W.C.2.—Proofs for dividend to be sent by November 28th to the trustee, Mr. L. A. West, Bankruptcy Buildings, Carey Street, W.C.2, Senior Official Receiver.

STOCKS AND SHARES

THE gilt-edged stocks in the security markets have shown a weakening tendency ascribed partly to the final effect of the Thanksgiving Weeks, which are soon to come to an end, partly to the greater activity in stocks and shares in other departments. The necessity for financing purchases of the more speculative issues has led, it is surmised, to sales of British Government stocks, the prices of which have declined under the leadership of 2½ per cent. Consols. This spread dullness throughout the purely investment classes, though it failed to shake the best-class ordinary shares of industrial companies, amongst which those of the Home electricity supply group are, of course, included. Prices of these ordinary shares keep firm, but the preference show a tendency to droop in consequence of the uncertainty as to the position of the shares under the proposed nationalisation of the industry.

Revival of Confidence

After the apprehension aroused by the result of the General Election, there has come a revival of confidence in the outlook and a renewal of the support from investors. " Net maintainable revenue " is one slogan, and " fair compensation " another in connection with nationalisation. Optimism is possibly inclined to expect generous treatment from the Government. Yorkshire Electrics have hardened to 42s. 6d., City Lights to 30s. and Richmonds to 27s. Midland Counties are 6d. lower at 41s. 6d. Prices of preference shares have mostly lost 6d. or 1s. under pressure of many small orders to sell.

Cable & Wireless

One of the most active markets is that for Cable & Wireless stocks. The ordinary stock has been in particular demand, the price at one time drawing almost level with that of the 5½ per cent. preference. A good many of the buyers took some of each stock, in the proportion of three preference to one ordinary, on the ground that if the company were to go into liquidation, the preference might be repaid at 100, but that, in such event, the ordinary would receive something like 160 to 180 per cent. On the other hand, if the Combine remains in being, the preference will presumably receive a British Government stock in exchange for what assets the Government acquires. The attraction of the double purchase appealed to a wide circle of investment. After erratic fluctuations, the two stocks are both up 10s. the ordinary at 107½ and the preference at 112½. Globe ordinary rose to 45s. and the preference to 32s.

Crabtree Electrical

Crabtree Electrical Industries shows a net profit for the year to the end of last month of £77,902, an advance of about £5,500 on that of the previous year. The dividend, as already announced, is 5 per cent. plus a bonus of 7½ per cent., making 17½ per cent. for the twelve-month. a rate which has been paid regularly each year since 1937.

The company acquired, in 1936, the whole of the capital of J. A. Crabtree & Co., Ltd. (formed in 1919 to manufacture switches and other electrical installation accessories). The dividend and bonus of 17½ per cent. has been paid out of earnings that ranged from 18 per cent. for 1943 to 37 per cent. in the previous year. The price of the shares is about 46s., at which the yield on the money is 4 per cent. The balance sheet is strong. Plant and machinery, fittings and fixtures, and patents, each stand at £1.

Radio Shares

Buying from America is generally said to be the reason for a sharp rise to 35s. 6d. in Electric & Musical shares. New York is reported to have given 36s. 6d. for the shares in the London market. A. C. Cossor rose at the same time to 45s., shares having changed hands up to 46s. Philco hold their previous advance to 11s. Pye deferred are a trifle harder at 36s. 3d.; E. K. Cole remain at 37s. 6d.

Price Movements

Burco shares advanced to 19s. ex dividend. Tube Investments, after being 6¾, lost the fraction; the company has declared a special distribution of 10 per cent. on the ordinary shares. Telephone issues are a trifle easier after their recent advances. Automatics fell back to 70s., Orientals to 58s. 9d. The equipment and manufacturing group shows gains of 3s. 9d. to £4 1/16 in Christy Bros., and 2s. 6d. in Consolidated Signals to £7. Ever-Ready at 44s. 6d. are a few pence easier. Falk, Stadelmann at 38s. put on 1s. and General Electrics are better at 97s. 9d. Hopkinsons are a good market at 86s. 3d.

Southern Railway 5 per cent. preference at 106 is 1½ lower. A rise of 1s. 6d. lifted West Ridings to 45s. British Electric Traction deferred at 1145 is 15 points up

Overseas Shares

Calcutta Trams went back to 88s. 6d. after being buyers at 90s. The Calcutta Corporation is to take over the system on January 1st next, and announcement of the terms is expected daily; " bulls " of the shares talk of a possible £5, or even more, per share. Calcutta Electrics are easier at 62s. 6d., Madras Electrics at 41s. 6d. have lost a florin, and Cawnpores went back to 63s. 6d. Amongst other overseas issues, Tokyo sixes at 43½ are 4 points lower. The trouble in Palestine has had no effect upon Jerusalem or Palestine Electric " A " shares, the prices being 25s. 6d. and 36s. 6d. respectively. Victoria Falls and Transvaal Power shares at 98s. 3d. have lost a few pence. Atlas Electrics recovered to 8s. 9d.

RECENT INTRODUCTIONS

Notes on New Electrical and Allied Products

Fault Finder

MAINTENANCE engineers responsible for the upkeep of factory installations may like to know of a fault-finder, available from RUNBAKEN PRODUCTS, 71, Oxford Road, Manchester, 1, which is designed for testing single-phase and DC equipment up to 3 kW capacity.

The outfit is contained in a polished hardwood case; it is protected by magnetic cut-outs against short circuits and by fuses against persistent overloads. Visible and audible circuit continuity testing can be done at low and medium voltages. There are facilities for earth-leakage and insulation testing while a special socket is provided for determining the continuity of earthing leads by passing a heavy leakage current through them. First grade accuracy is claimed for the moving-coil indicating meters which are of the 2·5-in. size with voltage ranges of 0 to 30 and 0 to 300 AC or DC and 0 to 1, 0 to 5, 0 to 15A as well as 0 to 25A for leakage tests.

Testing terminals are of the Belling Lee insulated pattern and socket entries are provided for all existing B.S.S. plugs. Panel switches are of the low resistance toggle type with rotary switches for controlling the power circuits and meter range positions.

Connection diagrams are furnished with the instruction manual, which contains a comprehensive list of tests that can be performed with the outfit.

Fault-finding test outfit for factory maintenance

Toaster for Home or Restaurant

A new toaster made by the COOPER MANUFACTURING CO., LTD., Hanway Street Works, Hanway Street, London, W.1, is suitable either for home or restaurant use. It measures overall 12¼ in. by 5 in. by 7½ in. high and toasts two slices of bread at a time, both sides, in about five minutes.

The Cooper toaster

The 800-W elements, which are decrementally wound to ensure that the toast is evenly browned, are mounted on "Sindanyo" board each side of the toasting compartment, the toast being removed by means of pivoted trays at each end. There is a heat-resisting wooden handle at the top, and the feet are also of wood. The apparatus is at present constructed of tin-plate but anodised aluminium sheet will be used when supplies are available.

Electronic Relay

An electronic relay that needs only a few microwatts to operate it, yet is capable of controlling AC loads of up to 2 kW at 200 to 250 V, is announced by SUNVIC CONTROLS, LTD., Stanhope House, Kean Street, London, W.C.2.

Although it has been primarily developed for use with light contacting devices (toluene regulators) in order to resist contact erosion and oxidation, Type-EA.2 is adaptable for operation with a photo-electric cell, so widening its range of usefulness. The circuit is so arranged that opening of the control contacts

changes the phase of the grid in relation to the anode, thus causing anode current to flow through the heater winding of a hot wire vacuum switch, which closes the load circuit. When the control contacts close the relay ceases to "fire," so causing the hot wire switch to break the load circuit.

A double-pole isolating switch and pilot lamp are incorporated, with a protective fuse on the primary side of the mains transformer. Plug and socket connectors render the relay portable while the cast aluminium case measures 6·5 by 3·5 in. and weighs 7·5 lb.

Illuminated Magnifier

An illuminated magnifier for minimising eye strain in visual inspection and fine assembly work called the "Speetol-Gordon Magnascope," is being offered by SPEED TOOLS, LTD., 35, Percy Street, London, W.1. It is adjustable in height and angle on a short upright column supported by a bench pedestal. The plano-convex magnifier lens is inset in a hood that directs the light downward. For most purposes a 15-W lamp will suffice, but the reflecting cowl is ventilated to accommodate a 60-W lamp.

Battery Terminal Oilers

The "Clatonrite" battery terminal oiler marketed before the war was produced from base metal material. A new type just introduced by the makers, HOWARD CLAYTON-WRIGHT, LTD., Tiddington Road, Stratford-on-Avon, is moulded in a flexible plastic material which is claimed to be practically unbreakable. The oilers, which are supplied in pairs, are quickly fitted and need only a few drops of oil in the reservoir every six months.

"Ekco" War Activities

SINCE a year before the war, E. K. Cole, Ltd., have been engaged on war contracts,. Much of the work was, naturally, very secret and involved the transfer of the chief engineer, Mr. A. W. Martin, and his staff from Southend to Malmesbury, Wilts.

Among the first tasks undertaken was the development of radar air interception equipment (A.I.) and the first air-to-surface-vessel equipment (A.S.V.) for locating convoys when radio could not be used. A secret station was set up on Canvey Island and A.S.V. tested on ships passing up and down the Thames. It was successful over a range of from 40 to 60 miles.

E. K. Cole night fighter interception equipment

Later using an improved type for which the company made the cathode-ray indicator, the Fleet Air Arm was able to locate enemy vessels in the worst weather and it formed the basis of the transmitter of the searchlight beam control, and also as radar warning for A.A. gun sites.

The company was responsible for the development of much of the V.H.F. ground equipment by which fighters were able to maintain contact with their control on the ground and at one time was the only producer of this equipment. The Navy also used Ekco radar sets for identifying friend and foe (I.F.F.), and the company also produced large numbers of the Gee radio equipment which guided bomber pilots to their targets over a distance of 300 miles in all conditions of weather; the A.I. Mark 4 and Mark 8 for night interception of enemy planes; and the H28 sets which give a complete picture of the ground traversed on cathode-ray tubes in map form, used by Bomber Command.

Many radio sets were produced, and the company was responsible for the development of the receiver of the T1154-R1155, a transmitter and receiver used in bombers, making nearly half the 100,000 sets produced. No. 19 radio sets were produced for installation in about 70,000 tanks and mobile units, and three out of every four radio sets for Lancaster bombers. The No. 46 set, conceived by E. K. Cole's own engineers, works on fixed frequencies and is provided with a larynx microphone. Its success in the Dieppe raid and at Anzio was such that large quantities were manufactured for use on D-Day and after.

Large numbers of Lancaster and Lincoln bombers were provided with prefabricated wiring.

The lamp division supplied millions of electric lamps for Government Departments, some of very specialised types. A valve department was established. The plastics division has been enlarged considerably during the war to produce millions of moulded parts.

The parent factory at Southend was, by Government order, evacuated when invasion threatened, and equipment and staff were transferred to Aylesbury. Branches were opened at Malmesbury, Wilts, and Woking. In 1941 the Southend works was re-opened with a largely new staff. More recently a new factory at Rutherglen, near Glasgow, has been opened.

During the war extension was made to the section responsible for testing materials and components, by X-rays and other means. This section is being maintained. A limited quantity of radio sets is already being manufactured and the plastics division has begun to make moulded radio cabinets and other products for civilian use.

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.

Australia.—P.M.G.'s Department. January 3rd, 1946. Induction coils (Sch. C4816.) January 8th. Automatic exchange switchboard equipment for Cheltenham, Vic. (Sch. C4713). January 15th. Cable, trunk type (Sch. C4833). Testing instruments, exchange service type (Sch. C4820). January 17th. Telegraph instruments (Sch. 4826). January 22nd. Telephone parts (Sch. C4835).

Sydney County Council.—December 13th. Electrically operated overhead travelling cranes for Pyrmont "B" power station (Spec. 784). March 7th, 1946. Coal-handling plant for Pyrmont "B" (Spec. 72).—*Tenders* (Melbourne).

Batley.—December 4th. Electricity Department. 11-kV Cable. (See this issue.)

Scotland.—December 10th. North of Scotland Hydro-Electric Board. H.v. and l.v. overhead lines in Lochalsh area. (November 9th.)

Sheffield. — December 31st. Electricity Department. Two 600-kVA transformers. (November 9th.)

Skelton and Brotton.—November 30th. Electricity Department. Three three-phase transformers, with off-load tap-changing gear. (November 16th.)

Southend-on-Sea.—December 3rd. Electricity Department. L.v. cable. (November 9th.)

Orders Placed

Durham. — County Council. Accepted. Renewing and altering wiring at Easington Institution (£407).—Dixon Barker & Sons.

London. — Metropolitan Water Board. Accepted. Cables for filters at Hampton works (£444).—Aberdare Cables.

Northumberland.—County Council. Accepted. Electrical work in connection with the conversion of premises at Morpeth into a clinic and hostel for illegitimate children (£667).—Reid, Ferens & Co.

Warwickshire. — Education Committee. Accepted. Electrical work at Rugby Technical College (£620).—France's Electric.

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.

Alnwick.—Houses, Felton (20) and Shilbottle (50); R.D.C. surveyor.

Ancoats.—Factory additions, Lees Street, for Thos. Hope. Ltd.; Jones & Dalrymple, architects, 178, Oxford Road, Manchester, 13.

Bedfordshire. — County camp for children at Great Gaddesden (£14,000); county architect, Shire Hall, Bedford.

Burnley.—Extensions (£14,750), Bank Hall Maternity Hospital; J. L. Beckett, borough engineer, Town Hall.

Cheshire. — Police headquarters, "Vale Royal," Delamere; county architect, The Castle, Chester.

Chesterfield.—Houses (133), for R.D.C.; Houfton & Kington, architects, Market Place.

Clacton.—Extension scheme (£50,000), Clacton and District Hospital; secretary.

Clitheroe.—Foundry, Saunder Raike, Clipping; G. Tweedy & Co., Ltd.

Consett.—Houses, Delves Lane, Ritson's Road, Moorlands and Davie Avenue; U.D.C. surveyor.

Coventry. — Rebuilding hospital, Stoney Stanton Road; house governor, Coventry and Warwickshire Hospital, Keresley.

Droitwich.—Permanent houses (50), Stalls Farm estate; G. L. Robinson, borough engineer, 105, Friar Street.

East Retford.—Houses (51) and others later, for R.D.C.; B. D. Thompson, architect, 83, Bridge Street, Worksop.

Glasgow.—Transformer house, North Speirs Wharf; Scottish Agricultural Industries, Ltd.

Works extensions, Mountain Blue Street; British Basket & Besto Co., Ltd.

Factory reconstruction, Sutcliffe Road; Farquarson Bros., Ltd.

Extensions, Possilpark tram depot (£13,883); M. Simpson & Co., Ltd.

Gosport.—Permanent houses (150), in pairs and blocks of four, Bridgemary site; borough engineer, Town Hall.

Great Yarmouth.—Permanent houses (70), North Denes estate; H. F. Dyson, borough engineer, Town Hall.

Hartlepool.—Factory, for the Educational Supplies Association, Ltd.

Hebburn-on-Tyne. — Reconstruction of workshops for Palmers, Hebburn, Co., Ltd.; G. Wimpey & Co., Ltd., Pilgrim House, Pilgrim Street, Newcastle-on-Tyne.

Hendon.—Additions to factory, Endersleigh Gardens, for Tormo, Ltd.; W. F. Thorpe, 26, The Broadway, N.W.7.

Ilkeston.—Houses (122), Cotmanhay estate; A. O. Marshall, borough engineer, Town Hall.

Langleybury (Herts.).—Erection of annexe to St. Bartholomew's Hospital; county architect, Castle Street, Hertford.

Leeds.—Adaptations at St. James's Hospital (North), for maternity isolation unit and infirm wards; superintendent of works, 125, Beckett Street, Leeds, 9.

Leicestershire.—Nurses' home, Bosworth Park Infirmary (£26,500); conversion of The Gables, Melton Mowbray, for extension to Grammar School; and adapting Dower House, Quorn, Loughborough, as hostel for college (£4,700); county architect, Leicester.

Leominster.—Houses (28), on three sites, for R.D.C.; G. Morris, builder, Ryelands, Leominster.

Lindsey.—Two children's homes (£9,420), Horncastle; county architect, County Offices, Newland, Lincoln.

Llandilo.—Permanent houses (30), in pairs, for U.D.C.; W. S. P. Cotterell, architect, 8, Quay Street, Carmarthen.

London.—Flats at various estates (£116,000); L.C.C. architect.

Luton.—Departmental buildings (£45,000), Chaul End; F. Oliver, borough engineer, Town Hall.

Manchester.—Cinema, Oxford Street and Mosley Street; A.B. Cinemas, Ltd., 30, Golden Square, London, W.1.

Market Harborough.—Permanent houses (30), Bowden Fields; surveyor, Council Offices, Northampton Road.

Middlesex. — Maternity accommodation (£12,906), Chase Farm Emergency Hospital; Middlesex county architect.

Monk Bretton.—Houses (20); Model Estates Development Co., Ltd., builders, Coronation Street.

Motherwell and Wishaw.—Proposed new public baths (£150,000); burgh surveyor.

Newcastle-under-Lyme.—Sunday school club rooms and assembly hall (£7,000); Rev. W. Norcross, Methodist Church, Westlands.

Poole.—Fish canning factory and cold storage depot: Marshalls (Aberdeen), Ltd.

Rochdale.—Hospital: S. H. Morgan, borough surveyor, Town Hall.

Rugeley.—Pumping station, pump houses, etc., Brereton, for U.D.C.; A. H. S. Waters, engineer, 25, Temple Row, Birmingham, 2.

Rutherglen. — Houses (600), Spital Farm estate; burgh surveyor.

Sunbury-on-Thames. — Houses (69), Green Lane, Beards Road and Alexandra Road, for U.D.C.; Braddell, Deane & Bird, architects, Victor House, 1, Baker Street, London, W.1.

Warwickshire. — Education office, Solihull; police houses (£10,000); maternity home Kenilworth Road, Leamington (£11,500); and extensions, Monroe Devis Maternity Home, Stratford-on-Avon (£14,000); county architect, Warwick.

Yeovil.—Permanent houses (60), East Coker, Martock and South Petherton, for R.D.C.; Petter, Warren & Roydon Cooper, architects, Old Oxford Inn, West Hendford, Yeovil.

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.—" High-voltage transformers, particularly instrument transformers." 12538/43. August 4th, 1942. (573003.)

Anglo-Iranian Oil Co., Ltd., and A. C. Hartley.—" Couplings for flexible tubes or electric cables." 9157. June 7th, 1943. (572932.)

J. L. Baird.—" Television." Cognate applications 13887/43, 15851/43, 16413/43, 16581/43, 19825/43 and 2370/44. August 26th, 1943. (573008.)

D. G. E. Barrie.—" Electrical connectors." 15386. September 20th, 1943. (572939.)

British Thomson-Houston Co., Ltd. (General Electric Co.). — " Cathode-ray deflecting means." 15740. September 24th, 1943. (573032.)

C. S. Bull.—" Seals or supports for conductors for use with high-frequency currents." 4072. March 5th, 1940. (572981.)

Callender's Cable & Construction Co., Ltd., and A. B. F. G. Richardson.—" Mechanism for producing or controlling the longitudinal movement of electric cables during manufacture and installation and for other analogous purposes." 13964. August 26th, 1943. (572968.)

Callender's Cable & Construction Co., Ltd., Callender-Suchy Development, Ltd., P. V. Hunter, L. G. Brazier and C. T. Suchy.—" Flexible electrical conductors." Cognate applications 11900/43 and 7728/44. July 21st, 1943. (573002.)

A. C. Cossor, Ltd., and A. Levin.—" Electric-discharge devices." 15304. September 17th, 1943. (573030.)

P. X. Fox.—" Electrically heated hair waving or curling apparatus." 14420. September 3rd, 1943. (573009.)

General Electric Co., Ltd., N. R. Bligh, D. M. Heller and L. C. Stenning.—" Multi-channel radio signalling systems." Cognate applications 5651/42 and 9127/42. April 27th, 1942. (572918.)

B. W. Hirsh and Imperial Chemical Industries, Ltd.—" Electrolysis of aqueous solutions." 5229. April 23rd, 1941. (572950.)

Igranic Electric Co., Ltd., S. P. Maynard and J. M. Bedford.—" Direct current motor control systems." 15294. September 17th, 1943. (572971.)

B. Jablonsky.—" Methods of and apparatus for treating articles under pressure with high-frequency electric heating." 10343. July 24th, 1942. (573021.)

H. Jackson.—" Portable radio equipment employing thermionic valves." 5599. April 27th, 1942. (572955.)

W. W. Spooner.—" Washing machines." 17151. October 19th, 1943. (573042.)

Standard Telephones & Cables, Ltd.—" Selenium paste and method of making and applying it for use in electric rectifiers." Cognate applications 6160/43 and 6161/43. April 24th, 1942. (572999.)

Stratton & Co., Ltd., and H. N. Cox.—" Insulated electrical connectors or terminals." 15382. September 20th, 1943. (572938.)

C. S. Thomson.—" Electrically energised luminous gas devices." 7657. April 25th, 1944. (572977.)

H. Webster and J. F. Bridge.—" Safety apparatus for automatically stopping electrically propelled vehicles." 7837. April 26th, 1944. (572979.)

H. E. W. West.—" Electric power installations and engine starting arrangements for aircraft." 17843. October 28th, 1943. (573074.)

Advt. of The General Electric Co., Ltd., Magnet House, Kingsway, London, W.C.2

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.

THE CHARGE for advertisements in this section is 2/- per line (approx. 7 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 this counts as six words and 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.

OFFICIAL NOTICES, TENDERS, ETC.

BOROUGH OF BATLEY

THE Batley Corporation invite tenders for Two lengths (approximately 500 yards in all) of E.H.T. 11,000-volt Paper Insulated Plain Lead Sheathed Cable served with fireproof covering.

Specification and form of tender may be obtained from the Borough Electrical Engineer, Electricity Works, George Street, Batley.

Tenders should be sent to the undersigned in plain sealed envelopes, bearing no mark to indicate the sender, endorsed "E.H.T. Cable," and are to be delivered not later than noon on Tuesday, December 4th, 1945.

The Corporation does not bind itself to accept the lowest or any tender.

THOS. E. CRAIK, Town Clerk.

Town Hall, Batley. 3478

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.

CITY OF NOTTINGHAM

Electricity Department

Appointment of Three Assistant Shift Control Engineers

APPLICATIONS are invited from suitable candidates for the position of ASSISTANT SHIFT CONTROL ENGINEER for North Wilford Generating Station (Plant Capacity 88,500 kW).

Applicants must have experience in the control of large Electric Supply Systems and Parallel Operation of Turbo-Alternator Plant with the Grid System. They must be technically qualified up to at least Ordinary National Certificate in Electrical Engineering and have had a good general engineering experience.

The salaries for each of the three positions will be in accordance with the N.J.B. Schedule, Class H, Grade 10.

Extensions are in progress which will increase the capacity of the Generating Station by 60,000 kW, and which should be in operation by September, 1946. Further extensions scheduled are 53,000 kW for 1947 and 52,500 kW for 1949.

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

Applications, giving full details of training and experience, and including not more than three testimonials, must be delivered to the undersigned by Friday, November 30th, 1945, and must be endorsed "Assistant Shift Control Engineer."

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

J. E. RICHARDS, Town Clerk.

November 7th, 1945. 3366

BOROUGH OF HESTON AND ISLEWORTH

Electricity Department

Appointment of Deputy Borough Electrical Engineer and Manager

THE Corporation of Heston and Isleworth invite applications for the position of Deputy Borough Electrical Engineer and Manager, at a commencing salary of £600 per annum, rising by £25 per annum to a maximum of £700 per annum, plus cost of living bonus (at present £59 16s. per annum) and a motor car allowance of £100 per annum (at the discretion of the Council). Candidates should preferably not be more than 40 years of age. They must have held executive positions of considerable responsibility and be possessed of sound administrative ability, and must be a Member or Associate Member of the Institution of Electrical Engineers.

The person appointed will be required to carry out such duties as may be assigned to him, to devote his whole time to the duties of his office, and to reside within the Borough. He must have had sound experience in generation and distribution of electricity, both A.C. and D.C.

The appointment is subject to the Local Government Superannuation Act, 1937, and the selected candidate will be required to pass a medical examination. The position may be terminated by two months' notice on either side.

Applications for the position must be made on a form to be obtained from the Borough Electrical Engineer and Manager, 11, Staines Road, Hounslow, and addressed to the undersigned, endorsed "Deputy Borough Electrical Engineer and Manager," accompanied by not more than three recent testimonials, to be received not later than Saturday, 8th December, 1945.

Canvassing, directly or indirectly, will be deemed a disqualification.

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.

HAROLD SWANN, Town Clerk.

3410

BOSTON & DISTRICT ELECTRIC SUPPLY CO. LTD.

Assistant District Engineer

APPLICATIONS are invited for the above position. Applicants should have experience in the operation of a high tension system in a Rural Area and be conversant with the maintenance of overhead lines and associated equipment.

Preference will be given to applicants who have also had some knowledge of dealing with consumers' requirements in the matter of installations and the equipment of farms, as the successful applicant will be required to take charge of a section of a Rural District and deal with most matters arising therein, other than new construction work.

Applications, giving age, education, details of training and experience, together with commencing salary required, and accompanied by copies of recent testimonials, should be sent to the above Company at the address given below not later than the 8th December, 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.

Besco House, Market Place,
Boston, Lincs. 3431

BOROUGH OF BASINGSTOKE

Electricity Department

Appointment of Mains Assistant

APPLICATIONS are invited for the above appointment. Applicants must have had experience in the Mains Department of a Public Electricity Supply Undertaking.

Applicants must have good technical knowledge and practical experience in the laying and maintenance of E.H.T. and L.T. Underground Mains. Experience with overhead lines and converting plant will be an asset.

Salary in accordance with the National Joint Board Schedule, Class D, Grade 8 (at present £356 per annum).

The appointment will be subject to the Council's Sick Pay Scheme and the Local Government Superannuation Act, 1937. The selected candidate will be required to pass a medical examination.

Applications, endorsed "Mains Assistant," stating age, full particulars of training, qualifications and experience, accompanied by copies of not more than three recent testimonials, should be forwarded so as to reach the undersigned not later than first post on Wednesday, 5th December, 1945.

Canvassing, either directly or indirectly, will be a disqualification.

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.

MEIRION O. JONES,
Town Clerk.

Municipal Buildings,
Basingstoke.
16th November, 1945. 3467

BOROUGH OF LEYTON

Electricity Department

Appointment of Mains Superintendent

APPLICATIONS are invited for the above appointment from electrical engineers who have had considerable experience in an Electricity Supply Undertaking in the layout, operation and maintenance of H.T. and L.T. systems, including static and rectifier substations from 6,600-volt bulk supply. Also administrative experience and knowledge of street lighting.

Corporate Membership of the Institution of Electrical Engineers is desirable.

Salary in accordance with Grade 3, Class F, of the National Joint Board Schedule, at present £612 3s. per annum.

The appointment will be subject to the Local Government Officers Superannuation Act, 1937, and the successful applicant will be required to pass a medical examination.

Applications, endorsed "Mains Superintendent," stating age, qualifications and experience, accompanied by copies of three recent testimonials, should be delivered to the Borough Electrical Engineer and Manager, Electricity Offices, Cathall Road, Leytonstone, E.11, not later than Monday, 3rd December, 1945.

If the successful candidate is serving with H.M. Forces application for his release will be made immediately.

Canvassing, directly or indirectly, will disqualify.

D. J. OSBORNE,
Town Clerk.

Town Hall,
Leyton, E.10. 3348

MID-LINCOLNSHIRE ELECTRIC SUPPLY CO. LTD.

Meter Mechanician

APPLICATIONS are invited for the appointment of a Meter Mechanician at the rate of 2s. 2½d. per hour for a 47-hour week, for Class A Polyphase Testing Station. Applicants must have had experience in repairing all types of quarterly and prepayment meters, time switches, maximum demand attachments, etc.

The successful candidate will be required to participate in the Company's Superannuation Scheme.

Applications in writing, giving details of training and experience, accompanied by copies of recent testimonials, endorsed "Meter Mechanician," should be addressed to the Meter Superintendent, Mid-Lincolnshire Electric Supply Company Limited, North House, Grantham, Lincolnshire, not later than the 7th December, 1945.

The Ministry of Labour and National Service have given permission under the Control of Engagement Oder, 1945, for the advertisement of this vacancy. 3420

BOROUGH OF WILLESDEN

Electricity Department

Appointment of Installation Superintendent

APPLICATIONS are invited for the above position from engineers who have had a sound technical education and practical experience in all branches of installation work, who will be responsible for the preparation of estimates and forms of tender in connection with lighting, heating, power, equipment, and installations for domestic, commercial and industrial consumers, and responsible also for the installation, testing, servicing and maintenance of all such equipment and installations upon consumers' premises. Applicants must be Corporate Members of the Institution of Electrical Engineers.

The appointment will be subject to the provisions of the Local Government Superannuation Act, 1937, after a probationary period of six months. The selected applicant will be required to pass a medical examination. The salary and conditions of service will be in accordance with the schedule of salaries and conditions of employment, National Joint Board of Employers and Members of Staff, Electricity Supply Industry, Class H, Grade 4, at present £638 per annum, plus a car allowance in accordance with the Council's scale, at present £75 per annum.

Applications must be made on the application forms to be obtained from the undersigned, and should be returned to the undersigned, together with copies of three recent testimonials, not later than 17th December, 1945, endorsed "Installation Superintendent."

Canvassing in any form is prohibited and will disqualify.

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

W. T. PIRIE,
Town Clerk.

Town Hall,
Dyne Road, N.W.6.
13th November, 1945. 3422

BOROUGH OF RADCLIFFE

Electricity Department

Cable Jointer (Plumber)

APPLICATIONS are invited for the position of Cable Jointer in the above Department. Wages and working conditions in accordance with the Schedule of the District Council No. 3, North-Western Area, Electricity Supply Industry, Zone A. Present rate 26.45d. per hour for a 47-hour week.

Applicants must have experience in high and low tension mains jointing, feeder pillar, network boxes and substation H.T. & L.T. boards.

The appointment will be a designated post under the Local Government and Other Officers Superannuation Act, 1922, and the successful candidate will be required to pass a medical examination.

Applications, stating age and experience, and accompanied by copies of not more than three recent testimonials, endorsed "Jointer," should reach the undersigned not later than MONDAY, DECEMBER 10th, 1945.

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

H. A. FOX,
Town Clerk.

Town Hall,
Radcliffe, Manchester.
November, 1945. 3457

ASSISTANT MAINS ENGINEER

APPLICATIONS are invited from Graduate Members of I.E.E., who must have experience in the laying, jointing, testing and maintenance of 3-phase E.H.T. and L.T. cables and overhead lines, maintenance and operation of static substations (indoor and outdoor types), and keeping the necessary records in connection with the above. This is a small Urban and Rural Undertaking in South-West England, where the housing problem is acute, and preference will be given to a young single man. Sales experience will be an advantage. Salary £360 per annum. Apply, giving full details of age, technical and practical training, whether married or single, to Southern Area Electric Corporation Limited, 37, Alexandra Road, Epsom, Surrey.

The Ministry of Labour and National Service have given permission under the Control of Engagement Order, 1945, for the advertisement of this vacancy. 3379

BOROUGH OF BRIDLINGTON

Electricity Department

Mains Engineer

APPLICATIONS are invited from suitably qualified candidates of experience for the appointment of Mains Engineer in the Electricity Department. Salary in accordance with the National Joint Board Schedule, Grade 6, Class C, at present £382 per annum. Candidates must have had a sound technical training, together with a practical experience in the laying, maintenance and operation of 11-kV E.H.T. and three-phase L.T. underground cable systems.

The appointment is subject to the provisions of the Local Government and Other Officers Superannuation Act, 1937, and the selected candidate will be required to pass a medical examination.

Applications, endorsed "Mains Engineer," should be delivered to the Commercial Manager, Electricity Department, Brett Street, Bridlington, not later than Monday, the 3rd December, 1945, accompanied by copies of two recent testimonials.

Canvassing, directly or indirectly, is prohibited and will disqualify an applicant.

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

GEORGE MELVIN,
Town Clerk.

Town Hall, Bridlington.
16th November, 1945. 3461

LINCOLN CORPORATION

Electricity Department

Appointment of Senior Demonstrator

BY permission of the Ministry of Labour and National Service, under the Control of Engagement Order, 1945, applications are invited for the position of FEMALE SENIOR DEMONSTRATOR for the above Department.

Applicants must have a good knowledge of cookery and be able to demonstrate all types of appliances.

Candidates having specialised in war-time cookery and having co-operated with the Ministry of Food will receive special consideration.

Salary in accordance with the Corporation's scale, £150-£200 – bonus at present £48 2s.

Applications, giving full particulars, stating age, whether married or single, should be addressed to the undersigned not later than the 1st December, 1945.

F. NEWEY, M.I.E.E.,
Engineer and Manager.

Electricity Department,
Brayford Side North,
Lincoln. 3380

COUNTY MENTAL HOSPITAL, CHESTER

APPLICATIONS invited for post of DEPUTY to RESIDENT ENGINEER. Salary £400 by £25 to £450 per annum, plus bonus now £1 3s. a week. Appointment subject to provisions of Asylums Officers Superannuation Act, 1909. Committee intends to build, as soon as possible, a house which will become an emolument. Pending occupation of house, £75 per annum living-out allowance payable in lieu.

Candidates should not be over 40, have served an apprenticeship as Mechanical and/or Electrical Engineer, and are expected to hold a Board of Trade or National Certificate in engineering or other equivalent qualifications. Experience in maintenance of Steam Raising Plant, Diesel Engines and Electrical Power Plant needed. Closing date 31st December, 1945. Application forms obtainable from Medical Superintendent.

This advertisement is published by permission of the Ministry of Labour and National Service under the Control of Engagement Order, 1945. 3407

RAWLINGS BROS. LIMITED

(Established 1887)

REQUIRE Radio Service Engineers and Electricians, Class A ex-Servicemen and those not subject to Control of Engagement Order invited to apply to—

H. J. Rickman,
RAWLINGS BROS. LIMITED,
88, Gloucester Road, S.W.7
(opposite Gloucester Road Station). 3302

BOROUGH OF DARWEN

Electricity Department

Appointment of Mains Assistant

APPLICANTS for the above position must have had sound technical training and be experienced in work on the layout, connection and maintenance of E.H.T. and L.T. distribution systems, including substations. Experience in change-over work will be an added recommendation.

Salary will be in accordance with the N.J.B. Schedule, Class C, Grade 8 (commencing £329 per annum).

The successful candidate will be required to pass a medical examination and contribute to the Council's Superannuation Scheme.

Applications, giving full details of age, training and experience, together with copies of three testimonials, are to be endorsed "Mains Assistant," and must reach the undersigned by Saturday, December 8th, 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.

ALEX. WATSON, A.M.I.E.E.,
Borough Electrical Engineer.

Electricity Works,
Robin Bank Road, Darwen. 3468

BOROUGH OF GRAVESEND

Appointment of Borough Electrical Engineer and Manager

APPLICATIONS for the above appointment are invited from engineers who are experienced in the management and administration of an Electricity Undertaking. Candidates must have been engaged in the business of electricity supply for an extended period and have had practical experience in the generation and distribution of electricity. The salary will be in accordance with the Agreement made by the National Joint Committee of Local Authorities and Chief Electrical Engineers, dated 9th July, 1941. The present salary according to scale is £1,422 per annum, and this salary will be paid from the date of taking up duties. The appointment will be subject to the provisions of the Local Government Superannuation Act, 1937, and the person appointed will be required to pass a medical examination.

Application forms for the appointment may be obtained from the undersigned and must be returned by Friday, 30th November, 1945.

Canvassing, either directly or indirectly, will disqualify.

H. H. BROWN,
Town Clerk.

4, Woodville Terrace,
Gravesend, Kent.
13th November, 1945. 3432

PORTLAND URBAN DISTRICT COUNCIL

THE above Council invite applications from suitably qualified persons for employment in their Electricity Undertaking as

(a) Electrician.
(b) Plumber Jointer.

Wages in accordance with the D.J.I.C. Schedule, No. 11, South Coast Area.

Applications in writing, stating age, experience and giving names and addresses of two persons to whom reference may be made, should be submitted to the undersigned as soon as possible.

Applicants in the age group 18-50 years, except Class A release men, should place their applications through a local office of the Ministry of Labour and National Service.

IVOR G. EVANS,
Electrical Engineer.

Electricity Department,
Council Offices, Portland, Dorset.
15th November, 1945. 3460

BOSTON & DISTRICT ELECTRIC SUPPLY CO. LTD.

APPLICATIONS are invited for the following vacancies:

PLUMBER JOINTER used to work up to 11,000 volts. Rate 2s. 3½d. per hour.

METER TESTER / MECHANIC, CLASS 1, for Type A non-polyphase testing station. Rate 2s. 2½d. per hour.

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

Applications to the above Company at Besco House, Boston, Lincolnshire. 3430

ELECTRICAL POWER ENGINEERS' ASSOCIATION

NOTICE

HESTON AND ISLEWORTH CORPORATION

Appointment of Deputy Borough Electrical Engineer

THE National Executive Council of the above Association desires to point out to all intending applicants for the above position that, under the National Joint Board Agreement, the minimum commencing salary should be £810 per annum.

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.,
General Secretary,
Electrical Power Engineers' Assn.
3411

AN experienced Estimating and Supervising Engineer required all branches lighting and power distribution schemes, preparation of specifications. Permanency, good prospects. Applications only from those exempt from the provisions of the Control of Engagement Order, 1945.—H. French Limited, 79, Broad Street (entrance Sheepcote Street), Birmingham. 3408

AN old-established company in the London area, manufacturing telephone cables, requires an engineer with experience of works and production organisation, and control of personnel, in the capacity of Assistant Works Manager. Experience of the industry, while valuable, is not considered the first requisite, as the company will arrange facilities for a period of special training. The prospects are excellent and a salary commensurate with the experience and qualifications of the selected applicant will be paid. The appointment is permanent and pensionable.—Box 3349, c/o The Electrical Review.

ARMATURE Winder, 5 to 50 h.p., A.C., D.C. Class A ex-Serviceman. Good employment conditions. Also Woman or Girl for similar but lighter work, and Boy to train.—Industrial Electrical Co. Ltd., Offord Street Works, London, N.1. 3423

ARMATURE Winders, experienced all classes A.C. and D.C. jobs. Class A ex-Servicemen or otherwise exempt M.O.L. control. Permanencies for suitable men.—Service Electric Co. Ltd., Abbey Mfg. Estate, Alperton, Telephone, Wembley 0194. 49

ARMATURE Winders required for all types of A.C. and D.C. rewinds, permanent position, tip-top rates for first-class men, good working conditions with paid holidays. Class A ex-Servicemen or otherwise exempt M.O.L. control. Write particulars of experience, etc. to—Box 7935, c/o The Electrical Review.

ARMATURE Winders used to repair work, for S.W. London. All classes A.C. and D.C. jobs. Good conditions. Permanency for right type of men. Class A ex-Servicemen or over 51.—Box 7852, c/o The Electrical Review.

ASSISTANT Works Engineer required for industrial undertaking Outer London area. Experience essential in mechanical and electrical engineering. Builders' experience an asset. Applications from Class A ex-Servicemen and others exempt from M.O.L. control only. Write full details in confidence, stating qualifications, age, experience and salary required, to—Box 7904, A.K. Advg., 212a, Shaftesbury Avenue, W.C.2. 3368

BUYER required with previous experience in the radio or associated light electrical industries by established and progressive company of small transformer manufacturers, London area.—Box 3448, 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. 24

COMPETENT Armature Winder wanted. Able to teach others and take control of small works. Suitable man would eventually have complete control of department and, when proved satisfactory, house would be provided Rotherham area. Must be exempt from M.O.L. control.—Box 3270, c/o The Electrical Review.

COST and Record Clerk (Female) required with knowledge of electrical contracting. Permanent position. Write, giving full details of experience, age and salary required, to—Giles (Electrical Engineers) Ltd., 9 and 11, Victoria Colonnade, Southampton Row, W.C.1. 8001

COUNTER Assistant, essential good knowledge of the trade, Class A ex-Serviceman. State experience, age, salary, etc., to—General Manager, Sloan Electrical Co. Ltd., 41, Kingsway, W.C.2. 3466

DEAF Aids. Experienced men required for final assembling and testing, also for repairs. Permanent positions for suitable applicants. Under 18, over 51, or Class A ex-Servicemen only. Apply—Fortiphone Ltd., 33, Copeland Road, Rye Lane, Peckham (3rd floor, Block A). 3377

DESIGNER required for A.C. and D.C. machines by well-known firm in Eastern Counties. F.H.P. experience desirable. Applications from men over 51 or Class A ex-Servicemen only. State age, experience and salary.—Box 3357, c/o The Electrical Review.

DRAUGHTSMEN and Estimators with experience in layout of lighting, heating and power schemes, and installations in restaurants and factories. Class A ex-Servicemen, or men over 51 years of age. Write, giving details of experience, age and salary required, to—Chief Draughtsman, Electrical Dept., J. Lyons & Co. Ltd., Cadby Hall, W.14. 3429

DRAUGHTSMEN, Electrical and Mechanical, required by large electrical engineering firm in Midlands. Men becoming available for civil employment under Class A demobilisation are invited to send particulars stating age, technical qualifications and industrial experience to—Box No. 231, 8, Serle Street, London, W.C.2. 3444

DRAUGHTSMEN, under 18, over 51, or Class A ex-Servicemen, wanted for N.W. London. Some experience with electric motors desirable.—Box 3281, c/o The Electrical Review.

DRAUGHTSMEN (3) required immediately by leading radio manufacturers in South-East London area for design department working on radio and television equipment, previous experience essential. Applications from Class A ex-Servicemen and others exempt from M.O.L. control only. Write, stating age, experience and salary required, to—Box 7901, A.K. Advg., 212a, Shaftesbury Avenue, W.C.2. 3367

ELECTRICAL Fitter. Experienced assembly and repair motors, 1 to 50 h.p. Good employment conditions. Class A ex-Serviceman, or otherwise exempt.—Industrial Electrical Co. Ltd., Offord Street Works, London, N.1. 3424

ELECTRICAL Fitter experienced dismantling, overhaul and assembling of all types electric motors. East London area. Class A ex-Servicemen or otherwise exempt M.O.L. control.—Box 3390, c/o The Electrical Review.

ELECTRICIAN-Wiremen for installation and maintenance work. Class A ex-Servicemen or otherwise exempt from Ministry of Labour control.—C. F. Parkinson, 114, West Street, Boston, Lincs. 7993

ELECTRICIAN-Wiremen. Three capable and energetic men required for Essex factory. A.C. and D.C. installation, rearrangement and maintenance. Fault location ability and experience of A.C.-driven machine tools an advantage. Permanency to suitable men. Week-end overtime and occasional night work. District rates. Class A ex-Servicemen or over 51.—Box 3421, c/o The Electrical Review.

ELECTRICIANS and Assistants for work in London and Provinces. Class A ex-Servicemen or otherwise exempt from Ministry control. Write or apply to—F. H. Wheeler & Co. Ltd., 39, Victoria Street, S.W.1. 3397

ELECTRICIANS and Assistants required for good-class installations, London and Provinces. Class A ex-Servicemen, otherwise exempt from Ministry of Labour control. Permanent position.—Giles (Electrical Engineers) Ltd., 9 and 11, Victoria Colonnade, Southampton Row, W.C.1. Holborn 5726. 7999

ELECTRICIANS and Assistants wanted. Class A ex-Servicemen or over 51. Permanency to right men.—J. H. Plant Ltd., 99, St. Martin's Lane, Charing Cross, W.C.2. 7946

ELECTRICIANS and Electricians' Mates. Men exempt from Ministry of Labour control, or Class A ex-Servicemen, are invited to communicate with—Powerlite Electrical Installations Ltd., Windsor House, Victoria Street, S.W.1. Telephone, Abbey 1319. 3394

ELECTRICIANS and Mates (exempt from M.O.L. control) wanted Central London, for general installation and repair work. Every consideration and permanent job to reliable and conscientious workers.—Waddington & Goodwell Ltd., 34/35, Hatton Garden, E.C.1. 7945

ELECTRICIANS required for maintenance and repairs. Applications only from those over 51 and Class A ex-Servicemen. Reply stating salary and experience.—Box 3415, c/o The Electrical Review.

ELECTRICIANS urgently wanted. Installation and repair work. D.I.C. rates of pay and conditions. Class A ex-Servicemen or over 51 only. Apply Borough Electrical Engineer, 17/18, High Street, Rugby. 3479

ELECTRICIANS required by East Anglian Electric Supply Co. Ltd., Finborough Hall, Stowmarket, Suffolk, on contract work. Rate of pay 2s. 4½d. per hour. Applicants should be Class A ex-Servicemen or exempt from labour control. 7858

ELECTRICIANS required by small established contractors for good class installation and maintenance work. Screwed L.C.; T.R.S. Good conditions. Permanent employment. Class A ex-Servicemen or otherwise free.—Winfield & Co., 12, High Street, Boston, Lincs. 7895

ELECTRICIANS required, general lands, all systems, single men preferable. Applicants should be Class A ex-Servicemen or otherwise exempt from labour control. Apply—Boston & District Electric Supply Company Limited, Bexon House, Market Place, Boston, Lincs. 3273

ELECTRICIANS required for industrial installation and maintenance work. Must be used to screwed conduit. Class A ex-Servicemen or otherwise exempt M.O.L. Control. Permanencies for suitable men.—Service Electric Co. Ltd., Abbey Manufacturing Estate, Alperton, Telephone, Wembley 6134. 42

ELECTRICIANS required immediately. Permanency for suitable men. Applications from Class A ex-Servicemen and those over 51 only. Pre-war employees especially invited. Apply—Courtney Pope Ltd., 141, Seven Sisters Road, Tottenham, N.15. Stamford Hill 4286. 7950

ENGINEERS and Draughtsmen, becoming available for civil employment under Class A demobilisation, are invited to apply for positions in the heavy electrical plant departments comprising electrical machines and transformers of all kinds of a large electrical engineering manufacturer in the Midlands. Applications, stating age, appropriate technical qualifications and industrial experience, and order of salary required, to—Box 71, c/o The Electrical Review.

ENGINEERS & Draughtsmen becoming available for civil employment under Class A demobilisation are invited to apply for positions in Steam, Gas and Water Turbine and Diesel Engine Departments of a large engineering manufacturer in the Midlands. Applications stating age, approximate technical qualifications and industrial experience and order of salary required to—Box 2405, c/o The Electrical Review.

ENGINEERS and Draughtsmen, becoming available for civil employment, under Class A demobilisation, are invited to apply for positions in the Switchgear Department of a large electrical engineering manufacturer in the Midlands. Applications stating age, appropriate technical qualifications and industrial experience, and salary required, to—Box 49, c/o The Electrical Review.

ENGINEERS. Junior Assistants for design work, electrical and mechanical, preferably with drawing office experience, required by large electrical engineering firm in Midlands. Young men becoming available for civil employment under Class A demobilisation, who have obtained technical training equivalent to university degree standard, are invited to send particulars stating age, technical qualifications and industrial experience to—Box No. 230, 5, Serle Street, London, W.C.2. 3445

ESTABLISHED City firm of electricians and jobbing builders require a Manager. Good prospects right man. Write, giving experience, age and references, to—Box 7991, c/o The Electrical Review.

ESTIMATING Engineer required by a firm of manufacturing electrical engineers in the South of England to deal with enquiries and technical correspondence for house service meters and indicating instruments. Applicants who have specialised in either product may apply, but preference will be given to those with a knowledge of both. Salary £450/£525 according to qualifications. The Ministry of Labour and National Service have given permission under the Control of Engagement Order, 1945, for the advertisement of this vacancy. Applications, which must be in writing, stating date of birth, full details of previous experience (including a list in chronological order of posts held), should be addressed to—Box 3430, c/o The Electrical Review.

ESTIMATOR wanted, capable of preparing own schemes in addition to standard quoting on consultants' work. Keen energetic necessary and sound knowledge of electrical contracting business essential. Very comfortable post and permanency to right man. Class A ex-Servicemen or men otherwise free. State salary required and experience to—Box 7961, c/o The Electrical Review.

EXPERIENCED Female Tracers required by well-known manufacturers. Attractive rates offered; 40-hour week. Reply, stating full particulars of experience, etc., to—Bellringer & Cowan Ltd., Elmore Road, Old Trafford, Manchester, 16. 3454

FOREMAN Electrician to assist in small contractor's business, able to estimate and make up accounts. Permanency. Applications from Class A ex-Servicemen or those over 45 only. Write in first instance to—Mr. O'Brien, c/o E. Hollidge, Ltd., Bedford Hill, Balham, S.W.12. 3004

FULLY qualified Fitter and Turner, used to setting up of capstan. Good prospects and salary. Applications from those over 51 or Class A ex-Servicemen only. Apply—Box 3340, c/o The Electrical Review.

HEAD Foreman required for winding shop specialising in new and repair work. Must have good general experience in A.C. and D.C. motor winding. Theoretical and practical knowledge essential. State age, salary expected and references. Apply to—Box 3441, c/o The Electrical Review.

LADY Book-keeper required, also Invoice Clerk for Export Firm. Both with knowledge of typing. No Saturdays. Apply—Box 3475, c/o The Electrical Review.

LEADING cable manufacturers (members of C.M.A.) seek the services of a first-class Mains Cable Sales Engineer for the Midlands. An established connection with electricity supply authorities is essential. Post offered is permanent and progressive. Full details of experience, age and salary required should be submitted by letter in confidence to—Box 3417, c/o The Electrical Review.

LECTURER in Electrical Engineering required for Military College of Science. Candidates should preferably hold an Honours Degree in Electrical Engineering and have specialised in Light Power Engineering (not Telecommunications). Experience in teaching would be an added recommendation. Salary: Age 25 and over, on range of £400 to £600 a year, plus Civil Service war bonus, at present £60 a year, according to qualifications and experience. Lower rates apply to successful candidates under 25 years of age. It is anticipated that a scale of pay with annual increments and a higher maximum will be introduced at a later date. Successful candidates required to take up duties as early as possible. Write, quoting D.1357A, to Ministry of Labour and National Service, Appointments Department, Technical and Scientific Register, Room 470, York House, Kingsway, London, W.C.2, for application form, which must be returned completed by 3rd December, 1945. 3414

LONDON and Home Counties Joint Electricity Authority Meter Inspector and Repairer required for Twickenham area. Rate of wages as for No. 50 area J.I.C., at present 1s. 9.432d. — 1.365d. Sparks Award. — 4d. war bonus per hour. Applications from men over 51 years of age or Class A ex-Servicemen. Applications to be sent in writing to the Area Engineer, London Home Counties J.E.A., Barford, Dorking, Surrey. 3450

MANAGER required, technical and commercial, for small progressive manufacturing company in North London area. Experience in design of electrical control gear essential. Permanency and excellent prospects for capable man. Replies treated in strictest confidence. State experience, age and commencing salary. Write—Box 3440, c/o The Electrical Review.

METER Reparer required for Class A non-polyphase station, single man preferable. Applicants should be Class A ex-Servicemen or otherwise exempt from labour control. Apply—Boston & District Electric Supply Company Limited, Bexon House, Market Place, Boston, Lincs. 3272

METER Reparers and Testers. D.J.I.C. No. 5. B Zone. 2s.5½d. an hour. Class A releases or men exempt from labour control.—The East Anglian Electric Supply Co. Ltd., Finborough Hall, Stowmarket, Suffolk. 7992

OUTSIDE Representative, capable and energetic, required by old-established manufacturing electrical engineers, to cover Yorkshire, Lincolnshire, Nottinghamshire. Resident in Leeds or Sheffield. Must have wide technical knowledge of electric power and distribution, and have connections amongst supply authorities and industrial organisations. Car owner preferred. Particulars of experience, with age and salary required, to—Box 3428, c/o The Electrical Review.

PERMANENT position offered to capable Electrician (London district). Over 51 or Class A ex-Servicemen only. Apply—Box 3432, c/o The Electrical Review.

PLUMBER Jointer required. Used to mains up to 11,000 volts, single man preferable. Applicants should be Class A ex-Servicemen or otherwise exempt from labour control. Apply—Boston & District Electric Supply Co. Limited, Bexon House, Market Place, Boston, Lincs. 3271

QUALIFIED Electrical Engineer, knowledge domestic appliances and R.P. and H.F. heating, London. Applications from those exempt from M.O.L. control only. Box 8003, c/o The Electrical Review.

REALLY good man required to build up and operate Armature Rewinding section of established electrical engineering concern on Sussex coast. One prepared to work and also train others. Sound position with excellent future prospects. Applications from those over 51 and Class A ex-Servicemen only. State salary required. References.—Box 3413, c/o The Electrical Review.

REQUIRED an Electrical Engineer for gold mines in South India with a diploma or degree in Electrical Engineering and having fairly extensive experience of the erection and maintenance of heavy electrical plant and distribution systems. Preference given to a man with some experience of steam and Diesel generating plants and power station operation. Write with full details of age, training and experience to—"Y.O.," c/o Streets, 110, Old Broad Street, E.C.2. 3462

REQUIRED, Salesmen, Storekeeper and Assistants for radio retail stores. Applications only from those over 51 and Class A ex-Servicemen.—Box 3416, c/o The Electrical Review.

SALES Engineer, preferably with connection, required by large English electrical manufacturing concern for their Scottish Branch. State education, technical qualifications, age, and salary required.—Box 3336, c/o The Electrical Review.

SECRETARY (Female), capable and experienced, for small pleasant office, Victoria (no Saturdays). Shorthand, typing, telephone, book-keeping. Knowledge of general engineering terms an asset. Write, giving full particulars and salary required, to—Box 3435, c/o The Electrical Review.

SENIOR Draughtsmen required by switchgear manufacturers. Preference will be given to applicants experienced in E.H.T. switchgear and mining gear design and/or detail. Association rates offered; 40-hour week. Applications are invited from Class A ex-Servicemen and others exempt from M.O.L. control only. Reply, giving full particulars of experience, etc., to—Switchgear & Cowans Ltd., Elsinore Road, Old Trafford, Manchester, 16. 3453

SHOWROOM Assistants required for industrial, commercial and domestic showrooms, with radio servicing facilities. Class A ex-Servicemen, otherwise exempt from Ministry of Labour control. Apply in writing in first instance, stating age, experience, salary required, to—Giles (Electrical Engineers) Ltd., 9 and 11, Victoria Colonnade, Southampton Row, W.C.1. 8000

SWITCHGEAR manufacturers require Engineer for Sales and Estimating section, A.C. and D.C. air and oil break, L.T., H.T. switchgear and switchboards, automatic switchgear, etc., Manchester district. Class A ex-Service or otherwise exempt from M.O.L. control, or over 51. Applications, in confidence, should state age, previous experience and salary required.—Box 3455, c/o The Electrical Review.

TECHNICAL Assistant to Electrical Engineer required in Central London architects' office. Applications only from Class A ex-Servicemen and others exempt from M.O.L. control. Give details of technical education, experience and salary required to—Box 7917, c/o The Electrical Review.

TELEVISION and Radio Draughtsmen required for progressive growing firm, with good prospects. Applicants should be exempt from the provisions of the Control of Engagement Order, 1945. Class A release men with experience welcomed. Write fully, in confidence, giving age, experience and salary required, to—O-Personnel Officer, R.F. Equipment Limited, Amersham, Bucks. 3452

TWO Armature Winders, conversant with split phase winding of A.C. stators. Good prospects and salary. Applications from those over 51 and Class A ex-Servicemen only. Apply—Box 3341, c/o The Electrical Review.

TWO Substation Attendants at Dorking and one at Leatherhead, experienced in the operation and control of H.T. and L.T. switchboards, rotary converters and rectifiers. Shift work of 48-hour rota; No. 9 Area J.I.C. rate of pay, £3 19s. per week, plus 6d. per hour war bonus. Applications from those over 51 or Class A ex-Servicemen only to—Senior Area Engineer, London and Home Counties Joint Electricity Authority, 42 York St., Twickenham. 3442

VACANCIES are available for men released in Class A who have had experience on Instrument Work. Preference will be given to those who possess some theoretical knowledge. Apply, stating experience, training, age and wages required, to—Cambridge Instrument Company Ltd., Sydney Road, Muswell Hill, N.10. 46

WAREHOUSEMAN, essential good knowledge of the trade, Class A ex-Serviceman. State experience, age, salary, etc., to—General Manager, Sloan Electrical Co. Ltd., 41, Kingsway, W.C.2. 3465

WAREHOUSEMAN-Packer required. Permanent position. Past experienced preferred. Applications only from Class A ex-Servicemen. Write, stating wages, etc., to—Box 3437, 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 7595—Representative; Box 7596—Assistant Sales Manager; Box 8188—Production Controller; Wallasey Corporation—Senior Demonstrator.

SITUATIONS WANTED

A POST WITH SCOPE FOR A YOUNG ENGINEER

B.Sc. Tech. Electrical Engineer specialised in Instruments Ex Metrovick Apprentice. Production experience. Eight years' responsible training, administrative and intelligence work in R.A.F. Squadron-Leader for last 4 years. Twice mentioned in despatches. Excellent references. I wish to re-enter the electrical industry in a responsible post with opportunity for advancement and improving a keen engineering aptitude.—Box 7932, c/o The Electrical Review.

COMMERCIAL AND/OR SALES MANAGER

ADVERTISER, aged 43, of proved ability to handle a wide range of products, desires change to progressive manufacturer. Fourteen years' all-round managerical experience, organizing and controlling sales, publicity, estimating, costing, buying, labour and staff. Good technical background, some works experience and d.o. training. Reasonable salary. Midlands preferred but not essential.—Box 8012, c/o The Electrical Review.

TO PRINCIPALS OR MANAGING DIRECTORS

MAJOR, Royal Engineers (T.A.), Class A release, with 23 years' experience in design and production of electrical apparatus, desires executive position.

Experience of works management, good administrator and organiser.

Intimate knowledge of domestic appliances, telephone and signalling apparatus & systems, and electrical instruments.

Energetic and ambitous with plenty of initiative.

Replies treated in confidence.—Box 7972, c/o The Electrical Review.

A Technical Engineer, A.I.E.E., M.I.E.I. (39), extensive experience design, purchasing, inspection, production (modern tooling methods) in domestic apparatus, small electric motors, switchgear. Executive position with responsibility and scope required. West London or Surrey. Excellent references. Present position 10 years. Write—Box 7949, c/o The Electrical Review.

A Technical Engineer, age 27, requires progressive position demanding drive, initiative and organizing ability. 4½ years' experience in design, manufacture, and test of Automatic Control Gear and Industrial Switchgear. Particulary interested in contactors and the acceleration of motors, and keen on traction and lift work. Fluent German and Italian. Release obtainable. London preferred. Reply—Box 8005, c/o The Electrical Review.

A Young Foreman, single, wide experience of installations and maintenance, wants position abroad or on the Continent.—Box 7989, c/o The Electrical Review.

ABOUT to be de-mobbed, young man, 32, keen and conscientious. Comprehensive experience, 10 years with three leading electro-mechanical instrument firms. Including 5 year apprenticeship in all shops and latterly in test room, experimental and inspection departments, desires permanent post offering good prospects.—Box 7984, c/o The Electrical Review.

ADVERTISER desires change, seeks post as Sales Manager with progressive firm. Excellent connection with electric motor mfrs., telephone and radio mfrs., also electrical wholesalers in London and district. Owns car. Box 7987, c/o The Electrical Review.

ADVERTISER (35), for many years in well-known contractors office, desires change. Thoroughly experienced in preparation of tenders and administration of large contracts in all stages, including final accounts. Responsible position with prospects required by man with initiative. London area preferred.—Box 7973, c/o The Electrical Review.

ADVERTISING Manager, in twelfth successful year with leading company, invites offers from manufacturers of industrial and domestic electrical products.—Box 8023, c/o The Electrical Review.

ALL Chief Engineers. A supply undertaking has the opportunity to secure service of Development Engineer, A.I.E.E., M.E.M.E., qualified take charge development of area any size, load building, sales, installations. Prefer Scotland, but consider any district. Commencing salary £550. Apply first instance—Box 7998, c/o The Electrical Review.

A.M.I.E.E. (40), Power Station O.H. and U.G. district. Practical, technical and commercial exp. supply work. Overseas preferred.—Box 7974, c/o The Electrical Review.

AN Electrical Contractor's Supervising Engineer. Electrical, Mechanical, etc. Long experience, connections, London centre radius.—Box 8019, c/o The Electrical Review.

BUYER offers services. Experienced 6 and 7-figure purchases, electrical equipment and access. Knowledge of markets, keen buyer, home and foreign. Free soon.—Box 3426, c/o The Electrical Review.

BUYER (35), experienced with radio manufacturers, also general office management, seeks change.—Box 7928, c/o The Electrical Review.

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OLD-established London and Manchester firm of Steam and Electrical Equipment manufacturers is reviewing agency arrangemnts in England and Wales. Enquiries from reputable firms with good connections, in particular with local electricity authorities, are welcomed. Reply—Box 3446, c/o The Electrical Review.

PLUMBING, Sanitary Electrical Hardware and Ironmongery. Dublin, Eire. Estd. 35 years. Central offices, well connected, are open to act as agents for above lines, also miscellaneous lines allied to above.—Box 2965, Eason's Advertising Service, Dublin. 3447

SOUTH Africa. Agent, with own offices in Salisbury and Cape Town, desires to contact British manufacturers view to representation.—Berns Agencies, P.O. Box 575, 2. Bein Bro. Building, First St., Salisbury, S. Rhodesia. 3395

SPECIAL Announcement. Messrs. Leons, of 153-155, High St., Epsom, Surrey, the actual manufacturers of Leons Decorative Electric Lighting Fittings, wish to announce to the numerous enquirers that an excellent range of Ultra-Modern Floor Standards and other Fittings, in the most exquisite designs and finishes, with immediate stock deliveries for most lines, can now be seen in London, at one of their branch factories. Immediate appointments can be made, by phoning Epsom 2400, with wholesalers and fittings factors. 67

BUSINESSES FOR SALE AND WANTED

TO ELECTRICAL WHOLESALERS

ADVERTISER wishes to purchase interest (preferably controlling) in established electrical wholesalers' business. Large turnover not essential provided the business is of good trade standing and capable of development. E.W.F. member operating in London or Home Counties preferred. Preliminary replies will be treated in very strictest confidence.—Box 8022, c/o The Electrical Review.

BUSINESS OPPORTUNITIES

NEW store opening in Richmond, Surrey (large floor space) wish to contact manufacturers for regular line of Electrical Goods. Write—28, Hill St., Richmond. 3373

MISCELLANEOUS

ANNOUNCEMENT. The Hotpoint Electric Appliance Co. Ltd. announce that on and after November 18th, 1945, their depot at Rutland House, Otley, Yorkshire, will cease to operate, and future enquiries from this area should be addressed to—99, Corporation St., Manchester. 3438

PHOTOGRAPHY. Victory ends restrictions. For a permanent pictorial record of your war-time factory and products, for your peace-time advertising, catalogue and general purpose photographic illustrations, phone Holborn 6858.—Miles & Kaye Ltd., 100, Southampton Row, London, W.C.1. Specialists in commercial and industrial photography for over 60 years. 3246

PATENT NOTICES

PATENT Agents.—A. E. Hill, Chartered Patent Agent, 27, Chancery Lane, London, W.C.2. 65

PATENT Electric Tool Tipping Machine. For tipping machine and other tools with tungsten carbide, stellite, high-speed steel, or flash welding H.S.S. to low carbon steel. Advertiser has for disposal, either on royalty or will sell outright, British patent rights to manufacture and sell patent Electric Tool Tipping Machine, already marketed. Also new Prototype Tipping Machine of 6-kVA capacity, bench model, capable of tipping tools from one square inch in cross section, down to one-eighth. Good opportunity for export trade. Interested parties should write to—Box 8015, c/o The Electrical Review.

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BOTH Government and industry have announced and emphasised that young men with technical knowledge and qualifications must receive every chance of rising to the highest posts within their capacity in post-war engineering and allied industry. Write to-day for "The Engineer's Guide to Success"—200 courses—free—which gives particulars of the first-class training supplied by the T.I.G.B. for the **A.M.I.E.E., A.M.Inst.C.E., A.M.I.Mech.E., A.F.R.Ae.S., A.M.I.P.E., B.Sc.(Eng.), C. & G.**, etc., examinations in which T.I.G.B. home-study students have gained **44 FIRST PLACES AND OVER 1,000 PASSES.** The Guide covers careers in all branches, **Electrical, Mechanical, Radio, Aeronautical, etc.**

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THE ASSOCIATION OF SUPERVISING ELECTRICAL ENGINEERS

The Swann Diploma Examination

NOTICE is hereby given that the Swann Diploma Examination will be held at Centres on May 29th and 30th, 1946.

SUBJECTS: Electrical Installation.
Electrical Maintenance.

Application forms and copies of Regulations and Syllabus may be obtained from the General Secretary, The Association of Supervising Electrical Engineers, 54, Station Road, New Barnet, Herts.

The latest date for receipt of application forms is March 1st, 1946.

A. BRAMMER, General Secretary.
22nd November, 1945. 3409

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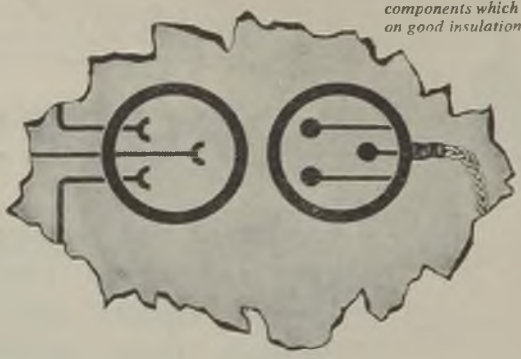

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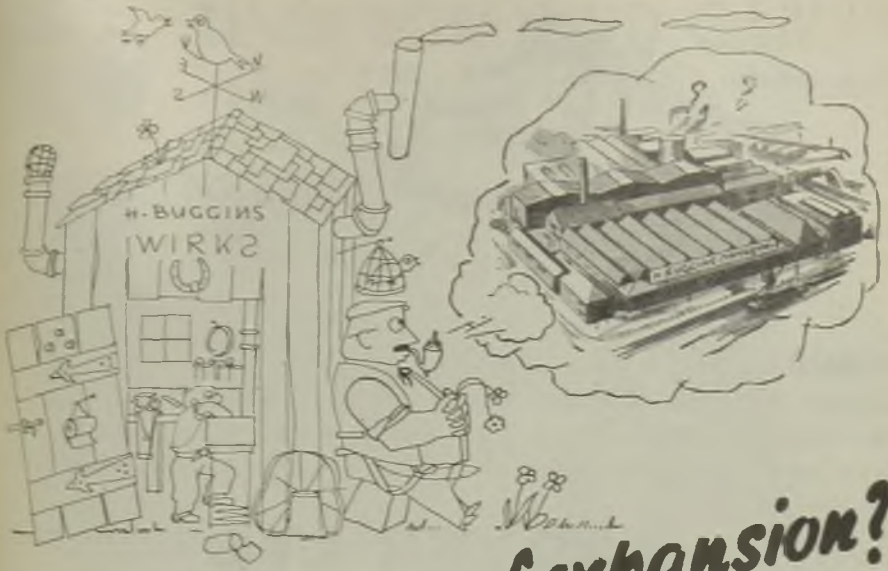

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