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September 6, 1946

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September 6, 1946

MERCURY SWITCHES



32



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33 SMALL

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INTERNATIONAL



Electrical Review, September 6, 1946

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September 6, 1946



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37

ALLEN WATERWORKS PUMPING PLANT

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The Engine, Pumps, Generator, Switchboard and Auxiliary motor-driven pumps are all of Allen construction.

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Allen waterworks plant is efficient, reliable in operation, straightforward in design and simple to operate. Above all, it secures uniformity in standards of design and performance down to the smallest detail.

ALLEN

ENGLAND

September 6, 1946

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AIT 745



(Photograph by courtesy of Messrs. Hoover Ltd.)

"ZANDEROLL" PROCESS

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ELECTRICAL REVIEW



This illustration shows a number of the various types of W. & G. Lampholders supplied with and without porcelain interiors.

A wide and comprehensive range of electrical accessories is available for essential purposes.

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ELECTRICAL REVIEW

September 6, 1946



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THERMOVENT'S EFFICIENCY. Thermovent Electric Space Heating is such a system. It distributes warm air throughout the space to be heated and thermostatic control makes it completely responsive to temperature fluctuations. No other method is so economical of fuel or labour.

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ELECTRICAL REVIEW





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What we made in War was of course secret, but it is no secret that in Peace we can supply your requirements better than others.

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N the days of Peace to come, this same organisation, with its skilled engineering development ability and modern equipment, is available to all for the manufacture of the finest Electrical Equipment, incorporating new and advanced designs to meet the needs of Peace.

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ELECTRICAL ONE EQUIPMENT E. Partridge Milson & Co. Ltd. MANUFACTURING ELECTRICAL ENGINEERS DAVENSET ELECTRICAL WORKS, LEICESTER ELECTRICAL REVIEW

September 6, 1946



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September 6, 1946

Do you need "distilled" water?

Permutit "Deminrolit" Process cuts cost as much as 95%

In In									
ANALYSES OF WATER BEFORE AND AFTER TREATMENT BY PERMUTIT 'DEMINROLIT' PLANTS IN COMMERCIAL USE. (Note - All figures in parts per 100,000.)									
-	Plant		No. 1		No. 2		No. 3		
Water			Crude	Treated	Crude	Treated	Crude	Treated	
Catio	ns								
Calci	บธ	Ca	3.2	-	9.4	-	10.7	-	
Magne	sium	Mg	0.8	-	0.36	-	1.09	-	
Sodiu	n	Na	0.46	0.23	1.0	0.31	1.66	0.44	
Total			4.46	0.23	10.76	0.31	13.45	0.44	
Anion	S								
Carbo	nate	C O ₃	4.2	0.24	12.4	0.29	10.5	0.57	
Chlor	ide	Cl	1.8	0.06	2.5	0.12	2.84	0.30	
Sulph	ate	S04	1.35	-	3.48	0.03	11.95	-	
Nitra	te	NO3	-	-	-	-	1.15	-	
Total			7.35	0.30	18.38	0.44	26.44	0.87	
Total	Total ions in solution		11.81	0.53	29.14	0.75	39.89	1.31	
COST per 1000 gallons		5.22d		9.83d		16.5d			

The table shows the composition of some types of water before and after treatment by Permutit's "Deminrolit" Process. Water similar to a distillate is produced by this process at a fraction of the cost. Where distilled water was too expensive you can afford "Deminrolit" water. The process has been in practical use in Great Britain for over 7 years. Write for technical publication "Distilled Water without Distillation" to

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C8355 Tee piece



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The illustration shows the Rotor of a 30,000 kW Waterwheel Generator. The complete Rotor weighs 180 tons and is designed for an overspeed of 410 r.p.m. One of three for New Zealand.



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ELECTRICA	L REVIEW
September 6, 1946 Contents :—	Managing Editor : Hugh S. Pocock, M.I.E.E. Technical Editor : Commercial Editor: C. O. Brettelle, M.I.E.E. J. H. Cosens
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ELECTRICAL REVIEW

THE OLDEST ELECTRICAL PAPER - ESTABLISHED 1872

Vol. CXXXIX. No. 3589.

SEPTEMBER 6, 1946

Traditions

9d. WEEKLY

POLITECHNIK



N the ferment of to-day, which owes much to an influx of new scientific conceptions and a speeding up of their technical applications against a background of changing political theory, there is a not unnatural tendency to question the validity of many traditional ways of thought and practice. Even the weight that is now (at long last) attached to research as an essential means of providing for the future may appear superficially to be antagonistic to methods that embody the results of past experience which have proved their fitness for survival.

Proper Use of Knowledge

Changes in machinery, whether material or administrative, react on the human element responsible for ensuring that such changes do mean progress. Certain characteristics cannot be sacrificed without jeopardizing the attainment of even a short-term purpose. Implicit in the proposals worked out by engineering institutions for education and training is the need to foster the capacity to use academic knowledge intelligently (rather than to be satisfied with its mere acquisition), to take the initiative and to be willing to shoulder responsibility. British manufacturers rely on the ability of their representatives in the remotest spots of the earth to " make the machine work," without waiting for further instructions should blueprints not allow fully for local contingencies. That is a distinctive national asset.

Similar qualities were shown by the engineering staffs of electricity supply undertakings in the epic of the "blitz," when

the tradition of keeping the supply going was so nobly maintained. Their success was the logical result of their having been accustomed, in flexible organizations, to adapt pre-arranged plans to suit the varying requirements of day-to-day working. It is second nature to them to add to the value of their nominal duties (without being told to do so) by devising improvements out of their own intimate knowledge of detail and, if necessary, submitting them for acceptance, modification or reasoned rejection by higher authority. Part of their success in developing the electricity supply service on bold lines is the ingrained belief that a man who never made a mistake never made anything—a view that is incompatible with over-centralized administration.

Personal Service

Engineers are not unduly concerned that the lay public, especially those members of it who are engaged in tasks of a non-progressive nature, should fail to understand the intricacy of their work and the amount of overtime thought given to the solution of its problems. Nor are they disturbed because of lack of appreciation of the magnitude of their contribution to society in providing not only the material basis of modern civilization but also a leaven that is derived from a training which entails a scientific approach to matters in general. What electricity supply engineers most prize in their work is the unhampered privilege of giving spontaneous personal service that engages all their faculties in bringing the benefits

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of electricity to the public. If that is denied to them, no promise that they will be allowed to retain their present salaries can remove the sense of frustration that spoils the best work, especially if further discouragement is to come from a realization that their efforts may be frittered away in bolstering up less desirable and less technically advanced competitors.

Four power stations are named for the first time in C.E.B. Programme the list of new generating plant (given on another page) for which arrangements have so far this year been made between the Central Electricity Board and supply undertakings. They are widely dispersed, as is the re-mainder of the 1,029,000 kW, all of which is to be installed within the next three years or so at an estimated capital cost of nearly £40 million. A good proportion of this figure would be accounted for by site works and civil engineering structures suitable for more than the plant initially installed. A net capacity of 339,000 kW as scheduled is needed to meet the winter load of 1948 and 690,000 kW is due to be installed by the end of the following year.

> New Power Stations

THE four stations referred to are included among the eighteen, which the Board's Annual Report for 1945 mentioned as

required for the four years 1946 to 1949. Their capacities as now stated relate to the first sections only. For 1950 further generating capacity amounting to 1,470,000 kW will be necessary. Most of this plant will presumably be in new stations, as room for extensions on existing sites is becoming increasingly limited. The substitution of larger and more efficient units for obsolescent plant, however, presents possibilities. This is exemplified at Portobello (*Electrical Review*, August 9th) where the opportunity is to be taken of adopting higher steam conditions as well.

University Training Constant Constant

ence columns of *The Times*. Principal John Murray opened the matter in a letter which referred to reports on scientific training which " with tolerance rather than conviction admit as an afterthought the

claims of the arts subjects." This was followed by a letter from Lord Cherwell who deprecated the grafting of " a fullblown school of engineering " on to any existing university and favoured the establishment of independent institutions of university status, instancing the Zurich and Delft Polytechnica, the Massachusetts Institute of Technology and some German institutions, to ensure an adequate supply of highly-trained engineers. In a later letter Lady Snowden and Sir Patrick Hannon championed the teaching of the "humanities" to the science student to in-culcate " the cultural quality of relating his work to the march of human progress and the exaltation of human character."

Australian re Voltages m

ON another page we reproduce some comments from a Melbourne contemporary on the

subject of voltage standardization. It is shown that in different States 230, 240 and 250 V are all employed. The commonest voltage is 240 and the least used (in Western Australia) is 250. Conditions therefore favour the standardization of 240 V, which is in use in four States, from the economic point of view, and if the reasons for the British decision to adopt this as a standard are accepted, where they are applicable to Australian conditions. it is considered that the choice is also technically substantiated. Such a decision would be gratifying to British manufacturers supplying equipment to the Australian market.

> Heat Pumps

As a means of warming houses in this country the heat pump is generally regarded as having few

prospects. In sunnier climes it holds out more promise of successful application when combined with summer air condition-Mr. J. M. Barry, of the Alabama ing. Power Co., addressing the Edison Electric Institute recently, urged that the economic possibilities of pumps that would serve both purposes should be actively investigated. At an annual load factor of 25 per cent, after allowing for diversity, he considers that, at rates of between 1 and 2 cents per kWh, over 30 per cent of the million new houses to be built in the southern United States within the next decade might be warmed and cooled in this way.

Metals Testing

Specialized Electrical Equipment Applied to Production

N the articles "Making Bolts & Studs" and "Temperature Treatment" in the Electrical Review of November 30th and December 21st, 1945, we described the essential electrical applications to the processes involved in the production of bolts, etc., at the factory of A. P. Newall & Co., Ltd., Glasgow. It is now our intention to complete this story by an outline of the main specialized electrical equipment which we saw devoted to inspection and testing of the works raw materials and productions.

It was explained that bar for the manufacture of bolts is received from various sources in large quantities, and under these





The tensile strengths of heat-treated samples of incoming materials are carried out on a 50-ton tensile testing machine

balancing bridge between two coils. When two samples of like properties are placed in the coils, i.e., one sample in each coil, a balanced field is obtained, but when unlike samples

To counteract the possi bility of materials of different specifications being mixed in transit a magnetic sorting bridge is used

conditions there is an inevitable risk of materials of different specifications being mixed in transit. To counteract this possibility a magnetic sorting bridge is used in all cases where there is any doubt on this The instrupoint. ment, which was supplied by Salford

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A close check of thread form is made by this special projecting equipment

Instruments, Ltd., consists essentially of a ton Denison tensile testing machine to ensure cathode-ray tube linked as an electrical that their physical properties satisfactorily

are introduced the balance is disturbed, so that the loop or line on the cathode-ray tube screen is distorted previous its from In this way form. all unlike material can be readily recognized, and it is a simple matter to test a sample of unknown specification against one the specification of which already been has

verified. Samples from all batches of incoming materials are fully heat-treated before being tested on a 50meet the rigid specifications laid down. Further, while the bolts, etc., are passed through the various processes during production samples are taken from the heattreated batches and similarly proved. Samples of finished parts are also tested on this machine for the Admiralty, A.I.D., M.O.S., other inspecting authorities. The and machine incorporates a hydraulically operated ram, served by a motor driven oil pump, and the load is weighed on a compound-lever system which records on a self-indicating dial. The scale on this dial can be changed to read 5, 10, 25 and 50 tons for the full scale, i.e., the full scale can be utilized in each case. Transverse bending and compression tests can also be carried out on the bottom beam of the machine. The radial oil pump is directly coupled to the driving motor which is of 3 H.P. and runs at 960 r.p.m. The motor is direct-on started with pushbutton and contactor control.

Bolts in the process of manufacture have their threads checked at prescribed periods on a Zeiss projector. This applies particularly to those bolts produced by the automatic bolt makers, because in this case the method of manufacture is very fast and a close watch is necessary, not only to check the thread form, but also to ensure that the inspector will readily detect any sign of wear



The electro-limit gauge is used for checking parts ground to a very close limit

or loss of form in the dies. Further, before the manufacture of circular dies for the Steinle thread-generating machines is undertaken a test piece is submitted for check on the projector.

The image is magnified on this machine The beam is proto thirty diameters. jected from underneath the work piece under test and through a prism, giving a right-angle turn on to a vertical screen. At the same time the outline of a master thread etched on the graticule, that is, a glass member arranged under the prism, is also projected. The top part of the instrument is moved to bring the beam into line with the helix of the thread, and the image of the thread on one side of the bolt is then superimposed on to the image of the master thread on the screen by means of a 0 0001 micrometer adjustment, and the micrometer



The hardness of finished parts is determined on motorized hardness testers

reading is noted. By taking a similar reading for a projection of the thread on the other side of the bolt the pitch diameter of the thread can be computed.

The detection of cracks in the various products plays quite a big part in the works inspection programme, and this applies particularly to such highly stressed parts as connecting-rod bolts and cylinder studs. During the war about a million aircraft parts per week were crack detected in this factory. The machine used for this work is a development of the well-known Johnson Fel model. The operation is in two parts. In the first the component is loaded between two contact points at about 150 A at very low voltage; secondly, the "charged" component is then immersed in crackdetecting fluid in a tank at the back of the machine for a few minutes, with the result that there is a concentration of the detecting

September 6, 1946

medium at any defect on the surface of the component under test. There are eight heads at the front of the machine, each with a pair of adjustable contacts, one of which in each case is spring loaded, and the electric head a steel lever armature is spring mounted between two coils, and is actuated by a contact spindle, the slightest movement of which deflects the armature thereby unbalances the bridge and

circuit. A power unit contains two other coils which complete circuit, the bridge together with a voltage regulator, a 10-to-1

The crack-detection equipment has eight heads, each with a pair of adjustable contacts on which the components are " charged,"

these contacts are served by a transformer unit incorporated in the machine at one end. On the other side of the machine there is inset in a bench opposite each contact head the fluid tank, so that the head and the tank together comprise one testing unit.

For checking the thicknesses, etc., of parts ground to very close limits, the Taylor-Hobson electro-limit gauge is used. This instrument is in the form of a column carrying a gauge head which is connected to a meter which records to an accuracy of either

0 0001 or 0 000005 inch. The range is changed by means of a switch which has a pointer engraved on it to indicate which range is in use. The basic principle of the machine lies in a combination of mechanical gauging contact and magnificaelectrical tion. The gauge is set by known standards, and the displacement of the gauging point resulting from a variation in the size of the work being inspected controls the electrical circuit on the electrical balance bridge

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The micro-structures of specimens of incoming materials are projected or photographed on this projection microscope

principle in such a way that errors are shown in a greatly magnified and visible form on the dial of a micro-ammeter. In

applied by a depressor bar which brings a cam on the driven shaft to bear on the loading mechanism. Testing on a production

ratio transformer, and a rectifier unit by which a micro-ammeter is operated by direct current. Hardness checking is effected on most work

on a percentage basis, while all special parts and all case-hardened components are The similarly tested.

> equipment used for this is a motorized of Rockwell type hardness tester. For soft materials a 1. -in. diameter ball is used with a 100-kg load, direct readings being taken on the "B' while for scale, hardened parts the diamond "Brale" is used with a 150-kg load, and direct readtaken on ings are the "C" scale. The motor is housed in the base of the machine. The minor load is applied by hand and the major load is





ELECTRICAL REVIEW

basis is carried out by a battery of these machines.

Equipment of particular interest in the physical laboratory is a Vickers projection



Electro-chemical analysis apparatus is used for the electrolytic determination of copper, nickel, cobalt, etc.

ined to ensure that the best possible microstructure is obtained for the given heat treatment. The work can be either projected on to the screen or actually photographed. One of the two items we have selected

for reference from a comprehensive range of electrical equipment in the chemical laboratory is an electroanalysis chemical which is apparatus used for the electrolytic determination of copper, nickel, cobalt, etc., in ferrous and non-ferrous metals. The equipment includes a hot-plate by which the solution to be analysed is warmed, and metal to be determined is plated out of a solution by a platinum anode on to a platinum cathode. microscope which is fitted with а dual illumination concarriage sisting of а " Pointolite " of 150 c.p. and a carbon-arc lamp 500 c.p. of Specimens of incoming materials are cut polished and etched, and then for examined micro-structure. Similarly, specimens are taken neriodically heatfrom treated batches of bolts, etc., production, in and are examwhich the solution under test is agitated. The cathode is weighed before and after test, and the percentage of the required metal is thereby determined.

The other equipment in this laboratory is a high-temperature furnace which is used for the rapid determination of the carbon and steel contents. The furnace has a platinum-wound tube which affords a maximum working temperature of 1,350 deg C. It is served by a "Sunvic" temperature controller. Essentially the determination is effected by burning off the carbon and steel in a stream of oxygen. The gases are collected in a volumetric gas burette, measured, then passed through an absorption bulb in which the CO_2 is dissolved, after which the remaining gas is again measured in the gas burette.

The difference between the measurements is noted, and by correction for normal temperature and pressure, the percentage of carbon in a steel sample is readily computed. The total time taken to effect such a determination is about one minute. Other electrical equipments included in the comprehensive laboratory apparatus are resistance muffle furnaces, drying ovens, water baths and water stills.

We are indebted to Mr. A. P. Newall, managing director, for permission to visit the works and to publish this article, and to Mr. A. P. Newall, jun., director, Mr. C. Reid, works manager, Mr. W. Horn, chief



Rapid determination of carbon and steel content is made by this hightemperature furnace and its associated equipment

A rectifier unit supplies the plating equipment with d.c. at up to 12 V. The motorized head in the apparatus serves a stirrer by inspector, and Mr. W. Johnstone, chief chemist and metallurgist, for their help in preparing this article.



Biographies of Officers

HE new chairman of the Mersey and North Wales Centre of the Institution of Electrical Engineers is Mr. R. Varley,



general manager and engineer of the Mersey Railway Co., Birkenhead. Mr. Varley received his technical education at Sheffield University, and served his apprenticeship with the Sheffield Corporation Electricity Department, with whom, in March, 1922, he became junior engineer. In August of the same year, however, he left

Mr. R. Varley

Sheffield to join the Mersey Railway Co. with which company he held various posts before being appointed to his present position of general manager and engineer in 1938. He has served on the Committee of the Mersey and North Wales Centre from 1938-39 and from 1942 to date.

Mr. E. T. Norris, chairman of the North Western Centre, won a scholarship at the

Guilds City and Engineering College, Finsbury, and received his technical training British with the Westinghouse Co. He joined the Metropolitan-Vickers Electrical Co., in 1919 as transformer designer, and in the following year went to Ferranti's as chief assistant transformer designer, becoming chief engineer



Mr. E. T. Norris

of the Transformer Department in 1922. Mr. Norris is a member of the Institution of Mechanical Engineers, a Fellow of the American Institute of Electrical Engineers, and an Associate of the Manchester College of Technology. He is the author of numerous papers and articles which have appeared in the British and Foreign technical press, and he acted as British delegate to the International Electrochemical Conferences at Paris, Prague, The Hague and Torquay. He is a

member of a number of committees of the B.S.I., E.R.A. and B.E.A.M.A. He is the inventor of the moving-coil voltage regulator and many other devices and he designed the apparatus for producing one million volts for the first time in this country in 1925.

Mr. P. Philip, chairman of the Scottish Centre, was educated at Brechin High School and Dundee Technical College. From 1904 to 1908 he served an apprenticeship to marine



and general engineering, and in the latter year commenced his association with the Dundee Corporation Electricity Department with whom he has served in the construcdistribution, tional. substation and generating departments. From 1922 until his appointment as city electrical engineer in 1941, he was generat-

Mr. P. Philip

ing engineer and power station superintendent. Mr. Philip is a member of the Institution of Mechanical Engineers and a member of the Institute of Fuel. He has been hon. secretary of the Dundee Sub-Centre of the I.E.E. for the past twenty years and is immediate past president of the Dundee Institute of Engineers. He is a member of the Consultative Technical Committee of the Central Electricity Board, Central Scotland Area.

The chairman of the North Eastern Centre is Mr. T. M. Ayres, Chief Engineer of the Operation (Transmission and Distribution)

Department of the North-Eastern Electric Supply Co., Ltd. Mr. Ayres was educated at Hammond's Grammar Swaffham, School, Norfolk, and entered the electricity supply industry as an articled pupil with the Urban Electric Supply Co., Ltd. (a subsidiary of Edmundsons), at their Stamford and Grantham electricity undertakings.



Mr. T. M. Ayres 25. From 1914

to 1918 Mr. Avres was on the generation and distribution staffs of the Cleveland & Durham Electric Power Co., and after a short period as a cadet in the R.A.F. he joined the staff of the North-Eastern Electric Supply Co., Ltd., in 1919 as an assistant electrical construction engineer in the company's South Durham and North Yorkshire areas. In 1924 he was appointed assistant engineer in charge of electrical construction work in those areas, and held this position until he was transferred in 1935 to the company's headquarters at Carliol House, Newcastle-on-Tyne, as chief assistant to the electrical construction engineer. In May, 1937, he became deputy engineer, and about six years later he took up his present position.

Mr. Ayres is a member of the North-East Coast Institution of Engineers and Shipbuilders.

Fluorescent Lamps in France

CCORDING to information furnished by a correspondent in Paris the Philips fluorescent TL.100

lamp is at present available in three shades of colour, "white," "warm white," which is rose tinted, and the "daylight" variety, for operation on

circuits at from 115

in diameter, the tube

alone absorbing

22.5 W while the total

loading including the

rare gas relay (starter)

and stabilizing device

is from 28 to 30 W.

The effective output

of light is claimed to be from 35 to 40

The lamp is said to be started instantly by means of a simple switch. It is one metre long and 35 mm

to 220 V.

a.c.



Fluorescent tubes used form a lighting to standard

The useful life of the lumens per watt input. tube is claimed to be twice as long as that of a good quality incandescent filament lamp. The provision of a diffuser, or screen, is not considered necessary and there is no appreciable temperature rise. These tubes are expected to appeal strongly for interior decorative illumination. The accompanying illustration shows a combination of three of the tubes to form a standard lamp. They are also used in pendant fittings and behind laylights.

Generating Plant Extensions

SINCE the beginning of this year, the Board has made Central Electricity arrangements with authorized electricity undertakings for the installation of the generating plant and boiler equipment, details of which are given below :---

Area and Station	Owners	Generating Plant (kW)	Boilers (lb. per hr.)
Scotland— Braehead Portobello Clyde's Mill	Glasgow Edinburgh Clyde Valley Co.	1 × 50,000 1 × 60,000 2 × 30,000	2 × 300,000 1 × 540,000 2 × 300,000
N.W. England Brom- borough Agecroft	and N. Wales- Birkenhead Salford	1×50,000 2×52,500*	2 × 300,000 4 × 315,000
M.E. England Skelton Grange Prince of Wales	Leeds Rotherham	2 × 60,000 1 × 50,000*	4 × 360,000 2 × 200,000
Central Engla Staythorpe Walsall	nd— Derby & Notts Co. Midlands J.E.A.	2 × 60,000 2 × 30,000	6 × 240,000 4 × 150,000
S.E. England- Barking Cliff Quay Southwick Rye House	County of London Co. Ipswich Brighton Northmet Co.	3×75,000 1×45,000 1×50,000 2×32,000	6 × 405,000 2 × 365,000 2 × 300,000 2 × 350,000
S.W. England Poole	& S. Wales— Bourne- mouth & Poole E.S. Co.	2×50,000	4×300,000
Total * Less and previous do 2 × 50,000 a	nendment of lirections for and 1 × 30,000	1,159,000	13,000,000
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		,02,000	

The 339,000 kW due for commissioning by the winter of 1948 includes 150,000 kW at Barking, 64,000 kW at Rye House, 100,000 kW at Poole and 25,000 kW due to amendments which have been made in previous directions as stated above.

The remaining 690,000 kW is required by the winter of 1949. Skelton Grange, Staythorpe, Rye House and Poole, are new stations not included in previous lists. A cooling tower of 3 million gal. per hr. capacity is to be installed at Clyde's Mill and two of 1.6 million gal. at Walsall.

Czechoslovakian Cable for Russia

The Prague correspondent of the Financial Times reports that the Kablo concern at Kladno has received a Soviet order for cables amounting to £1,000,000. It is stated that Russia is to furnish 500 truckloads of copper, lead, jute and rubber.

Views on the News

Reflections on Current Topics

N many matters Government control means a sharing (or maybe avoidance) of responsibility among several departments and unlucky applicants are passed from one to another. It is therefore with pleasure that I note that the Minister of Transport, in his statement on street lighting, said that as regarded procedure in this matter he had arranged with other Departments concerned that even when a number of Departments had to take action in a specific case, one application on the part of the lighting authority would be sufficient.

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The New Statesman and Nation is not at all pleased with the way the Government is handling the iron and steel industry which has been such that "the big steel men" have greeted it with "unconcealed satisfaction," suggesting that they have been assured that they need fear no nationalization Bill within the lifetime of this Parliament. The New Statesman asks if this is a turning point in the history of the Labour Government. "If the steelmakers can get away with it, cannot the vested interests in gas, electricity and transport be equally successful?" It is an interesting suggestion, but the cases of steel and electricity are so different. The electricity supply industry is too compact and well organized to escape the net; it will be needed to act as an example of how well a nationalized industry can run to offset some other not-sogood examples.

A London evening paper reports that the Indian cricketers have a "remarkable collection of British goods to take home with them," and specifically mentions electric kettles, electric irons and electric stoves. No indication is given of the composition of the remainder of the collection, but it does not seem to me that the desire of our cricketing guests to take home electrical appliances, which they have apparently come to appreciate during their stay in this country, is in any way remarkable. These same appliances may serve as useful samples for the Indian market.

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I have found that some confusion exists with regard to the registration of electrical contractors. In the first place there is the National Register of Electrical Installation Contractors—with which *Electrical Review* readers should be well acquainted as a good deal of matter has been published on the subject lately. Then there is the registration scheme of the Ministry of Works. Under

Defence Registration 56AB all persons undertaking building and certain civil engineering contracts are required to be registered by the Ministry. Unlike the N.R.E.I.C. this takes no account of ability to carry out the work. Anybody will be granted a certificate of registration unless a previous certificate has been withdrawn or the applicant has been convicted of offences under the building control regulations. It is therefore quite legitimate for incompetent operators to describe themselves as "registered contractors," but if they use the term "registered electrical contractors," not being on the National Register, they are on rather uncertain ground and anyway they are deceiving the public.

In commenting on the proposed emergency conversion of 1,200 main-line locomotives to oil firing, *The Times* suggests that the advantages of railway electrification may be correspondingly increased as coal becomes more costly. This is certainly correct in regard to fuel saving, since the 14 million tons of coal per annum could be replaced by not more than 5 million tons burned in power stations. Moreover, the first figure relates to coal classed as "large" and therefore suitable for other purposes. In spite of progress in power station efficiencies, the Central Electricity Board could hardly offer terms so favourable to electrification as it could before recent advances in the price of coal, which have borne no relation to its commercial value, upset the economic balance.

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There was a sports discussion in a television programme one evening last week and in the course of it a speaker referred to the possibility of carrying on football, tennis, etc., by artificial light to give working people more opportunities of participating in these sports. He referred to what was being done in Sweden in this way. Such arrangements would not be new to this country; there were quite a number of schemes of this kind before the war and even to-day illuminated dog-racing tracks are common. At the moment, I suppose, Mr. Shinwell would look askance at anything which added to the consumption of fuel, but I will risk the displeasure of dog-racing enthusiasts by suggesting that lighting used for football or tennis would be less of a waste than that employed at the country's numerous greyhound "stadiums" (or stadia).—

REFLECTOR.

Swedish Water Power Resources

One-Third of Total Developed

BOUT one-third of Sweden's total potential water-power resources estimated at 40,000 million kWh a year are at present utilized, according to Swedish Foreign Commerce, published by the General Export Association of Sweden. The aggregate capacity of the hydro-electric stations is to-day approximately 2.5 million kW, and the total power output in 1945 amounted to 13,500 million kWh. This figure corresponds to a production per in-habitant of 2,050 kWh per year, which is surpassed only by Norway, Canada and Switzerland. Owing to the shortage of imported fuel the Swedes had to expedite the development of their water-power resources during the war. While in the years 1936 to 1940 the water-power production only grew by about 1,200 million kWh, the increase during the following period up to 1945 totalled about 5,000 million kWh.

As the falls in central and south Sweden, which are the most industrialized and densely populated areas of the country, are almost fully utilized, further demands for power must mainly be supplied from the northern parts of the country, where already a large number of power plants are in operation. Among existing stations, Trollhattan, 50 km north of Gothen-burg, and Krangede, on the Indal River, in the north, are two of the largest with a capacity of over 200,000 kW each. They will, however, be surpassed by the plant now in the course of erection at the Harspränget falls in Lapland, which will have a capacity of approximately 260,000 kW. In addition several plants of between 20,000 and 100,000 kW are being built. The number of steam-power stations in Sweden is relatively small, and many of these, especially

the big ones in Visteris, Stockholm and Malmo, are chiefly used as stand-by stations.

The transmission of electric power from distant parts of the country has required the building of an extensive power line system. There are at present four long-distance trunk lines, a fifth line will be ready in 1947, and a sixth and seventh in 1949 and 1950 respectively. One of them has a length of over 700 km and will later on be increased to 1,000 km or more.

All power stations of any importance in the country are now interconnected, and a joint central distribution organisation in which the private owners and Government-owned plants are collaborating on a voluntary basis, has been set up, to control this network.

In terms of capacity, the Swedish Government owns 36 per cent of the water-power plants, industrial companies 24 per cent, municipalities 6 per cent and private hydro-electric power companies 34 per cent. About 70 per cent of the energy produced is absorbed by the industries. The railways consume 10 per cent and the balance of the energy produced, 20 per cent, is consumed by small industries, farms and households. All towns and villages are completely electrified, and in the countryside 85 per cent of the houses have electricity supply.

The exploitation of Sweden's "white coal" is, however, growing ever more expensive as most of the falls within convenient reach and comparatively easy to harness, have now been developed. Many of the new plants, like Harspranget, are being built in desolate parts of Norrland or require the blasting of enormous discharge tunnels in order to create sufficient height of fall for the turbines.

Electricity Supply in Russia

THE August issue of the Engineers' Digest contains a translation of an article on the Russian electricity supply industry published in Electrotechnicky Ohzor. According to this, "the Soviet Government attaches no particular importance as to whether the individual power stations are under the control of the State, of municipal corporations or of industrial works. The main concern of the experts in charge is reliability and economy."

Electricity supply undertakings are in four groups. The large district power stations, which account for about three-quarters of the total installed capacity, are under the jurisdiction of the Ministry of Electricity Supply. There are four regional grid systems comprising the most important industrial and mining areas.

The other three groups, which cover smallcapacity stations of merely local importance, are the municipal stations (under the Ministry of Municipal Affairs), the rural stations under the Ministry for Agriculture and the industrial stations. The groups are supervised by a central planning commission. Each of the four regional grid systems has a managing office and each individual undertaking has a manager appointed by the Ministry of Electricity Supply. The senior officers are nominated by the regional managing office and the rest of the staff by the manager, who is responsible for the technical and administrative sides of the undertaking. He is assisted by a works council which assists in maintaining discipline.

It is stated that each undertaking is given a definite "target" and if this is bettered any additional profit is shared by the management and staff. Employees' wages are determined by their qualifications and the amount of work done individually, a certain minimum being required of every employee.

CORRESPONDENCE

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

Domestic Water Heating

WITH reference to the article which appeared on page 135 of your issue of July 26th, some years ago I carried out detailed tests on various arrangements of immersion heaters and on circulators, using a cylinder suitably designed to observe temperatures at various levels, and I reached the conclusion that the best arrangement is a vertical immersion heater.

As soon as this is switched on, hot water begins to rise in contact with the element. I found that the production of hot water at the top of the cylinder is nearly as rapid as with a circulator and without the disadvantages of the circulator under thermostatic control, which are the low *average* temperature of the water in the cylinder and the high temperature of the water inside the top of the tube, which causes rapid scaling. I have known circulators in North London to become completely choked with scale in less than a year.

With a long vertical immersion heater, the installation can be run with a higher average water temperature than with a circulator, and yet with a lower maximum temperature. This ensures better service from a given cylinder and freedom from excessive scale. It might be noted that the vertical immersion heater has been adopted as standard in practically every make of lagged storage water heater.

Abergavenny, Mon. W. C. McCallum.

Immersion Heater Terminals

WE should like to draw the attention of manufacturers to the inconvenience caused by not having the connection terminals marked and printed instructions given for three-heat control or thermostat connections. The general practice appears to be four unmarked terminals forming the connections for two circuits, two of which have to be bridged when connected to a thermostat.

In these days, particularly, when purchasers have to get a plumber or fit the heaters themselves due to shortage of skilled electricians, they often complain that the heater does not work or else it takes hours to get any hot water (due entirely to wrong connections). Once the heater has been fitted

to the tank, it is very difficult to explain to clients how the circuit can be traced out. This applies even to the skilled man; if he has fitted the heater before noting the tube or blade formation, time has to be wasted in testing out the circuits. Surely it is a simple matter for manufacturers to remedy this obvious omission.

MORTIMER, GALL & CO., LTD. London, E.C.4. G. S. GORRINGE, Sales Department.

"A Universal Plug-Now"

It is becoming increasingly plain that "Plain Engineer" is one of the type of people who will agree to any plug and socket so long as it is his particular fad. It is difficult to get some of our colleagues to agree to anything. However, there is one fact which we must all acknowledge and that is for so many years the engineers in our industry have not had the moral courage to grasp the plug and socket situation and settle it once and for all.

It is surprising that our consumers have tolerated the situation for so long and it is now apparent to me that my friend "Plain Engineer" has identified himself with a particular plug and socket and is most reluctant to contemplate any change at all. I would like to reassure him that he is not alone in this. We are all facing this, and while the building programme is in its present state, it is a sobering thought that we have no universal standard ready at the present moment.

The "small body" purporting to represent the views of the industry to which your correspondent has referred covered as wide a field as possible and I give the constitution of that body at one stage of the proceedings. In addition to this, a number of deputations were received and their proposals were considered at great length and patiently. With a little thought on the matter it will be appreciated that the Technical Committee of the B.S.I. is charged with the task of producing a specification, which is a most difficult job and should have all help from the rest of the industry.

Whether this question is settled this week or next year, the fact remains that we are at last putting our house in order, and that in itself should be some compensation for the inconvenience which is bound to occur at some stage or other.

I maintain that this is the time to carry out the change and I think it can be done intelligently and with tolerance.

Halifax.

A. G. CONNELL, Engineer and Manager.

[The list appended by Mr. Connell to his letter includes the names of representatives of the following bodies on the B.S.I. Electrical Industry Committee under the chairmanship of Dr. C. C. Paterson, O.B.E. (now Sir Clifford Paterson) Admiralty, General Post Office, M.O.L. Factory Department, National Physical Laboratory, Ministry of Works, Ministry of Supply, Central Electricity Board, railway companies, Electricity Commission, Association of Consulting Engineers, B.E.A.M.A., E.R.A., Cable Makers' Association, Electrical Contractors' Association, Electric Lamp Manufacturers' Association, Incorporated Association of Electric Power Companies, London Electricity Supply Association, Provincial Electric Supply Association, Incorporated Municipal Electrical Association, Public Service Transport Association, Institution of Electrical Engineers, Electric Light Fittings Association, Air Ministry, British Electrical Development Association and Ministry of Fuel and Power-EDITORS, Electrical Review.]

Fluorescent Lighting Effects

N his article in your August 16th issue Mr. R. O. Ackerley quotes the *British Medical Journal* as referring to "speculations as to possible ill-effects of fluorescent lighting," but surely when considerable numbers of users, both here and in America, experience eye trouble, headaches, etc., when working with this type of lighting it is reasonable to attribute the trouble to some harmful effect of the light.

If only one or two instances were known one might admit the possibility that the trouble was due to some other factor than the light and that it just happened to coincide with the period when this light was being used, but such instances are far too numerous to be dismissed as "coincidences" and incidentally when the *British Medical Journal* says that "no valid evidence of harmful effects is known" one would like to know what is meant by "valid evidence" and what more valid evidence is required than the fact that so many people appear to suffer from various eye and head troubles after using fluorescent lighting.

Surely it is not so much evidence of

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harmful effects that is lacking as knowledge of how and why such effects are produced. "H.H.'s" suggestion in your issue of

August 30th that the practically undamped frequency oscillations are the real or chief cause of the trouble seems very cogent, as such oscillations must have a more marked effect upon the retina and iris muscles than the same oscillations applied to a hot filament which largely damps them.

I am a little surprised that Mr. Ackerley, and apparently Mr. Weston and others, should attribute all these troubles to faulty design and layout, for surely manufacturers of the equipment should be able either to install it correctly themselves or to instruct their salesmen and agents as to how it should be installed. If they are not competent to ensure its correct installation may we not equally doubt these manufacturers' competence to produce an article which is harmless in itself?

There have been quite a number of articles and letters in the technical press recently professing to "refute" the rising tide of complaints by users of fluorescent lighting and this fact alone seems to indicate that at all events there is something quite serious to refute.

Incidentally, this form of lighting is claimed to be economical in power, yet I find that 7 or 8 watts per sq ft is quite commonly being used, while in the old days of ordinary filament lamps $\frac{1}{4}$ to $1\frac{1}{2}$ watts was about the usual range: in fact the latter figure was colossally high for direct lighting, yet the fluorescent type of lighting is direct and now we are being told that the cause of the trouble is that the intensity of the light is not high enough.

London, W.C.1. G. V. DOWNER.

Is There a Shortage?

OBSERVE in the "Electricity Supply" notes in the *Electrical Review* of August 23rd the report of the borough engineer of Sunderland on the shortage of electrical equipment for houses.

If he will take the trouble to go to one of the chain stores, he will find enough switches, holders, etc., to carry out this work. I noted in Sheffield this week huge quantities of all types of accessories, by a maker of good repute, on sale and this, I think, is general in most towns.

Nottingham. WA

WALSALL CONDUITS, LTD. E. P. PRIOR, District Manager.

PERSONAL and SOCIAL

News of Men and Women of the Industry

THE September meeting of Blackburn Town Council will be asked to agree to a new salary for the borough electrical engineer (Mr. R. H. Harral), which will not carry war bonus or fees paid for pupils, both systems being abolished. The salary for the position will be increased from £1,534 to £1,650 rising to £2,052, in accordance with the "Walker" scale.

Mr. H. E. Annett, M.I.E.E., who, as we reported in our last issue, is retiring from the



Mr. H. E. Annett

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ue, is retiring from the position of borough electrical engineer at Bolton in January next, received his technical training at Faraday House from 1899 to 1903, and the whole of his career has been spent with the Bolton electricity undertaking, where he commenced in 1902 as a junior engineer. He occupied the successive appointments of engineer in charge, station engineer

and resident engineer, before becoming borough electrical engineer and manager in 1927.

A presentation was made recently to Mr. G. H. Lake, who has retired from the position of city electrical engineer at Nottingham, by the staff of the Electricity Department. The presentation took the form of a cheque and facsimile of an inscribed silver plate which will adorn a television set which Mr. Lake proposes to obtain with the cheque. The presentation was made by Mr. M. Wadeson, deputy electrical engineer, and Mr. Lake in accepting the gift referred to the happy relations which had always existed between himself and the staff.

Mr. W. J. Forster informs us that he has now taken up his appointment as borough electrical engineer at Wallasey.

Mr. H. C. Johnson, assistant installation and meter superintendent with Barking Corporation Electricity Department, has been appointed installation engineer in the High Wycombe Corporation Electricity Department.

Mr. H. R. Mills, M.Sc. (Lond.), A.M.I.E.E., has been appointed Assistant Director of the Science Department of the British Council. Educated at Taunton's School and University College, Southampton, he became a Professor of Physics in the Madras Christian College and specialized in spectroscopy. In 1935 he was appointed principal of the Cochin State Government College, affiliated to Madras University,

and served as a member of the Senate and the Academic Council. During the war he served in the Royal Indian Navy as an engineer lt.-commander, engaged in anti-magnetic mine work and the training of electrical officers. In 1943 he was appointed Assistant Director of Education at Naval Headquarters, India, and liaison officer with the Director of Admiralty Research and Development (India).

Capt. P. Gibson, R.M., formerly of the Ministry of Works, has been appointed resident engineer manager by Neale & Partners, Edinburgh.

The Sheffield City Council has approved an increase of the salary of the general manager and engineer of the Electricity Department, **Mr. John R. Struthers**, to £2,500 per annum.

Mr. J. C. Fraser, M.I.Mech. E., manager and engineer of the Johannesburg Electricity Department, is now paying his first visit to Edinburgh since he left there in 1904.

Mr. T. G. Symonds Babb, C.B.E., Chief Mechanical and Electrical Engineer of the Air Ministry Directorate-General of Works, and Mr. T. E. H. Pitt Kennedy, O.B.E., Superintending Engineer, retired at the end of August. They were entertained at the Savoy Hotel, London, on Saturday last by the senior staff of their Division, when Sir Ernest Holloway, K.C.B., O.B.E., Director General of Works, made presentations to them from their colleagues. Mr. Babb will be succeeded as Chief Mechanical and Electrical Engineer by Mr. A. Watson, B.Sc., M.I.E.E., M.I.Mech.E.

Mr. R. G. Flanagan, who during the war was inspector of cooking equipment, Northern Command, has returned to Carron Company as Northern sales engineer, Electric Cooking and Heating Dept. Mrs. Flanagan is resigning her position with the company, held during Mr. Flanagan's absence.

After forty-six years with the Post Office, Mr. A. E. Ryland, telephone manager in the Newcastle-on-Tyne area is to retire and will be succeeded by Mr. F. Hobbs, at present telephone manager at Middlesbrough. Mr. Ryland went to Newcastle as telephone traffic superintendent eighteen years ago and in 1932 was appointed telephone manager in South Wales. In 1936 he returned to Newcastle as telephone manager. He was awarded the O.B.E. during Mr. Hobbs was telephone manager the war. at Middlesbrough for two years. Mr. W. J. Bentlett, who was previously telephone manager at Middlesbrough, but has been doing special work in Germany, is returning to his former post at Middlesbrough.

Long service presentations were made in the works canteen of W. T. Henley's Telegraph Works Co., Ltd., on August 26th, when five veterans received gifts of national savings certificates. These veterans, who had each completed over forty years' service when they retired at the end of June, were Messrs. E. Humphrey, W. H. Young, M. Sullivan, G. T. R. Ling and W. S. Vamplew. Mr. A. W. McArthur, M.I.E.E. (works manager), opened the proceedings and Sir Montague Hughman (chairman) made the presentations. Other officials present included Mr. A. T. Winder (assistant works manager), Mr. H. A. Hughes (personnel officer), Mr. S. E. S. Sellers (foreman, Rubber Covering Department), Mr. J. H. Savage, M.I.E.E. (chief electrician), Mr. G. H. Morris (foreman, Lead Covering Department), and Mr. J. T. Alderton (foreman, Laying-up Department).

Another Henley long service employee who has recently retired is Mr. P. J. Cross (chargeman), who commenced with the company in 1906. Mr. A. W. McArthur presided at a presentation ceremony held at the works on August 23rd and paid tribute to the long and faithful service rendered by Mr. Cross.

The Caroline Haslett Trust has now awarded its scholarships in electrical housecraft for the session 1946-47. In accordance with the terms of the trust deed there has been a geographical distribution of scholarships, and this year's holders will train at colleges in Aberdeen, Newcastle, Bath, London, Liverpool and Bristol.

The scholarships, which are worth £150 for the session, have been granted to the following: Miss Margaret Nichol Burton (Liverpool); Miss Jill Oliver (Birmingham), Miss Barbara Cecil Redford (Bowdon, Cheshire), Miss Elizabeth Ruth Musson (Musselburgh), Miss Sadie S. Silver (Hull), and Miss Brenda May Gawne (Wallasey). The Committee have also made a grant to Miss Fay Constance Lynton, of Douglas, Isle of Man, who will train at the Manx Technical College.

Appointments Vacant.—Among the vacant positions advertised in this issue are the following:—Electrical engineer and manager at Bolton (salary £1,600 per annum, plus bonus); assistant designing engineers, senior engineers and engineers in the New Zealand State Hydro-Electric Department (salaries £800-£850, £565-£800, and £435-£500 respectively); chief constructional assistant, Brighton Electricity Department (salary £1,000 per annum, plus war bonus); power installations engineer and installation engineer, Sheffield Electricity Department.

Obituary

Mr. G. Gledhill.—The death occurred on September 2nd of Mr. Gilbert Gledhill, a director of Gledhill-Brook Time Recorders, Ltd., and a past chairman of the Incorporated Sales Managers' Association. He was fiftyseven.

Wills.—Mr. A. J. Fuller, M.I.E.E., borough consulting and electrical engineer of Fulham, and a past-president of the Incorporated Municipal Electrical Association, who died in February, left £17,273 (net personalty £15,403).

Mr. R. W. Moore, of Whipp & Bourne, Ltd., left £995 (net personalty £937).

Mr. F. M. Platt-Betts, Kensington, left £201, all to the Electrical Industries Benevolent Association "in consideration of benefits received."

I.E.E. Students' Sections

THE opening meeting of the South Midland Students' Section of the I.E.E., for the 1946-47 session will be held on September 11th at 6.30 p.m. at the James Watt Memorial Institute, Great Charles Street, Birmingham, when Mr. F. Crook (chairman of the Section), will give an address on "Electric Resistance Furnaces."

The summer outing of the North Eastern Students' Section of the I.E.E. will take place in the High Force Area on September 15th. A motor coach will leave Newcastle Central Station at 9.30 a.m. and will proceed to Langdon Beck where it will meet a coach carrying members of the Teeside Area. Members should bring their own lunches, but tea will be served at the High Force Hotel. As usual ladies are cordially invited. The party will be limited to thirtytwo from Newcastle area and twenty from Teeside and the cost of the outing will be 14s. 6d. per person, payable in advance.

Members wishing to travel from Newcastle should notify Mr. J. L. Morris, while those from Teeside should get in touch with Mr. F. Linsley for further details.

Liverpool Electrical Engineering Courses

PART-TIME day courses for electrical engineering apprentices will be held at Liverpool City Technical College during the winter session, which commenced on September 2nd. The courses have been devised for apprentices engaged in various sections of the electrical engineering industry—general electrical engineering, electrical installation work, manufacture of electrical apparatus and specialities, maintenance work and power generation, distribution and utilization. The Electrical Advisory Committee consists of representatives from the Automatic Telephone and Electric Co., Ltd., the City Electrical Engineer's Department, Electrical Contractors' Association, P.O. Telephone Department, and the Electrical Trades Union. There are also evening courses in electrical engineering.

Institute of Welding

The North London Branch of the Institute of Welding is holding a meeting on Wednesday next at the Polytechnic, Regent Street, W.1, at 7.30 p.m. when Mr. T. J. Palmer will give a lecture on "The Weldability of Malleable Cast Iron."

Street-Lighting Equipment

Exhibits at Next Week's A.P.L.E. Conference

ALTHOUGH the exhibition, which is to be held from Tuesday to Thursday next week at the Central Hall, Westminster, in connection with the Association of Public Lighting Engineers' Conference, will include much apparatus that is already well known, many new products make their first appearance. The preponderance of electrical apparatus continues to increase and three-quarters of the forty displays are of wholly or mainly electrical interest. The growing popularity of electric discharge lighting is also very noticeable. Brief details of the exhibits follow:—

Automatic Telephone & Electric Co., Ltd.— An exhibit showing the "Rythmatic" centralized remote control system is designed to represent a typical power station control room through the windows of which can be seen a model city with a complete network of street lights. In all other respects the exhibit is "life size" and visiting engineers may inspect a standard control desk and take over the control of the model network, injecting signal frequencies generated by a motor alternator of the type suitable for small installations. The switching operations which they have initiated can be seen functioning.

Prominence is given to the galvanometer type relay responding only to one predetermined frequency impulsed at a fixed rate or "rhythm." This dual selective principle of the relay ensures complete reliability in operation and immunity from interference. Moreover, its design imposes no limitations on the method of injection employed.

Brighton Lighting & Electrical Engineering Co., Ltd.—This company will exhibit a comprehensive range of street lighting lanterns, brackets, both for pole and wall mounting, time-switch, fuse-switch and control gear in cast-iron boxes, illuminated pillars for traffic control, and flood-lighting projectors. For Group "A" lighting two new types, the "Triplite" and "Multilite" lanterns employ three gas-filled lamps in line. For Group "B" lighting there are types with single or double-piece refractor glassware, giving the maximum light output and control. Attention is also drawn to "Bleeco" illuminated bollards with traffic signs, and a new cast aluminium flood projector.

British Electrical Development Association.— Attention is drawn to the prominent part played by electricity in providing economical, safe and adequate street lighting. Charts illustrate the progressive reduction in the average price of electricity used for street lighting, the large and steady expansion in the amount of electricity used annually, and the quantity of illumination obtainable from various types of electric lamp per lb of coal per kWh generated. Other illustrations relate to the main principles governing the siting of street lamps, to particulars of various large authorities who have recently decided to adopt electricity for street lighting, and to the many advantages of this source of illumination.

British, Foreign and Colonial Automatic Light Controlling Co., Ltd.—Among a comprehensive range of time switches from 5 A single contact to 50 A mercury break, special interest is centred in the 10-A model "GF," made in hand-wound clockwork or synchronous motordriven types. This is one of the smallest switches on the market, and is adaptable for use either in lamp standard bases, watertight cases or for fitting to existing control boxes. It has hand control for operating the switch or for test purposes. Change-over, two-circuit control and multi-operative switches, together with models for special purposes; are also shown.

British Thomson-Houston Co., Ltd.—Illuminated panels show how the careful siting of the appropriate type of street lantern can make



B.T.H. "Mazdalux "horizontal enclosed lantern

striking improvements to the lighting of public highways. Typical cross roads, roundabouts, "T" junctions, bends and single and dual carriageways are depicted to demonstrate how the maximum amount of light can be directed where it is most needed. The "Mazdalux" lanterns displayed are typical of the very wide range designed by the company to meet all requirements. A new range of lanterns designed to accommodate every size and type of "Mazda" and "Mercra" lamp used for street lighting, includes a horizontal enclosed type (illustrated) and makes it possible for an entire city, and all the roads leading to it, to be lighted with lanterns which have a uniform daylight appearance.

Concrete Utilities, Ltd.—A full-size sectional model of a 1 ft 6 in. bracket illustrates the

method of taking the cable through to the lantern, patented tension bolt fixing, and safety tube. There are also scale models of the latest lamp columns, with sections of concrete in various colours and finishes.

Edison Swan Electric Co., Ltd.—Several new street lighting fittings will be available early in 1947. The range displayed includes the "London" minor, medium and major lanterns.

Electric Street Lighting Apparatus Co.-Reflectors of the "Bi-Multi" system include



"Esla Bi-Multi AL/IHS" reflector for 85-W or 140-W sodium lamp

designs for use with sodium lamps, the "AL/ 1HS" (45-W lamp) (illus.), "AL/2HS" (60-W) and "AL/3HS" (85-W or 140-W). All have the distinctive mirror facet construction.

Engineering & Lighting Equipment Co., Ltd.— The "Orbital" lantern is completely water-tight and the refractor plates are of improved design to give greater efficiency. The "Hamilton" fitting with its one-piece aluminium alloy body is designed for top or side suspension, while the "Golden Ray" fitting for sodium lamps has had the prismatic plates redesigned.

A new range of fittings will be exhibited for tungsten filament lamps, the "Royston" and "Stevenage," suitable for 300-500-W gasfilled or 80-125-W fluorescent mercury lamps, consisting of a one-piece aluminium alloy casting with a specially designed single-piece refractor.



"Ware" lantern (Engineering & Lighting Equipment Co.)

The "Stevenage" has a clear outer globe and the fitting is dust-proof. The "Welwyn" and "Ware" (illus.) for 60-200-W tungsten filament lamps or 80-125-W mercury lamps, have a

new design of single piece refractor, giving two-way distribution at 170 deg in the horizontal plane. The "Ware" has a clear outer globe and the fitting is dust-proof. There will be other fittings, new raising and lowering gear with only one moving part, a winch, control gear boxes, and ripple control relay units.

Falk, Stadelmann & Co., Ltd.—To comply with the findings of the M.O.T. Committee on street lighting in its final report all of the eight "Efesca" lanterns shown, except one, incorpor ate a bowl or dome type prismatic refractor. Both of the two types intended for Group "A" roads, the "Hilux" (illus.) and "Hotspur," are of the enclosed type taking 250- or 400-W m.v. lamps. For Group "B" roads there are



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Falk, Stadelmann " Hilux " lantern

three enclosed units, the "Albacore," "Comet" and "Dragon," and three open type, the "Albatross," "Dalux" and "Albemarle."

Foster & Pullen, Ltd.—Scale models indicate the range of public lighting equipment available. Any Group "B" scheme can be carried out by one or other of the lanterns shown.

General Electric Co., Ltd.—A range of street lanterns includes three new designs. A unit of rather unorthodox design for side streets (illus.) is a two wing directional lantern, each wing carrying six flat mirror facets. Side entry suspension at 30 deg from the vertical ensures that no condensation can enter the lantern from the bracket. The lantern can be used with filament lamps up to 200 W or with either of the two small "Osira" h.p.m.v. lamps. A new side street lantern for sodium lamps has windows in each side into which are cemented two 10-in. by 5-in. refractor plates with sealed prisms. The lampholder and lamp steady are carried on an over reflector which hinges downwards to facilitate wiring.

Originally known as the "Double Dish" lantern, the "Dioptrion" lantern gives a controlled cut-off form of light distribution and is arranged for use with 250-W or 400-W horizontal burning m.v. lamps. It incorporates a magnetic deflector. Arranged for side entry



G.E.C. faceted reflector lantern forside streets

mounting, the die-cast, light alloy body carries two large dish-shaped refractors so that more than 90 per cent of the lantern surface is trans-

lucent. Despite this practically no light is directed above the horizontal. A refractor plate lantern for sodium lamps for main road lighting can be used with 85- or 140-W sodium lamps. The "Uniway" lantern giving unidirectional lighting has advantages for lighting dual carriageway roads. It takes 80-W or 125-W m.v. lamps. The versatile "Difractor" lantern can be used for nearly every kind of main road lighting.

Gowshall, Ltd. —This company's illuminated guardposts have a high finish and are designed for ease of installation and maintenance. All components are standardized and can quickly be replaced on site by unskilled labour. Internally illuminated signs and external lighting fittings are displayed.

Holophane, Ltd.—Attention is drawn to the remarkable degree of resistance of Holophane glass refractors to temperature variations, moisture and atmospheric impurities, and to their robustness

and durability, which make them suitable for use in any climate. The company's Special Service Department is available to advise and assist with any particular problem and to suggest lay-outs to meet specific requirements.

Horstmann Gear Co., Ltd.—Among a range of time switches the type "K" unit has the smallest practicable overall dimensions consistent with safe design. Self-starting synchronous motor-driven movements are fitted as standard. Special attention is directed to adequate provision in design and layout of the switchgear. A new electric wind movement has been evolved and solar dials are becoming increasingly popular.

Measurement, Ltd., shows its "Actadis" ripple control equipment. From its experience

over the past twenty years the company guarantees that mal-operation of these relays will not exceed 1 in 10,000. To achieve this reliability the series emission method has been adopted, making it possible to propagate a powerful signal and to employ a correspondingly robust and simple relay of positive response. Other advantages claimed are minimum spillover interference: freedom from inadvertent operation by harmonics and surges; no limitation on network extensions; emission may be sectionalized, providing greater flexibility and better voltage regulation; and foolproof operation due to absence of complicated time coding. Another interesting exhibit is a rotating miniature reproduction of the "Actadis" installation which has been put in at Hazel Grove electricity works (illus.).



"Actadis" contactor panel (Measurement, Ltd.)

Metropolitan-Vickers Electrical Co., Ltd. – A comprehensive range of street lighting lanterns includes units for both Group "A" and Group "B" roads. The "Trafford" lantern (illus.), for use horizontally with 250-





or 400-W m.v. lamps, gives close control of light in the vertical plane to ensure optimum distribution for maximum road brightness, with the avoidance of glare. The "Gower" bowl refractor lantern, with a copper body riveted to a cast-iron canopy, is suitable for use vertically with 250- and 400-W m.v., 80- or 125-W fluorescent m.v. lamps, or with a dome refractor and clear outer well glass, 300- or 500-W m.f. lamps. Either two-way axial, two-way non-axial, or symmetrical distribution in plan is available with either type of lantern. Taking the same range of lamps the "Urmston" lantern has a neat arrangement for side-entry mounting. Available in three different lengths to take 45-, 60-, 85-, or 140-W sodium lamps, the " Poplar " lantern provides distribution of 160 deg in plan as standard, although a distribution of 180 deg can be supplied if required.

For Group "B" roadways, the "Ealing" unit is a top entry bowl refractor lantern for side street lighting. The one-piece bowl refractor supplied as standard gives a two-way non-axial distribution, but alternatively a bowl providing a symmetrical distribution can be supplied. It can be used with 80- or 125-W m.v. lamps or 100-, 150- or 200-W m.f. lamps. The "Welwyn" top entry lantern, for 100-150or 200-W m.f. or 80-125-W m.v. lamps, consists of a one-piece aluminium alloy casting having a high resistance to corrosion. The complete lampholder assembly is readily removable.

Philips Lamps, Ltd.—The six ratings of mercury and fluorescent mercury lamps and the four of sodium will figure prominently on this stand. Attention is also drawn to lanterns shown by other exhibitors incorporating these lamps.

Poles, Ltd.—In addition to small-scale models of "Adastra" galvanized sectional steel street lighting columns, there is a display of photographs of sixteen standard types of column suitable for Group "A" and Group "B" lighting and for supporting ornamental lanterns. On the front of the stand, at either side, are fixed a short hexagonal and circular column made from actual components used in practice. Components such as standard bracket arms in galvanized steel and spigot adaptors in cast aluminium alloy will be on view, together with a full size base section with inspection door and detachable slotted steel instrument panel fixed inside the column.

Radiovisor Parent, Ltd.—The Radiovisor lighting control unit operates according to daylight intensity. Lamps are automatically lighted during premature darkness in the daytime, and automatically extinguished when normal daylight conditions return. The unit, is being used for the control of street lighting, lighting in offices, factories, railway and works yards.

Record Electrical Co., Ltd.—A working model of a portion of a town lighting system illustrates some applications of the Record remote operated selective switching units. Selective switching of lights is shown on two different systems of wiring—through a pilot wire, and by interruption of the main circuit when no pilot wire exists. Both schemes can be operated from a central point, either manually or by a time switch to give any pre-arranged combination of lighting up to eight.

Revo Electric Co., Ltd.—Lanterns of the "cut off," "semi-cut off" (illus.) and "non cut-off" types for use with sodium, m.v. and



Revo "controlled light" fitting for 140-W sodium lamp

tungsten lamps provide wide distribution both laterally and longitudinally to give good illumination on the pavements as well as on the roadway. Graphs and illumination data will permit ready comparison of the relative merits of these units.

Two other interesting exhibits are a prototype unit for street lighting using twin 80-W fluorescent lamps, and a lantern combining high efficiency in sodium light distribution with a certain amount of colour correction laterally for shopping centres.

Sangamo Weston, Ltd.—A display of meters includes Sangamo "Type HMT" house service meters of the single-, double- and triple-element the "Model S.11" rotating subpattern : standard meter for checking house service meters; and the "Lincoln" thermal type maximum demand indicator. Synchronous motor-driven time switches are available with a standard 24-hour dial, a solar dial, or with a 1-hour dial. The day omitting device enables the whole sequence of operations to be cut out on any predetermined day or days of the week. The model S.16 hour meter is designed to record the number of hours during which an electrical circuit or electrical apparatus has been functioning.

A new range of moving coil, moving iron and dynamo meter instruments comprises 12-in. scale laboratory standards, 6-in. scale sub-standard and switchboard models and miniature panel mounting types in various sizes. The dynamometer wattmeters are to be supplied as single-, double- or triple-element types. Single-phase sub-standard wattmeters are available in three forms. The 6-in. scale moving-iron instruments have linear scales down to 10 per cent of the maximum reading.

A new 54-range, 6-in. scale test set gives measurements over a wide range of voltage, current and resistance including insulation.
resistance at 500 V d.c. A pocket-type footcandle meter for general checking purposes is another new product.

Two types of moving-coil relays are exhibited, one for automatic control and the other with magnetic contacts which will not release until reset by hand or by remote electrical control. Both relays can be made to operate on currents as low as 5 µA.

Siemens Electric Lamps and Supplies, Ltd.-"Sieray" electric discharge lamps, chokes and capacitors are arranged to show their internal construction. Two lanterns for Group "A" roads are the "Barnet-Sieray," incorporating Holophane refractor panels for use with the 250- and 400-W "Sieray" m.v. or 300- and 500-W " Sieray-Dual " lamps; and a new bowl refractor lantern.

For Group "B" lighting an enclosed version of the "Newton-Sieray" minor lantern in-corporates a single-piece dome refractor, a clear-glass outer globe assisting maintenance in a dust-laden atmosphere. A second lantern is the "Marton-Sieray," a small bowl refractor unit. A working model of lantern raising and lowering gear demonstrates features of the contact head, in which the number of moving parts has been minimized.

A sample lighting scheme prepared by the Siemens Illuminating Engineering Department is available for inspection. The stand is lighted by 80-W "daylight" fluorescent tubular lampe in decorative fittings of a type suitable for uss in public buildings. Photographs of other designs can also be seen. The lighting of the showcase is carred out with the new 2-ft. 20-W " Sieray " fluorescent lamps.

Spun Concrete, Ltd.-Reinforced concrete hollow spun poles are a speciality of this firm, which claims by means of its centrifugal process to ensure uniformity at high density of concrete approximately 160 lb per cu ft; absolute impermeability; infallible centralization of the reinforcement; and minimum weight with maximum strength.

ELECTRICAL REVIEW

Ltd.-A working model using "Perspex" strip lighting indicates the basic principles of operation of the company's d.c. bias system of street lighting and off-peak load control. The operation of the various items used in this system is also demonstrated. A comprehensive range of the heavier grades of rubber and p.v.c. cables covers all types of public lighting installations. Attention is also drawn to the time-saving features of "Stanelco" resistance heating soldering tools.

Stanton Ironworks Co., Ltd.-A spun concrete lighting column is surrounded by a small stand in which there will be a porthole to allow the root to be seen. Three 2 in. to the foot scale models indicate other types of column. The Stanton column has a smooth granolithic finish obtained by grinding after the centrifugal moulding has taken place. This results in a permanent finish which does not require painting or other maintenance.

Stewart & Llovds, Ltd.- A lighting column 15-ft mounting height, complete with swan-neck bracket, is shown fitted with switchgear, condensers, etc.; also a pillar type lighting column, with lantern and lighting unit, and cast-iron dwarf hase for ornamentation purposes if desired. In addition there is a base section of a 25-ft mounting height lighting column generally used for lighting traffic routes, together with part of the upper fluted shaft, collars and footpieces. Photographs show other types of lighting columns.

Venner Time Switches, Ltd.-Of special interest among a wide range of time switches of the hand wound, electrically wound and synchronous motor driven types is Type " MSSL, a self-starting synchronous motor driven solar dial unit. A demonstration set shows the application of the Venner pilot relay system to the control of public lighting. Various types of clocks and synchronous movements, as applied to time switches, will also be shown by the company.

Jet-Propulsion Engine

NOTABLE feature of the exhibition to be A held by the Society of British Aircraft Constructors at Radlett, Herts, from September 12th to 15th will be an F2/4 Metropolitan-Vickers axial-flow jet-propulsion engine. This engine is the latest form of those installed in the Gloster aircraft which in November, 1943, made the first flight of a British machine powered by this type of engine and which embodied experience gained by the company in designing gas turbines for the same purpose since 1938; this in turn owed much to the research carried out by the company on materials for use with high-temperature steam.

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The engine to be shown is 13 ft 3 in. long and 3 ft 3 in. in greatest diameter and weighs 1,750 lb. Its maximum speed is 7,700 r.p.m. and its specific fuel consumption is 1.05 lb per hr per lb; the rated thrust is 3,500 lb. It comprises a singlestage turbine, a ten-stage axial-flow compressor and annular combustion chamber, into which kerosene is sprayed through twenty atomizing jets; Diesel oil has also been successfully used. Starting is by a de-clutchable electric motor.

Compensation for varying fuel demands at different altitudes is provided. A special electrically heated furnace was used to ascertain the required stress distribution with the steep temperature gradients in the turbine disc when in operation and other high temperature phenomena. A large amount of compressor testing with wide speed variations was carried out at the power stations of the Northampton Electric Supply Co. and of Wigan Corporation.

South African Commission

Review of Activities in 1945

THE end of hostilities found the power supply industry in South Africa severely handicapped by shortages of generating capacity and distribution equipment to meet the widespread demand for electricity for mining, industrial and domestic consumers.

In its report for the year ended December 31st last the Electricity Supply Commission states that numerous requests for new or extended supplies were received including inquiries from towns and villages remote from any of the Commission's existing power stations. Apart from the shortage of plant and materials there was also a great scarcity of skilled labour. In addition prices rose to such an extent as to make the supply of electricity to isolated small communities uneconomic for the time being.

The Vaal station, which will have an installed capacity of 200,000 kW will supply the initial requirements of the developing gold mines in the



Concrete poles for the new 88-kV line between Harrismith and Bethlehem

Odendaalsrust area of the Orange Free State. The nearest mining development is taking place at a point 120 miles distant from the power station and it is proposed to transmit the power by means of an 88-kV line. A new power station will probably be required by the ime the mines reach production stage and the

question of a suitable site is now being investigated. The two 33,000-kW generating sets supplied by the Metropolitan-Vickers Electrical Export Co., Ltd., went into service in January and April, 1945. Of the three 33,000-kW Ljungstrom main sets and the 7,000-kW house set ordered from Sweden in 1939, the house set and No. 2 main set were delivered in October, 1945, and the last set was expected to leave Sweden in June this year. The first of the three machines is almost ready for commercial operation, and the other two are expected to be in service by November this year. A further house set and four additional boilers are on order for delivery within two years.

Complaints have been received from residents in the vicinity of Congella power station regarding coal dust and ash deposits from the station. The Commission while doing everything in its power to abate the nuisance, points out that when it was decided to build the station the site was in a swampy area isolated from any established residential locality or industrial activities. The belated commissioning of the 40,000-kW set in February this year which should have been in operation in 1941, was The attended by many operating troubles. dust and grit extraction plant provided for the new 200,000-lb boilers did not come up to guaranteed efficiency, and it has been necessary from time to time to take the boilers out of service in order to effect modifications to the precipitators.

Table Bay Extensions

Orders for all the major items of works connected with the Table Bay power station extensions of the Cape Town City Council had been placed by the end of 1945, but it is not anticipated that the new plant will be ready for service by the winter of 1947 as was planned in the first instance. Details of the system to supply power to the proposed main line electrification from Cape Town to Touws River, with the possibility of an extension of the scheme to Beaufort West, are still under consideration and no work has yet been put in hand. In conjunction with the proposed main line electrification, which will operate at 3,000 V d.c., the Railway Administration intends also to convert to that voltage the present suburban 1,500-V system.

In the Natal Central undertaking, the extensions to the Colenso station referred to in the previous report are well in hand. Work on the new 88-kV line on reinforced concrete poles from Harrismith to Bethlehem continued throughout the period under review.

In its last report the Commission sounded a warning that tariff increases might be unavoidable during the next few years as the result of increased costs. No increases were made during the year under review, but some of the undertakings operated at a loss, and the net result of the year's working on all undertakings was a deficit of $\pm 17,123$. The Durban undertaking was mostly affected and certain adjustments to the tariffs of that undertaking will therefore be necessary during the current year.

At December 31st last 872,650 kW of plant was installed in the Commission's main stations, and plant under construction or on order will increase the total to 1,085,856 kW. The output for the year totalled 4,861.4 million kWh, a record, and exceeded the previous year's total by 317.6 million kWh. Sales amounted to 4,706 million kWh, an increase of 290.3 million kWh. The average cost per kWh sold advanced from 0.1818d. to 0.1930d. and the price received from 0.1755d. to 0.1862.

The revenue for the year was £3,770,631, as compared with £3,353,508 for the previous year and the total expenses were £3,787,754 (against £3,345,681), leaving a deficit, as already stated, of £17,123.

An addendum to the report gives statistics relating to the whole of the Union, extracted from the 1943-44 industrial census. This shows that the total electricity generated was 8,042.9 million kWh and the total sales were 6,919.7 million kWh. The total installed plant capacity of 318 stations was 1.905.035 kW.

Registration of Contractors

Ministry's Explanation

T has been suggested to the Ministry of Works that many of those concerned do not fully understand the requirement that anybody doing building or civil engineering work in connection with certain activities must be registered under Defence Regulation 56AB. The Ministry has accordingly asked the trade press to explain the position.

Certificates of registration are granted by the Ministry upon receipt of a completed form (B.C.E.ZG.) which is obtainable from the Registrar, Building and Civil Engineering Contractors, Ministry of Works, 271-277, High Holborn, W.C.1. Control of entry into the industry has been discontinued and certificates are granted to all applicants, unless a previouslygranted certificate has had to be revoked or the applicant has been convicted of illegal building.

Among the activities covered by the regulation are:—(a) the construction, alteration, repair, decoration or demolition of buildings, or the provision of water, light, heating or other service for a building; (b) the construction, alteration, repair, or demolition of docks, harbours, bridges, roads, viaducts, aqueducts, canals, inland navigations, pipe-lines, plant foundations, cooling towers and ponds, cable trenches, cable ducts, railways, aerodromes, sea defences, river works, piers, quays, wharves, reservoirs, filter beds, sewage works, sewers, tunnels and gasholders, the erection of overhead line supports and any works of a similar nature, or the provision of water, light, heating or other services for any such works; and (c) the carrying out of any processes, operations or manufactures incidental to the carrying on or any of the services detailed in (a) and (b).

The general effect of this is that all undertakings which are engaged wholly or mainly in the installation of heating, ventilation and electrical equipment in building and civil engineering work (among others) must be registered.

Australian Voltages Standardization Proposals

THE recent decision in this country to adopt 240 V as the standard consumers' voltage has prompted the *Electrical Engineer and Merchandiser* (Melbourne) to review the position with regard to voltages in Australia. Our contemporary says that three different voltages are in use: New South Wales, Queensland, South Australia and Tasmania employ 240 V between phase and neutral, a voltage of 230 is standard in Victoria, and Western Australia uses 250 V. In parts of Adelaide and Melbourne there are 200-V systems which are being changed over.

In 1938 the Standards Association of Australia recommended a standard voltage of 230 but at the same time added a proviso that in those States where 240 V predominated or had been declared standard by statutory regulation that voltage should be recognized as the permissible standard. In each case a variation of plus 6 per cent and minus 4 per cent was allowed.

In Western Australia, where there are relatively few consumers as compared with other States, there has been no attempt to bring the voltage into line. The Western Australian Government has embarked on a plan to standardize the frequency and with this in view is to equip the new South Fremantle station with 50-cycle machines. A frequency changer is to be installed to convert the output of the existing East Perth 40-cycle station. It is considered that this provides an opportunity for standardizing the voltage at the same time.

The prevalence of 240 V in Australia makes this the most economical standard, " and if the reasons for the British decision are accepted where they are applicable to the Australian conditions the choice is also technically substantiated."

Glasgow Exhibition

A list of the exhibitors at the forthcoming technical exhibition at the Kelvin Hall, Glasgow (November 15th to 27th) shows a very substantial electrical representation. The hon. director of the exhibition is Mr. D. M. Slorach, 19, Ladysmith Avenue, Sheffield, 7.

Australian Trade

Increased Imports in 1944-45

THE Australian Government has published detailed statistics of the overseas trade of the Commonwealth for 1944–45. The figures relating to electrical goods and apparatus have been extracted and are shown in the accompanying table together with notes of increases or decreases compared with 1943–44. The trade was shared almost wholly between the United Kingdom and United States with little

Class of Goods	1944–45 £ (000)	Inc. or dec. on 1943-44 £ (000)
Dry cells From United Kingdom	144 13	+ 101 + 11
, United States Nickel alkaline batteries	42 12	+ 34 + 10
, United States Storage batteries for motor vehicles	30	$+ 24 \\ - 7 \\ 17$
Other batteries and parts From United States	10	$- 17 \\ - 9 \\ + 5$
Cable and wire, cotton-covered From United Kingdom Telegraph and telephone cable	18	$+ \frac{8}{-51}$
From United Kingdom ,, United States	82 22	- 7 - 44
Light and power cable, paper- insulated, lead-covered Other cable and wire for light and	+ 53*	- 13
power From United Kingdom	452	- 315 - 48 - 265
, United States Other covered cable and wire From United Kingdom	34	+ 22 + 24
", United States Motors under 1 H.P. (separate)	118 63	+ 62 + 24
, United States	51 4	$+ \frac{35}{2}$
Switch units above 15 kV Reactors, voltage regulators, etc.	142*	$+ 78 \\ - 10 \\ + 14$
From United Kingdom United States	1 24	+ 14
Liquid slip regulators, thrustors, etc. Generators, induction	41	- 3 - 13 - 6
Generators, a.c. variable speed	8	- 7
commutator type Other a.c. generators	3* 23	++
"United States "United States Other d.c. dynamo-elec. machines	8 99	+ 8 + 13
From United Kingdom United States	72 27 92	+ 12 + 2 - 10
From United Kingdom United States	62 30	- 39 + 29
Generators for turbines From United Kingdom	379 132 244	
Relays, switches, fuses, cut-outs, etc From United Kingdom	. 141 105	+ 32 + 23
", United States Lamps, filament, automobile	33 30 19	+ 9
United States	, 10 h	+ 10
flashlights From United Kingdom	50 12 31	+
"Canada	. 7	

appreciable change in their respective shares.

Among noteworthy items in which increases were recorded were certain kinds of batteries, fractional-horse-power motors, telegraph and telephone material, transformers and radio parts. Radio sets were imported to a decreasing extent, as also were measuring and recording instruments and cable. The grand total was £6,446,000 against £4,851,000 in 1943-44.

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In 1944-45 Australia exported electrical goods to the value of £299,000 against £183,000 in 1943-44. The principal markets were New Zealand and the Pacific Islands with India and Ceylon also figuring. The principal classes were radio goods (£66,000), batteries (£30,000), cable and wire (£23,000) and refrigerators (£22,000).

COMMERCE and **INDUSTRY**

Appliances for Home Market. Plant for Scotland.

Rising Electrical Production

N the Monthly Digest of Statistics for August prepared by the Central Statistical Office in collaboration with the Statistics Divisions of deliveries of British-built machine tools, electric motors, welding sets and power tools. The value of deliveries of electric motors of from 1-300 H.P. was £1,017,000 in June, as compared with £1,119,000 for May. The number of portable power tools delivered in June was 6,039, as compared with 8,184 in May. Deliveries are given for July for welding sets. These show a total of 505 arc welding sets. These show a total of 505 arc welding sets, valued at £55,000 and 109 resistance welding sets, valued at £21,000.

In a table showing the production and supplies of electrical appliances for the home civilian market, considerable increases are shown for the first quarter of the current year (the latest figures available) as compared with the last three months of 1945. The average monthly production of electric fires totalled 179,700 (against 122,000 in October-December, 1945), of which 163,900 were supplied for the home civilian market (115,000). Electric irons produced rose during the same period from 170,100 to 250,500 (home market from 155,000 to 24,100), electric vacuum cleaners from 20,400 to 33,100 (home market from 17,300 to 26,700), and electric kettles from 22,000 to 34,900 (home market from 21,000 to 29,400). The monthly average for 1937 was as follows:— Electric fires: 115,000 produced (100,000 for home market). Electric irons: 112,000 produced (100,000 for home market). Electric vacuum cleaners: 34,000 produced (33,000 for home market). Electric kettles: 35,000 produced (30,000 for home market).

Refining of Brass Scrap

The Ministry of Supply has entered into arrangements with copper refineries in the U.S.A. and Canada under which the Ministry electrolytic copper. The brass scrap is mainly 70/30 ammunition scrap and ingots cast from ammunition scrap. The Ministry expects about 100,000 tons of copper to be returned to this country. The bulk of the contracts have been placed with American refineries.

British Aluminium Acquisition

The British Aluminium Co., Ltd., announces that the Falkirk Rolling Mills, designed and operated for the Government during the war, have now been acquired for commercial purposes. The factory was originally laid out primarily for the production of heat-treated aluminium alloys for aircraft, but is now also producing sheet and coiled strip for prefabricated houses, furniture, and many other new or re-established peacetime uses for aluminium. The plant is one of the largest and most up-todate units in the country for producing sheet and strip rolled products in pure aluminium, and a full range of work-hardened and heattreated alloys.

Blackpool Tableaux Wanted by South Africa

Blackpool Corporation Electricity Committee has received a request from the city electrical engineer, East London, Cape Province, to sell him illuminated tableaux for use during the royal visit to South Africa next year. Having regard to shipping difficulties the Committee has decided that it cannot sell the tableaux but has agreed to forward illustrations and specifications and to render other technical assistance.

Model Turbine

Our illustration shows a model of a steam turbo-alternator, with its auxiliaries, recently made by Bassett Lowke for the English Electric Co., Ltd. Made to the scale of $\frac{1}{2}$ int to the foot, it is a faithful reproduction in every detail



Model 32,000-kW English Electric turbo-alternator

will ship for treatment during the next fifteen months about 148,500 tons of brass scrap and the refineries will return the copper content as of the original set installed in the Taylors Lane power station of the Northmet Power Company. The original turbine is remarkable for the high steam pressure and temperature employed -1,300 lb. per sq in. at 950 deg F. The electrical output totals 32,000 kW, of which 30,000 kW is accounted for by the main alternator, which generates at 33 kV. An unusual feature in turbo-alternator design is that the main shaft extends to a duplicate gear box from which two low-speed shafts are driven, each running at 1,010 r.p.m. One drives the house alternator, and the main and pilot exciters. To the other are coupled two variable voltage d.c. generators which, on the Ward-Leonard principle, are used. in connection with the unified boiler control system. The model should be of material assistance both in future turbo-alternator design and for exhibition purposes.

Submarine Cable to Germany

The longest submarine telephone cable between this country and Europe has been laid since the end of the war by the General Post Office. It goes direct to Germany, is 200 nautical miles long, and provides five telephone circuits or four telephone and eighteen telegraph circuits. As originally laid it provided only one telephone and six telegraph circuits, but the additional circuits have been made possible by the provision of a special submarine repeater developed by the Post Office engineers.

Radio-controlled Tractor

In co-operation with the Royal Aeronautical Establishment at Farnborough (Kent), Tractors (London), Ltd., The White House, Bentley Heath, recently gave a demonstration of a radio-controlled tractor at Knifton's farm, Bentley Heath, Hertfordshire. The radio equipment and mechanical accessories were almost standard parts from early models of the "Queen Bee" apparatus for pilotless aircraft. Standing in a corner of the field with a switchbox in his hand, the ploughman sent out various combinations of four radio signals which caused the tractor to start and stop, turn left and right, and plough when directed. The transmitter used had a range of 25 miles, but should the idea prove worth developing, a less powerful equipment could be designed with a range of one mile.

At the tractor end were a radio receiver and a relay box, which operated the various controls of a standard tractor by means of compressed air supplied from a cylinder. A future development will be either a compressor attached to the tractor motor, or a very low horse-power electric motor to produce the power for the mechanical operations. Mr. J. C. Reach, managing director of the company responsible for the experiment, believes it is capable of easing and speeding many of the operations in farming routine. It is suggested that one operator could control six tractors working in series.

Builders' Manufactured Goods of Iron and Steel

On July 1st, a notice was issued announcing that builders' manufactured goods of iron and steel could now be obtained without a certificate to purchase. The following statement has been issued by the Ministry of Works in response to

requests for more information regarding procedure and for a list of items of builders' manufactured goods covered by this procedure. The list of builders' manufactured goods include the following:—Domestic cookers (gas and electric), cast-iron and steel radiators, wash boilers (gas and electric), and lifts. Manufacturers are given a bulk supply of cast-iron and steel for the production of builders' manufactured goods to meet all requirements (including those of Government Departments, local authorities, public utility undertakings, builders and contractors and the general public). No "M" Form, or other purchase certificate is required. In the case, however, of those items of builders' manufactured goods which are included in the scheme for the priority distribution of building materials and components, the provisions of that scheme will, of course, apply. Items not classified as builders' manufactured goods include plain castings or finished steel which are not subject to any additional manufacturing process, e.g., structural steel, tubes, pipes and standard fittings therefor and wire products. These items are covered by the procedure described in the Control of Iron and Steel Orders which provides that, with certain exceptions, an "M" Form must be obtained for individual requirements.

Token Imports from Switzerland

As previously announced, arrangements have already been made for a small flow of imports to be known as "token" imports, to come into this country from Canada, the U.S.A. and Belgium. Arrangements have now been completed whereby token imports of the same goods will be admitted from Switzerland at the same rate of 20 per cent per annum by value of the Swiss manufacturers' pre-war trade in the goods in question with the United Kingdom. The Swiss manufacturer or exporter, should apply for this certificate to the Swiss Export Licensing authority, and should send it to the importer in the United Kingdom who will then make application for the import licence.

Telecommunications Conference

The United States has been advised by the Soviet Government that September 28th has been fixed as the new opening date for the preliminary Five-Power Telecommunications Conference in Moscow. The conference was postponed last month at the request of Great Britain and America.—Reuter.

Electrical Machinery for Australia

Machinery worth £1,000,000 is being supplied to Australian electricity producers by C. A. Parsons & Co., Ltd. This was revealed by Sir Claude Gibb, chairman of the company, when he arrived in Sydney by air on a month's visit. He said the company was spending £1,000,000 on plant reconstruction in order to help meet orders at present held. Half of the orders, worth £15,000,000, are for export.— *Reuter*.

Improvements at an L.M.S. Depot

Improvements to be carried out by the L.M.S. Railway at its permanent way stores depot at Crewe include the provision of a $7\frac{1}{2}$ -ton capacity electro-magnetic crane, capable of lifting six rails at a time, in lieu of two smaller cranes capable of lifting only one rail at a time. The new crane will operate on a ferro-concrete gantry 80 ft wide and more than 300 ft long, spanning a rail siding. An electric rail saw for cutting steel rails into any required lengths is also being installed as part of the improvement scheme.

Turkish Telephone Orders

The Turkish Government has placed an order with the General Electric Co., Ltd., for more than £500.000 worth of telephone transmission and teleprinter equipment. The whole of the equipment will be manufactured at the G.E.C. telephone works at Coventry, and delivery will commence in a few months' time. G.E.C. engineers will go to Turkey to supervise the installation. While completing an order for 15,000 automatic telephones for South America, the company has received an order for 15,000 more telephones from Montevideo, Uruguay. Orders for telephone equipment have recently been received from twenty different countries.

Trade Announcements

Hendrey Relays, Ltd., have moved from Bourne End to a new factory in Bath Road, Cippenham, near Slough (telephone: Burnham 645).

645). The Hoffmann Manufacturing Co., Ltd., opened a branch office on September 2nd at 217, Westgate Road, Newcastle-on-Tyne, 1 (telephone: Newcastle 26608; telegraphic address: "Hoffmann, Newcastle").

E. K. Cole, Ltd., have announced a widening of their service organization which will handle the service interests of the Lighting and Heating Divisions of the company, Dealer Instruction Schools, Car Radio Installation Advisory Service, etc., in addition to the radio service. Mr. E. W. Shepherd (Service Centre—Somerton Works, Southend), becomes manager of all E. K. Cole service activities, and he will be assisted at headquarters by Mr. J. Proctor (commercial interests), Mr. C. E. Butler (works liaison and technical matters), and Mr. H. Fuller (chief clerk). At the Provincial Depots, the following district service managers have been appointed:—Messrs. D. A. Nicol (Glasgow); A. E. Rothschild (Manchester); and A. C. Hopkins (Bristol). In addition, Mr. S. A. Howard is resident engineer at Birmingham.

The Worcester Office of British Insulated Callender's Cables, Ltd., has been moved to 37, Broad Street. The telephone number is unchanged.

Works Visit

On August 26th the Lord Mayor and Lady Mayoress of Birmingham (Alderman A. S. Giles and Mrs. Giles) visited the works of William McGeoch & Co., Ltd. Owing to the unavoidable absence of Mr. W. McGeoch, managing director, the visitors were received by Major P. McGeoch, director, and Mrs. P. McGeoch. Before the tour of the works the departmental managers and senior members of the staff were presented to the visitors. The works fire brigade was also inspected. In the Switchgear Department, the Lord Mayor made a presentation to Mr. W. Barnett on behalf of the directors. Mr. Barnett, who is seventy-three, has just retired after forty-eight years' service with the company. Other old employees were presented to the Lord Mayor during the tour.

Surplus Machine Tool Sale

An "on-site" sale of 300 machine tools will be opened at the K.L.G. Plug Factory, Bridgend Trading Estate, South Wales, on September 18th and will continue until September 24th. Any machines not disposed of during this sale will be on view at the factory from September 25th to October 1st for competitive tendering. The machines include capstan lathes, millers, grinders, drillers, and miscellaneous types.

Southwark Showrooms Extension

The Southwark Borough Council has purchased sites in Penrose Street, adjoining the power station, on which it is proposed to carry out extensions to the electricity showrooms at a cost of £15,500.

"Industrial Ten"

The Board of Trade announces that the "Industrial Ten" supplement of clothing coupons for the 1946-47 ration period will be issued before the end of this year. The opening date will be announced in due course and employers and workers are asked not to send inquiries to the Board of Trade or to local offices of the Ministry of Labour. The schedule of qualifying occupations will be similar to that for 1945-46, except that workers are

The schedule of qualifying occupations will be similar to that for 1945-46, except that workers in clothing factories where the machines are not driven by mechanical power or where less than ten workpeople are employed are now included. No further claims in respect of the 1945-46 period can be entertained.

Scottish Plant Orders

John Brown & Co., Ltd., shipbuilders of Clyde, are to play an important part in Scottish hydro-electric developments now being carried out by the North of Scotland Hydro-Electric Board. Orders have been received from Boving & Co., Ltd., London, for the construction of water turbines for the Clunie and Errochty generating stations on the River Tummel. John Brown & Co. have undertaken this work, valued at over £160,000, in order to broaden the basis of their employment, and to assist in development schemes of a purely Scottish character. Three turbines are being supplied for each station, and the aggregate capacity of the two stations will be approximately 185,000 B.H.P.

Boving & Co., Ltd., have also placed orders with Glenfield & Kennedy, Ltd., for water turbines for the Pitlochry generating station of the Tummel-Garry scheme and for the Loch Morar scheme of the Hydro-Electric Board. The alternators for the Clunie and Errochty stations will be supplied respectively by the British Thomson-Houston Co., Ltd., and the General Electric Co., Ltd.

Overseas Broadcasting Equipment Orders

Marconi's Wireless Telegraph Co., Ltd., is to supply Iraq with an up-to-date broadcasting and telecommunication system. Short and medium wave transmitters, together with studios, including a concert hall, and all the necessary control gear, are to be provided to a total value of approximately £35,000. The company has also secured the contract for the supply and installation of a complete new radio station on the island of Timor for the Portuguese Ministry of Colonies. All the radio equipment on Timor was demolished by the Japanese when they evacuated the island, and as a temporary measure since then, a Portuguese warship lying off the coast has been the islanders sole means of radio communication with the outside world. The equipment will include three transmitters. Two of these are short-wave sets and the third a medium-wave set. Another order is for the supply of broadcasting equipment to the *Jornal do Commercio* of Recife, Brazil. The contract covers the supply of one 20-kW medium-wave air-cooled broadcasting transmitter, which can be adapted to work on 10 kW when required, two 25-kW short-wave broadcasting transmitters, studio equipment, and frequency modulated v.h.f. studio links.

Electrical Apparatus at Leeds Exhibition

Electrical fittings figure prominently at the Homes of To-morrow Exhibition, opened last Friday by Mr. Lewis Silkin, Minister of Town and Country Planning, at Lewis's Stores, Leeds. An attractive and decorative fluorescent lighting system is displayed by the Electric Lamp Manufacturers' Association, and the importance of efficient lighting is demonstrated. Consideror encient lighting is demonstrated. Consider-able interest is being shown in the "Simmerstat" oven control and the "Aerovap" unit for exterminating flies. Smith's English Clocks, Ltd., show a selection of clocks, including three types of movement in section form.

Elfson's display a cabinet wringer equipped with electric drying and airing apparatus.

Electrical Manufacture at Burnley

Mr. T. Fletcher, of Burnley Aircraft Products, Ltd., has purchased Ashfield Factory, Burnley, and proposes to start the manufacture of rotary switches for domestic appliances, thermostats and water storage heaters.

Electricity as a House Modernizer

How electricity can transform old-fashioned town residences into flexible easily-run practical apartments will be seen at the "New Homes from Old "Exhibition, organized by the Housing Centre, to be opened on September 11th by the Minister of Health, at the Tea Centre, Regent Street, London. The British Electrical Development Association exhibit will show the conversion of a large Victorian living room into kitchen-dining room, with a practical utility room for laundry, etc. The practical kitchen will be equipped with the latest style electric cooker, family-sized refrigerator, and the smaller accessories such as toaster, coffee percolator

and electric kettle. In the utility room there will be a washing machine, fitted drying cabinet and ironing equipment, and a " Dulec water heater under the draining board.

Merz & McLellan (India), Ltd.

Owing to the growing importance of their work in India, Messrs. Merz & McLellan work in India, Messrs. Merz & McLellan have established a separate associated firm there under the title of Merz & McLellan (India), at 16, Lee Road, Calcutta, the partners being the present partners in Mcrz & McLellan and Mr. F. H. Sharpe, who has been their chief engineer and manager in India for some years.

Institute of Marine Engineers

The presidential address to the Institute of Marine Engineers will be delivered by Sir Amos L. Ayre, on September 10th at 5.30 p.m. at the Institute, The Minories, London, E.C.3.

Trade Publications

Trico-Folberth, Ltd., Great West Road, Brentford, Middlesex.—Illustrated and priced leaflet reintroducing illuminated electric direction indicators for motor vehicles.

Thomas Bolton & Sons, Ltd., P.O. Box No. 3, Widnes, Lancs.—Booklet (No. 120) containing 44 pages of tabulated data on copper and its alloys in the forms of wires, strip, sheets, bars and tubes for electrical and other uses.

TRADE MARKS

THE following applications have been made for trade marks. Objections may be entered within a month from August 28th :--

ARDITE. No. 639,891, Class 6. Welding rods of common metal alloys.—Hard Metal Tools, Ltd., Fletchamstead Works, Fletcham-

Tools, Ltd., Fletchamstead Works, Fletcham-stead Highway, Tile Hill Lane, Coventry. CLIPVAC. No. 635,555, Class 7. Power operated clippers for horses, cattle and sheep.— The Wolseley Sheep Shearing Machine Co., Ltd., Wolseley Works, Electric Avenue, Witton,

Birmingham, 6. BOFFIN. No. B640,601, Class 7. Wringing. washing, ironing, clothes drying, clothes airing and meat mincing machines, and lawn mowers.— Walter Raylor, 20, Westbourne Road, Birkdale, Southport.

W (design). No. 637,262, Class 9. Electrical apparatus and instruments included in Class 9. -Westool, Ltd., St. Helens Auckland, Co. Durham.

REOSOUND. No. 641,495, Class 9. Apparatus and instruments for reproducing and recording sound.—R. E. Owen, 76, Clifton Road, Sutton Coldfield, Warwickshire.

WIPAC. No. 640,729, Class 12. Electrical parts and fittings for motor vehicles, all being goods in Class 12.—Wico-Pacy Sales Cpn., Ltd., 11, Wadsworth Road, Perivale, Greenford, Middlesex.

TRONEX. No. 640,850, Class 17. Electrical insulation material, insulation parts, insulators, and packings and jointings (in the nature of packings).—T. C. Wheaton Co., North Second Street, Millville, New Jersey, U.S.A. Address for service: c/o S. Sokal, I, Great James Street, Bedford Row, London, W.C.1.

Circuit Interruption

By R. W. J. Cockram, A.M.I.E.E., A.I.Mech.E.

Reviewing switching problems, the author suggests that much may be achieved by controlled atmospheric

operating conditions

ALTHOUGH a considerable mass of technical data has been collected by various research and testing stations in regard to conditions prevailing on rupturing an electrical circuit, little of this is available to the designer of control apparatus. The study of breaking conditions can be either a simple elementary problem where small power values are concerned or it may lead to most intricate investigation for large circuit breakers of modern design.

The influence of the mechanical engineer is very much in evidence in the design of all forms of switching appar-

atus. The knife switch, that simple mechanical device which requires so much maintenance and replacement of worn and eroded components, soon found

favour due to ease of production and apparent ability to give, by means of series and parallel operation, any required combinations of the connected points. Soon an attempt was made, by means of a quick-breaking bar, to reduce burning of contacts on opening, but contact resistance values between blades still caused local overheating, and hence oxidization, with consequent deterioration of contact conductance.

Electrically operated switches next found place for automatic control, but the essential polar construction of the knife switch was

Here retained. another step was taken in comparatively recent years in the incorporation of silver a n d rhodium contact tips welded to the parent copper. This was an attempt to improve working conditions whilst carrying current, for the oxides of



Fig. 1.—Oscillograms of "Satchwell" micro-gap switch interruption

the metals used are all relatively good conductors compared with oxide of copper. Other methods adopted were the "wiping" action of contacts on closing, line-and-point contact to reduce mating surface areas and careful spring-pressure adjustment to such values that conductivity is assured without approaching too close to the "welding-in" pressure on overload. Various forms of arc-control devices have also been developed, including asbestos chutes, through which the arc is pulled by magnetic means to a long length to ensure rupture.

Protective circuit breakers have been developed to a high degree of efficiency, and many are the basic theories advanced for the rupture of the circuit under fault conditions.

> Early tendencies were towards oil immersion with the enclosure of contacts in strong "explosion pots" to resist the considerable forces occurring on fault rupture. Various ingenious

methods of using these forces to render the arc self-destructive then appeared, wherein the arc energy, in displacing the surrounding oil, forced other clean, cool oil across its own path. In the "Dion-Grid" the arc is magnetically pulled radially along its length into small ducts containing fresh oil. Later developments for oil-less breakers include the use of compressed air literally to blow out the arc and the injection of inert gases into the arcing space.

A further characteristic of rupturing conditions is the effect of the amount of space

available to the arc. The rotary switch, by virtue of confining the arc to a small chamber. gives improved breaking characteristics, and thereby achieves a small space factor for the power to be controlled. Where larger powers are to be controlled,

chambers are operated in parallel, which again reverts to an arc-splitter effect. This, however, is the only direct form of arc control incorporated, for the physical

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characteristics preclude the fitting of " blowout" coils. Two forms of mechanism are down at 850 V at 25 deg C, and thus gives

conditions an air gap of 0.005 in. breaks

a factor of safety of 850/230 = 3.7

With a combination of these two characteristics of small air gaps. the arc on separating contacts by 0.005 in. on a 230-V supply can persist only until the next voltage zero. Thereafter it will be unable to restrike unless the natural frequency of the circuit gives a rate of rise of voltage of the order of 25×10^6 V per sec. The speed of operation of the contacts should be as high as possible, in order, first, to reduce the duration of high resistance at point of breaking contact and, secondly, to ensure that, at the next voltage zero, the the gap is sufficiently large to prevent restriking of the arc, i.e., contacts must separate in a quartercycle or 5 micro-sec on a 50-cycle supply.

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A further claim for the micro-break switch lies in its reduction of the arc energy by restriction of arc length, thereby minimizing erosion

This follows from the electro-

fitted: a quick break for d.c. circuits and a slow break for a.c. latter circuits. the taking advantage of the inherent characteristics of alternating values of e.m.f.

This multiplicity of control features (by no means completely covered here) indicates that designers hold few ideas in common of the conditions to be met Little information appears to be available as to what govern the factors physical dimensions required for breaking a given circuit, what precise influence the inductance of the circuit has beyond that of producing a transient value of voltage far in excess of normal and to what extent the restriking voltage will control design. In this field design would seem to be largely a matter of convention and reproduction of features fixed many years ago, showing that a large field exists for the research engineer who is sufficiently far-sighted

GETTER SPRING STEATITE CONTACT WINDINC ROBBIN FULCRUM CONTACT SUPPORT NOTWIRE WINDING BUSBARS GLASS SUPPORT DIVEN STEATITE WINDING BOBBIN SCALING PIP -CONTROL LEADS MAIN LEADS

Fig. 2.-Mechanism of Sunvic hot-wire vacuum switch

of contacts.

contact pitting*.

to consider a long-term policy in design. Much work is being carried out in this direction, and as an instance of this a few examples of the results of scientific approach to the problem are given.

The micro-break switch finds its main application in the control of domestic circuits, i.e., where natural frequencies $(f=1/2\pi\sqrt{LC})$ far below 2,000 cycles per sec may be anticipated. This means that a rate of rise of restriking voltage of less than $3 \times 10^{\circ}$ V per sec will occur at the contacts, which is much less than the rate of rise of electric strength of small air gaps (Slepian gives 25×10^8 V per sec). Under test

* I.E.E. Journal, Vol. 92, Pt. 2, No. 26. "The Design and Installation of Electrical Accessories for Domestic Purposes." F. C. Fuke.

switching involves the electrostatic forces

static considerations above for, since the

velocity of the electrons emitted is pro-

portional to the product of length of gap

and magnitude of the field, so also will be

the kinetic energy of the electrons on arrival

at the opposite contact. Restriction of arc

length therefore greatly lessens the bombard-

ment of this contact face, thereby reducing

Another way of considering micro-break

between the electrons emitted from the contacts at the high temperature occurring at the instant of contact separation. The velocity of these electrons, being proportional to the length of gap is, in the micro-break switch, restricted to such low velocities that the electrons repel one another due to inherent electrical charges. This repulsion, which is "swamped" by the high electron velocity of the unlimited break switch, takes place with a miniature explosive force which causes lateral spread of the elements of the Under such conditions the arc may be arc considered self-destructive*. The oscillograms (Fig. 1) show how, irrespective of the point of contact separation "A", the arc fails to restrike after the first current zero.

By operating the micro-gap switch by the expansion of wire when carrying current and enclosing the whole mechanism under vacuum conditions, a considerable advance is made in this form of control apparatus. The

operation of the hot-wire vacuum switch is shown in Fig. 2. Maximum ratings of this switch at present stand at 30 A for 250 V and 20 A for 600 V, with either a.c. or d.c. conditions and a contact separation of about 0 001 in. Contact erosion is then practically negligible and the switch will operate millions of times without appreciable deterioration

The heating circuit, being formed by a very flat coil, is almost non-inductive and, requiring only a few mA, may be controlled by very light contacts requiring no quick-make or break action. Having small mass the unit is not subject to risk of operation characteristics due to vibration, and no temperature differential is experienced between pick-up and drop-off voltage values. As a further development the switch may be rendered capable of

controlling inductive circuits by the inclusion of a surge suppressor connected across the main contacts (Fig. 3). This form of

*I.E.E. Journal, Vol. 80, No. 485. "The Micro-Gap Switch." Prof. W. M. Thornton, O.B.E., D.Sc., D.Eng. switching device, then, shows a considerable step forward towards scientific control of the electric circuit, for it minimizes maintenance work and, what is more important, is entirely reliable.

A form of switching device developed from the conventional tilting mercury switch shows another method of attacking this problem from a scientific angle. Various forms of operation have been evolved, but that shown in Fig. 4 seems to indicate the line giving the greatest return. Operating features are as follows: Two electrodes are inserted, one at the top, the other at the bottom, into a glass tube containing mercury. The upper electrode is extended into a quartz-glass plunger which has an annular magnetic armature fixed at its upper end and contains a second pool of mercury at the bottom. On operation a relay coil pulls this inner tube down into the mercury and contact is made by the two pools of mercury

meeting through the holes provided in the inner tube. On de-energizing the coil the inner tube again floats to the top of the outer mercury pool and disconnects the circuit under controlled air conditions. Two further holes higher up in the inner tube prevent collection of mercury there.

Switches of this type have been developed for controlling up to 150 A at 400 V. Absence of any moving parts (except for the central tube), together with controlled atmospheric conditions in the sealed tube, gives a life of many millions of operations.

Switches of this design have been produced for 250 A at 24 V. By arranging for the plunger to flood mercury over a weir and through various restricting orifices, it is possible to obtain controlled notching start con-

ditions for motor control applications.

Numerous switches may be operated from a single solenoid coil since very few ampereturns are required to operate the armature. This method, adapted for over-current trips,



Fig. 3.-Surge suppressor and h.v.s. unit

prevents possibility of single phasing of motors. The energizing current for these contactors and relays is extremely small,

instruments some taking only one twenty - thousandth part of the controlled current.

last two The examples appear to

- (1) Lower electrode in contact with pool of mercury (11). (2) Outer glass con-
- tainer (3) Orifice in wall of
- inner quartz plun-ger (10). ger (10). (4) Magnetic armature attached to quartz plunger (10). (5) Special seal to elec-
- trode (8) to ensure perfect contact.
- (6) Flexible connecting lead.
- (7) Container for seal (5).
- (8) Upper electrode dipping into mer-cury in lower porof plunger tion (10)
- (9) Orifice to prevent collection of mer-cury in upper part of plunger (10).
- (10) Quartz-glass plun-(II) Pool
- of mercury in plunger kept at higher level than the mercury outside.
- (12) Mercury in outer glass container.

Fig. 4.-Non-tilting Sordoviso mercury switch

indicate that controlled atmospheric operating conditions may hold the secret of successful control of the electric circuit. Extending the life of operating contacts would materially assist in lowering maintenance costs and reduction of moving parts will considerably increase the mechanical life of components.

The writer acknowledges the loan of illustrations for this article by Sunvic Controls, Ltd., Sordoviso Switchgear, Ltd., and Mr. F. C. Fuke of British Mechanical Productions, Ltd., who tendered useful advice on the micro-break switch.

Swedish Water Power Resources .--- The Svenska Vattenkraftfoereningen in its annual statistical report estimates the total resources of waterpower in the country which have already been, harnessed or which can be exploited on a remunerative basis at 41,250 million kW, a figure which according to the report, will be reached in about 40 years.



NEW BOOKS

An Index of Mathematical Tables. By Dr. A. Fletcher, Dr. J. C. P. Miller and Professor L. Rosenhead. Pp. 451. Scientific Computing Service, Ltd., 23, Bedford Square, W.C.1. Price 75s.

As a result of the increasing development and more extended use in recent years of calculating machines as a primary means of tabulation, the number of fundamental tables placed at the disposal of scientific workers has enormously increased. At the same time the results are likely to be far more accurate than those which are arrived at by more laborious methods.

With the growing tendency to apply mathematics to problems of industry, the merit of a book of this kind becomes increasingly more practical. Its subject is restricted to mathematical tables and it does not normally cover experimentally determined numbers such as physical and other constants, but it should fulfil its intention of providing "a working tool for the working scientist" in a wide variety of investigations and should be of value to both users and makers of such tables.

In Part 1, each of the component twenty-four sections is devoted to tables of a particular group of functions ranging from primes, factors, products and quotients to numerical operations involved in harmonic analysis and synthesis. Part 2 consists of a 70-page bibliography under the names of the authors of books and papers quoted in Part 1 and some special statistical tables in addition. The work is a model for compilations desirable in other fields of knowledge, where the difficulty of keeping in touch with progress becomes inevitably more and more pronounced as that progress accelerates .--- C.O.B.

The Modern Diesel. Edited by G. Geoffrey Smith and revised by Donald H. Smith, M.I.A.E. Pp. 254; figs. 200. Iliffe & Sons, Ltd., Dorset House, Stamford Street, London, S.E.I. Price 6s.

This is the tenth edition of a handbook covering the theory and practice of Diesel engines which was first published in 1930. Since then the compression-ignition engine has attained predominance for road and rail transport and for marine craft down to the smallest sizes, mainly owing to research and experiment carried out by road-transport manufacturers.

In this book new British engines are described and the technical characteristics and performance capabilities responsible for developments up to the present time are discussed. A considerable proportion of the space is devoted to fuelignition equipment and combustion-chamber design, with emphasis on the swing towards direct-injection systems, especially those of the toroidal-cavity piston type.-C.O.B.

BLECTRICITY SUPPLY

Tenants' Wiring Scheme. Indian Water-Power Development.

Aberdeen.—INCREASED DEMAND.—In presenting his annual report at a recent meeting of the Corporation Electricity Committee, Mr. A. Gardner, eity electrical engineer, stated that there had been an increase in output under all headings. The large rise of nearly 16 per cent in the domestic tariff supplies was due to the continued change-over to this tariff by consumers and to the difficulties experienced by householders in obtaining solid fuel. The position of coal stocks was giving some anxiety.

Ashton-under-Lyne.—LOANS.—The Electricity Committee is applying to the Electricity Commissioners for sanction to borrow $\pm 3,000$ for mains and services, $\pm 2,500$ for transformers and substation equipment and $\pm 1,000$ for meters. Sanction has been received to the borrowing of $\pm 1,500$ for unspecified works.

Burnley.—STREET LIGHTING DEPARTMENT.— The Town Council has approved in principle the establishment of a separate street lighting department.

Glusburn.—STREET LIGHTING CONVERSION.— The Parish Council proposes to convert the gas lighting for main roads to electric lighting and has made a provisional agreement with the Electrical Distribution of Yorkshire, Ltd., for 123 electric lamps at an annual cost of £354.

Hebden Bridge.—YEAR'S WORKING.—Councillor J. W. Cockcroft, chairman of the Hebden Royd Council, reports that during the past year the gross profit of the Hebden Bridge electricity undertaking was £2,436, and the net profit £519.

Holmes Chapel (Cheshire). --STREET LIGHTING. -The Parish Council has borrowed £420 for the installation of electric street lighting in the parish.

likeston (Derbyshire).—SUPPLY TO COUNCIL HOUSES.—No fewer than 740 of the 900 Council house tenants have had their houses wired for electricity despite the early opposition of the Town Council. After this early opposition had been overcome by the formation of a Council House Tenants' Association, a scheme, estimated to cost £5,000, was launched. Led by ex-Councillor J. Hoult, the tenants formed a company, the likeston Assisted Wiring Co., Ltd., to sponsor the scheme, on a cash or hirepurchase basis, as individual tenants desired. This company engaged eight different firms to carry out the wiring. On four of the Council housing estates the wiring is overhead, and on the fifth it is underground. So far between thirty and forty houses have actually been connected, power being supplied by the Derbyshire & Nottinghamshire Electric Power Co. Completion of some houses is held up owing to lack of materials.

Kilwinning (Ayrshire). — "ALL-ELECTRIC" Houses.—The Town Council, having been assured that with the W.B.A. permit which the Council had it could obtain delivery within reasonable time of cookers, etc., it has agreed that its housing scheme shall be all-clectric. Middlesbrough.—ESTATE SUPPLY.—The borough electrical engineer (Mr. H. Haigh) is preparing a scheme for supplying electricity to the second portion of the Thorntree Estate.

Stockport. — STREET LIGHTING. — The Electricity Committee has approved the erection of concrete pillars for public lighting by electricity at an estimated cost of £2,169 and the lighting by electricity of Belvedere Avenue and Somerford Road.

Stockton-on-Tees.—No SUPPLY FOR NEW HOUSES.—The Town Council has been notified that the Ministry of Health is not prepared to sanction the installation of electricity in houses on the Mount Pleasant Estate owing to the shortage of materials and having regard to the fact that alternative services have already been provided.

Power FOR LOCAL INDUSTRY. — The Town Council has received sanction to borrow £29,355 in connection with the supply of electricity to the Bowesfield industrial site comprising £14,216 for mains and £15,139 for plant. Application has been made to borrow £5,050 for substation work.

Upton-by-Chester.—STREET LIGHTING CON-VERSION.—The Parish Council has borrowed £888 for the conversion of fifty-three gas standards to electricity.

Overseas

Austria.—IMPROVED SUPPLY FOR VIENNA.— Considerable improvement in the electricity supply for Vienna is expected as the result of the recent inauguration of a 100,000-V supply line from hydro-electric generators in the South of Austria to the capital. This line was recently switched on by the Mayor of Vienna. The Germans completely destroyed the cables connecting Vienna with its supply stations at the end of the war.

India.—NORTH MADRAS SCHEME.—Construction of the Machkund hydro-electric project is being started almost immediately by the Madras Electricity Department, it is reported. Sir S. V. Ramamurti, who is in charge of development in Madras, said that the mineral, forest and agricultural wealth in North Madras was immense and that the only thing wanting was cheap hydro-electric power. Surveys which had been carried out showed that minerals in the area included bauxite, manganese, iron, graphite, mica and gold. The forest wealth was also immense, and industries which could be developed in the area were shipbuilding, jute manufacture, textiles, groundnut products and sugar.—Reuter's Trade Service.

Switzerland.—INCREASING POWER OUTPUT.— Some recently issued figures show that during the war period there was a noteworthy increase in electric power output in Switzerland, a total of about 9,600 million kWh having been attained during 1945 as compared with 7,134 million kWh in 1939, an advance of approximately 35 per cent. It is estimated that 99 per cent of the power production of the country is hydroelectric. The increased consumption is stated to be largely due to the scarcity of coal for house heating and to the shortage of domestic help which has caused householders to resort more and more to the use of electric fires, cooking stoves and other appliances.

TRANSPORT

Canada. — WINNIPEG COMPARISONS. — Statistics published in Mass Transportation show the operating results of the Winnipeg Electric Co. and its subsidiaries in 1945 for the three types of transport—street-cars, trolley-buses and motor-buses. Street-cars numbered 215, which operated 7,534,000 miles and carried 60,109,000 passengers, equivalent to 7.97 per mile. The 30 trolley-buses ran 1,127,000 miles and carried 9,658,000 passengers, or 8.56 per mile, while the 161 motor-buses ran 5,716,000 miles and carried 27,952,000 passengers (4.89 per mile). Gross revenues were \$4,094,000, \$649,000 and \$2 026,000 respectively, with operating expenses at \$2,775,000, \$286,000 and \$1,884,000. After allowing for taxes (excluding petrol tax) and depreciation there was a net profit on the street-cars of \$656,000 (equal to \$3,052 per vehicle) and on the trolley-buses \$271,000 (\$9,043 per vehicle). On the motor-buses there was a deficit of \$182,000 (\$1,13 per vehicle). On a mileage basis motor-buses had a superior showing as regards accidents, with only 0.821 per 10,000 miles, against 1.473 on the trolley-buses and 1.938 on the trams. Delays through defects in vehicles were considerably more numerous on motor-buses than on the other forms of transport, numbering 4.947 per 10,000 miles operated compared with 1.388 for the street-cars and 1.221 for the trolley-buses.

Glasgow.—New TRAMS.—A capital expenditure of £727,150 this year is involved in proposals for the extension of the Glasgow Corporation transport system, £200,000 being earmarked for the acquisition of new trams.

Manchester. — OPERATING RESULTS. — The accounts of the Transport Committee for the year ended March 31st last show a deficit of £97,664 on the tramways, a surplus of £89,630 on the motor-buses, a surplus of £38,909 on the trolley vehicles, and a deficit of £13,421 on the parcels department.

Wolverhampton.—YEAR'S WORKING.—New records in the mileage run and the number of passengers carried are shown in the abstract of accounts of the Municipal Transport Department (Mr. C. O. Silvers, general manager and engineer) for the year ended March 31st last. The total revenue from trolley vehicles was £498,711, as compared with £488,692 for 1944-45, and from motor omnibuses £182,734 (against £178,249), making a total of £681,445 (£666,941). The total working expenses. were £521,648 (against £466,689), and after providing for war service allowances and sickness allowances, there was a gross surplus on the trolleybuses of £105,448 (£138,893) and on the motor omnibuses of £45,362 (£51,628), a total of £45,343, as against £33,696 for the preceding year. The general rate fund again receives £10,000 and after providing for deferred maintenance and deferred vehicle purchase, the balance of £9,166 is transferred to reserve fund. The number of miles run during the year rose from 6,474,582 to 6,661,702, and the passengers carried from 91,034,729 to 92,106,902.

South African Electrical Purchases

NEW electrical materials will be released only to public authorities for the illumination of public buildings during the Royal visit next year, and only Government and public authorities will be permitted to erect stands, says the Minister of Economic Development in a statement on the use of building materials and electrical equipment for temporary purposes during the Royal tour. The statement says that inquiries about the release of electrical materials for illuminating buildings and the use of timber for stands have been carefully considered, but it is felt that the supply position is so difficult, and the need for housing and other buildings so great, that the use of materials for these purposes would not be justified.

British-made electric irons of the latest design are now being sold in South Africa at less than the pre-war price. This is due to the operation of mass-production methods in Britain and the price control in South Africa. The manager of a firm of importers said he had been fortunate in receiving a shipment of about 1,800 irons recently. "At 11 a.m. of the first morning on which I displayed them they had sold so rapidly that I only had fifty left. The pre-war price of

this iron in Cape Town was 57s. 6d. To-day it is on sale at 38s. The manufacturers in Britain are giving us preferential treatment for exports, and South Africans can expect for some time to buy these irons more cheaply than the people in Britain. What was an exclusive design with limited production before the war is now being mass-produced, and the factory cost is actually lower than in 1939. Johannesburg received a consignment of 4,000 of these irons. They were sold out in a few days. We now have 20,000 on order, but we do not know when further shipments can be expected." The profit margin now allowed by the Price Controller on electric irons is 65 per cent. American irons of similar design, when obtainable, are on sale at about 55s.

The Controller of Building Materials announces that control of the sale of domestic an electrical refrigerators has been lifted. This is step has been made possible by the fact that increased supplies have been reaching the country in the past few months and that all reports indicate that this improvement will be maintained. Control was maintained in order to enable hospitals and other essential services to obtain their requirements.

RECENT INTRODUCTIONS

Notes on New Electrical and Allied Products

Another "N.H.D." Cooker

A new electric cooker just going into production at the new Blackwood works of South WALES SWITCHGEAR, LTD., Treforest, in con-



nection with the National Housing Drive, incorporates all the usual upto-date qualitiesattractive appearance, easy-cleaning features. thermostatic oven control. toe recess, etc. The oven has a capacity of 2,570 cu in., the hotcupboard measuring 16 in, wide, 7 in high and 13 in. deep. The oven has a loading of 1,600 W. the 8-in. hot-plate 1,800 W and

National Housing Drive cooker

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the grill boiler 2,000 W. Solid or radiant type hot-plates conforming to the E.D.A. specification will be fitted as an extra, with "Lokost" or "Simmerstat" control. Standard finishes which will be available include cream and black, cream and green, mottled green, and mottled grey.

Modern Design Radio Set

The first of the 1946 broadcast radio receivers to be introduced by FERRANTI, LTD., Hollinwood, Lancs, is the transportable Model 546 incorporating a plate aerial. It is a.c./d.c. mains operated, consuming 55 W and furnishing 1.5 W output to a 6.5 in. mains-energized moving-coil speaker. The superheterodyne circuit uses four valves and a rectifier, operating in the medium and long wavebands. The glass tuning scale is edge-lit with a rotating pointer and the off-white moulded cabinet is of modern style. The set is 7.5 in. high, 11.5 in. long, 6 in. deep and weighs 10.5 lb.

Direction Indicators

Production of direction indicators and actuating switches for motor vehicles has been recommenced by TRICO-FOLBERTH, LTD., Great West Road, Brentford, Middlesex. There are exterior and built-in models, each with an amber arm either 7 or 8.5 in. long, internally illuminated by a miniature festoon type bulb for operation from the 6- or 12-V car battery. The dashboard switches, toggle and rotary, include a self-cancelling time switch which automatically lowers the signal arm after ten seconds time lag.

HUNT SAFETISIGNS, LTD., an associated firm of the same address, has for some time been manufacturing a commercial model with a 12-in. arm for installation on coaches and other large passenger vehicles.

Switch-tripping Cabinet

A new design of cabinet for housing an "Exide" battery for energising switch-tripping circuits in power and sub-stations is announced by the CHLORIDE ELECTRICAL STORAGE CO., LTD., Clifton Junction, nr. Manchester. The top portion houses a selenium rectifier for trickle charging the battery. The transformer of the rectifier effectively isolates the battery from metallic contact with the mains. For visual indication of the battery's condition there are a voltmeter and press switch which brings into circuit a resistance load to ensure that the battery voltage is measured under working conditions.



Switch-tripping battery cabinet

The Planté type plates have heavy section inter-cell connectors and a hydrometer and bottle of distilled water are provided with the cabinet which is made of heavy gauge sheet steel, black crinkled stove enamelled on the outside and treated to withstand sulphuric acid on the inside It can be locked against unauthorized interference.

Swiss Hydro-Electric Plant

BUILDING began in 1942 of the new Rupperswil-Auenstein hydro-electric plant on the River Aar, and it recently started production for the Swiss Federal Railways and the Forces Motrice du Nord Est. The annual canal 2.5 km long, rejoining the river one kilometre further on. The barrage has three 22-metre wide double gates.

The plant comprises two 23,000-H.P., 100r.p.m. turbines. The power is stepped up from



Upstream view of the Rupperswil-Auenstein hydro-electric plant

output will be about 210 million kWh, which will be divided between the two consumers.

The plant has been built to the left of the barrage, the water being taken through an escape

11 to 66 and 132 kV by means of two singlephase transformers for the Swiss Railway substation at Rupperswil. Three-phase current is stepped up to 50,000 V for the Forces Motrice. 5,00

A.S.E.E. Diplomas

FOLLOWING an investigation into a suggestion by Mr. H. W. Swann, M.I.E.E., in his presidential address to the Association of Supervising Electrical Engineers in 1941, for some test which would ensure the competence of the engineer in the electrical work for which he is responsible, the A.S.E.E. inaugurated such a scheme last year.

The scheme provides for the award, to the candidates who pass the whole of an examination, of a diploma to indicate a standard of ability in electrical installation or maintenance work or both. Endorsements indicate a candidate's possession of any or all of certain special qualifications over and above the basic requirements, and credits are awarded for high proficiency in special subjects.

The object of the scheme is not only to encourage and reward the endeavours of those who desire to advance in the industry, but to provide the employer with a proof of ability in matters on which he expects to rely upon his employee's understanding and judgment.

The standard for the award of the "Swann Diploma" is high and the examination is in two parts. Part I comprises a question paper to be answered in writing at the candidate's home (or elsewhere) and an oral examination, conducted at a centre, on the written answers.

Part II is also oral and deals with practical and technical subjects, Section (c) being designed to bring out those special qualifications which may lead to endorsement of the diploma with honours or credits.

The first examinations were held in Glasgow, London and Manchester on May 29th and 30th, and the report of the examiners, of whom Professor R. O. Kapp, B.Sc., M.I.E.E., Pender Professor of Electrical Engineering, University College, London, is the chief, indicates that the basis of the scheme is most satisfactory, and gives that individual attention necessary in an examination based on practical experience.

The results of the 1946 examination have been announced:—In Electrical Installation and Maintenance Work passes were secured by Messrs. B. C. Tanner (Worcester Park, Surreycredit), J. U. Smith (Nottingham-credit), H W. Jones (Tottenham-credit), H. Coulls (Snodland, Kent), C. R. D. Morse (Ealing), and P. H. Usher (Chislehurst). Mr. J. Delaney (Waterloo, Ashton-under-Lyne) passed in Electrical Installation Work. Passes in Part I only were secured by Messrs. B. H. C. Gurt (Bexley Heath), W. A. Smith (Folkestone), and E. J. Moore (Sidcup).

It is expected the next examination will be held in May, 1947.

FINANCIAL SECTION

Company News. Stock Exchange Activities.

Reports and Dividends

Veritys, Ltd.—Presiding at the annual meeting held on Monday last, Mr. B. C. Evans (chairman and managing director) said that the change-over from war production to normal working was proving extremely difficult, for while the reorganization of the works had to a large extent been carried out and the new plant installed, there were factors outside their control which prevented them from obtaining an adequate output. While there was no shortage of orders there was an acute shortage of essential materials. Costs of all commodities were rising and there was a lag in the adjustment of selling prices, and it was difficult, while the shortage of materials continued, to forecast when an economic level of output and prices could be attained. There was a big demand for marine motors, but the production must devetail with the shipbuilding programme, and deliveries would in the majority of cases not be required until next year. Having regard to the eduction in output at the present time they had decided not to recommend any further dividend in respect of 1945, and to further strengthen their resources by placing £7,500 to the contingencies reserve, building this up to £57,500.

The British Vacuum Cleaner & Engineering Co., Ltd., held its annual meeting on August 27th, when Mr. H. C. Booth (chairman), who presided, in the course of his speech said that practically the whole of their war effort was directed in channels outside the scope of their normal peace-time production, and the transition problems had been very great on that account. The volume of production, therefore, taking the year as a whole, was substantially lower than that of the previous year. Problems of reconversion and the shortage of materials were likely to result in a further temporary setback for the current year. When their full production capacity was established they would be able to add some entirely novel lines to their established range of domestic electric appliances which would be complementary both as to production, but it was their intention to broaden the scope of their activities in the electrical appliance field. Two new works had been acquired in areas where adequate labour facilities existed and both these factories were now in the initial stages of production.

The Kalgoorlie Electric Power & Lighting Corporation, Ltd.—In the course of his speech at the annual meeting held on August 28th Mr. A. J. Fippard (chairman), said that following the visit of Mr. C. E. Sexton to Kalgoorlie, the Corporation had decided to install further plant to take care of the estimated increased demand for the next ten years or so. It was desirable to erect an entirely new generating station and to install new boiler plant, together with a new 15,000-kW turbine-driven generating set. It was also proposed to change the transmission and distributing systems to permit the use of 11,000 V instead of the present 3,300 V. Preparations were being made so far as possible for making the changes but no definite steps could be taken until they secured a renewal of their concession. Negotiations were well advanced for a renewal for twenty-one years.

The Nigerian Electric Supply Corporation, Ltd., reports a net profit for the year to February 28th of £122,713, as compared with £147,844 for the preceding year. The final dividend is 7 per cent making 10 per cent for the year (against 8 per cent), plus a bonus of $2\frac{1}{2}$ per cent (against 2 per cent).

Thomas De La Rue & Co., Ltd., report a profit for the year ended March 31st last of $\pounds 616,485$ as compared with $\pounds 478,683$ for the preceding year. The final dividend is 35 per cent making 45 per cent for the year (against 40 per cent).

Thorn Electrical Industries, Ltd., reports trading profits of the company and its subsidiaries of £65,092, after depreciation, for the year ended March 31st last, as compared with £80,063 for 1944.45, and a net balance of £27,742 (against £26,978). General reserve receives £15,000, and the ordinary dividend for the year is maintained at 20 per cent, less tax, leaving £10,955 to be carried forward (against £10,713 brought in).

The Engineering & Lighting Equipment Co., Ltd., reports a net profit for the year ended March 31st last of £13,308, as compared with £21,357 for the previous year. The net profit is arrived at after providing £4,500 for future taxation (against nil). The ordinary dividend for the year is maintained at 8 per cent less tax by the final payment of 5 per cent.

The Telephone & General Trust, Ltd., is maintaining its interim dividend at 3 per cent.

The Lancashire Electric Light & Power Co., Ltd., has announced an interim ordinary dividend of $2\frac{1}{2}$ per cent (same).

The Rheostatic Co., Ltd., is again paying an interim ordinary dividend of 4 per cent. This year, however, it is payable on increased capital.

The London Electrical & General Trust, Ltd., is paying a final ordinary dividend of 4 per cent (against 3 per cent), making 6 per cent for the year (against 5 per cent).

Walsall Conduits, Ltd., is paying an interim dividend of 20 per cent (same).

Brown Bros., Ltd., have declared an interim dividend of $2\frac{1}{2}$ per cent (same).

New Companies

H. Ponton & Co., Ltd.—Registered August 19th. Capital, £4,000. To acquire the business of H. Ponton & Co., 55, Sloane Square, S.W.1, and to carry on the business of electrical, radio and television engineers, etc. Directors: H. Ponton, and three others. Regd. office: 55, Sloane Square, S.W.1. **Robert Hendricks, Ltd.** — Registered July 30th. Capital, £1,000. Manufacturers of, and dealers in, electrical goods and apparatus, etc. J. Cohen is the first director. Regd. office: 20-23, Halton House, High Holborn, W.C.1.

Apex Radelec, Ltd.—Registered July 12th. Capital, £500. Radio engineers, electricians, electrical engineers, etc. Directors: J. W. Greaves and A. B. Garton. Regd. office: 2-3, Pilkington's Buildings, Hartington Road, Middlesbrough.

Modern Electrical Industries (Northern), Ltd.— Registered August 1st. Capital, £5,000. To carry on the business indicated by the title. Directors: A. Read, Mrs. Gwendoline H. O'Neill, E. O'Neill and W. J. Read. Solicitors: Wooler, Burrows & Appleby, Leeds.

Lindsey Electrical Co., Ltd.—Registered August 2nd. Capital, £2,000. Manufacturers of, and dealers in, electrical apparatus, etc. Directors: H. J. Bennett, J. D. Coo and L. Bennett. Solicitors: Hopkins & Goodwin, Grimsby.

Vickery & Bowker (Holcombe Brook), Ltd.— Registered August 12th. Capital, £2,000. To acquire the business of electrical engineers and wireless dealers carried on by A. F. Vickery and N. Bowker at 8, Longsight Road, Holcombe Brook. Directors: A. J. Vickery and W. N. Bowker. Regd. office: 8, Longsight Road, Holcombe Brook, near Bury.

Barton Electrical Co., Ltd.—Registered August 12th. Capital, £600. To carry on the business indicated by the title. Directors: J. A. Barton, G. D. N. Nabarro and A. E. Wright. Secretary: A. E. Wright. Regd. office: The Old Dee Works, Saltney, Flint.

G. Duder Gray, Ltd.—Registered August 10th. Capital, £5,000. Electrical engineers and general electrical installation contractors, lighting specialists, etc. Directors: G. D. Gray and Mrs. Margaret E. Gray. Regd. office! 30, Guildford Road, Woking.

H Lawrence Electrical, Ltd.—Registered August 8th. Capital, £1,000. Electrical, welding and general engineers, etc. Directors: H. Lawrence, Major H. F. Kingston and Hilda E. Hulands. Regd. office: 34, Aldersgate Street, E.C.1.

Broughton Electrical Co., Ltd.—Registered August 8th. Capital, £100. Manufacturers of, and dealers in, dynamos, motors, armatures, magnetos, batteries and electrical plant, etc. Directors: H. E. Alexander and Blanche Sapper. Regd. office: 11, Albert Square, Manchester, 2.

Austin Turner & Co., Ltd.—Registered August 10th. Capital, £5,000. To acquire the business of an electrical contractor carried on by G. A. Turner, 101, High Street, Harlesden, N.W., as George Austin Turner. Directors: G. R. Bourne and G. A. Turner. Regd. office: 101, High Street, Harlesden, N.W.

Barwell Electrical Products, Ltd.—Registered August 17th. Capital, £1,000. Manufacturers of and dealers in, radio and electrical instruments, appliances and apparatus, etc. Directors: M. W. Wells, D.G. Barrow and Mrs. Phyllis E. Wells. Regd. office: 255, Earlsfield Road, Wandsworth, S.W.

Modern Electrical Industries (Southern), Ltd.—Registered August 15th. Capital, £3,000. To carry on business as indicated by the title. Directors: J. D. Macnee and D. G. Jones. Regd. office: 9, Hatherley Road, Sidcup.

Wheeler & Pearce, Ltd.—Registered August 14th. Capital, £5,000. To acquire the business of an electrical engineer and contractor, etc., carried on by H. Wheeler as Wheeler & Pearce" at Trafalgar Street, and 73, Milton Street, Sheffield. Directors: H. Wheeler, G. B. Crawshaw, Blanche Wheeler and Mary B. Crawshaw. Regd. office: 73, Milton Street, Sheffield.

A. Barlow & Co., Ltd.—Registered August 15th. Capital, £1,000. Wholesale and retail electrical and radio engineers, etc. Directors: H. A. Barlow and Mrs. Irene A. Barlow. Secretary: H. A. Barlow. Regd. office: Sealey House, Church Hill, Loughton.

Edmund Bassett & Son, Ltd.—Registered July 24th. Capital, £1,000. Manufacturers of, and dealers in, all kinds of electric light fittings and equipment, etc. Directors: E. E. Bassett and Dorothy G. Bassett. Regd. office: 105, Station Road, Edgware, Middlesex.

Beasley Brothers, Ltd.—Registered August 17th. Capital, £1,000. Importers, exporters and manufacturers of, and dealers in, electrical fittings, radio receivers, etc. Directors: J. B. Beasley and G. E. Beasley. Regd. office: 109, Pitfield Street, N.1.

Tudor Radio, Ltd.—Registered August 20th. Capital, £1,000. To carry on the business indicated by the title. Directors: F. W. Gill and A. C. Hooker. Secretary: Emanuel C. Silver. Regd. office: 29, Broadwater Street, West Worthing.

Jack Porter, Ltd.—Registered August 20th. Capital, £1,500. To acquire the business of a radio and electrical engineer now carried on by W. J. Porter at 22, College Street, Worcester, as "Jack Porter." Directors: W. J. Porter and Mrs. D. Porter. Secretary: Mrs. D. Porter. Regd. office: 22, College Street, Worcester.

Bankruptcies

J. Leivers, radio electrical engineer, Victoria Radio Stores, 94, Victoria Road, Kirkby-in-Ashfield, Notts.—Public examination, October 3rd at the Court House, St. Peter's Gate, Nottingham.

P. M. Gill, radio and electrical dealer, carrying on business at 166-170, Partington Lane, Swinton, under the style of Swinton Radio Service, and at The Circle, Davyhulme, Lancs, as Radio House.—Application for discharge to be heard on October 11th at the Court House, Encombe Place, Salford.

W. S. Poole, electrician, High Street, Queensbury, near Halifax.—Last day for receiving proofs for dividend, September 14th. Trustee, Mr. E. T. Sanders, 71, Manningham Lane, Bradford, official receiver.

R. J. Thurlow, electrical engineer, carrying on business at 27, Fore Street, Ipswich.—First and final dividend of 5s. $9\frac{1}{2}d$. in the £, payable September 10th at 13a, Great Colman Street, Ipswich

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September 6, 1946

ELECTRICAL REVIEW

55

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STOCKS AND SHARES

EAVY falls in prices in the Stock Exchanges of New York, Calcutta and Bombay, threw a general heaviness over the House in most of its departments. In American securities there is little market on this side, for the simple reason that only in the shares of a comparatively few companies is it possible to deal with any freedom. Sales can be made from here, but not purchases, except in Brazilian Tractions and a handful of others. Why the apprehensions of New York, due to the European complications, should affect markets in gold mining shares and our domestic industrials, it is difficult to explain, but the fact remains. Labour conditions at home do not make for cheerfulness in the Stock Exchange markets. In spite of the adverse factors, however, prices do not go back to any material extent, and a fresh advance in British Government securities served to hearten investment markets generally.

Company Results

British Vacuum Cleaner 5s. shares have risen 1s. further, to about 28s. 6d., since the appearance of the full accounts, and the chairman's review of the conditions which accounted for the fall in 1945 profits. On the dividend of 20 per cent—reduced from 30 per cent—the shares yield £3 12s. 9d. per cent. Veritys report shows that the dividend, maintained at 71 per cent, is covered more than twice by available earnings. At 8s. 9d., the 5s. shares give a return of $4\frac{1}{2}$ per cent. The Engineering & Lighting Equipment ordinary dividend is again brought up to 8 per cent, although a decline in net profits for the year is announced in the preliminary statement. At 3s. 3d., the 2s. shares pay £4 18s. 6d. per cent on the money. Thorn Electrical 5s. shares at 32s. yield £3 2s. 6d. per cent on the 20 per cent dividend.

London Associated Electricity Undertakings

Before the war, London Associated was paying regular annual dividends of 7 per cent, 3 per cent of which was an interim payment. Interims were discontinued after 1939, and the full distribution dropped to 3 per cent in 1942. It was restored to 4 per cent for the next two years and to 6 per cent for 1945. The company has now resumed interim payments, with a distribution of $2\frac{1}{2}$ per cent on account of 1946. At 25s., the shares yield $4\frac{3}{4}$ per cent on last year's dividend. This suggests that a return to the pre-war 7 per cent dividend level is not regarded as an early prospect.

Price Fluctuations

Home Railway stocks drew a little support from the Government's request for the substitution of oil for coal. Southern 5 per cent preferred at 72 is $1\frac{1}{2}$ up and Transport "C" has continued its advance, with a rise to 61. The Home electricity supply list is firmer, with several gains of 6d. Electrical Finance are 1s. harder at 61s. Of the Indian shares, Calcutta Electrics lost 3s., at 60s., but Cawnpores are 6d. up at 57s. 6d. Calcutta Trams shed 2s. 6d. to 65s. Cable stocks are moving irregularly. Great Northern Telegraphs at 33 and Anglo-American 6 per cent preferred are both a point higher. Cable & Wireless ordinary and preference at 112 and 115 respectively, have receded, and Canadian Marconi at 15s. are lower. London Electrical & General Trust has increased its dividend to 6 per cent for the year, against 5 per cent, and the shares are 1s. 6d. better at 24s. 6d.

Manufacturing and Equipment

Chloride Electrical Storage have hardened to The feature in this list is a rise of 17s. 6d. £5. to 13¹/₄ in De la Rue. This followed the declaration of a dividend making 45 per cent for the year, against 40 per cent in the previous twelvemonth, and figures showing £137,000 increase in profit. Decca Records hold their rise to 61s. 3d. A.C. Cossor further recovered to 36s.; E. K. Cole eased off to 32s. 6d. A gain of 1s. 6d. made Greenwood & Batley 53s. 6d. Johnson & Phillips 85s. 6d., Murex 91s. 3d. and Vactrics 19s. 6d. are amongst the shares to show improvement. Power Securities at 32s. are up 1s. Westinghouse Brake went back to 76s. Peto Scott Electrical Instruments at 11s. are 3d. better.

British Power & Light Dividends

Last March the British Power & Light Corporation raised the ordinary dividend from 7 to 8 per cent, and, from surplus taxation reserves, paid an additional 2 per cent as a cash bonus. For the current year, the interim has been increased from 2 to 3 per cent, with the caution, however, that the object is to bring the interim and final distributions into equitable relationship, rather than to indicate a bigger total for the year. Clearly the interim decision gives no encouragement to the optimists inclined to take the full distribution of 10 per cent for 1945 as firm. But on the 8 per cent dividend alone, the shares at 32s. yield a round 5 per cent.

Aron Meters

The extent to which the transition problems of 1945 affected the profits of Aron Electricity Meters proved greater than had been expected. The price of the ordinary shares dropped from 70s., to less than 60s. on the cut in the dividend from 15 to 10 per cent, and the issue of the preliminary profits statement. According to the latter, trading resulted in a loss of £33,000 as compared with a profit of £19,000 the year before. E.P.T. repayments, however, came to the rescue, and after provision for taxation, the net surplus is £12,500, which covers the 10 per cent dividend with something to spare. On the reduced distribution, the yield on the shares at 57s. 6d. ex dividend is just under 3½ per cent.

September 6, 1946

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.

C. BARFORD.—"Tubing of hollow electrical resonators." 19448. November 20th, 1943. (579834.)
 K. Baumann and Metropolitan-Vickers Elec-trical Co., Ltd.—"Steam turbines." 12277.
 September 22nd, 1941. (579812.)
 A. D. Blumlein and E. L. C. White.—" Pulse encoding theoremic gues anaratus." 1689.

January 7th, 1940. (579725.) British Thomson-Houston Co., Ltd.—"Gas turbines." 6853/45. March 20th, 1944.

(579759.)

(579759.) British Thomson-Houston Co., Ltd. (General Electric Co.).—" Methods of making moulds for casting metals." 18740. September 29th, 1944. (579716.) " Ignition distributors." 3698. February 28th, 1944. (579864.) British Thomson-Houston Co., Ltd., and A. Bowen.—" Lanterns for electric gaseous discharge lamps." 15612. December 3rd, 1941.

(579731.)

British Thomson-Houston Co., Ltd., and C. J. Milner.—"Secret signalling systems." 5975. April 3rd, 1940. (579726.)

British Thomson-Houston Co., Ltd., and W. J. Scott.—"Glass-to-metal seals." 1363. January 25th, 1944. (579788.)

Brush Development Co.—" Piezo-electric gramophone pick-ups." 10774/42. July 31st, 1941. (579738.)

Callender's Cable & Construction Co., Ltd., and D. T. Hollingsworth.—" Wave guides for high-frequency electric currents." 11744. high-frequency electric June 20th, 1944. (579876.)

Compagnie pour la Fabrication des Comp-teurs et Matériel d'Usines à Gaz.—" Protection relay." 6207/39. February 25th, 1938. (579800.) Electric & Musical Industries, Ltd., and H. G. Lubszynski.—" Electron emissive cathodes." 15088. October 10th, 1940.

(579804.)

English Electric Co., Ltd., J. K. Brown, J. M. Hawkins and R. F. J. Weil.—" Apparatus for electric arc welding." 15235. August 10th, 1944. (579711.) Express Life Co., Ltd., J. H. Pastridae, and

Express Lift Co., Ltd., J. H. Partridge and L. E. W. Wells.—" Electrical resistors com-

L. E. W. Wells.— Electrical resistors com-prising a ceramic support and wire wound thereon." 9200. July 3rd, 1942. (579735.) C. H. Flurscheim and Mctropolitan-Vickers Electrical Co., Ltd.—"Air or gas blast electric circuit breakers." 590. January 6th, 1945. (579839.)

J. Forman and Pye, Ltd.—" System of radio vision and location." Cognate applications 12624/41 and 15037/41. September 30th, 1941. (579813.)

General Electric Co., Ltd., and D. O. Hawes. -"Apparatus for frequency-modulating carriers, particularly of a very high frequency." 18051. December 18th, 1942. (579745.) General Electric Co., Ltd., and E. B. Power.—

"H.p.m.v. electric discharge devices." 13880.

General Electric Co., Ltd., G. W. Edwards and R. W. Sloane.—"Electrical generators, amplifiers or modulators." 9834. June 5th, 1940. (579803.)

General Electric Co., Ltd., V. J. Francis and E. H. Nelson.—" H.p.m.v. lamps." 10813. July 2nd, 1943. (579748.) General Electric Co., Ltd., I. Jenkins and S. V. Williams.—" Methods for the surface carburizing of steel." 15391. November 2nd, 1942. (579742.) General Electric Co., Ltd., M. Berineit

General Electric Co., Ltd., M. Benjamin, B. S. Gossling and J. W. Ryde.—" Non-linear impedances." 14315. September 18th, 1940.

(579845.) L. W. Germany and Pye, Ltd.—" Circuit arrangement for producing a sine wave voltage from a pulse wave-form." 6137. April 3rd, from a pulse wave-form. 1944. (579794.)

from a purse drive and the provided and the purse of the provided and the provided

J. S. Hall and Metropolitan-Vickers Electrical Co., Ltd.—" Means of manœuvring control in marine turbines." 12275. September 22nd,

1941. (579810.) D. L. Hings.—" Radio-frequency generating and modulating systems." 9240. July 23rd,

1942. (579736.) D. B. Hoseason, H. West, D. Smith an Metropolitan-Vickers Electrical Co., Ltd.-Smith and

"Direct current dynamo-electric machines." 9433. May 29th, 1940. (579802.) H. L. Mansford.—"Thermionic amplifiers."

7623. April 24th, 1944. (579685.) B. J. Mayo.—" Velocity-modulated electron

discharge devices employing hollow resonators." 8632. May 29th, 1943. (579818.) Philips Lamps, Ltd., and A. J. Pinkney.— "High-frequency heating arrangements." 20179.

October 18th, 1944. (579717.) Revo Electric Co., Ltd., A. E. Felton and A. Crawford.—"Double pole electric switch mechanism." 16469. August 30th, 1944.

(579713.) L. Sharp and R. Winder .--- " Electric light fittings for local lighting to one or more positions from a single lamp source." 12368. July 30th, 1943. (579821.)

1943. (579821.) Siemens Bros. & Co., Ltd., M. Reed and G. H. Parks.—"Electrical communication system." 7888. April 27th, 1944. (579687.) Siemens Electric Lamps & Supplies, Ltd., and J. N. Aldington.—"Electric discharge lamps." 7887. April 27th, 1944. (579686.) Sperry Gyroscope Co., Inc.—"Directive electromagnetic antenna structure" 17313/42.

electromagnetic antenna structure." 17313/42. January 29th, 1942. (579746.) "Directive antenna structures." 1834/43. February 4th, antenna structures." 1834/43. February 4th, 1942. (579763.) "Electromagnetic energy

transmission apparatus." 8449.43. May 27th, 1942 (579764.)

1942. (579764.) R. A. W. Spooner. Pupe and cable coup-tings. 9600. May 18th, 1944. (579838.) Standard Telephones & Cables, Ltd. Phase changers." 20392/43. January 8th, 1943. (579782.) "Electro-deposition of selenium." 10270/42. December 1st, 1942. (579851.) (579782.) "Electro-deposition of selenium." 19830/43. December 1st, 1942. (579851.) Circuit arrangements for the generation of electrical pulses of variable duration." 375/44. January 8th, 1943. (579853.) Standard Telephones & Cables, Ltd.— "Distance indicating radio detection system." 3111/44. February 20th, 1943. (579863.) Standard Telephones & Cables. Ltd. (Inter-

Standard Telephones & Cables, Ltd. (International Standard Electric Corporation).— Pulse modulation systems." 17891. October

29th, 1943. (579777.) Standard Telephones & Cables, Ltd., and D. Bannock.—" Predictors for use with anti-aircraft guns." 12501. September 26th, 1941 (579729.)

Standard Telephones & Cables, Ltd., and R. Hilton.--"Time base circuits for cathode ray tubes." 1976. February 3rd, 1944. February 3rd, 1944. (579682.)

Standard Telephones & Cables, Ltd., and J. D. Weston.—" Combined glide and approach path systems for aircraft." 3885. March 1st, 1944. (579865.)

1944. (579865.) Standard Telephones & Cables, Ltd., and E. O. Willoughby.—" Radio antenna." 18436. November 5th, 1943. (579778.) "Keying arrangements for radio frequencies." 7479. April 21st, 1944. (579873.) J. Stone & Co., Ltd., and A. H. Chilton.— "Electrically-propelled torpedoes." 1083. January 27th, 1941. (579728.) Taylor, Tunnicliff & Co., Ltd., and W. Vose.— "Dielectric composition." 4815. March 15th, 1944. (579868.)

1944. (579868.) A. Tustin and Metropolitan-Vickers Electrical Co., Ltd.—" Electric motor control equip-ments." 14765. November 1st, 1940. (579727.)

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.

Aberdeen.—September 18th. Electricity Department. Substation, North Anderson Drive. Forms from the city electrical engineer.

Australia. — QUEENSLAND. — October 17th. City Electric Light Co., Ltd., Brisbane. 15,000-kW steam turbine and accessories. (Specification 412, first copy 2 guineas, others 10s. 6d.) H. Baskerville, secretary, Boundary Street, Brisbane. (Tenders.)

Bentley-with-Arksey.—September 14th. Ur-ban District Council. Electrical installation in 70 permanent houses on Scawthorpe estate. R. N. Penlington, engineer, Council Offices, Cooke Street (deposit of £1 1s.).

Chesterfield.—September 12th. Electricity Department. Seven 250-kVA outdoor distri-bution transformers. H.v. and m.v. cables. (August 23rd.)

Dundee.—September 10th. Public Health Committee. Electric lighting installation at administrative block, Maryfield Hospital. Particulars from city quantity surveyor, 21, City Square.

Edinburgh.—September 21st. Electricity Department. Switchgear, transformers and substation equipment. (See this issue.)

Kingston-upon-Thames. — September 30th. Borough Council. Tower wagon for street lighting purposes. (August 23rd.)

Manchester.—September 17th. Electricity Committee. Battery and charging equipment at two substations; and 660-V d.c. traction switchgear at three substations. (August 30th.)

September 18th. Electricity Department. Mercury-arc rectifier equipment for trolley-bus supply. (August 30th.)

New Zealand. - September 24th. Public

Works Department. Two 10,000-kVA, 110/11-kV transformer banks and two spare units. Specification can be seen at the New Zealand Government offices, 415, Strand, W.C.2. (Tenders.)

Peebles-shire.—September 17th. County Council. Electrical work in connection with twenty houses at West Linton. D. Peddie, M'Kay & Jamieson, architects, 8, Albyn Place, Edinburgh, 2 (deposit of £1 1s.)

Seaton Valley.—U.D.C. Electrical installation in 104 houses on the Hostel Estate at Cram-lington. Plans by the Surveyor, Council Offices, Seaton Delaval.

Southampton.-September 18th. Electricity Department. Fourteen electric refrigerators of the compressor type and of 5 to 7 cu ft capacity. (See this issue.)

Stockport.-September 11th. Town Council. Electrically-driven borehole pump for the Gas Department. T. Reynolds, gas engineer, Portwood Gasworks.

Wolverhampton.-October 8th. West Midlands Joint Electricity Authority. Supply, delivery, erection, testing and setting to work of two 33,000-V, 3-phase, 15-mVA feeder reactors. (See this issue.)

Orders Placed

Doncaster .- Electricity Committee. Accepted. Cables (£6,237).-Enfield Cables.

Eccles. - Town Council. Accepted. Electrically-driven pumping plant at Sewage Works (£2,551).—Pulsometer Engineering Co.

Glasgow.-Corporation. Accepted. Electrical Sannox Gardens-Argyle Electrical Co.

Greenock.—Corporation. Accepted. Electrical work for housing scheme (£8,648). Hurry Bros., Greenock.

Manchester.—Transport Committee. Accepted Trolley-bus motors and motor-generator sets, to be used as spares. Met.-Vickers Electrical Co.

Contracts in Prospect

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

Aberdeen.—Dining halls, etc., at three schools and extensions of existing meals facilities at other schools; J. A. O. Allan, Ross & Allan, architects, 10, Bon-Accord Square.

Baildon.—Houses (60), Knoll Estate, for U.D.C.; P. A. Watford, surveyor, Town Hall.

Batley.—Houses (48), Halifax Road Estate, for T.C.; borough engineer, Brunswick Street.

Blackpool.—Schools, Grange Park and Layton; borough engineer.

Boldon (Co. Durham).—Houses (88) on the Somerset Estate at East Boldon; Gordon Durham & Co., Ltd., builders, East Boldon.

Bowburn (Co. Durham),—Houses (80) at Bowburn and also prefabricated Airey houses at five places for R.D.C.; housing architect, Byland Lodge, Durham City.

Bradford.—Extension to science block, Highfield School, Tong Street, for T.C.; city architect, Town Hall.

Bury.—Houses (166), Brandlesholme No. 2 site, for T.C.; Building Contractors (Bury), Ltd., 16, Castle Street.

Chatham.—Houses (52), Wayfield Estate (£60,856), for T.C.; E. W. Ballard, builder, Cranford, Birling Avenue, Rainham.

Cleethorpes.—Houses (100), Clee Road site, for T.C.; A. B. Cooper, borough engineer, Council House.

Durham.—Extension to factory of Adams (Durham), Ltd., confectionery manufacturers (£65,000); E. M. Lawson, Barras Buildings, Barras Bridge, Newcastle-on-Tyne.

Farnham.—Houses (50), Heath End site, for U.D.C.; G. Maxwell Aylwin, architect, 26, West Street.

Featherstone.—Houses (68), and bungalows (18), Purston Estate, for U.D.C.; R. W. Bainton, clerk, Council Offices.

Forres.—Houses (90) for Town Council (electric cookers); burgh surveyor.

Glasgow.—Residential nursery school, Fairlee; city engineer. Factory, Possilpark, for Fibreglass, Ltd.; J. Houston, architect.

Glossop.—Houses (36), Sheffield Road site, for T.C.; R. S. Ainscough, Ltd., builders, The Sound, Delph, Oldham.

Great Yarmouth.—Permanent houses (65), Magdalen College Estate, for T.C.; H. F. Dyson, borough engineer, Town Hall.

Greenock.—Offices for Messrs. Scott, shipbuilders; the manager. Public health offices and clinic; proposed new destructor and

central garage at Ladyburn; and new public baths for Corporation; master of works.

Hull.—Rebuilding blocks B and Bl., Newtown Buildings, Southcoates Lane, for T.C.; city architect.

Huyton. Houses (100), Hag Plantation (£107,976), for U.D.C.; Fortus Construction, Ltd., builders, Rigby Street, Liverpool, 3.

Ilkeston.—Houses (133), Cotmanhay Estate, for T.C.; A. O. Marshall, borough engineer, Town Hall.

Inverness.--Factory for Celotex Company; manager.

Kiveton Park.—Houses (100), various sites, for R.D.C.; surveyor, Council Offices.

Lanarkshire.—Reinstatement of annexe at Bishopbriggs H.G. school for county council; W. R. Watt, county architect, 34, Albert Street, Motherwell.

Littleborough.—Houses (78), Hollingworth Lake site, for U.D.C.; G. F. Wild, surveyor, Council Offices.

Melton Mowbray.—Houses (154), Asfordby and Nottingham Road, for U.D.C.; Wm. Moss & Son, Ltd., Queens Road, Loughborough.

Newburn-on-Tyne.—Houses (126), Claremont Estate, for U.D.C.; G. Bainbridge, builder, Copperas Lane, Lemington.

Newcastle-on-Tyne.—Leather factory in The Side, for T. Owen; A. H. Fennell, Bridge End Chambers, Chester-le-Street.

Alterations to a factory in High Bridge for J. Paul & Sons, Ltd.; C. Solomon, 3, St. Mary's Place.

Goods lift to four floors at premises in Guildford Place for Brough's, Ltd., provision merchants; Tasker & Child, Trinity Buildings, New Bridge Street.

Workshop and offices in Nixon's Place, Haymarket, Newcastle, for the Haridix Co.; Dixon & Bell, Pearl Buildings.

New Romney.—Houses (50), for T.C.; Culpin & Son, architects, 3, Southampton Place, London, W.C.1.

North Kesteven.—Houses (114), North Hykeham and Bracebridge Heath, for R.D.C.; J. Chadwick, surveyor, 31, Clasketgate, Lincoln.

Oldham.—Works extensions and new office; Phœnix Doubling Co., Cromwell Street. Houses (16), Dove Street; Greenwoods Building Industries, Ltd., Salem Works, Lees Road.

Otley.—Houses (56), Lineholm estate, Bradford Road, for U.D.C.; F. Laughey, clerk, Council Offices, North Parade.

Potters Bar.—Houses (38), Baker Street and Dugdale Hill (£47,180), for U.D.C.; Newland Bros., Ltd., builders, Potters Bar.

Saltash.—Houses (124), Warfelton; S. C. Drabble, borough engineer, Church House, Saltash, Cornwall.

Sheffield.—Extensions and alterations to maternity unit, Nether Edge Hospital (£31,775); R. C. Hutchinson, Ltd., builders, 430, London Road, Sharrow.

Shildon (Co. Durham).—Houses (40), Dale Road, Shildon, for the U.D.C.; Kitching & Co., architects, 40, Albert Road, Middlesbrough.

Slough.—Permanent houses (124), Stoke Poges Lane; borough engineer, Town Hall. September 6, 1946

AUTOMATIC COIL WINDING

A representative group of Coils wound on the Durban 1 Machine.



The Durban 1 with A.C. Geared Motor

The Neville's Durban I Automatic Coil Winding Machine is designed for winding all types of coils up to 12" in length. Wire from 11 to 35 S.W.G. can be used. A foot operated clutch, and built in control gear are included in the specification. Faceplate speeds from 50 to 340 r.p.m. are obtainable and a $\frac{1}{2}$ horse power 1425/447 r.p.m. geared motor can be supplied. An experienced staff of specialists is always prepared to give individual attention to any coil winding problems, and full particulars of the complete range of coil winding machines can be obtained from Dept. MD. Your enquiries are invited.





minus shadow = plus production

HOURS OF PRECIOUS time are lost in that patch of shadow. Errors flourish there, and inaccuracies multiply. No wonder industrialists working under high pressure are glad to find a way to cut the shadow out ! OSRAM Fluorescent Lamps—next best thing to daylight—provide a steady, even radiance with no hard shadows. Economical, too ! The 80-watt OSRAM Fluorescent Lamp, for example, gives approximately three times as much light as a tungsten lamp for the same amount of current. This is the logical lighting for industry !



Adv. of The General Blectric Oo. Ltd. : Magnet House : Kingsway, London, W.O.N



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-CLASSIFIED A DV DER NISEDMEDNY K

ADVERTISEMENTS for insertion in the following Friday's issue are accepted up to First Post on Monday, at Dorset House, Stamford Street, London,

THE CHARGE for advertisements in this section THE CHARGE for advertisements in this section is 2/- per line (approx. 7 words) per insertion; ONLY OFFICIAL AND GOVERNMENT ANNOUNCE-MENTS CAN NOW BE DISPLAYED:--30/- per 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, Stam-ford 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.

WEST MIDLANDS JOINT ELECTRICITY AUTHORITY

Contract No. 181—Ocker Hill Generating Station: Feeder Reactors

THE above-named Authority invite tenders for the

THE above-named Authority invite tenders for the supply, delivery, erection, testing and setting to work of two 33,000-volt, 3-phase, 15-MVA Feeder Reactors. Topies of the conditions, specification and form of tender may be obtained on payment of one guinea, which will, after the Authority have come to a decision on the tenders received, be returned to the tenderer, provided he shall have sent in a bona-fide tender and shall not have withdrawn it. Additional copies can be obtained on a further gayment of one guinea per copy, which sum will not be returnable. Cheques should be made payable to "West Midlands Joint Electricity Authority." Tenders must be forwarded in the envelope provided so as to reach the undersigned not later than noon on Tuesday, 8th October, 1946. The Authority do not bind themselves to accept the lowest or any tender. H. F. CARPENTER,

H. F. CARPENTER, Clerk and Manager.

Phænix Buildings, Dudley Rd., Wolverhampton. 26th August, 1946. 2365

CITY AND ROYAL BURGH OF EDINBURGH ELECTRICITY DEPARTMENT

THE Lord Provost, Magistrates and Council of the City

THE Lord Provost, Magistrates and Council of the City of Edinburgh invite tenders for annual contracts for the supply of the following equipment: ---6.6.kV Ring Main Switchgear (Specification No. 200); 500 kVA Three-phase Transformers (Specification No. 201); Medium Voltage Substation Equipment (750-a. Air-break Circuit Breakers and H.R.C. Fuse Feeder Unbis) (Specifica-tion No. 202); Substation Relay Panels (Solkor and Trans-lay Equipment) (Specification No. 203). Conject the specifications, etc., may now he obtained

lay Equipment) (Specification No. 203). Copies of the specifications, etc., may now be obtained from Mr. J. F. Field, Engineer and Manager, Electricity Department, Dewar Place, Edinburgh, 3. Sealed tenders, endorsed "6.6-kV Ring Main Switch-gear Specification No. 200" (as the case may be), musi-be delivered to the undersigned not later than 10 a.m. on Saturday, 21st September, 1946. The Corporation do not bind themselves to accept the lowest or any tender. J STORRAR, Town Clerk. 2425

City Chambers, Edinburgh.

2425

COUNTY BOROUGH OF SOUTHAMPTON ELECTRICITY DEPARTMENT

Electric Refrigerators

TENDERS are invited for the supply and delivery of fourteen Electric Refrigerators of the compressor type and of 5 to 7 cubic feet capacity. Short specification and form of tender may be obtained from Mr. W. G. Turner, Rorough Electrical Engineer. Civic Centre, Southampton, by application and on pay-ment of one guinea, which will be refunded on receipt of a bona fide tender. Additional copies may be purchased at a cost of 10s. 6d. each. Steled tenders, endorsed "Electric Refrigerators." must be delivered to the undersigned not later than Wednesday. Isth September, 1946. The Council does not bind itself to accept the lowest or any tender. R. RONALD H. MEGGESON.

R. RONALD H. MEGGESON. nton. Town Civic Centre. Southampton. 23rd August, 1946.

SITUATIONS VACANT

SUNDERLAND EDUCATION COMMITTEE

The Technical College Principal: D. A. Wrangham M.Sc. (Lond.), Sen.Wh.Sc., M.I.Mech, E., D.I.C.

A PPLICATIONS are invited for the post of Lecturer in the Electrical Engineering Department, duties to commence as scon as possible. Salary in accordance with the Burnham Technical Scale. The commencing salary vill include an allowance for approved industrial or pro-gessional experience (after the age of 21 years) up to 7 years, or in special cases up to 10 years. The standard of the full-time day courses is that required for an Honours Degree, and of the evening courses the Higher National Certificate. Candidates should have a good Honours Degree in Electrical Engineering, with quali-fications in Telecommunications, and have had practical experience in modern developments in this field. Forms of application and further particulars may be obtained y sending a stamped addressed folscap envelope to the Registrar. The Technical College, Sunderland. Applica-tion forms should be returned to the undersigned as soon as possible. as possible.

W. THOMPSON. Education Offices, Director of Education. 15, John St., Sunderland. August, 1946.

BOROUGH OF AYLESBURY ELECTRICITY DEPT.

Appointment of Assistant Mains Engineer (Junior)

A PPLICATIONS are invited for the above appointment at a salary in accordance with Grade 9, Class F, N.J.F. Schedule, at present £358, rising to £373 per annum. Candidates must have had good technical education and training, with practical experience in the installation and maintenance of E.H.T. and L.T. underground distribution systems and equipment, together with some experience in mains drawing office work and mains records. The post is superannuated and the appointment is subject to the successful candidate passing a medical examination. Applications, stating age, training and experience, to be sent to the undersigned not later than September 23, 1946. E BENT M LE E. A M UMech E.

idate page, training september 2a, ersigned not later than September 2a, F. BENT, M.I.E.E., A.M.I.Mech E. Borough Electrical Engineer and Manager, 2380

Electricity Offices.

Exchange Street. Aylesbury, Bucks.

CITY OF MANCHESTER ELECTRICITY DEPT.

A PPLICATIONS are invited for the position of Senior Assistant Chemist. Candidates must have had ex-perience in power station chemistry, and hold the Higher

perience in power station chemistry, and note the right National Certificate or equivalent diploma. Salary to commence, 2455 per annum. The appointment will be subject to the City Council Superannuation Scheme, and the successful candidate will be required to pass a medical examination.

medical examination. Applications, giving full particulars of age, technical training and experience, forether with copies of recent testimonials, must be endorsed "Senior Assistant Chemist" and addressed to the Chief Engineer and Manager, Elec-tricity Department, Town Hall, Manchester, 2, not later than 10 a.m. on Monday, 16th September, 1946, Canvass-ing, directly or indirectly, will disqualify.

PHILIP B. DINGLE. GLE. Town Clerk. 2385 Town Hall, Manchester, 2. 29th August, 1946

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NAVAL SERVICE OF CANADA

A limited number of suitably qualified Civilian Electrical Engineers are required immediately by the Royal Canadian Navy for service in the Dominion of Canada. The appointments will be for two years' duration, with the possibility of extension. Travelling expenses from the United Kingdom to place of employment in Canada, and. United Kingdom to place of employment in Canada, and, in the eyeut of termination of appointment, return to the United Kingdom, will be provided for successful candidates, and their wives and children at first class rates. Reason-able costs of moving household effects to place of residence in Canada, and return to the United Kingdom, will be provided. Salaries will be dependent upon qualifications. Applicants should hold the Higher National Certificate or a University Degree in Electrical Engineering, and should have had good practical training and experience in industry. In addition, war-time experience in the detailed layout, installation and testing of electrical systems in modern cruisers, aircraft carriers and destroyers is

modern cruisers, aircraft carriers and destroyers in essential.

essential. Applications, giving full details of age, nationality, general and technical education, industrial and war-time experience, are to reach the Canadian Naval Mission Over-seas, 10, Haymarket, London, S.W.1, not later than Monday, 16th September, 1946. Copies of not more than three recent testimonials are to be forwarded with applications

CITY OF OXFORD ELECTRICITY DEPARTMENT

Appointment of Senior Electrical Cooking Demonstrator

A PPLICATIONS are invited for the position of a Senior Rectrical Cooking Demonstrator in the City of Oxford Electricity Department, Candidates must be well educated and should hold a recognised Diploma in Dormestic Science such as E.A.W. Electrical Housecraft Diploma. The person appointed must be thoroughly competent to practise cook-ing by electricity and to advise consumers either in the demonstration room or in the consumers' kitchen. In the absence of a recognised scale for this class of appointment the salary offered is £350, plus war bonus of £48 2s, per anoum. The appointment superannuation Act, 1937, and the selected candidate will be required to pass a medical examination. Applications, clearly marked "Demonstrator," should

pass a medical examination. Applications, clearly marked "Demonstrator," should be addressed to the City Electrical Engineer and Manager, 37, George Street, Oxford, and must be received not later than Monday, 23rd September, 1946. HARRY PLOWMAN, Town Clerk.

2424 Town Hall, Oxford.

BOROUGH OF COLCHESTER ELECTRICITY DEPT.

Switchhnard Attendant

A PPLICATIONS are invited for the appointment of A Switchboard Attendant. Applicants should have had experience in the operation of high and low tension control switchgear in a generating station, including synchronising of alternators, load control and running rotary convertors. This is a temporary appointment, but for a period of at least 12 months.

The rate of pay will be 2s. 64d, per hour and the con-ditions in accordance with National Joint Industrial Coun-cil, No. 9 Area. Applications in candidates own handwriting, stating age.

experience and when able to take up duties, accompanied by copies of two recent testimonials, to be forwarded to the undersigned not later than Monday, 16th Sept., 1946. G. P. DIXON, A.M.I.Mech.E., Electricity Offices. Borough Electrical Engineer.

Electricity Offices. 36, Osborne Street

Colchester, Essex.

2374

CITY OF LONDON ELECTRIC LIGHTING CO. LTD.

Junior Draughtsman

A PPLICATIONS are invited for the position of a Junior Draughtsman in the Distribution Department of the above Undertaking.

Applicants must have been trained as Draughtsmen and Applicants must have observations and applicants must have experience in a Drawing Office of an Electrical Under-taking. Electrical qualifications will be an advantage. Salary according to age and qualifications. Applications, giving full particulars, to be sent to the undersigned not later than September 12th.

G. H. FOWLER, M.I.E.E.

Falcon House, Aldersgate St., London, E.C.1. Distribution Supt. 2244

SHEFFIELD CORPORATION ELECTRICITY DEPT.

A PPLICATIONS are invited for the following

Positions:— POWER INSTALLATIONS ENGINEER. Applicants must have had a sound technical and practical training in electrical engineering, either with a manufacturing elec-trical engineering firm or with an electricity supply undertaking and must be Graduate or Corporate members of the Institution of Electrical Engineers or possess equivalent technical qualifications.

Considerable experience in the preparation of power installation schemes and specifications for large works comprising motors, switchgear, furnaces, etc., together

comprising motors, switchgear, lumaces, etc., tegether with the ability to tender for and supervise the installation of such schemes is essential. Applicants must possess a thorough knowledge of the care and maintenance of works electrical plant, including the rewinding of motors and the repair and maintenance of switch and starting gear, together with experience of all applications of electrical development normally under-taken by a supply authority. The salary will be in accordance with Class M. Grade SA, of the National Joint Board Schedule, commencing at 5597 per annum. INSTALLATION ENGINEER. Anglicants must have

5597 per annum. INSTALLATION ENGINEER. Applicants must have had a sound technical training and considerable practical experience in the installation and maintenance of all classes of electrical installations for lighting, heating and power and must at present be holding a supervisory position of responsibility in the electrical contracting or supply industry. Ability to prepare estimates and speci-fications for all classes of installation work, to supervise the carrying out of such work and to efficiently control staff is essential, together with experience of development work in the domestic, commercial and industrial applica-tions of electricity.

stan is essential, together with reprinting of untertophica-tions of electricity. The salary will be in accordance with Class M. Grade 9A. of the National Joint Board Schedule, commencing at 2478 per annum. Both appointments will be subject to the provisions of the Local Government Superannuation Act, 1937, and applicants must have previous local authority service carrying transfer value within the meaning of the Act or otherwise be not more than 40 years of age. The selected applicants will be required to pass a medical examination. Applications, on forms to be obtained from the under-signed, are to be returned to me not later than Monday, 23rd September, accompanied by copies of not more than three recent testimonials. Canvassing or any communica-tion to a member of the Council, either directly or indirectly, is prohibited and is a disqualification. JOHN HEYS_

Town Hall. Sheffield, 1

JOHN HEYS. Town Clerk 2417

WEST MIDLANDS JOINT ELECTRICITY AUTHORITY

Appointment of Relief Charge Engineer, Ocker Hill Generating Station

THE above-named Authority invite applications for the position of Relief Charge Engineer at Ocker Hill Generating Station at a salary of £437 per annum, Class G. Grade 8A, of the National Joint Board Schedule. Candidates must be experienced in the operation of steam turbo-alternators, high pressure boilers and auxiliary plant in a modern generating station. Corporate member-ship of either the Institution of Electrical Engineers or the Institution of Mechanical Engineers will be an advantage advantage

advantage. The appointment will be subject to the Authority's Superannuation Scheme under the Local Government Superannuation Act, 1937, and the selected candidate will have to pass a medical examination. Applications, stating age, training and experience, accom-panied by copies of three recent testimonials, should reach the undersigned not later than the 20th September, 1946. Canvassing, either directly or indirectly, will disqualify. H. F. CARPENTER. Phoenix Buildings. Clerk and Manager.

Phœnix Buildings, Dudley Road, Wolverhampton, 28th August, 1946. 2414

WESSEX ELECTRICITY COMPANY

THERE are vacancies in the Company's Distribution Centres in Berks. Oxon and Wilts for Electricians, Plumber Jointers. Overhead Linesmen. Conditions of service and rates of pay in accordance with the Nos. 6 and 9 District Joint Industrial Council's regulations, Apply to the above Company at Oxford Road. regulations. App Newbury, Berks.

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COUNTY BOROUGH OF BRIGHTON ELECTRICITY Department

Chief Constructional Assistant

Chief Constructional Assistant PPLICATIONS are invited from Chartered Civil or Mechanical Engineers for the above position. The person appointed will be directly responsible to the Elec-statistical Engineer and Manager and will act as his chief assistant in the carrying out of large power station works. Applicants must have had extensive experience of the subulding works and plant installation as well as the stati-function of large projects. Some experience of dack and harbour works will be considered an advantage The pointment will be subject to (a) the scheme of fucal Authorities' Administrative. Professional: Technical deficience Services (b) the provisions of the Local be required to pass a medical examination. The salary use the fillenge and the selected examination. The salary use the fillenge and manager. Brighton Corporation functionally, the manes of two resons to whom refersion may be made, are to be sent to Mr. H. Pryce-Jones, may be made, are to be sent to Mr. H. Pryce-Jones, may be made, are to be sent to Mr. H. Pryce-Jones, may be made, are to be sent to Mr. H. Pryce-Jones, may be made, are to be sent to Mr. H. Pryce-Jones, may be made, are to be sent to Mr. H. Pryce-Jones, may be made, are to be sent to Mr. H. Pryce-Jones, may be made, are to be sent to funct Assistary, the received by him not later than noon on Monday. 23dr and received by him not later than noon on Monday. 23dr and received by him not later than noon on Monday. 23dr and received by him not later than noon on Monday. 23dr and received by him not later than noon on Monday. 23dr and received by him not later than noon on Monday. 23dr and received by him not later than noon on Monday. 23dr and received by him not later than noon on Monday. 23dr and received by him not later than noon on Monday. 23dr and received by him not later than noon on Monday. 23dr and received by him not later than noon on Monday. 23dr and received by him not later than noon on Monday. 23dr and received by him not later

J. G. DREW. Town Clerk. 2418 Town Hall, Brighton, 1. September, 1946.

CROWN AGENTS FOR THE COLONIES

Colonial Government Appointments

A PPLICATIONS from qualified candidates are invited for the following post: Accountant required by the Government of Malaya Electrical Department for one tour of three years in the first instance, with prospect of per-manency. Salary \$400 a month rising to \$800 a month. Dollar = 2s 4d. Initial salary according to age and war service. Children's allowance, \$70 a month for the first child and \$50 for second child. Outfit allowance £60 Free passages and liberal leave on full salary. Candidates, between 25 and 35 years of age, must be Associates of the institute of Chartered Accountants or of the Society of Incorporated Accountants and Auditors, or possess similar professional qualifications, and should have had expreinence in accountancy in a municipal electricity department or other electricity undertaking. Apply a once by letter, stating age, whether married or single, and full particulars of qualifications and experience, to the Crown Agents for the Colonies, 4, Millbank, London, S.W.1, quoting M/N / 16829, on both letter and envelope. 2995

ROYAL BURGH OF PERTH ELECTRICITY DEPT

Appointment of E.H.T. Plumber-Jointer

A PPLICATIONS are invited for the above appointment from Jointers having first-class experience in mains, services, pillars and switchgear, up to 11 kV. Wages and conditions in accordance with the Scottish D.J.C. Schedule, Zone B. Present rate 27d. per hour. The appointment will be subject to the provisions of the Local Government Superanniation (Scotland) Act. 1937, and the passing of a medical examination. A house will be available at a very early date for the successful applicant. Applications, giving fullest particulars of acc, experience and earliest date available for duty, with two testimonials of the uames of three people to whom reference may be made, should be addressed to John N. Atkinson, A.M.I.E.E. Burgh Electral Engineer, Power Station, Perth. 2421

NEW ZEALAND GOVERNMENT

A PPLICATIONS are invited for the positions of Assi-tant Designing Engineers. Senior Engineers and Engineers in the State Hydro-Electric Department, the salary scales respectively being 8800/1850, 2565/1800 and 2435/1560 New Zealand currency. Applicants should be Chartered Civil Engineers or should hold a recognised Degree in Engineering, with experience of design and con ruction. For further part apply by 30th September to the High Commissioner for New Zealand, 415, Strand, London, W.C.2.

COUNTY BOROUGH OF SOUTHPORT ELECTRICITY DEPARTMENT

Appointment of Lady Demonstrator

A PPLICATIONS are invited for the appointment of Lady Demonstrator in the Electricity Department at a salary in accordance with the National Scale of salaries (£252-£288, plus war bonus, at present £48 2s.

as laries (252-228), plus war honus, at present 246 Zs. Applicants should be over the age of 21 years and must have had a good general education, and hold a recognised Diploma in Domestic Science and/or the E.A.W. Electrical Housecraft Diploma. Applicants must be competent to arrange and conduct lectures and cookery demonstrations. and advise on the selection and use of electrical appliances of all types. The appointment will be subject to the provisions of the Local Government and Other Officers Superannuation Act, 1937, and the successful applicant will be required to pass a medical examination. Forms of Application may be obtained from the Borough Electrical Engineer, 188, Lord Street, Southport, to whom they should be returned not later than Saturday, 14th September, 1946, in an envelope endorsed "Lady Demonstrator." B EDICAP PEPENIS

R. EDGAR PERRINS, Town Clerk. 2317 Town Hall. Southport. 23rd August, 1946.

KIRKCUDBRIGHT COUNTY COUNCIL

District Electrician/Linesman

A PPLICATIONS are invited from suitably qualified men for the post of District Electrician/Linesman in the Castle-Douglas area. The duties will include the installa-tion and maintenance of domestic and farm electrical quipment, meter fixing, erection of dverhead service lines, etc. Preference will be given to applicants having previous experience with an electricity undertaking, and a know-edge of the operation of rural distribution systems will be an added advantage. The terms and conditions of the appointment will be in accordance with the J.I.C. Agreements, and the present wage, including war bonus, is 55 38. 10d., with the possi-bility of an increase up to 55 11s. 8d. within a short period. After two years' continuous service the post will carry superannuation benefit and the man selected may be re-dured to pass a medical examination. After two jeansel, and accompanied by two testimonials, should be forwarded to the undersigned for receipt by the 10th September. 1945.

A. N. BOTT. County Electrical Engineer.

Electricity Dept., Co 165 King St., Castle-Douglas, 26th August, 1946, 2300

COUNTY BOROUGH OF BOLTON

Appointment of Electrical Engineer and Manager

A PPLICATIONS are invited for the position of Elec-trical Engineer and Manager from engineers who are Corporate Members of the Institution of Electrical Engineers and who have had wide experience in the operation of a Selected Generating Station and in the administration, distribution and commercial work of an electricity undertaking. The safary will be at the rate of £1.600 per annum, plus honus. The safery the safe the rate of £1.600 per annum,

plus homs." The appointment will be terminable on either side by three months' notice in writing: will be subject to the provisions of the Local Government Superannuation Acks and the successful candidate will be required to pass a medical examination. Applications. together with the names of three persons to whom reference may be made, must be delivered to me in a sealed envelope endorsed "Electrical Engineer and Manager " not later than 23rd September, 1946. Relation-ship to any member or senior officer of the Council must be disclosed and canvassing will be a disqualification. PHULP S. RENNISON Town Clerk

PHILIP S. RENNISON, Town Clerk Town Hall, Bolton 2407

A CTIVE and experienced Representative required to develop the sale of all types of rubber and mains cable in the South Wales area. Applications, detailing training and experience, should be sent to—The Employ-ment and Welfare Officer, Johnson & Phillips Ltd., Victoria Works, Charlton, London, S.E.7. 2376

ASSOCIATED MUNICIPAL ELECTRICAL ENGINEERS & ELECTRICAL POWER ENGINEERS' ASSOCIATION

NOTICE-BOLTON CORPORATION

Appointment of Electrical Engineer and Manager

THE Standing Joint Committee of the above Associations desire to point out that the above post is not adver-tised in accordance with the Agreement made by the National Joint Committee of Local Authorities and Chief Electrical Engineers (Electricity Supply Industry). Accord-ing to this Agreement and the latest available data (subject to any adjustment which may be necessary under the interto any adjustment which may be necessary bluet the met-pretation of the Agreement) a commencing salary should be paid, under Clause 10, of £1.916 15s. for the first year, rising to £2.255 in the third year, and thereafter subject to adjustment above or below in accordance with the

A adjustment above of below in accordance with the National Agreement. ALL ENGINEERS, WHETHER ENGAGED IN THE ELECTRICITY SUPPLY INDUSTRY OR NOT, ARE URGENTLY REQUESTED NOT TO APPLY FOR THE POST NOW BEING ADVERTISED. AND IF AN APPLICATION HAS ALREADY BEEN MADE IT SHOULD BE WITHDRAWN.

(Signed) Joint Secretaries— A.M.E.E.—A. P. MACALISTER. E.P.E.A.—J. F. WALLACE. 2408

A fully-qualified Electrical Engineer required for a section of a large iron and steel works in North Experience necessary in some or all of the following: Planning, specification, installation and maintenance work as applied to heavy industry. electrical manufacture. including technical and commercial work. Reply, stating fully details of education, training, experience, qualifica-tions and present salary, to—Box 2391. c/o The Electrical Review Revi

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TEYLON YLON. Office Manager required for Electrical Department, Colombo Engineering firm. Must be Department. Colombo Engineering firm. Must be accustomed electrical correspondence, supervision, costing, stock and sales. Attractive terms would be offered man of good education and personality. Preferably young, unmarried. Write Rox ZO. 303, Deacons Advertising, 36, I eadenhall St., London, E.C.3. CHIEF Draughtsman required for drawing office staff of six products: electrical motors, generators, rotary transformers, motor alternators up to lo kW, all fre-quencies, all voltages, including high tension. Salary according to ability, south-east London district. Reply stating experience, technical training and salary required to—Box 2309, c/o The Electrical Review.

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Broad, S.E.14. 2378
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 DOMESTIC appliance manufacturers require Com. Rep. for East and S.E. London and Essex. Details to—Description of generative and the second statement of the second statement

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required, and give references.—Box 9526, c/o The Elec-trical Review. IMPERIAL Chemical Industries Ltd. Applications are invited for the position of Shift Charge Engineer in the company's power stations in Runcorn and Widnes. Applicants, who should not be less than 33 years or more than 45 years of age, must have had a sound practical and technical training in mechanical engineering and good experience of the shift operation of modern steam power station equipment, including turbo-alternators and water tube boilers of not less than 10,000 kW and 50,000 lbs steam/hour capacity respectively. Generous commencing salary. Applications, which must give the applicant's date of birth and full details of qualifications and experience. including a list in chronological order of posts held, should be addressed to—Staff Manager. Imperial Chemical In-dustries Ltd., General Chemicals Division, Cunard Build-ing, Liverdool, 3. INSPECTOR required by manufacturers of small and medium size A.C. Motors in London area. Sound prospects for suitable man.—Box 2315, c/o The Electricai Review.

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SWITCHGEAR Engineer for estimating, preparation of tenders and handling contracts. Experienced man required, Manchester district.—Box 2364, c/o The Elec-trical Review.

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APPOINTMENTS FILLED

Dissatisfaction having been so often expressed that un-successful 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.

BOROUGH of High Wycombe—Installation Engineer: Box 1945—Joint Manager: Box 1986—Asst. Engr.; Mid-Lincolnshire Electric Supply Co. Ltd.—Asst. Con-sumers' Engineer. All applicants are thanked.

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SITUATIONS WANTED A Capable Engineer (36), with managerial and ad-ministrative experience, seeks responsible position. London area. Fully conversant all machine tools, planning and progress, time study, rate fixing. Salary approx. 8750. - Box 9538. c/o The Electrical Review. A position with a future required by ex-Flight-the electrical trade. - Box 9438. c/o The Electrical Review. A young man (25), at present Section Engineer on pro-duction of light Dissels in large Midlands factory, desires change of position. Would accept reasonable salary of gain executive experience. -Box 9528. c/o The Elec-trical Review. A BLE, active and versatile Electrical Engineer (42).

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constructional and general engineering. withing to take when necessary. Car available.—Box 2422, c/o The Electrical Review. A CCOUNTANT Secretary. 37, 14 years' experience electricity supply industry. England and abroad, c/o The Electrical Review.

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A DVERTISER (31), fully qualified Chartered Electrical A DVERTISER (31), fully qualified Chartered Electrical Engineer with college and works training, ex. R.E.M.E. Maior, requires post with responsibility. Would suit farm of repute requiring a branch manager or area representative where ability to meet customers and discuss their problems is of importance. Salary about 7700. Further details supplied.—Box 9547, c/c

or area representative where abuity to inter customage and discuss their problems is of importance. Salary about \$700. Further details supplied.—Box 9547, c/o The Electrical Review.
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EXPERIENCE counts. Estimating, supervising, specifications, schemes for complete installations, introduce new business, make contracts pay, good sales-man, would represent good firm, age 48, own car, London or Home Counties.—Box 9429, c/o The Electrical Review. **G**ENERAL Manager seeks an appointment with elec-trical engineering firm where wide knowledge of the electrical industry can be fruitfully employed. Works, commercial and sales experience gained at two of the largest organizations in the country. Products covered include motors, transformers, switchgear, bakelite acces-sories, lighting units, cables, electric cokers and domestic appliances generally. Capable organiser and staff controller.—Eox 9433, c/o The Electrical Review. **TNDUSTRIAL Electronic Designer seeks responsible**

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September 6, 1946

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FOR SALE

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

BURGH OF LERWICK ELECTRICITY DEPT.

OFFERS are invited for the following equipment in first-class condition: 1 G.E.C. Battery Charging Booster. 26-h.p., 1,000-r.p.m., 460/510-volt D.C. motor direct coupled to 2-0/115-volt, 8.6-kW generators, mounted on base plate, complete with switchboard. 1 Miking Booster, English Electric, .7-h.p., 1,500-r.p.m., 230-volt motor direct coupled to 6-volt, 50-amp. generator, mounted on base plate, complete with switchboard. 2 End Cell Resultance

switchboard. 2 End Cell Regulators. 2 "Salford " Air Circuit Breakers, mounted on polished slate, 400 amp. 230 volt D.P., complete with overload and no-volt coils. New. 1 Triple Pole similar to above. New. Offers to: Engineer and Manager, Electricity Works, Lerwick, Shetland. 2398

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OFFERS are invited for the purchase and removal of one "Gent" 8-h.p. Siren, suitable for operation on 3-phase, 400-volts, 50-cycles system, and complete with main switchfuse and ancillary equipment, situated at the Town Hall, Morley. Inspection may be made by prior arrangement with the undersigned, to whom tenders should be delivered not later than Tuesday, 17th September, 1946. E. V. FINNIGAN, Tuwn Hall, Town Clerk.

Town Hall, Morley, Yorks.

ACCRINGTON CORPORATION ELECTRICAL ENGINEERING DEPARTMENT

2319

SEVEN panels "Ellison" Unit Type draw-out Switch-gear suitable for three-phase, 400 volts, four-wire supply, each panel being fitted with an oil circuit breaker, capacity 146 amps, having three overloads, time lags, ammeter and cable sealing box.—Borough Electrical Engineer & Manager, Corporation Electricity Works, Off Hyndburn Road, Accrington. 2396

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 A number of Lighting Sets from 3-10 kW, Petrol and Diesel driven, 110 or 220 v. D.C., or various descriptions. Further details from The Electroplant Co., Wembley, Middx.
 Mumber of unused, portable, petrol-driven Welding and D.C. House Service Meters, all sizes, quarterly and prepayment, reconditioned, guaranteed one year Repairs and recalibrations.—The Victa Electrical Co. 47.
 Battersea High Street, S.W.11. Tel. Battersea 0780.
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September 6, 1946



There's a moral in the ECHINOCACTUS NAPINUS CHILE . .

• • • a moral in so far that if you don't know anything about cacti and start messing about with them you are liable to get stung rather badly.

Now apply the same thought to Transformers; some people want a few Transformers and think the order is not large enough to bother us with (nonsense of course, as you know, but some people do think that) so they knock a few up themselves from odds and ends that are lying about.

Of course, the so called Transformers are just not quite perfect and don't just do the job they should. The same thought applies also to very cheap quality Transformers which some people buy and attempt to use.

The moral is when buying Transformers - go to an expert and get the right article - it may cost you a little more but, in the long run, you are saving money.

PARMEKO of LEICESTER. @ Makers of Transformers.



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SCREWS • TERMINALS • PRESSWORK


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September 6, 1946



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Watch Aberdare cable emerging from lead presses which are capable of covering cable up to 4 ins. diameter with pure lead, free from dross or impurities of any kind.

Just one of the many processes at the Aberdare Works, where advanced methods ensure the consistently high quality and reasonable prices of Aberdare Cables.



ABERDARE CABLES LTD., NINETEEN WOBURN PLACE, W.C.1. Tele.: Terminus 2777 Works: ABERDARE, GLAM., SOUTH WALES Tele.: Aberdare 416-7 Specialists in paper-insulated cable for power purposes up to 33,000 volts