THE ELECTRICIAN

THE TECHNICAL NEWSPAPER OF THE ELECTRICAL INDUSTRY

4 APRIL, 1947
SIXPENCE

INDEX TO ADVERTISERS IN THIS ISSUE

A NEW and comprehensive List of **SLIDING RESISTANCES** and **DIMMERS** is now available on application

THERE HE STANDS — symbol of authority in an orderly World — controlling — directing — obeyed because absolutely trustworthy and reliable.
What a fitting comparison with BIRCH RESISTANCES, *Arms of the Ohm's Law.*
Backed by many years of practical experience in which their reliability has been tested under all conditions, BIRCH RESISTANCES, in their various applications, stand up to their job and can always be depended upon to provide specified service because of their first-class workmanship.

Birch

Registered Trade Mark

Please call upon us to help you solve any Resistance problem.

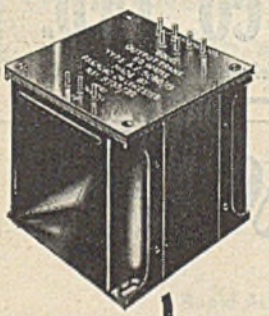
Resistances

ARMS OF THE OHM'S LAW

May we quote you for any of the following :—

DIMMERS—REGULATORS (Field, Shunt, Voltage)—**RESISTANCES** (Arc Lamp, Charging, Regulating Sliding)—**RHEOSTATS—ELEMENTS** and **SPIRALS**—Asbestos Woven Resistance Nets and Grids.

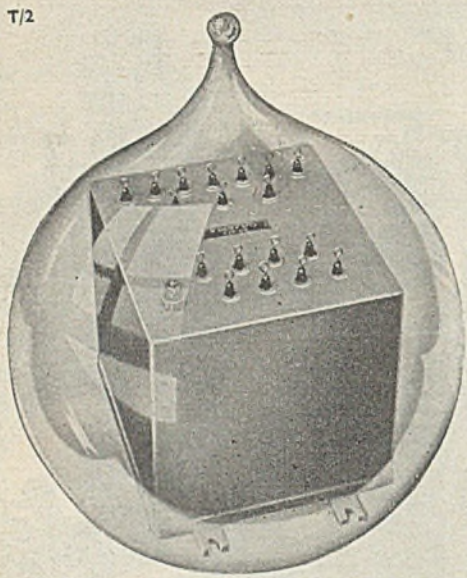
H. A. BIRCH & CO. LTD., Wilohm Works, Wood Street, WILLENHALL, STAFFS
Telegrams: "WILOHM." Willenhall. Telephone: Willenhall 494-495
G97



EVERY MAN FOR HIMSELF . . .
Well maybe we could adopt that policy of slapping Transformers together and churning them out irrespective of quality, you know, bash the next chap for all he is worth, let the future take of itself. But we think that attitude is wrong and a Parmeko job always has been made up to a standard not down to a price. We realise that the success of our business depends upon the success of your business, if you go bust you don't buy any more Transformers and then we go bust - in any case when a new client comes to us we like to feel that in 20 years time we shall still be making some very good Transformers for him . .

PARMEKO OF LEICESTER.
MAKERS OF TRANSFORMERS.

T/2



HERMETICALLY *Sealed*

TRANSFORMERS

(PATENT APPLIED FOR)

Robust construction, liberal internal specifications and specially developed hermetic sealing ensure efficient operation at constant load under extreme tropical conditions. Sealed against humidity, destruction by termites and other pests, these Transformers can now be supplied to meet your particular requirements. Write to us for full particulars and specifications.

W. ANDREW BRYCE & CO. LTD. W.A.B.

W. ANDREW BRYCE & CO. LTD.

SHENLEY ROAD, BOREHAM WOOD, HERTS. *Tel: ELStree 1875 & 1117*

COOKER CONTROL - DS PLUG STYLE

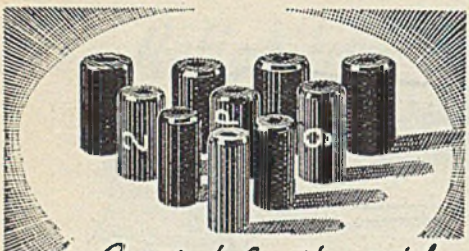
THE DS Cooker Control Unit is a compact yet efficient switch and plug unit. It includes a 30-A double-pole switch for the cooker and the famous DS Fused Plug and Socket for the kettle.

Conduit Holes are provided at top and bottom for cable entry but may be provided elsewhere to special requirements.

COOKER DS CONTROL

Announcement of D.S. Plugs Ltd., Manchester, London, Glasgow.

E 1046



Capital for the job!

CABLE END FERRULES

Strong, accurate, well made and highly finished ferrules in casein plastics, giving brilliant and permanent colours for quick identification in even the poorest lighting conditions.
Standard colours: black, white, blue, green, yellow and red.
Plain, or engraved to customers' own requirements.

Manufacturers:

CRITCHLEY BROS. LTD.
BRIMSCOMBE · STROUD · GLOS.

DUNDAS

Insulating

MATERIALS

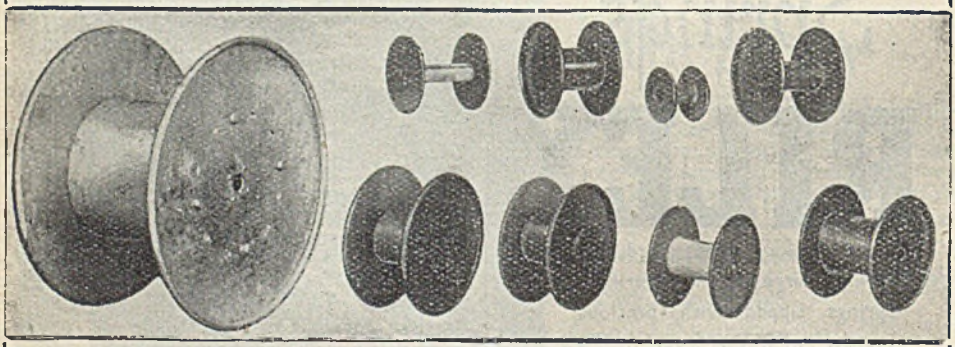
Varnished Cloths
IN SILKS AND CAMBRICS
Tapes
IN SEWN AND SEAMLESS BIAS FORM
Guaranteed to B.S.I. Specification

EDWARD **MACBEAN** & CO. LTD.

WELLINGTON MILLS
PORT DUNDAS, GLASGOW, C.4
Telephone: Douglas 5866 (3 lines)

REELS LTD.

BYRON STREET : PRESTON : *'PHONE: 3922*



Makers of all kinds of wood and steel reels for the electric wire and cable trades.
Our speciality:—Steel flanges with very strongly beaded edges in a wide range of diameters.

Try **REELS LTD.** *for* **R**igid **E**fficient **E**ver-lasting **L**ight **S**trong

MISCELLANEOUS ADVERTISEMENTS

SITUATIONS VACANT

CITY AND COUNTY BOROUGH OF BELFAST.
ELECTRICITY DEPARTMENT.

APPLICATIONS are invited for the position of:—

Senior Draughtsman.

Applicants must have a sound general engineering training. Experience in the lay-out of Central Station generating plant is desirable. Applicants must not be more than 40 years of age on 1st May, 1947.

The salary for the position is in accordance with Grade 8b, Class J, of the National Joint Board Schedule of Salaries for Technical Engineers on the staff of Authorised Undertakers. The scale is £456 for the first two years, £466 for the third and fourth years, and £477 after the fourth year.

Preference will be given to ex-Service candidates possessing the required qualifications.

In computing applicants' ages for the purpose of the age qualification clause, any periods of war service in H.M. Forces will be deducted from applicants' actual ages, provided that this will not apply to applicants whose actual ages would be over 45 years on the date of taking up duty.

Applications must be made on official forms, which can be obtained from the City Electrical Engineer and General Manager, Electricity Department, East Bridge Street, Belfast, and, with copies of not more than three recent testimonials, should reach the Town Clerk, City Hall, Belfast, not later than 4 p.m. on Friday, 18th April, 1947.

Canvassing, oral or written, if proved to the satisfaction of the appointing authority, will disqualify.

JOHN DUNLOP,
Town Clerk.

City Hall,
BELFAST.
26th March, 1947.

COUNTY BOROUGH OF OLDHAM.
ELECTRICITY DEPARTMENT.

Appointment of Charge Engineer.

APPLICATIONS for the above appointment are invited. Applicants must possess suitable technical qualifications and sound practical experience. Salary in accordance with N.J.B. Schedule, Class "H," Grade 8, at present £481-£507 per annum.

The appointment will be subject to the provisions of the Local Government Superannuation Act, 1937. The successful applicant will be required to pass a medical examination, and to comply with the condition as to residence to which appointments under the Corporation are subject. Canvassing will be a disqualification.

The age limit for new entrants to the Local Government Service is 45 years unless a transfer value in respect of superannuation is payable. For the purpose of this application, the age of applicants who are serving or have served in H.M. Forces will be regarded as being reduced by the number of years of their war service.

Applications, endorsed "Charge Engineer," stating age, full details of education, training and experience, with copies of not more than three testimonials, to be forwarded to the Chief Engineer and Manager, Corporation Electricity Department, Greenhill Offices, Oldham, not later than Wednesday, the 16th April, 1947.

THOMAS ALKER,
Town Clerk.

Town Hall,
OLDHAM.
3rd April, 1947.

FIRST-CLASS Electricians required. Used to all systems. Permanent posts to right men. Apply—R. J. Kemp and Co., Coalville.

SITUATIONS VACANT

BEDFORD CORPORATION ELECTRICITY UNDERTAKING.
APPOINTMENT OF MAINS ASSISTANT.

APPLICATIONS are invited for the position of Mains Assistant. Candidates, whose age must not exceed 40 years, must be a Graduate or Corporate Member of the Institution of Electrical Engineers or other acceptable equivalent qualification, with practical experience in the laying, erection and maintenance of 33 kV, 11 kV and lower voltage underground and overhead cables and the associated sub-station equipment.

The commencing salary will be in accordance with Grade 7, Class "G," of the National Joint Board Schedule (at present £494 per annum). The appointment will be subject to the provisions of the Local Government and other Officers' Superannuation Act, 1937, and the successful candidate will be required to pass a medical examination.

Applications containing full details of age, qualifications and experience, accompanied by copies of three testimonials, to be forwarded to the undersigned not later than 28th April, 1947. Canvassing, either directly or indirectly, will disqualify the candidates.

A flat will be available to the successful candidate at a reasonable rent, if required.

P. G. CAMPLING,
Chief Engineer and General Manager.

Electricity Offices,
Prebend Street, BEDFORD.
March 26th, 1947.

BOROUGH OF NELSON.
ELECTRICITY DEPARTMENT.

APPLICATIONS are invited for the following positions on the permanent staff of the Electricity Department:—

(a) **Relief Charge Engineer.**—Class "F," Grade 8a, on Schedule of National Joint Board. Candidates must have had sound experience in the operation of chain grate fired boilers, steam turbo generators (preferably Brush-Ljungstrom), auxiliary plant, E.H.T. and D.C. switchboards, rotary convertors, and bulk supplies.

(b) **Switchboard Attendant.**—Applications are invited for the position of Switchboard Attendant at the Nelson Corporation Power Station. This Station is a Selected Station running in parallel with the C.E.B. system. Preference will be given to applicants who have had experience in parallel running with the C.E.B. Applicants should have had a recognised training and experience in similar duties.
Salary in accordance with N.J.B. Schedule, Class "F."

The appointments will be governed by conditions of service of the National Joint Board, subject to the provisions of the Superannuation Act and to the passing by the successful applicant of a medical examination, and to one month's notice on either side.

It is anticipated that the Station may be re-classified "G" during 1947.

Applications, stating age, qualifications, and experience, accompanied by copies of not more than three recent testimonials or the names of three persons to whom reference can be made, must reach the undersigned not later than Tuesday, the 8th April, 1947.

T. DAWSON MARTIN, A.M.I.E.E.,
Borough Electrical Engineer and Manager.
Electricity Works,
NELSON, LANCS.

EXPERIENCED DRAUGHTSMEN required for the mechanical design of large D.C. and A.C. machines by Mather and Platt, Ltd., Park Works, Newton Heath, Manchester, 10. Write c/o Employment Department.

SITUATIONS VACANT

WOLVERHAMPTON AND STAFFORDSHIRE TECHNICAL COLLEGE.

Principal: W. E. Fisher, O.B.E., D.Sc.

APPLICATIONS are invited for the following posts:—

(1) Lecturer in Mechanical Engineering.

(2) Lecturer in Electrical Engineering.

Applicants should hold a University Degree in Engineering or equivalent qualification. Subject to adequate qualification and experience of applicants, either post may be designated a post of Responsibility carrying an allowance of £80 per annum over and above the Burnham Technical Scale for Assistants.

Burnham Technical Scale Salary for men progresses from £300 per annum to £525 per annum by annual increments of £15; additions for approved study and training; additions for degree; previous experience credited in fixing commencing salary.

Particulars, etc., from

F. LONSDALE MILLS,
Clerk to the Governors,
Education Offices,
North Street, WOLVERHAMPTON.

20th March, 1947.

COUNTY BOROUGH OF PRESTON.

ELECTRICITY UNDERTAKING.

Junior Mains Assistant.

APPLICATIONS are invited for the above position from candidates having a good technical knowledge in Electrical Engineering up to at least ordinary National Certificate standard, and preferably some experience in the Distribution Department of an Electricity Undertaking.

Possession of the Higher National Certificate in Electrical Engineering or its equivalent, will be an advantage.

The salary and conditions of employment will be in accordance with the N.J.B. Agreement, Class J, Grade 10 (at present £355 rising to £371 per annum).

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

Applications stating age and giving details of education, technical training and experience, together with copies of two recent testimonials, and endorsed "Junior Mains Assistant," should be sent to the undersigned not later than Monday, the 14th April, 1947.

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

40 & 41, Lune Street, PRESTON.

27th March, 1947.

SENIOR Draughtsman and a Junior Draughtsman required, experienced in the manufacture of radio components. Also a Draughtsman-Designer for press tools and estimates. Salary according to age and experience. Apply in writing to—The Personnel Manager, Philips Hamilton Works Limited, Wellhall Road, Hamilton.

NORTH STAFFORDSHIRE TECHNICAL COLLEGE, STOKE-ON-TRENT.

Principal: H. W. Webb, O.B.E., D.Sc., F.R.I.C., M.I.Chem.E.

APPLICATIONS are invited for a full-time lecturer in Electrical Engineering qualified to take Electrical Measurements and/or Electrical Power to Final Degree standard, to commence in May or September, 1947.

Applicants should possess a degree or equivalent qualification. New Burnham scale of salary with allowance for industrial experience. Applications should be sent in to the Principal as soon as possible.

J. F. CARR,
Clerk to the Governors.

B/OMC.
March 13th, 1947.

FOR SALE

2 1 H.P. HIGGS variable speed 3 phase 50 2 cycles 400 volt motor, almost new, from MURAD Canstan, £30 or near offer. PENCIL TYPE fire elements 1 000 watts, 230 volts, 10 in. between fixing centres. Dural screwed on end caps and terminals at 4s. 6d. each, any quantity. For sample enclose 6d. extra packing and postage. OBLONG TYPE FIRE BARS, 8 in. by 3 in. and 7 in. by 3 in. (fire opening size), available from time to time. Can be wound for 750 or 1 000 watts. Samples 7 in., by 3 in., 5s. 6d.; 8 in. by 3 in., 6s., plus 1s. packing and postage in each case. NIFE cap lamps. Double filament lamp 2 cell NIFE accumulator for belt fixing with long lead, headlamp with switch and headstrap. Ex-Admiralty stock. Charged and ready for use. Worth £5 each. 35s. each only, including packing and postage. ELEMENT SPIRALS, all sizes made to order. Sample 1 000 watt fire spirals, 17s. per dozen. £8 10s. per gross. Send your enquiries. TOGGLE SWITCHES: Flush 5/10 amp. 250 volt, with long dural dolly and hexagon fixing nuts. Sample, 2s. 6d., post free. Larger quantities special quote. ¼rd H.P. DELCO S.P. 110/240 A.C. Motor, 1 450 r.p.m., repulsion induction. £9. Customer collects.—Pruden and Pope, 38, Church Road, Upper Norwood, S.E.19. Tel.: LIVingstone 1426.

LAMP-HOLDERS, switches, plugs, blocks, ceiling roses, available, competitive prices. Send for Wholesale List. .2 amp. flush single pole double throw switches; 15s. doz.—Ransom, Bond Street, Brighton.

ELECTRIC MOTORS, 24 volts windscreen wiper, circular motion, suitable experimenting, all new. Price 8s. 6d. each or 7s. 9d. each for entire consignment of 160 motors. Metal braided FLEX 9/012 twin V.I.R., £15 10s. per thousand yards; 4-core £17 per thousand.—For complete catalogue of Cables and Flex apply Dominion Sales (London), 6, Finsbury Square, E.C.2. Met. 9017/8.

CONDENSERS.—Large stock of tropicalised paper block and paper tubular condensers by leading manufacturers, all new and unused, majority in manufacturer's packing; send for list.—H.S.E., 587-9, Bearwood Road, Smethwick, Staffs.

1—HEWITTIC unused Mercury Arc Rectifier, input 400 volts 3 phase 50 cycles, output 230 volts, 7 kW. 1—Flameproof brand new Triple Pole 500 volt, 30 amp. Change-over Switch by Walsall.—Oldfield Engineering Company Ltd., 96, East Ordsall Lane, Salford, 5.

2—PRACTICALLY new, "Reyrolle" Type 10 CHF Variable Speed, enclosed ventilated Commutator Motors, Shunt characteristics. 5/1.67 H.P., 1 440/480 r.p.m. 400 volts 3 phase 50 cycles.—Oldfield Engineering Company Ltd., 96, East Ordsall Lane, Salford, 5.

SWITCH BLOCKS, HARDWOOD, POLISHED AND GUARANTEED.

3 in. by 3 in. by ¾ in., 6s. doz.; 3 in. by 3 in. by ¾ in., 6s. 9d. doz.; 3½ in. by 3½ in. by ¼ in., 6s. 9d. doz.; 3½ in. by 3½ in. by ¾ in., 7s. 6d. doz.; 6 in. by 3 in. by ½ in., 8s. 9d. doz.; 6 in. by 3 in. by ¾ in., 9s. 6d. doz.; 6½ in. by 3½ in. by ½ in., 9s. 6d. doz.; 6½ in. by 3½ in. by ¾ in., 10s. 9d. doz. Post paid. Cash with order.—**S.T.C. Manufacturing Co.**, 33, Grange Road, Ramsgate.

TELEPHONES, complete units in iron-clad cases, with CONTROL PANELS for 4, 8 and 12 stations. New HAND-SETS with and without press keys. JACK PLUGS 2 and 3 way, SWITCH KEYS, CARBON INSETS, all new surplus Ministry goods, suitable for ships, factories, mines, etc. Enquiries and inspection invited for home and export trade. Ebonite Rod, Sheet and Tube.—Jack Davis, 30, Percy Street, London, W.1. Telephone: Museum 7960.

DUPLICATE books, billheads, memos, etc.; estimates by return; prompt delivery.—Central Press, Fence, Burnley, 5.

FOR SALE

ELECTRIC GENERATING PLANT.—12 h.p. Austin Engine and 27 accumulators, complete with tanks and switches, 50-75 volts, 2 kW. Price at farm, £80.—Auchendennan Farm, Loch Lomondside, Scotland.

FLUORESCENT LIGHTING UNITS, 4-ft. and 5-ft., FROM STOCK, with Warm White or Daylight tubes. Send for new illustrated Trade List.—Moss Bros., 53, Goodge Street, W.1. MUS. 5385.

SLEEVING SILK COVERED, .75 to 5 M.M., 15s. gross yards. Carriage extra. In quantities.—99, Lofting Road, N.1.

FLUORESCENT LIGHTING.—Write for details of our amazing OUTDOOR UNIT. Guaranteed weatherproof with rubber insulated unbreakable glass covering the 1, 2 or 3' tubes. Ideal for garages, sports stadiums, wharfs, etc. Scemco, Ltd., 6/7, Soho Street, London, W.1. Tel.: Ger. 1461.

FLUORESCENT LIGHTING.—CHOKES, extra quality, elongated, 4 ft., 40 W, tapped 200/250 V, silent working, each unit guaranteed, measurements 1⅞ in. by 1⅞ in. by 8½ in. Price £1 5s. each, net. Carriage extra.—Write Scemco, Ltd., 6/7, Soho Street, London, W.1. 'Phone: GERard 1461.

FLUORESCENT FITTINGS.—If he is electrically wise, it's Scemco he buys. For details of Fluorescent fittings, apply: Scemco, Ltd., 6/7, Soho Street, London, W.1. Tel.: Ger. 1461.

FLUORESCENT LIGHTING.—Constead units for sale, dispenses with all starter gear and gives instantaneous lighting, prevents maintenance worries; each unit guaranteed. -Apply Scemco, Ltd., 6/7, Soho Street, London, W.1. Tel.: Ger. 1461.

FLUORESCENT LIGHTING FITTINGS.—Extensive range including Trough and Flush type fitted with "All in one" "Constead Unit," and complete with tubes.—Write Scemco, Ltd., 6/7, Soho Street, London, W.1. Phone: GER. 1461.

FLUORESCENT LIGHTING.—30 watt fitting complete with self-contained control gear and 36 in. tube, £6 12s. 6d. Immediate delivery with guaranteed component and tube replacement service.—Scemco, Ltd., 6/7, Soho Street, London, W.1.

RUBBER STAMPS can assist in many ways. Are yours satisfactory and in good condition? W. L. Boughton, maker of all kinds, 53, Kenley Road, Merton, London, S.W.19.

FOR Export Only.—Prompt delivery unlimited quantities "Reelek" 1 kW Electric FIRES.—Reeves Electrical and Radio Co., Ltd., Baldock, Herts.

SUPERIOR Type Builders' Ladders now in production; also Steps, Trestles and Extension Ladders.—Phone: Shaftesbury Ladders, Ltd., 453, Katherine Road, E.7. Grangewood 3363/4

FLUORESCENT LIGHTING.—5 ft. fittings. Trough, Swallow, or Batten types complete with all gear. With or without tubes. (80 w.). 4 ft. batten type fittings complete with all gear, with or without tubes. (40 w.). 3 ft. Flush type fittings complete with all gear. With or without tubes. (30 w.). Delivery from stock. Write or 'phone. Croft Electrical Services, 5, Middleton Buildings, Langham Street, W.1. Museum 9941.

TO all manufacturers of radio and electrical goods.—L. Goodman (Radio) Ltd., 9, Percy Street, Tottenham Court Road, W.1, have the following surplus goods for disposal: 400 Syndanyo Panels, size 27 in. by 23 in., bevelled edges ¾ in. thick. Large quantity of Hellerman Rubber Sleeves in all sizes. Midget Radio Cabinets. 2 Tons 22½ S.W.G. D.C.C. Wire. Large quantity 16/012 3 Core Flex. 4 000 SBC Holders. Fluorescent Fittings 5 ft. and 4 ft. complete. Fluorescent Chokes. Power Factors. 15 and 30 amp. 2 way Fuse Boxes. 60 000 :01 Mica Condensers. Phone: MUSeum 0216.

FOR SALE

10-KW Unit Heaters, three-phase, 400 volts. Immediate delivery.—Carter and Co. (Nelson) Ltd., Engineers, Nelson, Lancs.

SACKS and Bags in excellent condition for all commodities, as low as 4½d. each. Write: John Braydon Ltd., 230, Tottenham Court Road, W.1. Tel. No.: Museum 6972.

ELECTRIC HOIST BLOCKS, capacity 5-cwt. to 7 tons. Reasonable delivery.—A Morgan and Co., 50, Wilkin Street, London, N.W.5. 'Phone: GUL. 1147.

LEATHER FINGER STALLS.—Made of Chrome Hide. Very strong and hard wearing. Length 3 in. Price 4s. per doz. Prompt delivery. Sample on application.—Willson Brothers, Industrial Clothing Manufacturers, Epsom, Surrey.

LADDERS, Trestles and Handcarts, from Ramsay and Sons (Forfar), Ltd., Forfar.

TIME SHEETS.—Our stock-printed Time Sheets are remarkably cheap compared with specially printed ones. On decent quality 8 in. by 10 in. paper:—100, 3s. 6d.; 500, 15s.; 1 000, £1 7s. 6d. Post Free. Send for sample.—F. H. Brown Ltd., P.O. Box 26, Burnley, Lancs.

GOOD quality square and rectangular wood pattresses, from stock, 3 by 3 by ½ in. to 6½ by 6½ by 1 in., at 4s. 6d. to 16s. per dozen, carriage paid; larger sizes to order, quotations given.—Jack Hinton (Electrical), Ltd., 17, Crown Street, Bolton, Lancs.

ATLAS lamps from stock, delivery in London, Surrey, Sussex and Kent; other lines include clocks, toasters, fires, irons, kettles, fans, fittings, chargers, speakers, etc.—Drubel Radio Distributors, Ltd., 39a, Stafford Road, Croydon. Croydon 1107.

HEAVY-DUTY ARC-WELDING PLANTS.—200 amps. Price £36 10s. complete. Also Spot Welders. £48 10s.—John E. Steel, Clyde Mills, Bingley. 'Phone 1066.

SECTIONAL TIMBER BUILDINGS.

SPECIAL OFFER. — Government Surplus new Window Sashes: 492, size 3 ft. 6 in. by 6 ft., 37s. 6d.; 758, size 4 ft. by 4 ft., 27s. 6d.; 696, size 4 ft. 6 in. by 4 ft., 30s. Each carriage paid. Cash with Order. Cannot be repeated. —D. McMaster and Co., 21c., Mount Bures Works, Bures, near Colchester. Telephone: Bures 351/2.

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

9 IN. Pencil Bar Elements for Electric Fires, immediate delivery. Supplied as plain bars, wound, or complete with end fittings. Send 2s. 9d. for wired sample, or call Dicas (London) Ltd., 20, Mackenzie Street, Slough, Bucks.

TINNED STEEL ARMATURE BINDING WIRE.—All even numbered sizes from 16 s.w.g.-28 s.w.g. supplied from stock on 7 lb., 14 lb. or 28 lb. reels. FREDERICK SMITH & CO. WIRE MANUFACTURERS LTD., CALEDONIA WORKS, HALIFAX.

JUNCTION Electric Irons, superior design and quality, supplied with suitable stand. Also Junction Nickel plated Torch Cases. Supplied for home trade and export. Also large selection of household electrical appliances, Fires, Radiators, other electric Irons, Toasters, Table Lamps, Torch cases, Dry batteries, etc. Please write for full list. —Brooks & Bohm, Ltd., 90, Victoria Street, London, S.W.1. Tele.: Vic. 9550/1441.

LABELS in COLOUR by most up-to-date processes. Ltd. Studio and Photographic Department. Send to Label & Colour Specialists for samples. Carillon Press, Ltd., 1/4, Roumelia Lane, Bournemouth.

WANTED

URGENTLY required for University of Cape Town, issues of "THE ELECTRICIAN," Vol. 74, 1914-15, Nos. 1912, 1914, 1915, 1917, 1918. Vol. 76, 1915-16, Nos. 1964, 1969. Vol. 122, 1939, No. 3167. Back number rates paid. Send to "THE ELECTRICIAN," Bouverie House, Fleet Street, London, E.C.4.

WANTED.—100-150 kVA 400/350 Belt Driven Alternator.—Reply to Box L.E.M., "THE ELECTRICIAN," 154, Fleet Street, London, E.C.4.

FLUORESCENT Lighting Tubes, worn out and useless, 5 ft. and 4 ft. wanted, any quantities, 2s. 6d. each, plus carriage. Letters only to S. H. Brown, 37, Tavistock Square, W.C.1.

MOTORS electric paint manufacturers, transferring to A.C. area urgently require 5 to 12 h.p. Motors 40v. 3 phase 50 cycles. D.C. types available for part exchange if desired.—Please send full details to Ferguson Edwards Ltd., Paint Manufacturers, Hoxton Square, N.1. Clerkenwell 7411.

FLUORESCENT Lamps, 5 ft., urgently required any quantity, best prices paid. Collected London area.—Box L.E.K., "THE ELECTRICIAN," 154, Fleet Street, London, E.C.4.

SILICON STEEL SHEET or Strip Mild Steel Sheet. Annealed Mild Steel Wire, any gauge. Any quantity urgently required.—H. Frost and Co., Ltd., Walsall, Staffs.

AN unlimited number of modern A.C. motors urgently required for essential work. Highest cash prices paid for suitable units. We also want all types of motors for conversion and rewinding. Send details to Sales Dept., A. P. Watson, 104, Upper Brook Street, Manchester, 13.

LAMINATIONS.—Large types required in any reasonable quantities. T's and U's. Also 75's and 4A's.—Par Metal Company, Wallworth Bank, Congleton.

A.C. MOTORS, 1-100 h.p., 500-1 500 r.p.m. Any make fitted with ball and roller type bearings. Must be good machines, such as you yourselves would buy. Alternatively motors for rewinding will be considered.—Oldfield Engineering Co., Ltd., 96, East Ordsall Lane, Salford, 5.

ELECTRICAL steel sheet or laminations of reputable make, .014 in. to .020 in. thick will be purchased for cash in any quantity by Davenset Electrical Works, Leicester.

REPAIRS

RUNBAKEN ELECTRICAL REPAIRS.—Rewinding to trade. Fractional h.p. motors a speciality, a.c. and d.c. Prompt service. Guaranteed work.—45, Oxford Road, Manchester. Tel.: ARD. 2507 (3 lines).

COOKERS.—We can give good deliveries of Sheet Metal Vitreous Enamelled Electric Cooker parts.—JOHN KING & SON (ENAMELLERS), LTD., PYRO WORKS, CHESTERFIELD. Phone: 5305.

HOTPOINT, Hoover, Hoover Dustette, Electrolux, Armatures, Re-wound, 2 days' service, fully guaranteed, 35s. Trade enquiries invited. — Bateson-Turner Ltd., Gibralter Works, Parkinson Lane, Halifax.

AGENCIES

INVITATION to Manufacturers.—Mr. G. A. LEISHMAN, of George Adam & Co., will be visiting INDIA during July and August this year, and will be holding displays of ELECTRICAL GOODS of British Manufacture as follows.—BOMBAY, 14 days; KARACHI, 10 days; LAHORE, 10 days; DELHI, 10 days; CALCUTTA, 14 days; BANGALORE, 3 days; MADRAS, 10 days. Manufacturers of Electrical Goods who would care to be represented during this tour, and would like to have a sample of their product displayed, without cost, should communicate at once with G. A. LEISHMAN, GEO. ADAMS AND CO., 103, Bath Street, Glasgow. Alternatively Mr. Leishman will be resident at the Piccadilly Hotel, London, from 23rd to 25th APRIL and would be pleased to arrange appointments on these dates.

WORK WANTED

WIRE WORKERS.—Wire Frames, Lampshade Wires, Element Guards, Fan Guards, etc., made to order, any design.—Industrial Design and Manufacture, 157, Goldhawk Road, W.12 (Phone: SHE 3096).

V.A.C. armatures rewound, 27s. 6d., 12 days' delivery.—Home Electric Services, 12, Cromer Grove, Keighley, Yorks.

WORK WANTED. — Modern and well equipped Factory in London Area has factory space and labour available for Sub Contracts in Electrical or Radio Assembly work.—Write Box L.E.J., "THE ELECTRICIAN," 154, Fleet Street, London, E.C.4.

COIL winding capacity available.—Modern Armature and Coil Winding Co. Ltd., Liphook, Hants

METAL Polishing Capacity available.—Price's, 95, Lower Richmond Road, Putney, London, S.W.15. 'Phone: Putney 0179.

FOR Fractional H.P. Motor Rewinds and Repairs you cannot do better than send them to "Autofraction." We have a lifetime of concentrated experience in this field. Our work is high class and gives confidence to our customers. Why not send us your enquiries?—The Autofraction Motor and Eng. Co., 106, Beaconsfield Road, Southall, Middlesex (Phone: Sou. 3598).

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FOR REWINDING ELECTRIC MOTORS. Fractional, up to 100 h.p. Transformers, Chokes, etc., contact Electrical Engineering Construction Company, Ltd., Seymour Wharf, Totnes, Devon. 'Phone 3282.

VACUUM CLEANER REWINDING SERVICE, commutators and Bearings. Prompt delivery and full guarantee.—Thomas Anderson, 117, Bowes Street, Blyth, Northumberland. 'Phone: Blyth 405.

YOUR old lampshade frame re-covered; also contract work undertaken for hotels, restaurants, ballrooms, etc. Write or call, 7, Ashleigh Drive, Leigh-on-Sea, Essex. Moderate prices; first-class work guaranteed. Silk parchment or plastic.

BUSINESS OPPORTUNITIES

SCEMCO LTD., Fluorescent Lighting Specialists, wish to contact manufacturers of electrical equipment and accessories, including Domestic and Industrial Lighting Switches, all "Novelty" and "Improved" electrical appliances. Fluorescent Tubes, Fittings and Components, both Domestic and Industrial, of particular interest. Where possible complete output will be taken and full co-operation given in exchange for sole distribution rights. Replies will be treated with strictest confidence. — Managing Director, Scemco Ltd., Scemco House, 6/7, Soho Street, London, W.1.

MISCELLANEOUS

BATTERY Charges Modernised. Your old Charger made like new by specialists. Conversion from valve to metal rectification. Send for interesting leaflet "Q.D." on this service.—Runbaken Electrical Products, Manchester, 1.

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THE

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MIDLANDS OFFICE:
Daimler House, Paradise Street, Birmingham
Telephone: Midlands 0784—5
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Top Priority

VARIOUS Ministers have during the last few weeks spoken of what in official circles is called top priority, but none as yet has made clear what the words mean in fact, as against what they are meant to infer. Our concern in the matter is relative to their application to the production of generating plant, for though it has been said and has been broadcast that special facilities are to be accorded to manufacturers of such equipment, not yet have we been able to ascertain what arrangements are being made.

The prefix top priority, has been applied to manufacture of electrical generating plant by the Prime Minister, the President of the Board of Trade, the Minister of Supply, the Minister of Education, and the Minister of Works, to name only a few, but none has indicated in detail in what way the use of the prefix will expedite the replacing of over-age generating capacity or hasten the starting-up of new.

It has been announced that a committee representative of the Central and Scottish Electricity Boards and of the electrical manufacturers and boiler-makers has been set up under the chairmanship of the Minister of Supply, with terms almost identical with those of the Heavy Plant Committee of the B.E.A.M.A., but no information relative to what is being done has yet been given by the Ministry. It is clearly not within the range of the Committee's powers to make its recommendations public; it is appreciated that the Committee needs

time to review the position; it is equally understood that with war-time experience to guide it the Committee may well have found the answers to some of the problems set it. That being so, and bearing in mind the fact that the formation of the Committee was announced in the House so long ago as March 17, the industry is encouraged to hope that the Minister of Supply may by now be able to explain in some detail what, in fact, is being done to improve the generating plant position. Without knowledge of the work which the Committee is doing it is obviously impossible to comment upon it; without information about the arrangements to be, or being, made by the Minister for additional labour, steel, copper and so on, the industry is unable to draw up plans for possibly assisting the Committee in its truly difficult task. In the circumstances, the industry looks to the Minister, as chairman of the body, to make known what is going on, and if there is any way in which those outside the heavy equipment field can help. If top priority means anything, let its meaning be understood by all.

The Domestic Restrictions

BECAUSE many domestic consumers of electricity have since February been at a disadvantage compared with their neighbours using gas, the statement in Parliament last week, that restrictions are to be applied to gas will have removed the cause for many a criticism. The domestic consumer of electricity is at the moment penalised for his enterprise in using a fuel which offers the greatest convenience, despite the fact that the gas industry is no less responsible for coal consumption, and let it be understood of coal of a higher grade than is that burnt in any power station. Because the gas industry has quite rightly pointed out that it would be dangerous to cut off supplies in restricted hours, as was done in the case of electricity up to four weeks ago, the Ministry of Fuel has in no way inconvenienced the gas consumer. With the altered conditions whereby electricity consumers are expected to voluntarily abstain from using their live mains during the periods of restriction, the same arrangements are as easily applicable to gas consumers. The question is not one of electricity versus gas but of saving coal in the national interest, the responsibility for which should have been shared by all consumers of all fuels from the start. The arrangements to be made for the future, details of which were not available when we went to Press, will we hope act more fairly to the electricity consumer.

Dearer Base Metals

IN THE ELECTRICIAN of January 21, attention was drawn to the effects which the rising costs of such metals as copper, lead and tin, are having upon the electrical industry, and the increases announced last week may therefore be expected to bring about further adverse reactions. Best copper, around £40 per ton in 1938 and £115 per ton last January, was on Monday £135 per ton. Lead at £16 per ton in 1938 was in January £71 per ton, and is this week raised to £91. Increases of this type must seriously affect manufacturing costs, which in their turn must influence the overseas trade in heavy electrical machines, cables, and so on, with the qualification that the increased cost of copper and lead is shared to some extent with the electrical industry of the United States. Another metal influencing manufacturing costs in this country is tin, the price of which is to-day the highest it has been for more years than many may remember. These conditions, coupled with the difficulty of obtaining adequate quantities of the metals to permit easy manufacture, are having a restricting effect upon most branches of the industry, including those connected with generating plant and power transmission equipment.

Nationalisation Opposition

WHILE the compensating clauses in the Electricity Bill continue to meet with strong criticism, the chairmen of the various power companies have, at their annual meetings, spared no efforts to draw public attention to the dangers in the Bill as at present framed, and in the Government's general fuel policy. Meetings held last week of a number of companies, and reported elsewhere in this issue, brought further criticism of the nationalisation arrangements, coupled in most cases with constructive suggestions, while the activities of the Standing Committee appear to be largely concerned

with amendments which have about them the views put forward by the industry some time ago. It must not be inferred from this, however, that the industry is likely to see in the Bill those clauses which would make the Bill at least more acceptable, for so far as can be judged its framing is to-day, on all serious counts substantially the same as when it was introduced for Second Reading. Opposition to the Bill is still strong, but the means adopted for expressing it seem to lack the punch which was expected and will need to be appreciably strengthened if they are to be more reasonably hopeful of results.

Fuel Efficiency

A CONFERENCE appropriate to the times was that staged at Glasgow last week in connection with the Scottish Fuel Efficiency Exhibition being held in that city until April 5. The exhibition itself is being supported by an appreciable number of manufacturers whose names are well known in the supply industry, while at the conference, papers emanating from electrical interests included two dealing, respectively, with district heating and the place claimed for electricity in fuel economy programmes. The latter subject was dealt with by Mr. W. J. COOPER, and his remarks, abstracted on another page, made clear where the supply industry stands so far as efficiency is concerned with respect to both hydro and thermal station generation. Another conference with fuel efficiency as the main subject for discussion is being held at Harrogate in June under the auspices of the Institute of Fuel, at which at least 14 of the papers to be read have as their authors personalities outstanding in the electrical industry, including Mr. P. W. THOMPSON of the Detroit Edison Co. Preliminary details are given elsewhere in this issue.

Appliances in the U.S.A.

FOLLOWING her return from the U.S.A., which as explained in our last issue, she visited as the first holder of the Caroline Haslett Travelling Exhibition in Electrical Housecraft, Miss JOAN WHITGIFT has indicated to a representative of THE ELECTRICIAN that though she was to some extent impressed by the domestic equipment she saw in the United States, she has the feeling that its design would not entirely fit in with the requirements of the British market. On the other hand, she is of the opinion that by comparison, our own equipment is not at the moment either adequate or good enough. American cookers (230 V) she says, are better. The standard horizontal type for the small home is four or five feet long, in white enamel, with a large, quick-heating oven, several boiling rings and a deep cooking well in the top. There are socket outlets for various purposes on the cooker itself, a clock, and a number of attachments such as holders for salt and pepper pots. There are small upright cookers for the kitchenettes of flats, but wherever there is space, large cookers are installed. The American housewife has more labour-saving appliances than her British sister, due largely to her higher standard of living and the fact that educational literature appears in all the magazines and other periodicals advocating their use. The cost of the standard cooker would be about £40 to £50.

Physical Society Exhibition

THE exhibition which is to be opened at the Imperial College, London, on Wednesday next, will, as indicated in the few advance details given elsewhere in this issue, contain much which is new and much which has been developed out of war-time experience. The interest which the measurement field possesses stretches far beyond the horizon of those directly engaged in it, and at the Physical Society Exhibition will be found equipment and apparatus of a design which will cover every possible requirement. The exhibition is receiving wide electrical support and among those participating will be found names familiar to all. The research side of the exhibition, as in former years, will include many exhibits and demonstrations not seen in any other exhibition, and the four days during which the equipment will be on view will, no doubt, as on other occasions, prove all too short—and perhaps all too crowded. Of its type the exhibition is among the most important supported by the industry, and since the bulk of the visiting public is as technically critical as it is interested, the industry may be relied upon to display the best that it has to offer.

Fuel Efficiency Conference

Electricity's Claim to Place in Economy Programme

THE claims of electricity to a place in the fuel economy programme were evidenced by its freedom from atmospheric pollution, ease and efficiency of transmission, scope and efficiency of application, uniformity of quality, and accuracy of measurement, Mr. W. J. Cooper told the Scottish Fuel Efficiency Conference at the Kelvin Hall, Glasgow, on March 27. On all these counts electricity had been justified and it was now a question of deciding how best in the national interest to convert natural sources of power into this almost universally applicable form of energy. He urged greater attention to hydro-electricity generation as presently under development by the North of Scotland Hydro-Electric Board.

HYDRO-ELECTRIC GENERATION

Given suitable hydro-static conditions, electricity can be generated from water power at an efficiency of 88 per cent. With a distribution efficiency of 90 per cent. this means that when electricity is used at the application efficiency of 100 per cent. credited to it in the Simon Report, heat or steam can be made available from electricity to the value of 79 per cent. of the stored energy of impounded water, perhaps hundreds of miles distant. The provision of energy at this high efficiency makes it clear that it is very much in the national interest that water power resources should be developed.

Referring to generation from coal, he indicated that in the boiler house of a modern generating station efficiencies approximating 88 per cent. were achieved and maintained over long periods. The ratio of efficiency of the steam turbine was of the order of 83 per cent. and the efficiency of the alternator approached 98 per cent. The maximum overall thermal efficiency was, however, only of the order of 30 per cent., since in the heat cycle used, approximately 43 per cent. of the calorific value of the coal burned, was given up to the cooling water of the condenser. Even at this thermal efficiency it should be noted that, with a distribution efficiency of 90 per cent. and an application efficiency of 100 per cent., the ultimate coal economy efficiency was 27 per cent., and it was suggested that, by and large, throughout the country, the average coal economy efficiency might not be higher than this if there was taken into account the energy used in transporting solid fuel to the point at which it was to be consumed.

The adoption of a heat cycle which resulted in an apparently low overall thermal efficiency arose from the fact that when using low-priced, low-grade fuel, it was commercially cheaper to give up this heat to the cooling water than to incur the capital expenditure involved in improving the heat cycle so as to reduce or eliminate this loss.

THERMAL EFFICIENCY

If, however, the value of coal and the need to conserve it now demanded that overall thermal efficiency was the dominating factor then it was theoretically possible to adopt a heat cycle which would raise the thermal efficiency to a value of, say, 50 per cent. To achieve this improvement considerable increased capital expenditure would be involved, but the present day value of coal and the greater need to conserve it would, in all probability, justify this additional expenditure and in any case there did not appear to be any good reason why there should not be spent in achieving a high thermal efficiency in a steam station the same capital expenditure as was generally accepted in the case of hydro-electric development.

The time had come, he continued, when the laborious trundling of coal up and down the country should be reduced to a minimum.

INSTALLATIONS AND APPLIANCES

Speaking on "Electrical Installations and Appliances" at the Conference, Mr. C. H. A. Collins urged that immersion heating of water be regarded as the logical method of raw fuel economy during the summer.

Assessing the prospects of electricity in the home, Mr. Collins said the general public would in the end have what it wanted and seldom consciously considered efficiency in the technical sense, but rather considered what was easiest, cleanest and most convenient to use within its income. Rising trend of electricity consumption clearly showed the public preference. Tests made in several areas demonstrated, he believed, that with the average all-in domestic tariff prevailing in Scotland, the annual consumption was well within the pocket of the domestic consumer. We knew, he said, in fact that the total fuel cost for an all-electric house was in general less than the combined costs of a mixture of methods for lighting, heating and cooking.

DOMESTIC WIRING DEVELOPMENTS

by "SUPERVISOR"

READING again through the paper "The Future of the Domestic Wiring Installation," by Messrs. Forbes Jackson, W. J. H. Wood, G. Smith and E. Jacobi, and the subsequent discussion, as recorded in the I.E.E. Journal, December, 1943, it is rather remarkable to realise how far development on the lines suggested has proceeded. It will be remembered that the main recommendations of the authors were, in so far as they concerned the redesign of electrical installations, as follows: (a) The employment of new materials and installation methods. (b) Alterations to existing regulations, based on two general principles: (i) that regulations are required for convenience and adequacy as well as technique and safety; (ii) that they should allow for continuous progress in materials and methods by being divided into two main divisions; the first, permanent basic safety conditions; and the second, explanatory memoranda which may be added to as often necessary.

Following these general recommendations, some of the detailed observations should be noted. One was, that up to 2 000 W might be regarded as a safe maximum in limiting the number of fixed lighting points connected to one circuit, although to prevent total failure of light a minimum of two circuits should be used in a house. A second recommendation was for the approval and use of a ring circuit for domestic socket outlets, although the socket size recommended was 10 A only, each 2 000 cu. ft. of volume of the house being covered by one 15 A fuse and one 7/.029 circuit, no limit being placed on the number of sockets so connected.

PROBLEM OF SMALL HOUSES

Dealing with the detailed recommendations first, the March, 1946, Supplement to the I.E.E. Regulations meets most of these, although in a somewhat cautious manner. For instance, there should be one lighting circuit per 1 000 sq. ft. of floor area, irrespective of the loading, and this somewhat arbitrary figure is leading to a little difficulty in small houses being wired to-day, in that so many of them just exceed the floor area mentioned. Had this figure been 1 200 sq. ft. of floor area, many of the small houses would fall within the category requiring one lighting circuit only, and the extra point or two connected could have no real bearing upon the safety or adequacy question.

The suggestion that there should be at least two lighting circuits in any house, is got over without difficulty in those installations in which the ring main circuit for the socket outlets is adopted, as the standard lamps connected to this circuit will provide an alternative lighting source if the fixed lighting points fail. This affords just another instance in which the adoption of the ring circuit makes for wiring economy, and in a manner not generally accorded when comparisons of cost are made. The approval of the ring circuit in the March Supplement is much on the lines of the recommendations made, but almost equally useful is the decision to adopt the 13 A socket and plug, and the approval for multiple 13 A socket outlets on single non-ring circuits.

SPREAD OF NEW METHODS

Regarding the general recommendations, (b), that referring to alterations to regulations, is not yet an accomplished fact, but there are signs and portents that lead one to believe that some revision is under consideration, and may eventually be accepted. The first recommendation, (a), calling for the use of new materials and installation methods, is to some extent being satisfied, but whether this is occasioned by a real desire on the part of the installation industry to improve such methods, or is due to desperation concerning the slow delivery or complete disappearance of standard installation material, it is difficult to say, but new wiring systems are, in fact, appearing.

During the past few weeks the writer has been privileged to witness some trial installations incorporating an entirely new system and installed in a new way. If the full claims of the system can be substantiated, and there appeared to be nothing in or during the trials that would lead one to think otherwise, it may well revolutionise small house wiring methods, in which opinion the writer is joined by other independent observers. Space will permit only a brief description of the system, but as it should be on the market early in this year, descriptive literature should soon be available for interested readers.

The system is a conduit type, but with conduits constructed of a specially compounded P.V.C., and with Bakelite accessories. It is intended for use with P.V.C. insulated wires and cables, or, alternatively, unbraided v.i.r. cables for those who still jibe at plastic cables. By using this smaller type of cable, conduit sizes are possible of reduction, and it is

claimed that the ½ in. plastic conduit is equivalent in capacity to the ⅝ in. steel conduit of the light gauge type, and with which all installation costs are compared. The conduit is flexible, of the consistency of lead pipe, although this varies to some extent with temperature. As one size of conduit fits tightly into the next larger size, it is possible to reduce the number of accessories required to an absolute minimum, in that one size will fit two sizes of conduit.

There are many novel features about the accessories, which have clearly been designed by someone with an intimate knowledge of installation practice and requirements, and the whole range for domestic or farm wiring amounts to no more than 24 different items, including saddles and clips. The conduits are non-inflammable, unaffected by steam, chemical action, petrol or oils, and it is stated that no condensation occurs within them under what are generally considered to be ordinary conditions of installation.

So far, merely another conduit system has been described, but major interest centres round the way in which the system is used and installed. As the conduits are flexible, practically no cutting away is necessary, and in the houses examined no joist slotting or wall chasing had been needed, owing to the positions in which the conduits had been placed. Actually, the houses had been completed with all floors laid and internal partitions erected before the wireman carrying out the demonstration started work; there was only one man, and he apparently needed no mate.

The conduits were cut to the length, the conductors inserted, and the whole assembly then placed in position under the joists, in the angle made by the joist termination and the brick wall. Down runs were all arranged in wall angles, being taken out to the switch or socket outlet point, and as the lighting circuits were run on a point-to-point method, no conduit contained more than two, or at most three, small wires, and all could be easily withdrawn when the conduits were erected. The installation of the ring main circuit to the socket outlets appeared to be simplicity itself.

The writer was informed that it is possible to prefabricate runs from plan measurements, and take the assemblies to the site for easy installation. On this particular council estate costs were about 20 per cent. below the standard light gauge welded steel conduit - with - grip - fittings systems used on comparable houses, and it was claimed that on another site trial installations had proved to be some 27½ per cent. lower. The major saving was in labour costs, which were no more than 50 per cent. of those for the steel conduit installations, but the writer has been promised more detailed costs, which will be referred to later.

The Batti-Wallahs' Society

THE subject of the address by the guest-speaker, Mr. D. St. Julian-Bown, of the British Display Association, at the monthly luncheon of the Batti-Wallahs' Society in London on March 27, was "Britain Can Show it." Another guest, cordially welcomed by Col. Sir T. F. Purves, who occupied the chair in the absence of the president, Mr. P. V. Hunter, was Mr. M. H. Lindo, a Dutch consulting electrical engineer, normally resident at The Hague.

Mr. Bown said that although Britain could show it, as was demonstrated by the "Britain Can Make It" Exhibition, the question was "Will Britain show it?" Few Britons were successful in displaying their products because they did not do it in the right way. It was waste of money for firms to employ experts to show them the right way and then tell the experts what to do. The experts should be given free rein. If British commerce was to advance at the speed necessary to secure its place in the world's markets, display was one of the outstanding things that had to be considered. Our overseas trade would be largely affected by impressions taken away by visitors from other countries. The purpose of the display man was to make goods sell better and faster and to make services known to the public in the best possible way. In order to stop a passer-by and make him a potential buyer, a window display, or exhibit, had to grip his imagination. It was no good having a window display like a printed catalogue. Electrical engineering was a subject which offered great possibilities for effective display, because its various branches, such as power, lighting, communications and so on, lent themselves readily to dramatisation. If British commerce was to succeed it must recognise display as the science and art that it undoubtedly was.

Mr. M. Whitgift, the "mate," announced that Miss Caroline Haslett, director of the E.A.W., would be the speaker at the next luncheon on Thursday, April 24.

Physical Society Exhibition

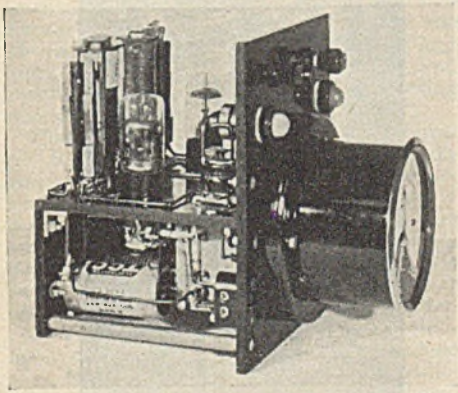
New Instruments to be Seen at Imperial College

MOST of the leading manufacturers of scientific instruments and apparatus will be represented at the Physical Society's 31st exhibition, which is to be held at the Imperial College, South Kensington, from April 9-12. In addition, in the research and educational section, as in previous years, there will be demonstrations of considerable technical interest, sponsored by such bodies as the Admiralty Experimental Establishments, the Ministry of Supply Atomic Energy Research Station at Harwell, the B.E.A.I.R.A., the Royal Aircraft Establishment, Farnborough and T.R.E., Malvern, as well as by the research laboratories of several large electrical firms.

On Thursday evening, a lecture is to be given on "Automatic and Manual Position Control Systems," by Prof. A. Porter (Military College of Science) and amongst the instructional films which are to be shown on each of the four days is one of Lord Kelvin, entitled "Kelvin, Master of Measurement." The exhibition, admission to which is by ticket only, will be open from 10 a.m. to 9 p.m. each day.

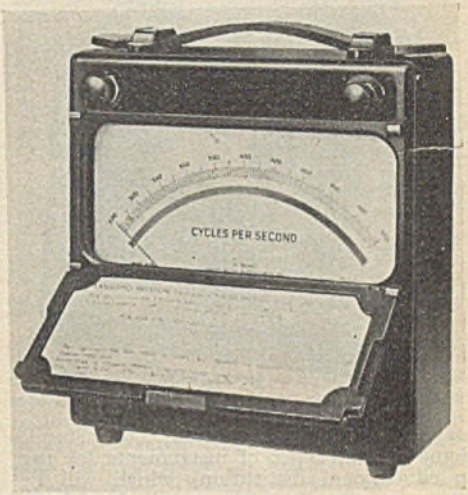
Particulars of some of the exhibits are given below:—

Demonstrations showing how plastics varnishes can protect metals from chemical corrosion will be seen on the stand of



Cold-cathode relay to be shown by Londex, Ltd.

Bakelite, Ltd., where Bakelite laminated and metal specimens are to be immersed in acid solutions. Various applications of the company's products to insulation problems will be seen, together with examples of precision mouldings for scientific instrument manufacture. Bakelite cements suitable for bonding metal to wood, metal to glass, etc., will also be shown, and there is to be a demonstration of the ability of joints produced by these



Sangamo-Weston frequency meter

methods to withstand prolonged immersion in boiling water.

On the stand of Philips Lamps, Ltd., will be apparatus used for X-ray analysis and two demonstrations in the telecommunications field, including a synchronising system for a pulse-time multiplex receiver and a method of frequency control by an impulse governed oscillator. The latter demonstration will show how any tendency of the "variable" oscillations to vary in phase relative to a master oscillation produces a signal which, when applied to a reactance valve in the oscillator, pulls it back into phase. With the help of an oscillograph, this process will be seen in "slow motion."

Two new cathode-ray oscillographs, one adapted especially for the investigation of high-frequency phenomena and the other for dealing with very low frequencies, are to be shown by the Mullard Wireless Service Co., Ltd. The low-frequency model, Type E.800, has a voltage-amplification factor of 7 000 and a frequency response curve flat to within 2 dB between 0.1 cycles and 40 kc/s. The same firm will also be demonstrating the photography of fast-moving objects by short-duration

flashes and will show an electronic analyser for square waveforms.

A wide range of electrical measuring instruments will be among the exhibits

The new Avo valve characteristic meter

on the Crompton Parkinson, Ltd., stand. Some special types of instruments for use in educational institutions which will be shown are made with an all-glass front and a cut-away scale showing the moving parts. Wattmeters, galvanometers and other moving-coil and moving-iron instruments will be displayed.

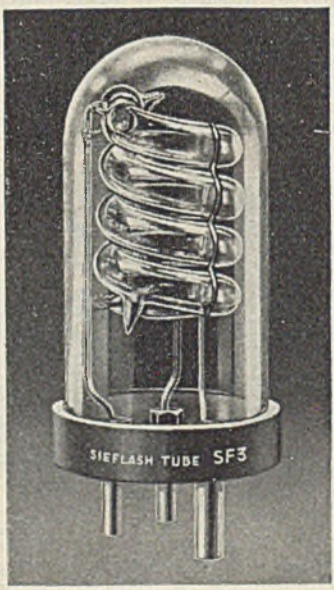
A method of amplifying the relatively low torque obtained from electrical data transmission systems of the Magslip and Selsyn types, so that these instruments can indirectly control an F.H.P. d.c. motor will be shown by Evershed and Vignoles, Ltd. The method makes use of an electro-mechanical system employing a small vibrating relay. Other products of this company on view will include an electronic repeater and the "Multiscope," a device for monitoring the condition of up to 15 switches over two wires.

Londex, Ltd., are to show several examples from their range of remote-control gear, and will demonstrate the working of a highly-sensitive cold-cathode relay. This relay, it is stated, can be used for operating heavy-duty contacts in conjunction with delicate meter systems and is grid-controlled. Suggested uses are the automatic control of variable electrical quantities, as well as temperature and humidity control.

A resistance thermometer controller, developed to meet the need for a highly sensitive device for creep testing equipment and other laboratory and industrial purposes, will be seen at the stand of Sunvic Controls, Ltd. The controller operates electronically, with a bridge circuit and a thyratron valve. The bridge is sensitive to a change in thermometer resistance of one part in five thousand, and there are no moving parts except a final thyratron-controlled vacuum switch. The controller incorporates a highly accurate bridge potentiometer.

On the stand of Marconi's Wireless Telegraph Co., Ltd., apparatus representing new developments in valve technique, a new lightweight radio compass and keying test equipment for quartz crystals will be shown. Two new valves will include an u.h.f. transmitting triode, designed for grounded-grid operation and with a maximum anode dissipation of 2.5 kW, and a velocity modulated Klystron arranged as an amplifier. The tube is cavity tuned over the range of 9-11 cm. and gives a power gain of five to one, with an output power of up to 15 W.

Meters will form the larger part of the exhibits on the stand of Sangamo Weston, Ltd., and will include some sub-standard types for laboratory use. A frequency meter, involving a new principle and working over a range of 25 to 15 000 c/s. with an accuracy of ± 1 per cent. will be of



Krypton-xenon filled "Sieflash" tube to be shown by Siemens

interest. It is made to operate on voltages between 75 and 600 V and its accuracy is not only independent of wave-form but also of changes of up to 33⅓ per cent. in

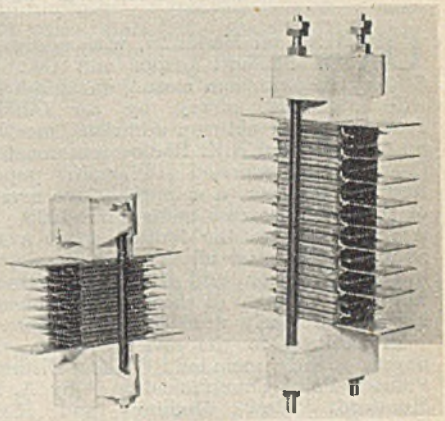
the supply voltage. A very sensitive moving-coil relay, requiring an operating current of 1μ A or less, will also be seen.

The Automatic Coil Winder and Electrical Equipment Co., Ltd., will have on view several of their "Avo" range of instruments, as well as an automatic coil winding machine. One piece of apparatus recently introduced is a valve characteristic meter, which represents a considerable advance on this company's well-known valve tester. The meter will test any standard receiving or low-power transmitting valve on any of its normal characteristics—in contrast to the original valve tester, which gave a mutual conductance reading only—and under conditions corresponding to any desired set of d.c. electrode voltages. Since only a.c. voltages are used throughout, however, the inherent regulation troubles and inaccuracies associated with d.c. working are avoided. The multiple selector switch from the earlier model is again used, and heater voltages up to 120 V are available. Rectifiers can be tested on each of their anodes separately at the full rated load for the valve. A polarised relay provides overload protection.

Electrical materials will be the main feature of the exhibit of the Telegraph Construction and Maintenance Co., Ltd. New instrument alloys produced since the war, including a magnetic shunt alloy, R. 2799, with a controlled diminishing temperature - permeability characteristic, and cold-rolled low hysteresis strip, will be shown. A demonstration of some scientific interest will be that of Transformer Steels, Ltd., owned jointly by the above company and Joseph Sankey and Sons, Ltd., illustrating the nature and results of researches into factors affecting magnetic performance.

Electro-medical apparatus is to be shown by the Edison Swan Electric Co., Ltd., and will consist of an electro-encephalograph and an automatic low-frequency wave analyser. The two instruments are associated. The electro-encephalograph, a device which is finding an increasing use in the examination of the minute currents originating in the brain cells, has a number of high-gain audio-frequency amplifiers, covering the frequency range 0.5-65 c/s, feeding direct-recording ink oscillographs. The wave analyser was designed to interpret the oscillographic records, but has a number of industrial uses.

The lamp research laboratories of Siemens Electric Lamps and Supplies, Ltd., are to show two instruments designed for illuminating engineering work, one a brightness photometer and the other an apparatus for investigating the phosphorescence of luminescent materials. This consists of a source of u.v. radiation, interposed between which and a photocell are glass plates covered with fluorescent powders. The luminescent output, and its



T.C.C. 100 and 300 kVA air-cooled mica transmitting capacitors

relation to the current waveform of the u.v. lamp, are observed on a double-beam oscillograph. Also to be shown are a range of krypton-xenon filled Sieflash tubes suitable for high-speed photography and stroboscopic work. One type is designed for an effective flash duration of 1-2 μ-secs.

The Telegraph Condenser Co., Ltd., are arranging to show several new developments in high-voltage capacitors, including an oil-immersed 600 kVA, 2 kV mica-transmitting capacitor and two forced-air-cooled types, rated at 100 and 300 kVA. For air-cooling directly on to the mica stack, copper fins are provided on the electrodes. The maximum working voltage is 4.5 kV.

In the research section, the B.T-H. Co. will be giving several demonstrations. Of particular interest will be an experimental three-phase 3 000 r.p.m. squirrel-cage induction motor with silicone insulated stator windings. The motor will be running on a load of approximately ½ H.P. giving a temperature of about 175° F. on the windings, and will be mounted so as to facilitate inspection. The insulation used consists of silicone treated glass cloth slot liners, silicone treated glass tape on the end winding, and glass insulated wire and flexible leads, the completely wound stator being impregnated in silicone varnish. On the same stand will be seen models demonstrating street-lighting problems, air sterilisation with u.v. lamps, infra-red detectors and an exhibit showing the nuclear structure of atoms. A water-jet model will illustrate the basic principles of reflex Klystron action.

Radiocommunication Convention

I.E.E. Record of Seven Years' Progress

OPENING on March 25, with addresses by Sir Stafford Cripps and Col. Sir Stanley Angwin, and closing on March 28, with a general survey by Sir Clifford Patterson, and with an additional meeting on April 2, the I.E.E. Radiocommunication Convention comprised 16 main papers forming, together, a comprehensive review of technical progress made since 1939. It is impossible, in the limited space available, to summarise all the ground covered in the convention, and abstracts are therefore given of some of those papers possessing a particularly wide general interest.

In addition to the reviews below, the papers read included "Long-Distance Point-to-Point Communication," by A. H. Mumford, "Low-, Medium- and High-Frequency Communication to and from H.M. Ships," by E. J. Grainger and W. P. Anderson, "Military Radio Communications," by Brig. J. B. Hickman, "Aeronautical Communications," by Dr. B. G. Gates, "Ultra-High-Frequency Technique Applied to Mobile and Fixed Services," by J. Thomson, J. D. Denly, I. J. Richmond, F. Pugliese and H. Borg, "Résumé of V.H.F. Point-to-Point Communication," by C. W. Sowton and F. Hollinghurst, "Naval Radio-Direction-Finding," by C. Crampton, "Fundamental Problems in R.-D.-F. at High Frequencies," by W. Ross, "The Investigation and Forecasting of Ionospheric Conditions," by Sir Edward Appleton, F.R.S., "The Influence of Propagation on the Planning of Short-Wave Communications," by K. W. Tremellen and J. W. Cox, "The Development of C.W. Radio Navigation Aids," by R. V. Whelpton and P. G. Redgemont, and "A Survey of C.W. Short-Distance Navigation and Landing Aids for Aircraft," by Caradoc Williams. There were also many supporting papers.

PULSE COMMUNICATION

Considerable attention was paid at the Wednesday evening, March 26, session, when the main paper to be read was "Pulse Communication," by Messrs. D. Cooke, A. J. Oxford, Z. Jalonek and R. Fitch. Sir Edward Appleton, F.R.S., was in the chair.

The paper was in three sections, consisting of a general review of pulse communication systems, an analytical survey and a description of the circuit techniques involved.

Modulation of continuous waves, it was explained, was inherently restricted to amplitude and angular variations, but a recurrent pulse train also allowed variations in shape of pulse to be effected, and this extra degree of freedom, coupled with the discreet nature of pulses, made possible a variety of types of modulation. There were four basic systems, as illustrated in Fig. 1.

TYPES OF MODULATION

The first of these, called pulse-amplitude modulation (p.a.m.), used a supersonic oscillator producing evenly spaced pulses of constant length once per cycle, and these had their amplitude modulated by the instantaneous speech voltage fed to the modulator by a speech amplifier. This system resembled c.w. amplitude modulation.

In the second system, pulse-frequency modulation (p.f.m.), which resembled c.w. frequency modulation, the frequency of a supersonic oscillator was controlled by the speech amplifier output by means of a reactor valve or similar device. The resultant frequency-modulated wave was made to produce pulses once per cycle.

Pulse-length modulation (p.l.m.) the third possible system, had no c.w. counterpart. The speech amplifier output in this case controlled the level at which a "slice" was cut from a sine wave or "sawtooth" produced in the modulator once each cycle of the supersonic oscillator. The output therefore consisted of constant-amplitude pulses at a constant repetition frequency, but of variable length.

The operation of the fourth system, pulse-phase modulation (p.p.m.), was similar to that of p.l.m., except that the length-modulated pulses produced were differentiated and sliced so as to produce a chain of pulses of constant length corresponding to the start or finish of the variable length pulses.

After discussing the distribution of distortion components in the signal, which were not, in general, harmonically related to the modulation, the paper pointed out that the wide frequency spread of a pulse transmission compared with modulated c.w., demanded the use of a part of the r.f. spectrum where the required bandwidth could be accommodated without causing unwarrantable interference with other transmissions. For this reason, the natural choice lay in the decimetre and shorter waves. Oscillators operating at these frequencies were, at present, preferably pulse-modulated, and full advantage

of the narrow beaming could be realised in point-to-point communication.

The choice of a pulse-modulation system for multiplex working was then considered, but it was concluded that none of the systems above was of outstanding merit in all respects for all applications. The individual requirements and conditions of use in a particular application had to be examined closely before an opinion could be ventured as to whether pulse modulation was or was not the best answer.

Pulse modulation could be said very broadly to have reached the stage in its evolution when, having emerged from the laboratory and been successfully applied to at least one major communication problem (such as the Army No. 10 set), the technique was being consolidated. The first difficulties of practical use had been largely overcome, and the properties of modulated pulses were now more thoroughly understood. One could expect a period of further experimentation on a larger scale, from which data could be drawn to supplement present knowledge.

During the session, a message from Field Marshal Lord Montgomery was read, praising the No. 10 set, which provided eight telephone channels safe from interruption by the enemy. Lord Montgomery said: "I have no hesitation in saying that I consider the No. 10 set to be a very marked and rapid advance in wireless technique. By using a chain of stations I was enabled to maintain my Tactical H.Q. as far forward as I did and still have direct control with London. No other Army, allied or hostile, possessed equipment equally effective in its role."

There were nine supporting papers in this section.

B.B.C. AT WAR

The technical story of war-time broadcasting, much of it hitherto unpublished, was made known on Thursday evening, March 27, when Mr. H. Bishop (Chief Engineer B.B.C.) delivered his paper on "The War-Time Activities of the B.B.C."

As early as 1935, Mr. Bishop said, it had been realised that, in the event of war, it would be necessary to find a means of broadcasting which would not assist enemy aircraft by guiding them to important bombing targets, while at the same time maintaining an adequate public service. By 1938, it had been decided to group several high-power transmitters on one wavelength so that no aircraft could tune into them separately until it was within about 25 miles range. By that time, the transmitter would be closed down on Fighter Command instructions. The medium-wave transmitters were, therefore, arranged in two groups, one including the transmitters in the south of England, and the other those in the north of England, Scotland, and Northern Ireland. Only once during the war were they all closed down simultaneously.

Synchronised transmitters a few hundred miles apart had, of course, to carry the same programmes if intolerable mush

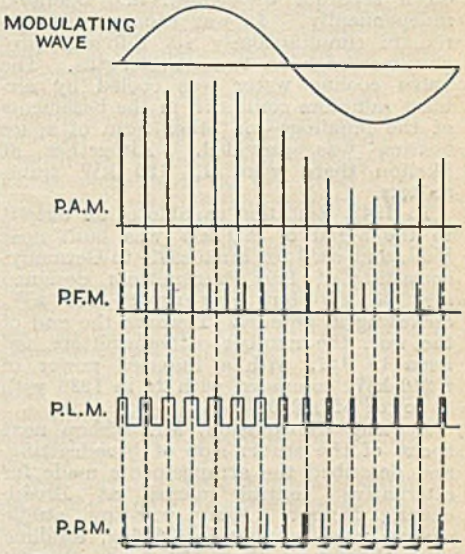


Fig. 1.—The four basic types of linear pulse modulation

were to be avoided. Consequently it was decided to combine the National and Regional programmes. The scheme required the development of highly accurate crystal drive equipment in order that close synchronisation could be maintained without the use of line links. For this purpose, the Post Office had developed crystals operating at fundamental frequencies in the 600-1 200 kc/s. range, thus overcoming in most cases the necessity for additional frequency multiplication after the crystal oscillator. By 1942, a new crystal drive had been designed, the short-time frequency stability of which was of the order of ± two parts in 100 000 000 for 24 hours and one part in 10 000 000 for periods of two or three weeks. Fifty-five of these were installed up to 1945. For frequency comparison, a pulse technique was developed by which the frequency of all medium- and long-wave transmitters could be checked from a 1 kc/s reference tone generated at Broadcasting House.

Owing to mutual interference between the synchronised transmissions, the service in some parts of the country was poor, and in these areas additional transmitters were built.

Describing the new transmitting equipment which had been added during the war years, both to provide world-wide

and European coverage, Mr. Bishop said that a short-wave station at Skelton in Northumberland was equipped with six 120 kW Class B anode-modulated transmitters. In each of these, two entirely independent h.f. channels was provided, and each of the channels could be set up on a separate wavelength and operated independently. It was thus possible to radiate simultaneously six different programmes each on two wavelengths. The valve cooling water was cooled by air-blast radiators contained in the basements of the buildings—no other form of space heating was provided. Altogether at Skelton there were 12 120 kW transmitters.

In 1943, a station capable of an output to the aerial of 800 kW was built near Hull, and used for broadcasts to Germany, consisting of four transmitters designed for 150 kW but over-run to 200 kW, operating in parallel. Towards the end of the war, the number of transmitters had risen to 121, with a radiated power of 6 240 kW, compared with 24 in 1939 with a power of 1 200 kW.

Leaving transmission, Mr. Bishop next spoke of the studio side of broadcasting, and described the arrangements made for alternative control rooms at Broadcasting House. Many war-time studio centres were brought into being, totalling altogether more than 150, and all were equipped with outside broadcasting equipment having two separate channels to guard against breakdown. Important Government buildings were given permanent O.B. facilities. As an example of the safeguards taken to prevent breakdown during vital National broadcasts, Mr. Bishop said, two microphones were placed in front of the speaker, each going through its own local O.B. amplifier on to separate lines. One amplifier was fed from batteries and the other from mains. In the Broadcasting House control room, each line was terminated with splitting pads, and thus the programme became available on four or more separate channels. It was then routed through separate amplifier chains to a mixer. These elaborate precautions sometimes proved necessary; on one occasion, three of the four alternative channels developed faults during one of Mr. Churchill's 9.0 p.m. Sunday broadcasts.

Finally, recording, programme control and the B.B.C. receiving stations were described. There were no supporting papers in this section.

COMPONENT DEVELOPMENT

In the session on Radio Components, held on Friday afternoon, March 28, two main papers, by Mr. E. M. Lee and Mr. I. M. Ross, were delivered.

Mr. Lee's paper, "A Review of the Radio Component Industry's Activities," began with a survey of the pre-war state of the industry and the steps taken by the R.C.M.F. to standardise components, dating back to 1933.

At the beginning of war, the manufacturers were being told that their real war job was to push the export of radio to help pay for imports, and the R.M.A. and R.C.M.F. decided that their first task should be to work out war emergency component standards.

NEW DESIGNS

The paper then told of the liaison committees set up between industry and the Services, and mentioned some of the tests devised to give accelerated climatic conditioning. By the middle of the war, production of receivers for the export market had completely ceased, and most of the technical committee work was in improving components for high-flying and arctic conditions and in the miniaturisation of components preparatory to the miniaturisation of the radio equipment itself. Complete new ranges of inter-unit plugs and sockets had to be designed and produced in millions. Delicate components such as small meters and rotary convertors were produced in hundreds of thousands and even the glass cartridge fuse had to expand to ten times its pre-war production to give an output of a quarter of a million a week. This increased production was achieved by the work carried out in small branch workshops set up in village halls, etc., the application of motion study and widespread use of quality control inspection technique.

Finally, Mr. Lee reviewed some of the individual components produced to meet war needs, and concluded with an estimate of future trends.

The associated paper by Mr. I. M. Ross, on "Component Development for War-time Service Applications," dealt with the subject from the viewpoint of the Services' design establishments. The important factors influencing component design were:

(a) The need for improved reliability to withstand the extreme conditions experienced in Service use.

(b) The need to reduce size and weight.

(c) Advances in communication technique, requiring corresponding advances in component design.

(d) Advances in materials and processes; and conversely, shortages of key materials, or bottlenecks in particular processes.

Under (a), extremes of temperature and high humidity were the main factors to receive attention, but other adverse conditions which had to be considered were

(*Continued on p.* 854)

REVIEW OF RADIO PROGRESS

SURVEY OF THE CONVENTION — FUTURE PROSPECTS

THE fourth day of the I.E.E. Radio-communication Convention ended with an address in which Sir Clifford Paterson, F.R.S. (G.E.C. Research Laboratories), surveyed the papers delivered and gave his estimate of future developments.

During the war, he said, a new range of frequencies above 30 Mc/s came into use. The R.A.F. had recognised early the possibilities of the v.h.f. band and the Army had also used it to a limited extent. Before 1939, much work had been in hand by the Admiralty and by industry to find out how signals on centimetre and decimetre wavelengths could be utilised for communication purposes and, though this work did not lead to quite such an early extension of signalling technique as the use of the very high frequencies, it did ultimately give such an outstanding set as the No. 10. The higher frequencies found their sphere of application in war-time in a way that pointed the way of future progress.

NEW MODULATION TECHNIQUES

Speaking of modulation techniques, Sir Clifford said that by the time the advantages of frequency-modulation had become apparent in the v.h.f. band, the Services were too deeply committed to amplitude-modulation equipment. As early as 1940, however, some installations proved quite successful in use. Here was a case where intelligence was conveyed not by intentionally varying the magnitude of a sinusoidal carrier-wave transmitted through a communication channel, but by intentionally varying another time function of the carrier. Now, time functions were attracting more and more attention, and pulse-time modulation systems relied essentially on them. The No. 10 set, using pulse methods, made it possible to interlace in time eight separate speech messages and provide a multiplex message. This was undoubtedly one of the major advances in communication technique during the war. Another great step forward was carrier-shift keying, in which the frequency of the carrier was changed in order to increase the reliability of telegraphic signalling.

In ionospheric forecasting, it was found possible to put into the hands of a radio operator a series of charts which gave him the optimum high frequency he should use in terms of the location of the transmitting and receiving stations, and the time of day and the season. There was now a good deal of data from which could be forecast with considerable accuracy the equipment required to give a service perhaps as good as the line telephone service. The sun, however, still controlled the transmitting medium on the longer wavelengths, and the rain affected the outlook on centimetres, while nature had its own radio counter-measures in the selective oxygen absorption.

Turning to equipment design, Sir Clifford mentioned the small magnetron and the disc-seal receiving triode, developed at an industrial laboratory, as factors which made the No. 10 set a possibility, and said that the production of 139 million valves between 1939 and 1945 allowed communication on a hitherto undreamed-of scale. Besides aiding in tropicalisation, the chemist had made outstanding advances in materials such as low-loss plastics cables. Of many advances in components, he mentioned the mass production of quartz crystals—where one could now remove some of the imperfections of the natural quartz. Aerial design had advanced in complexity and become a fine art.

Great advances were made in operational techniques, and a noteworthy achievement was a v.h.f. set where some 600 controlled channels could be set up by moving two dials, the harmonic output of crystals controlling the frequency of a free oscillator. Navigational aids using c.w. had been of great value, and some which enabled convoys at sea and in the air to maintain the transatlantic bridge had been brought near perfection. Perhaps the most interesting new technique in c.w. was that for the determination of position by the phase of the carrier wave.

NAVIGATIONAL AIDS

Sir Clifford began his remarks on likely future developments by saying that, so far as military communications were concerned, future requirements were impossible to predict. In civil aviation, however, it seemed possible that in due time the main short- or long-distance routes might be navigated by radio aids alone, and often with the radio aid controlling the automatic pilot and relieving the crew of an appreciable amount of anxiety. In landing and low flying both c.w. and radar aids would be involved. One could visualise the time when a passenger-carrying aircraft could be landed purely by radio aids. But that, of course, was not the whole problem. What were the expectations of giving such a service in practice with never a chance of failure? That was a vital but difficult question, which did not permit of experimental verification.

Only the rival claims on ether space would limit the further application of v.h.f. communication to road, rail and sea transport. An extension of the Post Office line-network facilities to moving vehicles might well prove to be a commonplace of the future. Such possibilities were largely due to the development of techniques in the metre and centimetre wavelengths. In the trunk telephone systems, natural obstacles might be bridged by short-range radio links, while the longer links spanning continents would become more reliable because of the greater information about the ionosphere and the greater ability to overcome defects caused by ionospheric disturbances. When one considered where the No. 10 set might lead an intriguing vista was opened, but so many economic factors were involved that he doubted whether any responsible engineer was ready to answer the question "Would the beamed multi-channel centimetre radio chain replace the coaxial cable?"

There were many places where a number of trunk channels could be collected together at audio frequencies, and it seemed likely that a pulse-time modulation technique would be very suitable for such requirements. The audio signals were easily translated into suitable pulses which were given their separate time allocations, while at the receiver the time-sorting of the mixed pulses naturally gave rise to an output at the separate audio frequencies. The problem here was to maintain each separate pulse waveform within the narrow time interval assigned to it. The appearance of multi-path radio signals would produce echo effects and hence cross-talk. The engineer who could best control the behaviour of these echoes would undoubtedly produce the best operational systems.

TELEVISION

After saying a few words about the B.B.C., where work on high powers and aerial systems would be of the greatest benefit of mankind, Sir Clifford turned to television, and said that the problem of producing a larger picture depended upon a definition of between 800 and 1 000 lines. Most of our techniques were ready for such developments, and our war-time experiences had made us familiar with much wider bandwidths, high radio powers at very short wavelengths and high-gain aerial systems. The fascinating problems of a colour system were slowly yielding to treatment, but there still seemed to be a wide gap between scientific achievement and commercial possibilities.

Concluding, Sir Clifford said that the bearing of war-time progress on export trade must not be overlooked. The urgent needs of the Services had hastened the development of materials and components to work under onerous conditions, and the industry was therefore in a better position than before the war to supply equipment engineered to the particular requirements of any specific locality. There would be some changes in internal construction, primarily a replacement of the older materials with those less susceptible to the effects of fungus and humidity, and in external construction and design there would undoubtedly be still further simplification. Throughout the war, the world saw the research workers of this country taking the lead in most pioneer developments. We had made the first moves in the metre and centimetre wavebands and disclosed the possibilities of a great extension of radiocommunication. This reputation must be maintained. The overseas market for telecommunications was very great.

Radio Convention

(*Continued from p.* 852)

salt spray, dust, damage by fungi, vibration and, in the case of high-altitude flying, low ambient air pressure.

Speaking of the development work which had taken place in various components, Mr. Ross said that the main advance in carbon-composition resistors was in the introduction of smaller types, particularly in the lower-wattage ratings. Of particular interest was a one-tenth W type, with paint protection, measuring only ¼ in. by ⅛ in. diameter. Miniature paper capacitors were introduced, the greatest reduction in size being obtained by the use of evaporated metal electrodes in the place of foil. Development work also took place on the use of plastic films in place of paper.

Of new types of batteries developed, there was the layer cell, in which, as the name implied, the cell constituents were assembled in layers instead of the earlier concentric construction. The layers stacked well and gave better capacity/volume ratio. Another interesting type, which had not gone into production by the time the war ended, was the American Ruben cell, a zinc-carbon couple with mercuric-oxide depolariser and potassium-hydroxide as electrolyte. Outputs of from two to five times that of the equivalent dry cell were obtained depending on the conditions of discharge. The cell had the advantage of being hermetically sealed.

In this section there were two supporting papers, on crystal filters and component standardisation.

• Electrical Personalities •

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

MR. T. B. O. KERR has been appointed assistant secretary of the General Electric Co., Ltd., as from April 1.

MR. T. B. O. KERR

MR. N. V. BALDWIN, manager of the Bristol branch of the Igranic Electric Co., Ltd., for 20 years, is commencing duties as district manager in London. Mr. Baldwin is an associate-member of the I.E.E., and in 1938 was president of the Bristol Association of Engineers, of which he has been a member for 20 years. During the war he held the rank of Lt.-Col. in the Royal Corps of Signals.

MRS. G. K. WAINWRIGHT, J.P., has been re-elected president of the Hartlepools branch of the E.A.W.

MR. C. BECK, shift charge engineer with the Scarborough electricity department, has been appointed district engineer at Filey.

MR. L. K. TRAVIS has been promoted to the position of first assistant mains engineer in the Brighton electricity department.

MR. JOHN HEYES, head of the firm of Heyes Bros., Southport, has been elected president of the Southport Chamber of Trade for the second year in succession.

MR. L. C. RAMSDEN, mechanical superintendent at Doncaster electricity works, who has been with the undertaking for 26 years, retired on March 25, his 65th birthday.

MR. J. L. TAYLOR, technical superintendent to the Lincolnshire electricity supply company, has been appointed deputy electrical engineer and manager to the Oxford City Corporation.

MR. A. M. BRYAN will take up his duties as Chief Inspector of Mines on April 14 in succession to Sir John R. Felton, who will retire on that date after 39 years' service as an inspector of mines.

MISS MARGARET D. WARDLAW, the home lighting specialist of the E.L.M.A. Lighting Service Bureau, 2, Savoy Hill, London, a photograph of whom illustrates the cover of the programme for the forty-eighth illumination design course, beginning on May 6, is now available to give talks to women's organisations and supply company audiences.

MR. C. HEATHCOCK, managing director of the Midland Electric Corporation, Tipton, has been appointed chairman of the West Midlands Joint Electricity Authority, with Ald. W. S. Lewis, of Birmingham, as vice-chairman.

MR. F. B. OGAN has retired after nearly 20 years' service with the London Electric Wire Co. and Smiths, Ltd. Inquiries should be addressed to the London branch of the company at 31/33, Spenser Street, S.W.1.

SIR STANLEY ANGWIN (chairman) and the directors of Cable and Wireless, Ltd., on March 27 entertained the Indian delegates to the Commonwealth Communications Council at luncheon at Electra House, Victoria Embankment.

MR. N. M. HILL has been elected president of the Birmingham Electric Club. Other officers are: Mr. W. Balmford, senior vice-president; Mr. J. G. Fraser, junior vice-president; Mr. D. E. Reynolds, secretary; Mr. W. J. Bird, treasurer; and Mr. A. H. Goude, social secretary.

MR. J. E. P. MILLS, of the Metropolitan-Vickers Electrical Co., Ltd., as chairman, and Mr. F. J. Wilkinson, of the same company, as vice-chairman, have been nominated by the Committee of the North-Western Section of the I.E.E. for election for the 1947-48 session.

MR. H. M. SPIERS, of H. M. Spiers and Co., Glasgow, has been nominated by the Committee of the I.E.E. Scottish Centre for election as chairman for the next session. Mr. John Henderson, deputy manager of the Ayrshire Electricity Board, has been nominated as vice-chairman.

MR. F. W. HALLIWELL has been elected president of the Gauge and Tool Makers' Association. Mr. H. H. Harley is the immediate past president, and Mr. H. S. Holden and Mr. A. L. Dennison have been elected chairman and vice-chairman, respectively.

MR. W. TAYLOR has been appointed technical assistant to the Cheltenham electricity department. He received his training with the Stalybridge, Hyde, Mossley and Dukinfield Transport and Electricity Board, and then held the positions of assistant to the sub-station engineer and

later as assistant to the distribution engineer of that undertaking. During the war he served with the Royal Engineers in France, and afterwards in the R.E.M.E. in Burma, rising to the rank of Major.

MR. GLANVILL BENN, chairman of Benn Brothers, Ltd. (chief proprietors of THE ELECTRICIAN), left by air for the United States on Tuesday. He has gone on a business trip, which will take him across the U.S.A. and into British Columbia, and expects to be away about six weeks.

MR. E. MILLS has been appointed deputy mains engineer with the Cheltenham electricity department. After being in business on his own account, he served with the Callender's Cable and Construction Co. in their contract department. Subsequently he became senior distribution assistant with the Ealing electricity department.

MR. P. B. JOHNSON, director of Hawthorn Leslie and Co., Ltd., and chairman of the Parsons and Marine Engineering Turbine Development Association, and Mr. G. H. Wright, joint general manager of the Neptune Engine Works of Swan, Hunter and Wigham, Richardson, Ltd., have been elected Fellows of the North-East Coast Institution of Engineers and Shipbuilders.

PROF. P. B. MOON, Professor of Physics, Birmingham, distinguished for his researches in atomic physics and for his contributions to the development of microwave radar and to the subject of atomic energy; and Mr. Derek Ainslie Jackson, lecturer in spectroscopy, Oxford, first to determine the magnetic and mechanical movements of various atomic nuclei, have been elected Fellows of the Royal Society.

MR. G. W. GODFREY becomes general sales manager of the radio division of E. K. Cole, Ltd., and assumes responsibility for the general conduct of sales and service, with Mr. E. W. Shepherd continuing as service manager. Mr. Bentley Jones succeeds Mr. G. W. Godfrey as radio sales manager, with Mr. R. S. Underwood as Southern area manager and Mr. R. A. Drimmond as Northern area manager.

MR. F. BRUNDRETT has been appointed Chief of the Royal Naval Scientific Service in succession to Sir Charles Wright, who is retiring on April 30. Mr. Brundrett has been in the scientific service at the Admiralty since 1919, and during the late war was largely responsible for the mobilisation of scientists and scientific workers in the Government service and the setting up of an inter-service organisation for valve development.

MR. C. F. PARTRIDGE, chairman of the I.E.E. South Midland Centre, reports that the response to his appeal for the H. Hooper Testimonial Fund has been most gratifying and the Committee have decided that the presentation to Mr. H. Hooper, hon. secretary, who has completed twenty-five years' service to the centre, will take place at the first meeting of the next session. The final date for closing the fund has been fixed for April 30. Contributions can be forwarded to Mr. W. Clarke, c/o Messrs. English Electric Co., Ltd., 75, New Street, Birmingham, 2, up to that date.

Obituary

MR. ALBERT EDGAR TANNER, Rusholme Gardens, Wilmslow Road, Manchester, on March 26, aged 77 years. Until his retirement about 18 months ago he was a director of W. T. Glover and Co., Ltd., Trafford Park, and other companies.

MR. CHARLES WOOD, on March 10, aged 74 years. He was chairman and joint managing director of Scupham and Wood, Ltd., manufacturers of electric wood blocks and accessories, and had almost completed 60 years with the firm.

MR. HENRY M. PEASE, whose death in New York on March 7, at the age of 71 years, was announced in our issue of March 14, was the first vice-chairman and a director of the International Standard Electric Corporation, the manufacturing associate of the International Telephone and Telegraph Corporation, of which he was also a vice-president and director, vice-president and director of the Federal Telephone and Radio Corporation, and a director of International Telecommunication Laboratories, Inc. He began his business career with the Western Electric Co. in Chicago, and in December, 1902, was transferred to the London branch of the company to supervise the installation of central battery telephone exchanges for the Post Office and the National Telephone Company. In 1919 he was appointed managing director of the Western Electric Co., Ltd., in England, and in 1922 he took an active part in the formation of the B.B.C., becoming one of its original directors. In 1925 Mr. Pease became managing director of Standard Telephones and Cables, Ltd., the new company formed as successor to Western Electric Co., Ltd. In 1927 he was made general manager of all the corporation's properties in Europe, Africa, Australasia and India. Mr. Pease returned to New York in 1933 and in 1941 became president of the I.S.E.

MR. H. M. PEASE

Lessons of the Crisis

Suggestions for Future Based on Power Station Experience

THE increase in demand for electricity and the severity of the winter which brought about emergency conditions gave the supply industry an experience which should be borne very carefully in mind when framing the rules for restricting supplies on any future occasion.

In drawing our attention to the matter, Mr. W. C. Parker, borough electrical engineer at Fulham, reviews below the difficulties and sometimes possible dangers which were experienced.

Turbine Vibration.—With large sets, *e.g.*, 60 MW and overoperating at reasonably high pressure and temperature conditions, due and proper respect has to be paid to their sensitive reaction to changes in load, and subsequent changes in temperature conditions. If this is not done, serious vibration is likely to occur and, in the crisis, did occur. Perhaps the greatest amount of wear and tear which takes place is when a steam turbine is subjected to frequent changes in its heat cycle and the more rapid these are, the worse the wear and tear. A turbine which has been steaming steadily at full load adjusts itself in its temperature gradients both axially and longitudinally, and under this condition runs free from vibration. It is obvious, therefore, that if a big and sudden change in load takes place on a set, this temperature balance is upset, distortion of the shaft takes place, and vibration occurs, which can become so severe as to make it necessary to shut the set down immediately to prevent serious damage. This applies either in taking off or putting on load.

It will be obvious that where regulations for restriction on supply are named to begin simultaneously throughout the country, there is imposed on the generating stations a very material and sudden change in load. As will be described later, this was to some extent artificially overcome in the crisis, but as a policy for the future there would not appear to be any real difficulty in staggering the time of cut-off over a period of half an hour, so making the change reasonably gradual. This would also avoid wide variations in frequency, and, as will be realised, there is further danger to turbines when running at speeds appreciably below their normal running speed. This is not generally applicable to all types of turbines, but applies in some cases.

Boilers.—The rate at which boilers can pick up or shed load is, of course, dependent to some considerable extent upon the type of fuel burning adopted, but in quite a large number of plants it is detrimental to the plant to have large and sudden variations. As will be appreciated from the notes on turbine vibration, it is essential with large turbine plant to maintain the steam temperature reasonably constant, as an out of balance of 25°F. is sufficient to cause vibration. The problem on boilers could be split up as follows:

Grates.—In the early days of the crisis, the abrupt change in load involved the sudden cutting off of combustion air supplies to boilers, leaving large fires still on the grates, which were a potential cause of damage, involving heavy carry-over of hot coal to the ash pits and the seizing up of stoker mechanisms. In the same way, in calling upon boilers to be forced up from very light loads to full load in short periods of time, brought about uneven firing conditions, blow-holes in the fuel bed, carry-over of hot coal to ash pits, and a very uneven burning of the coal, taking a considerable time to get the fires back to normal condition for the safe and efficient burning of the fuel.

Economisers.—Running the station on a reduced loading with all turbine plant operating, reduces the temperature of the feed water and greatly increases the danger of economiser fouling.

Air Preheaters.—The exit gas temperature of air pre-heaters is critical, in order to avoid dew point condensation. With frequent changes of temperature due to sudden load variations on the boiler plant, a constant correct adjustment of the exit gas temperature on the pre-heater is essential. Failure to do this causes corrosion and fouling on the pre-heaters and reduces the availability of the boiler very materially.

Make-up water.—Here the operation of the station in the way indicated increases the demand on make-up water. Where evaporator plant is an integral part of the turbine plant, little or no make-up water is being made whilst the station is running at low loads with each turbine operating at perhaps less than half load.

Efficiency.—The whole efficiency of the station suffers considerably. In taking steps to try and retrieve this as much as possible, extraordinary measures such as running on half a condenser are resorted to, but these in their turn, present risks

as being abnormal operation where errors of judgment are likely to cause serious trouble, with subsequent mechanical damage, and, contamination of feed water. To maintain constant steam temperatures, it is necessary to operate boilers at a minimum of half full load rating. With frequent heavy and rapid station load reduction, bunking of boilers is necessary with the attendant loss in efficiency due to changes in fuel-bed, with loss of heat, and increased make-up through drain valve operation.

Remedies.—Generating stations, after their first one or two experiences, adopted in the crisis, the technique of avoiding to a large extent, the possible troubles and dangers outlined above. They did, in fact, anticipate the cut and the restoration of supply. This was done in two ways. First, in anticipation of the cut, they allowed steam pressure to fall and in addition, as long as frequency was over, say, approximately 48.5 cycles per second, reduced load on the station by allowing the frequency to fall, so that when the actual load shedding time came, there was a margin of frequency and the amount of load which had been artificially dropped before the load was shed was regained; thus compensating and making the apparent load shed on the station less than it would otherwise have been, keeping the frequency rise on the load shed within reasonable bounds, say, 50.5 cycles per second. In the same way, on taking up load this was anticipated by picking up load before the appointed hour, by allowing the frequency to rise and so, in the same way, when the load was switched on at the appointed time, the frequency again kept within a reasonable figure of, say, 48.5 cycles per second. This artificial expedient was essential to adopt in order to safeguard the plant.

The lesson to be learnt from this experience, it is suggested, is that if such cuts in supply have to be made again, the powers-that-be should stagger cuts over a period of time so that the rise and fall of load on the generating stations is kept within some reasonable bounds, without having to adopt extraordinary measures. It is suggested that this could be done merely by adopting a limited number of zones in which instead of the shed being at, say, 9 a.m., it is at 8.45 a.m., and in another limited number of zones, 9.15 a.m. In the same way, when these zones come back again, the first zone returns at 11.45 a.m., the second at 12.15 p.m., so that the actual period of cut is the same in all zones. This period of half an hour would make the generating stations' problem considerably easier. Incidentally, it would also make the task on the distribution side simpler, in that there would not be the sudden surges in the change of direction of load which occurred on the last ocasion. On a Sunday, this staggering is particularly advisable as the peak in the winter months, due to cooking and heating loads, is most sharp between the hours of 11 a.m. and 2 p.m.; if it were possible to avoid a shed on Sunday at all, this would be very advisable.

It would also be desirable on any next occasion to be more specific in detailing those people who could and who could not have supplies during restricted hours, but better still, if at all possible, any restrictions should be made during the summer months when coal stocks could be built up so as to avoid restrictions during the winter.

Expenditure Consents

THE Electricity Commissioners have reviewed procedure for dealing with applications for consent to the use of surplus revenue moneys for capital expenditure. The general consent dated December 19, 1927, was withdrawn in 1939, and since that date it has been necessary for a specific application for consent to be submitted in every case.

The Commissioners recently decided to give a revised general consent, subject to certain conditions, to cover particular items of capital expenditure, subject to the following limitations: (1) The consent is not operative in respect of expenditure on (a) generating plant or any other works chargeable to generation capital account; (b) land; (c) buildings, including showrooms and sub-stations, but not including sub-station kiosks; (d) high voltage mains and ancillary switchgear, transformers and equipment. Application must therefore be made for a specific consent before incurring expenditure thereon from net surplus. (2) The consent is operative in respect of expenditure incurred during the year in which the net surplus has been secured or during the next following year but not further or otherwise. (3) In carrying out any works regard must be paid to the Commissioners' circular letter (Ref. A.950/761/4) dated September 21, 1946, and the works must be suitable, without additional expense, for use ultimately on the approved standard system of supply described in such circular. (4) The consent is without prejudice to the consideration of any application which may be necessary for the utilisation of labour and materials required for the carrying out of the works. (5) The consent does not release the local authority from the duty of making any necessary application under Defence Regulation 56A.

Answers to Technical Questions

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

Why is the interrupting of the charging current of a transmission line comparable in difficulty with that of interrupting a heavy short-circuit current on the line?

A transmission line has capacitance to earth so that one phase of it can be represented as in Fig. 1, C_1 being the capacitance on the supply side of the

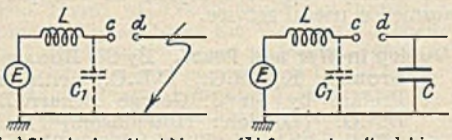


Fig. 1—Switching of transmission line

circuit breaker and C the capacitance on the line side. In Fig 1a is shown the condition when the line is short-circuited, the current to be interrupted in this case being given by $I = E/\omega L$; it may be well over 1 000 A and will be lagging by approximately 90° behind the voltage E. If the line is open-circuited and not carrying any load, as in Fig. 1b, the only current will be that in capacitance C, i.e. the charging current leading the voltage by 90°. This will be about 0.3 A per mile for a 132 kV line and about 0.5 A per mile for a 220 kV line.

The conditions when interrupting a short-circuited current are shown in Fig. 2. Suppose the circuit-breaker contacts have parted and the current has fallen to zero at the point A. Previous to this the capacitance C_1 was short-circuited, but as

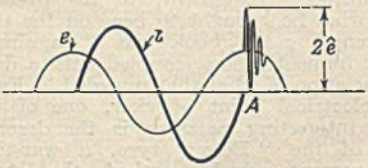


Fig. 2—Interrupting inductive current

soon as the circuit is broken the voltage e appears across it. At moment A, this voltage is $\hat{e}$ and the resulting charging current of C_1 is oscillatory (depending on L and C_1) so that the voltage across C_1, and therefore across the switch contacts c d, is twice the initially impressed voltage, as shown. This voltage might well break down the gap between the circuit-breaker contacts and cause the arc to restrike—if so the process will be repeated at the next current zero and so on until the contact separation has become long enough to prevent a breakdown and the circuit is finally interrupted.

The conditions when interrupting a capacitance current are shown in Fig. 3. If the contacts part and the current is interrupted at instant A the potential of point c will follow the e.m.f. wave e and that of point d, since the capacitance C will retain its charge for some moments, and will remain constant as shown by the horizontal dotted line. Immediately after the current has been interrupted at moment A, therefore, there will be no voltage across the contacts and conse-

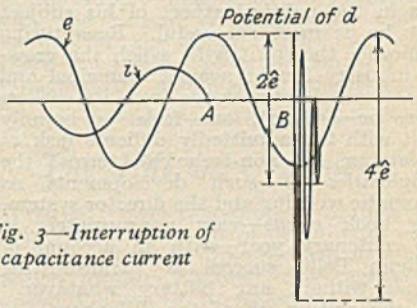


Fig. 3—Interruption of capacitance current

quently no tendency for the arc to restrike. It would appear at first sight that interrupting a capacitance current is very easy—half a cycle later, however, the potential of c has reversed, while that of d will not have altered, so that there will now be, at moment B, a voltage of 2 $\hat{e}$ across the contacts, just as in the inductive case. If this causes the gap between the contacts to break down, an oscillatory current will flow in order to reverse the charge on C and the voltage across it will be twice the initially impressed voltage as shown. One of two things may now happen—the oscillatory current may die down as in the inductive case, leaving the normal frequency charging current flowing again and the whole process will then be repeated at the next current zero; alternatively the current may be interrupted at the first current zero of the *oscillatory* current; this will be almost immediately

after instant B and the capacitance C will be charged to a negative potential of 3 ê and will retain this charge, as shown by the dotted line at the bottom of the diagram.

When the voltage e next reaches its positive maximum there will be a voltage of 4 ê, as shown, across the contacts and this will almost inevitably cause them to break down again. Although the charging current is small, there may, therefore, be some difficulty in obtaining a final interruption. It can also be seen that considerable voltage surges may accompany the interrupting process.

E. O. T.

Book Reviews

The Story of the Telephone.—By J. H. Robertson. (London: Pitman.) Pp. 299. Price 10s. 6d. net.

In setting out to write the complete story of the telephone industry, Mr. Robertson was faced with a very considerable task. Like the other public utilities—electricity supply and the railways—the telephone has a dual history, part-political and part-technical, and it would be beyond probability that any author, seeking to present both sides of the story, would achieve an ideal synthesis. The author describes himself as a "political journalist," and it must be admitted that it is in the political aspect of his subject that he is most successful. Recapturing admirably the spirit with which the growing industry fought against municipal and governmental interference from its earliest days, he has not, one feels, so happily dealt with the admittedly difficult task of explaining, in non-technical terms, the complexities of such developments as automatic working and the director system. The book opens—very appropriately in this centenary year—with an account of Graham Bell's success in "transmitting signals without any battery whatever," and the setting up of the Telephone Co. in London. The battles and eventual amalgamation with the Edison Co. are then described, and the author unfolds, most effectively, the story of steady technical development, hampered always by wayleave difficulties and the threat of eventual expropriation by the Post Office, which culminated in the nationalisation of 1912. The contrast between the failure of municipalities, with the exception of Hull, to operate efficient telephone systems, and their success with electricity undertakings is interesting. The account moves on to the introduction of automatic working, the efforts of the Telephone Development Association to loosen the Treasury grip on the G.P.O., and the period of expansion following the Bridgeman Report, in 1932. The final chapter is devoted to the achievements of the industry in the recent war. Mr. Robertson's book is exceptionally readable, and in documenting so fully the progress of the industry while it is still so young that both ends of its history can be grasped, he has performed a useful service.

Dunlop in War and Peace. By Sir Ronald Storrs, K.C.M.G., C.B.E., with a Preface by Sir J. George Beharrell, D.S.O. (London: Hutchinson.) Pp. 147, with 51 illustrations. Price 8s. 6d. net.

There must be many who always took rubber, like so many other vital commodities, for granted until the recent war and the loss of nearly all our supplies of raw latex caused one of the most acute and dangerous shortages. The Dunlop company has already screened a lavish documentary film showing the multiplicity of war activities in their factories, and has now commissioned Sir Ronald Storrs to tell the story of the firm from its earliest days. Sir Ronald, who is better known as an authority on the Middle East than as the purveyor on "inside information" on major industries, has performed the unfamiliar task well. His account is general, where that of an official of the firm might have specialised, and, as such, is not only understandable by those unacquainted with rubber technology, but is extremely readable and absorbing as well. Many of the more spectacular developments of the company are explained with a wealth of technical detail which must surely confirm the author's statement, in his preface, that what he brought to bear on the task of compiling the book was "an almost nosey inquisitiveness, coupled with a deep appreciation of what that revealed." From the electrical point of view, one of the most interesting passages is the description of the "Ecta" tyre, a war-time development which earthed the static charge collected on the surface of an aircraft during flight as soon as it touched down, and thus materially reduced fire-risks during refuelling. In addition to the most informative text, the book contains a generous quota of photographs, some of which show rubber products released from the secret list for the first time.

In Parliament

Electrical Questions Asked and Answered

Generators for U.S.S.R.—Two questions, one by Sir Waldron Smithers and the other by Mr. F. Noel-Baker, were asked about exports of generating equipment to the U.S.S.R. From the replies, it appeared that from the middle of 1945 until December 1, 1946, the heavy electrical plant industry in this country delivered 261 MW of plant to Russia. This represented the balance of war-time orders. The Board of Trade could not agree to cancel shipments as Sir Waldron Smithers had suggested. There were four generators, ordered and commenced in 1942, two of 12 MW and two of 25 MW capacity, approaching completion, which should be ready for shipment to the U.S.S.R. during the next few months.

Consumers' Guarantee.—Mr. D. Marshall asked the Minister of Fuel if he was aware that consumers of electricity at times gave guarantees to use a minimum specified amount of electricity a year, and whether he would make regulations to safeguard the consumer with regard to these guarantees if the enforced cuts prevented the consumption of this amount. Mr. Shinwell, replying, said that the purpose of these guarantees was to enable the undertaking to recover from the consumer a proportion of the fixed costs falling on the undertaking. The present curtailment of supplies could not result in any substantial reduction of these costs and he could not agree that undertakings should in present conditions be required to reduce their charges.

Mersey Radar Installation.—Wing-Commander Millington asked the Minister of Transport why a contract for radar equipment to control shipping in the Mersey harbour had been placed by the Mersey Docks and Harbour Board with the Sperry Gyroscope Co., Ltd., as this company had no radar experience and no radar manufacturing facilities in this country, and in view of the fact that competitive tenders were submitted by British firms of unparalleled experience who had been producing this equipment during the war. Mr. Barnes replied that the placing of this contract was entirely a matter for the Mersey Docks and Harbour Board, but he had made inquiries of them and had been informed that they invited tenders for equipment which would meet the known technical requirements of such a device and the operational requirements of the port. Two tenders were submitted to the Board and after full consideration they accepted the tender of the company referred to. This company had established an organisation for the manufacture of radar equipment in this country.

Underground Mains.—Mr. W. Roberts asked the Minister of Fuel and Power whether, when a planning authority directed that electricity mains must be laid underground in order to preserve the amenities of a country district, he would take powers to relieve consumers concerned of the additional cost by spreading this over a wider area. Replying, Mr. Gaitskell said that though planning authorities might make representations, they were not empowered to direct that mains were to be laid underground. Under the electricity supply acts the responsibility for giving consent to the erection of overhead lines devolved on the Minister. The incidence of the cost of supplying electricity to consumers fell to be settled by the supply undertaker in negotiation with the consumers. He could see no reasons for special provisions in cases where the method of giving supplies was influenced by planning considerations.

The Bill in Committee

SHARP Opposition protests against the proposed treatment of directors of companies to be taken over resulted in a concession by Mr. Shinwell, who agreed to amend Clause 13 to make it clear that directors "whose functions were substantially those of an employee" would be transferred. Part-time directors who did not do a "job of work" would not, however, be compensated.

The Committee also agreed to an amendment moved by the Minister that, when fees were incurred by directors prior to the vesting date, the liability would be discharged by the Area Board.

When Mr. Walter Elliot urged that companies should be allowed to wind up their own affairs, Mr. Shinwell declared that, after the vesting day, the directors would have no function other than to look after the interest of the shareholders and that they might for many reasons be "troublesome."

After repeated Opposition protests against the obscure language of Clause 13, Mr. Shinwell agreed to see whether they could make it less obscure, and the Committee then passed the clause by 21-12.

Contracts Open

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

Plymouth, April 12.—Supply of l.t. distribution boards for year ending May 31, 1948. Particulars from City Electrical Engineer, Armada Street, Plymouth.

Bolton, April 12.—Supply for twelve months of three-phase, 50 cycles, 6 600/422 V, naturally cooled transformers, of various sizes ranging from 100 kVA to 1 500 kVA, with extra prices for automatic " on load " tap-change equipment on certain of the larger sizes. Specification from Borough Electrical Engineer, Back o' th' Bank, Bolton; deposit, £1 1s.

Erith, April 14.—Supply and delivery, during 12 months ending March 31, 1948, of various materials and apparatus, including distribution equipment, domestic appliances, switchgear and instruments. Particulars from Borough Electrical Engineer and Manager, Electricity House, Erith, Kent.

Manchester, April 14.—Extensions to CO_2 fire-extinguishing equipment and annual requirements of : (a) cable supplies; (b) service cut-outs; (c) service units for domestic consumers. Particulars from Chief Engineer and Manager, Town Hall, Manchester, 2.

Wallasey, April 14.—Supply and delivery of mains cables. Specification from Borough Electrical Engineer, Wallasey Road, Wallasey.

Heston and Isleworth, April 14.—Supply, delivery and erection of one 500 kW rectifier equipment, comprising transformer, voltage regulating equipment, rectifier cubicles and d.c. control panel, for 11 kV, three-phase input, 480/240 V d.c. output. Particulars from Borough Electrical Engineer and Manager, 11, Staines Road, Hounslow.

Heywood, April 21.—Tenders for : (a) Supply and delivery of one 5 000 kVA, three-phase, 50 cycles, oil-immersed naturally cooled transformer for outdoor installation, ratio 11/6.6 kV; (b) supply and laying of 5 000 yds. 0.3 sq. in. 11 kV cable. Specifications from Borough Electrical Engineer, Electricity Department, Egerton Street, Heywood.

Newark, April 21.—Supply and delivery of: (a) 11 kV ring main unit; (b) l.t. switchboard. Specifications from Borough Electrical Engineer, Municipal Buildings, Baldertongate, Newark.

Bradford, April 22.—(a) Supply and delivery of three-phase static transformers; (b) supply, delivery and erection of two 350 kW glass-bulb type mercury arc rectifiers, etc., for Barkerend Road sub-station. Particulars from Electrical Engineer and Manager, Sunbridge Road, Bradford.

Bradford, April 22.—Supply, delivery and erection of two 350 kW glass bulb type mercury arc rectifiers. Particulars from Electrical Engineer and Manager, Sunbridge Road, Bradford.

Edinburgh, April 25.—Supply of : (a) telephone type control and indication equipment; (b) telephone type remote supervisory control and indication equipment; both for Portobello power station. Specification from Consulting Engineers, Messrs. Kennedy and Donkin, 12, Caxton Street, London, S.W.1.

Rhondda, April 26.—Supply and delivery of cables, wire, joint-boxes, fuse-boxes, cookers, wash-boilers and meters, for year ending March 31, 1948. Specification from Electrical Engineer, Electricity Works, Porth, Rhondda.

Middlesbrough, April 26.—Supply and delivery of : (a) one 11 kV, three-phase oil-immersed and compound filled metal-clad ring main tee-off unit, comprising two oil-break isolators and one circuit-breaker; (b) one 250 kVA, 11 000/440/250 V three-phase oil-cooled indoor transformer; (c) one meter testing set, single-phase, 0/500 V, 0/100 A, unity/zero power factor, complete with voltmeter, ammeter and power-factor meter and suitable for use on 240 V, single-phase supply or a three-phase four-wire 415/240 V, 50 cycles supply. Specification for items (a) and (b) from Borough Electrical Engineer, Corporation Electricity Department, Snowdon Road, Middlesbrough, deposit, £1 1s. each.

Cleethorpes, April 30.—Supply and delivery of l.t. cables. Specification from Electrical Engineer and Manager, Grimsby Road, Cleethorpes.

Madras, May 1.—Supply, delivery, erection and commissioning of transformers having the following ratings, for the Basin Bridge " B " power station, Madras : Two of 7 500 kVA, 11/5 kV; two of 1 750 kVA, 11 000/415 V; one of 1 250 kVA, 11 000/415 V and two of 200 kVA, 415/415 V. Copies of form of tender and specification from Merz and McLennan, Milburn, Esher, Surrey; deposit, £5 5s.

Salford, May 3.—Supply of : (a) 5 00 MVA, 33 kV, metalclad switchgear; (b) four 15 000 kVA, 33/6.6 kV transformers; (c) 4 300 yds. 0.3 sq. in., 33 kV, three-core cable; (d) four neutral earthing resistors; (e) 250 MVA, 6.6 kV, metalclad switchgear. Specifications from City Electrical Engineer, Electricity Department, Frederick Road, Salford, 6.

Electricity Supply

Leicester.—Application is to be made for consent to a loan of £100 000 for meters and £100 000 for cookers, wash-boilers, and water heaters.

Darlington.—Alterations are to be made to No. 1 cooling tower at the electricity works by the Town Council to reduce precipitation. The tower will be raised to the same height as Nos. 2 and 3 towers and the irrigation system will be altered. The work will cost £13 400.

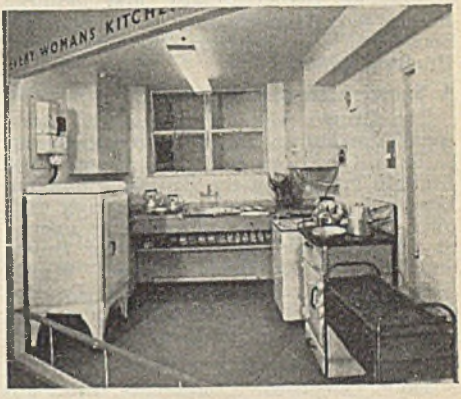
Tynemouth.—The annual report of the Electrical Engineer for the 12 months ended March, 1946, shows a net profit of £8 402, an increase of £1 220. The report states that during the past 11 years the undertaking's output had almost equalled that of the previous 31 years. The undertaking had given £48 075 to the general rates.

Hazel Grove and Bramhall.—A 4s. in the £ rebate on electricity charges for the quarter ending March 31 has been agreed by the U.D.C. The Council have decided to dissipate a money reserve which the electricity department had built up in recent months. The Chairman (Coun. R. Dean) said: "The Electricity Committee has made its decision in view of the fact that the undertaking is to be nationalised."

Westminster.—The Highways Committee of the City Council, which a year ago provided sodium discharge flood-lighting units at Grosvenor Gardens for the assistance of traffic during periods of fog, has now received from the Commissioner of Police favourable reports on the usefulness of this lighting and a request for its extension in the vicinity of Victoria Station. The Committee is therefore to extend it at a cost of £250, the maintenance cost being £13 per annum.

Southwark.—Anticipating a deficit of £5 823 for the year, the Electricity Committee recommends increases to consumers on prepayment meters from 5½d. to 6½d. per unit and to consumers with prepayment meters on the wiring installation scheme from 6d. to 7½d. per unit. The reduction for prompt payment should, it is suggested, fall from 5 per cent. to 2½ per cent. As a result of installing 200 time switches on side street lamps, at a cost of £915, the Committee expects to save £800 per annum currently spent on hand switching.

N. Wales.—Speaking of the North Wales Power Co.'s hydro-electric plan, estimated to cost £15 000 000, which was submitted to the Government and was under discussion by the Central Electricity Board,



The all-electric kitchen shown by the E.D.A. at the "Daily Herald" Modern Homes Exhibition, London. Television viewers, on Tuesday evening, saw a broadcast of the kitchen and of other electrical appliances at the exhibition

an official of the company stated: "We have not been told we must not go on with it, but it needs a Parliamentary Bill and, of course, that means delay. Ground has been surveyed, but no actual boring has been undertaken." At present three out of every four units used in North Wales come from the grid, and it is claimed that the hydro-electricity plan would supply all the area's requirements and create a surplus for export. The plan would involve the construction of six major power stations, with capacity of 300 000 kW and an output of 600 000 000 units. In certain cases, existing hydro-electric resources would be used, but in others dams and pipelines would have to be constructed.

Tyneside.—An unofficial ban on overtime working by certain employees at Dunston-on-Tyne power station has been called off. The men concerned were labourers and semi-skilled men who were dissatisfied with the national agreement governing wages in the electrical industry. The ban lasted a month and during that time thirty volunteer clerical and technical workers and officials at the power station worked each night unloading coal.

Industrial Information

Sussex Industries Exhibition

The second Sussex Industries' Exhibition, promoted by the Sussex Engineering and Manufacturers' Association, is to be held at the Dome and Corn Exchange, Brighton, from September 17 to 27, inclusive. The exhibition director is Lieut.-Colonel C. Hedley Briggs, and inquiries should be addressed to him at 3, Marlborough Place, Brighton, 1. Telephone: Brighton 6189.

A Scottish Branch Office

The British Aluminium Co., Ltd., and Alexander Brown and Co., announce that as from July 1, by mutual agreement, the Scottish business of the British Aluminium Company will be transacted through their own Scottish branch office to be opened at the same address as Alexander Brown and Co., 113, West Regent Street, Glasgow, C.2 (Telephone No.: Douglas 6528). Mr. Peter J. Ferguson has been appointed manager of the new branch.

Price and Discount Revisions

Taylor Electrical Instruments, Ltd., announces that they have reduced the list price of their model 85A/P universal meter, from £21 to £19 19s.; model 120A Taylor Junior, from £8 10s. to £7 10.; and model 110B a.c. measuring bridge, from £14 14s. to £12 12s. The trade discounts on most of their other instruments have also been increased, and a complete list is obtainable from the company at 419/424, Montrose Avenue, Slough, Bucks.

Electric Vehicles for Airports

Recently, Mr. George S. Lindgren, M.P., Parliamentary Secretary to the Ministry of Civil Aviation, Air Marshal Sir John d'Albiac, Commandant of London Airport, Mr. R. C. Pugh, airport manager, with representatives of the Air Ministry and the principal airlines, attended a demonstration at Heathrow by Crompton Parkinson, Ltd., of the advantages of battery electric vehicles for airport transport.

A battery electric vehicle which took part in a demonstration at London Airport

Three vehicles, two one-ton and one 10 cwt. of the standard commercial types, not specifically designed for airfield transport, were used. At the reception, Mr. P. Rochs, general sales manager of the vehicle division of the company, pointed out what he considered were the features that recommended the electric vehicle for airfield service. The demonstration that followed showed the visitors the high degree of manoeuvrability and the simplicity of driving. Despite having only his right arm free, his left being in a sling due to a dislocated shoulder, Mr. Lindgren drove a vehicle, and his example was followed by other guests.

Lighting Education for the Forces

Since the end of the war several short courses planned to teach the principles of good lighting to men serving in the Forces, who, on return to civilian life, intend to take up, or resume, occupations connected with lighting practice, or the sale of lighting fittings and material, have been held at the E.L.M.A. Lighting Service Bureau, 2, Savoy Hill, London. The one-day course on Friday, March 21, was attended by Colonel F. P. Roe, Command Education Officer for the London district, and a number of other officers, as well as the usual personnel, it having been felt by Captain A. J. Ketley, No. 1 Group Education Officer, through whose co-operation the Army courses at the bureau have been

The Command Education Officer and other officers at a short course for the Forces at the E.L.M.A. Lighting Service Bureau, 2, Savoy Hill, London

arranged, that if more were known of this method of trade education by experts on the spot, it might be adopted by other industries. In the accompanying illustration are seen, in the front row (left to right) :—

Captain A. J. Ketley; Captain Jonas, R.A.E.C.; Mr. E. B. Sawyer, manager of the Lighting Service Bureau; Col. E. P. Roe, Command Education Officer; Col. H. G. Herbert, C.O., No. 6 Central Workshops; Col. Arnold Edwards, Commandant, Command Ordnance Depôt, Greenford; Col. H. R. Primmer, Commandant, Command Ordnance Depôt, Feltham; Col. W. A. Kenny, Deputy Commandant, Command Ordnance Depôt, Greenford.

Intensive Export Drive

With the resumption of power supplies, at the Perivale works of Hoover, Ltd., the three thousand workers were told by the chairman, Mr. C. B. Colston, of the campaign to intensify the export drive in which it is planned to make up the three weeks' loss in production, over and above an ever increasing output, by the end of June. The entire output of the four weeks in March will go to Australia, New Zealand, Norway, and South Africa, respectively, and wall posters inform the workers what the country is receiving in food and raw materials in exchange for their efforts.

Summer School and Conference

The University of Bristol, in co-operation with the Institute of Physics, is arranging a summer school in theoretical physics, with particular application to cohesive forces in metals and mechanical properties of solids to take place from July 2 to 5. Lectures will be given by Professor Mott, Dr. Fröhlich, and other members of the staff of the laboratory. The course will be followed by a conference from July 7 to 9 on the mechanical properties of solids. The summer school is intended mainly for members of staffs of Government and industrial research laboratories who wish to familiarise themselves with the theoretical aspects of subjects on which they have carried out experimental investigations. Particulars can be obtained either from the Secretary of the Institute of Physics, 47, Belgrave Square, London, S.W.1, or from the Director of the Department of Adult Education, the University, Bristol.

Orders for 1 500 Diesel-Electric Sets

The Ministry of Supply have sanctioned the allocation of materials to Associated British Oil Engines, Ltd., and the Brush Electrical Engineering Co., Ltd., for the production of 1 500 Diesel electrical generating sets totalling 100 000 kVA. The engines are being built at the Airedale foundry works of J. and H. McLaren's, Leeds, and the generators and switchgear at the Loughborough works of the Brush Electrical Engineering Co., Ltd. Each set comprises an "MR4" four-cylinder, totally enclosed, high speed, 4-stroke cycle, airless injection engine, capable of developing 88 H.P. at 1 000 r.p.m., direct coupled to a 55 kW, 400/230 V, 50-cycle, three-phase, .8 p.f., 4-wire alternator complete with direct-coupled exciter and shunt field regulator. To ensure that they are sold to firms having the greatest need, the Ministry reserve the right to approve or reject applications received by Associated British Oil Engines, Ltd., to purchase these sets.

Sales Management Conference

The British Electrical Development Association has published a full report, running into 65 pages, of the proceedings at the ninth sales management conference held by the association at Cowdray Hall, London, from May 1 to 3, last year.

Emergency Lighting Systems

"Keepalite" automatic emergency lighting systems have been ordered from the Chloride Electrical Storage Co., Ltd., of Clifton Junction, Manchester, for the Palladium Cinema, Pwllheli; South Parade Pier concert and dance hall, Southsea; His Majesty's Theatre, Aberdeen; Adelphi Cinema, Dun Laoghaire; and the Regal Cinema, Craven Arms.

Rateable Value and E.P.T.

The question of whether, in estimating the rateable value of the undertaking of the South Somerset and District Electricity Co., Ltd., as a whole, any and, if so, what deductions should be made in respect of excess profit tax payable by the company in respect of the undertaking, was raised in a case before the Court of Appeal on March 28. The Somerset Quarter Sessions had held that regard should be had to the whole sums so paid, and dismissed the appeal of the Yeovil Rural District Council, as the rating authority, from the determination of the Yeovil Area Assessment Committee on the Council's proposals for the amendment of the valuation list in respect of the premises. The Council appealed to the Divisional Court, who upheld the decision of the Quarter Sessions. The Court of Appeal, by a majority, now allowed the appeal of the Yeovil R.D.C.

Benn Books

The Spring list of new Benn books and reprints, issued by Ernest Benn, Ltd., Bouverie House, 154, Fleet Street, London, while still restricted by the paper shortage, provides a choice for most tastes and the prospect of more to come. As the outcome of a visit by the chairman of the

company to the U.S.A. to renew old acquaintanceships and make fresh contacts, " The American Library," designed to give a picture of life and letters on the other side of the Atlantic, has been started. The Blue Guides, suspended during the war, are being revived, and " The Bouverie Library," which will contain outstanding books from the Benn and Fisher Unwin lists, is announced.

Ekco-Ensign Electric Ltd.

E. K. Cole, Ltd., announce that as from April 1, the whole of the activities of their lighting division, including Ensign Lamps, Ltd., are merged into one company to be known as Ekco-Ensign Electric Ltd., a wholly-owned subsidiary of E. K. Cole, Ltd. The directors are Messrs. E. K. Cole, chairman; D. W. Pritchard, vice-chairman; J. E. Clark, and J. F. Young, joint managing directors; W. V. Green; and J. Corbishley (secretary).

Illumination Design Course

The 48th illumination design course, arranged by the E.L.M.A. Lighting Service Bureau, which was postponed owing to the electricity cuts, will commence at 2, Savoy Hill, London, on May 6, and early application should be made for reservations. The programme is as follows:—

Tuesday, May 6: 9.45 a.m., registration; 10 a.m., official opening by Mr. A. Mansell, chairman, L.S.B. Committee; 10.15 a.m., " Lighting Terms, Definitions and Units," W. Robinson; 11 a.m., " The Relation Between Light and Vision," E. B. Sawyer; 2 p.m., " The Economics of Lighting," J. W. Howell; 3.30 p.m., " The Theory and Characteristics of Electric Lamps," K. R. Gibbins. Wednesday, May 7: 9.30 a.m., " Fluorescent Lamps," J. N. Bowtell; 10.45 a.m., " Fluorescent Lamp Accessories and Fittings," J. E. Pearse; 2 p.m., " Illumination Design for Interiors (1)," A. D. S. Atkinson; 3.30 p.m., " Illumination Design for Interiors (2)," J. F. Roper. Thursday, May 8: 9.30 a.m., " The Application of Fluorescent Lamps," A. D. S. Atkinson; 10.45 a.m., " Lighting in Industry," W. Robinson; 2 p.m., " Light and Colour," I. D. Spark; 3.30 p.m., " Home Lighting," Miss D. Wardlaw. Friday, May 9: 9.30 a.m., " Shop and Showroom Lighting," F. Jamieson; 10.45 a.m., " School and Office Lighting," C. J. King; 2 p.m., " Lighting for Effect," T. O. Freeth; 3.30 p.m., " E.L.M.A. and the Lighting Service Bureau," W. J. Jones.

E.A.W. Activities

The Manchester and Salford District branch of the E.A.W. celebrated its 21st birthday on March 27. The toast of the branch was given by the Dowager Lady Swaythling, the association's president, and responded to by Mrs. R. A. S. Thwaites, the branch chairman. Miss Caroline Haslett, director, proposed the toast of " The Cities of Manchester and Salford," to which acknowledgments were made by the Lord Mayor of Manchester, Ald. T. H. Adams, and the Mayor of Salford, Coun. Thomas Clarke. " Future Success " was proposed by Lt.-Commander R. J. Cook, E.D.A., and replied to by Mr. W. T. Stephenson, chief inspector of schools, Manchester Education Committee. The toast of the guests was given by Mr. R. A. S. Thwaites, city electrical engineer, and his predecessor, Mr. H. C. Lamb, responded. A special electrical exhibition at the Manchester showrooms was opened by Miss Haslett in the morning. At a meeting in the Town Hall in the afternoon, at which the Lord Mayor and Lady Mayoress were present, a 21st birthday cake was cut. Miss Haslett also attended E.A.W. branch meetings at Stockton and Harrogate, at each of which the respective Mayor was present. The Harrogate meeting was the Yorkshire and Mid-East area conference, with representation from branches all over the county.

Conference on Pulverised Fuel

A conference on Pulverised Fuel under the auspices of the Institute of Fuel will be held at Harrogate from June 3 to 6. The papers to be read will include: The history of the use of pulverised fuel at Detroit Power Stations, by P. W. Thompson (The Detroit Edison Co.); air preheaters for pulverised fuel, by C. E. H. Eckersley (James Howden and Co., Ltd.); selection, operation and maintenance of fans for pulverised-fuel boilers, by W. H. Johnson (James Howden and Co., Ltd.); design of superheaters for pulverised-fuel-fired steam generators, by L. C. Southcott (Superheater Co., Ltd.); large pulverised-fuel-fired steam generators, by E. McCabe (South Wales E.P. Co.); large pulverised-fuel-fired steam generators, by F. W. Lawton (Birmingham electric supply department); the design and operation of large pulverised-fuel steam generators working on a two-shift cycle and burning Midland coal of high-volatile ash and moisture contents, by J. R. Wilkins (Ewbank and Partners, Ltd.); large pulverised-fuel-fired steam generators consuming anthracite duff from 3 per cent. to 8 per cent. volatile matter, by E. Hywel Jones and B. S. Gylee (Swansea electricity department); pioneering and achievement in the use of pulverised fuel, by W. N. C. Clinch (Northmet P. Co.); electrostatic precipitators in central power stations, by H. W. Wagner (Sturtevant Engineering Co., Ltd.); the handling, wetting and disposal of flue dust, by P. B. Silk (Babcock and Wilcox, Ltd.); the disposal of fly ash, by H. D. Watson (Mitchell Engineering, Ltd.); some problems of modern boiler control with special reference to pulverised-fuel-fired boilers, by W. Szwander, Dipl. Ing. (Warsaw) (Metropolitan-Vickers Electrical Co., Ltd.).

Company News

COMPANHIA DE ELECTRICIDAD DE LA PROVINCIA DE BUENOS AIRES.—Net earnings for 1945 £275 561, less £11 527 int., commission and exchange; after £163 681 for amort. and provdg. for dirs.' fees and exes., there remains £92 435, allocated as follows: To res. £6 588, pre-pref. div. £43 847, ptg. pref div. £42 000.

LANCASHIRE DYNAMO AND CRYPTO, LTD.—Net prft. for 1946 stated as £92 500 approx. (£88 317). The 1946 fig. arrived at after charging full inc. tax on prfts., and divs. will be approp. net instead of gross, as in prev. yrs. Prft. fig. for 1945 adjusted to same basis. Fin. div. on ord. 10% (same) plus bonus 7½% (same), mkg. 22½% (same). In accordance with terms of issue, div. at ⅔ of these rates on the new shs.

ENGLISH ELECTRIC CO., LTD.—Trading prft. after taxn. 1946 £567 363 (£570 556), plus div. receivable from D. Napier and Son £22 523 (£20 475) and net div. receivable from Marconi's Wireless Telegr. Co., less int. pd. to Cable and Wireless (Holding) £59 990, mkg. £649 876 (£591 031). To deb. int. £42 101 (£43 215), dirs.' and trustees' fees £5 000 (£5 148), depreen. £110 000 (£100 000), lvg. net prft. £492 775 (£442 668). To 6½% pref. div. £73 830 (same), 3¾% pref. (period to Sept. 30) £9 375 (nil), ord. div. (already announced) 10% (same) £306 690 (£235 915), res. £100 000 (same); fwd. £123 673 (£120 793). Resolutions were submitted at mtg. to amend co.'s articles. Report states co. has received provisional post-war E.P.T. refund £569 894. This has been spent on capital assets. During yr. co. acquired over 99.3% of capital of Marconi's Wireless Telegraph Co. Capital was increased. Balance sheets of D. Napier and Son and Marconi's Wireless Telegraph show prfts. of £102 414 and £168 448.

INTERNATIONAL COMBUSTION, LTD.—In his statement, circulated with the accounts, the Managing Director (Sir George Usher) said that they had a vast number of orders on hand, many of which were for export. Among the most interesting upon which they were now engaged was one for the largest high pressure boiler plant ever installed in the British Empire. He had spent three months in the United States at the beginning of last year and made an extensive tour of all the big power stations which were of interest to them there and had satisfied himself that the country occupied a favourable position in the production of modern and highly efficient steam generating plant. They had developed their research department and engineering laboratories with a firm determination to keep ahead of all developments which concerned the economical production of power. In his last speech, Sir George said, he had referred to their interest in Aberdare Cables, Ltd. That company was making good progress, and had since formed a subsidiary company, South Wales Switchgear, Ltd. Both were now growing at a highly gratifying rate and were proving a real contribution to the vexed problem of absorbing the surplus labour in South Wales. In conjunction with Powell Duffryn, Ltd., International Combustion had taken an interest in the Rhymney Engineering Company, Ltd., of Monmouthshire. This company was manufacturing conveyor equipment and mining machinery of the most modern type and already had a full order book.

Coming Events

Tuesday, April 8

BRITISH KINEMATOGRAPH SOCIETY.—Newcastle-on-Tyne. "Heating and Ventilating of Kinemas," L. W. J. Henton.

Wednesday, April 9

I.E.E., SCOTTISH CENTRE. — Edinburgh. At the Heriot-Watt College. Annual meeting and paper. "Comparison Between Gas and Electricity on the Basis of Coal Economy," P. Schiller. *6 p.m.*

INSTITUTE OF WELDING, N. LONDON BRANCH.—Polytechnic, Regent Street, W.1. Annual general meeting and film. *7.30 p.m.*

EDINBURGH ELECTRICAL SOCIETY.—Electricity Department Showroom. Annual General Meeting, followed by film. *7.30 p.m.*

I.E.E., LONDON STUDENTS' SECTION. — "British and American Light Railway Motors and Control Equipments," J. R. Hanchett.

Thursday, April 10

BRITISH INSTITUTE OF RADIO ENGINEERS, Scottish Section.—Glasgow. At the Institution of Engineers and Shipbuilders in Scotland. Discussion on Television Development in Scotland, to be opened by A. Bogie. *6.45 p.m.*

I.E.E.—London. "Commercial Development of Electricity as a Consumer Service," by C. T. Melling. *5.30 p.m.*

I.E.E., N. WESTERN RADIO GROUP.—Manchester. "The Design of High-Fidelity Disc Recording Equipment," H. Davies. *6 p.m.*

I.E.E., S. WESTERN SUB-CENTRE.—St. Austell. General meeting, paper on "The Localisation of Faults in Low Voltage Cables," by J. H. Savage. *3 p.m.*

Friday, April 11

I.E.E., SCOTTISH CENTRE.—Edinburgh. North British Station Hotel. Presidential Visit and Luncheon. *12.30 p.m.*

I.E.E., LONDON STUDENTS' SECTION.—Kensington. Spring Dance. *7.30 p.m.*

Commercial Information

Satisfactions

ROSS INDUSTRIAL ELEMENTS, LTD. (formerly AIRCRAFT ELEMENTS AND MACHINE TOOLS, LTD.), Mitcham. — Satisfaction February 5, of mort. and charge reg. February 9, 1946.

ELECTRICAL APPARATUS CO., LTD., St. Albans.—Satisfaction January 27, of morts, reg. August 12, 1919, and April 9, 1920.

Dividends

BENNETT, Alexander, residing at 23, Melville Court, Goldhawk Road, London, W.12, and lately carrying on business at 204, North End Road, Fulham, London, as a cycle and radio dealer, and at 283, Regent Street, London, W., as a tobacconist. Court: High Court of Justice. Amount per £: 9d. supplemental. Payable: April 5, 1947, at Bankruptcy Buildings, Carey Street, London, W.C.2.

AMBROSE, Arnold, residing and carrying on business at 137, Market Street, Chorley, in the county of Lancaster, and formerly residing and carrying on business at 39, Steeley Lane, Chorley, electrical engineer. Court: Preston. Last day for receiving proofs: April 8, 1947.

Orders for Discharge

LAZARUS, Jack (trading with another as Langdons Radio), 217, Golders Green Road, Golders Green, N.W., Middlesex, wireless and electrical dealers, and formerly trading at 13, Craven Park Road, Willesden, Middlesex. Court: High Court of Justice. Date of Order: February 18, 1947. Bankrupt's discharge suspended for one year, and that he be discharged as from February 18, 1948.

THURLOW, Richard James, 13, Bolton Lane, Ipswich, Suffolk, electrical engineer, carrying on business at 27, Fore Street, Ipswich, electrical and radio repair service. Court: Ipswich. Date of Order: February 12, 1947. Bankrupt discharged as from November 12, 1947.

Company Meeting

Midland Counties Electric Supply

Injustice of Nationalisation

The thirty-fourth ordinary general meeting of the Midland Counties Electric Supply Co., Ltd., was held in London on March 28.

Mr. William Shearer, the chairman, in the course of his speech, said: Dealing with the company side of electricity supply generally, I know of no other industry that has ploughed back such a large proportion of its earnings over a number of years into the operating properties. In consequence, while the equity securities may not have had the same specific attraction as many industrial ordinary shares, they had enjoyed a very high investment rating.

In examining the proposed financial arrangements for the new Government boards, we find that the door is left wide open to possible political abuses. It is intended that the Central Authority should exercise complete control over the finances of the Area Boards, including the amounts to be paid by these Area Boards to the Central Board for Electricity Supplies, and the finances of the Central Board are placed under the control of the Minister. I find it difficult to follow the mental process which, starting from the promise that all monopolies are vicious, assumes that when they become State monopolies, and beyond competition, they immediately acquire all the sovereign virtues.

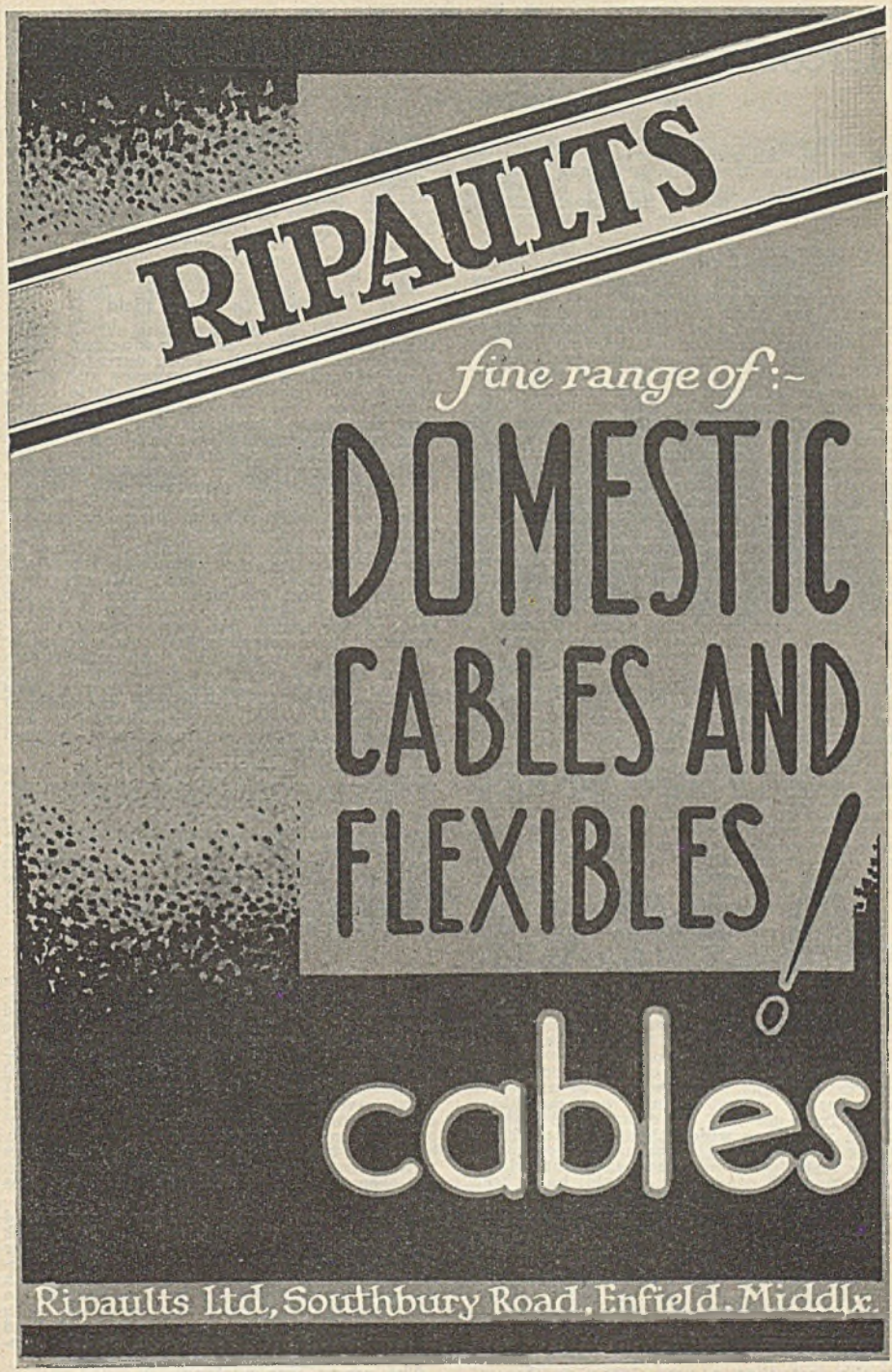
If the actual terms proposed are examined in relation to the earning capacity on the present rate of dividends being paid, a clear picture can be obtained of the confiscatory nature of the Government's proposal.

Stockholders' Losses

Assuming that in payment for the various issues of the company a 2½ per cent. Government Loan is issued, our 4½ per cent. preference stockholders will lose £1 5s. 7d. per cent. per annum, our 6 per cent. preference stockholders will lose £2 1s. 4d. per cent. per annum, and our ordinary stockholders will lose at least £4 1s. 5d. per cent. per annum. On the assumption that the Government will issue a 2½ per cent. Stock for compensation, the annual cost to them, before deduction of tax, will be under £400 000 per annum, whereas we earned in the year 1946 profits, after providing for depreciation and before tax, of approximately £950 000, with every prospect of increasing this year by year. Moreover, the Government Stock will, we gather, be a redeemable one, whereas by far the larger part of our business has been given to us by Parliament in perpetuity, and stockholders had every reason to believe their investment not only progressive but permanent. These figures and facts surely prove the monstrous injustice which the British Government propose to perpetrate.

Now you will expect me to say something about our traction business. Under the Transport Bill, which was first presented to Parliament, these undertakings might fall to be expropriated or dealt with in some other way as the Minister of Transport might direct under a scheme for passenger road transport as may be permitted by the Transport Bill. That, in itself, is objectionable enough, but under the terms of the Electricity Bill which has since been introduced, this company's entire assets will be taken over and, by a somewhat strange anomaly, the Minister of Fuel and Power thus becomes the owner of our three passenger traction companies.

The report was adopted and a final dividend of 4 per cent. (making 8 per cent. for the year), together with a bonus of 2½ per cent. on the ordinary stock, were declared.


RIPAULTS
fine range of:-
DOMESTIC
CABLES AND
FLEXIBLES
cables
Ripaults Ltd, Southbury Road, Enfield. Middlx.

Company Meeting

Marconi International Marine Communication

New Range of Equipment—Sir George Nelson's Address

The forty-seventh ordinary general meeting of the Marconi International Marine Communication Company, Ltd., was held on March 27 at Queen's House, Kingsway, London, W.C., Sir George H. Nelson, F.C.G.I., M.I.Mech.E., M.I.E.E., the chairman, presiding.

The chairman, in the course of his speech, said: Gentlemen,—This is the first opportunity I have had of addressing you as chairman of the company and, in doing so, I would say that I feel proud and privileged to be associated with an organisation with the fine tradition of efficient service which it has built up over nearly 50 years.

Following upon the decision of the Court of Directors of Cable and Wireless (Holding) Company to further the development of Marconi's Wireless Telegraph Company, Ltd., by associating it with the widest possible field of research, application, engineering and manufacturing facilities, the English Electric Company purchased the entire shareholding of Marconi's Wireless Telegraph Company which is the proprietor of a very substantial holding in our company, and we therefore will benefit by the advantages of association with the English Electric Company and we look forward to that association and their co-operation and help with great confidence.

My colleagues and I are keenly alive to the world-wide prestige of the name "Marconi," built upon the vision and research work of that great man and those serving him and my predecessors. It is the board's intention to ensure that the whole of the resources of both Marconi's Wireless Telegraph Company, Ltd., and of the English Electric Company shall be available to the Marconi Marine Company in its future work.

It will be our constant endeavour to ensure that equipment of the latest design and the greatest operative efficiency will be installed afloat as soon as it is practicable, so that the apparatus and magnificent staff "team" can be of the greatest service both to those who sail and operate ships as well as to those who travel in them.

Expectations Exceeded

With the enormous war-time advances at the disposal of our technical staff a completely new range of marine radio communication and navigational aids equipment have been designed, and these equipments are now being fitted as quickly as possible to fulfil the very large number of contracts we have received during the past year.

The results obtained from these new equipments have far exceeded our most optimistic expectations, and we have received numerous enthusiastic reports and congratulatory letters from many of the owners and masters of the vessels on which these sets are fitted. Owing to the war a large number of equipments installed some years ago, and which, under normal conditions, would have been replaced, have necessarily remained on vessels, but we are now in process of replacing these as quickly as practicable.

Aids to Navigation

In the radio aids to navigation field, notwithstanding the number of new methods of position finding and plotting which have been evolved during and since the war, the Marconi direction finder is still giving efficient and valuable service, as is evidenced by the fact that a very large number of British vessels of all classes are fitted with Marconi direction finders, and we have a large order book for further installations.

The direction finder is a particularly valuable navigational aid to seafarers, for not only does it enable the navigating officer himself to plot his position wherever he may be sailing, but it also enables him to locate the position of any vessel in difficulty which is able to send out a distress signal.

Activity in Radar Field

In the field of radar, that is, detection by short wave, we have been most active. Many types of radar were developed during the war under conditions of great urgency and where expense and man-power were of little or no consequence. The only thing that mattered was to have something done, and done quickly, irrespective of cost or how many men were required to maintain and operate the equipment provided. In peace-time, however, the economic factor assumes vital importance. Consequently, a great deal of development of a totally different character became necessary in order to ensure that the shipowner is provided with reliable instruments; reasonable in first cost; simple in operation; easy to maintain and which will give him continuous and first-class service with the minimum of care and attention. Development of this nature has been urgently undertaken by your company, but this necessarily takes time. In many cases the complexities of the original technical developments have become simplified as a result of lengthy tests under actual "sea" conditions, and several prototype models have been developed and tested in our endeavour to arrive at an ideal peace-time apparatus.

For some time past we have had our latest experimental marine radar equipment on one of the regular cross-Channel steamers and, by the courtesy and kindness of the owners, we have been able to carry out extensive and far-reaching tests. The apparatus is now giving first-class results. It is simple in character, easy to handle, and gives the master or navigating officer of the vessel a true picture of any objects upon the sea and the approaching coast-line.

Tribute to Staff

Our seagoing staff has returned to peace-time conditions and is providing a communications service for ships' personnel and passengers which is second to none with the modern and super-efficient apparatus with which so many vessels have been fitted by your company. Our "service" personnel deserve a special word of commendation. Not only have they carried out their normal maintenance routine duties with their usual efficiency and loyalty throughout the war, but they have also completed an enormous refitting and new fitting programme involving them in long hours of almost continuous overtime.

The administrative staff has also played its part in carrying the heavy load of work that has been involved in the change-over from war to peace-time conditions. In conclusion, therefore, you will doubtless wish to pass a most hearty vote of thanks to Mr. Van de Velde and all our staff, both ashore and afloat, who have so willingly and so loyally given of their best in the company's interests.

The report was adopted.

Marconi's Wireless Telegraph Company

Important Contracts—Sir George Nelson's Review

The forty-ninth ordinary general meeting of Marconi's Wireless Telegraph Company, Ltd., was held on March 27 at Queen's House, Kingsway, London, W.C., Sir George H. Nelson, F.C.G.I., M.I.Mech.E., M.I.E.E., the chairman, presiding.

The chairman, in the course of his speech, said: Gentlemen,—This is the first opportunity I have had of addressing you as chairman of the company and I should like to say how proud and privileged I feel to be associated with your fine traditions of efficient service which have been built up over so many years.

During the year under review the English Electric Company in August, 1946, purchased from Cable and Wireless (Holding), Ltd., their shareholding in your company and the board was reconstituted so as to ensure the maximum of co-operation and mutual support between this company and the other members of the English Electric group.

Many Orders

The new board's policy is active pursuance of the development of the company in its specialised field of communications between land, sea and air. It is satisfactory to report that 60 per cent. in value of our orders during the year has been for export. Among the more important contracts in hand I would mention high power broadcasting installations for Turkey and Eire, medium power broadcasting installations for Iraq, for South Africa and for Brazil, also important communication schemes and equipments for Portugal, Belgium, China and Canada.

You will be proud to know that your company has been privileged to equip with communication and broadcasting receiving apparatus the two Royal trains now carrying their Majesties on their tour of South Africa. In the Royal train itself is installed the broadcasting receiving apparatus and also an amplifier system by which announcements may be made by loudspeakers throughout the train. The pilot train carries a similar installation, and in a separate coach a complete transmitting and receiving equipment provides either telephone or high-speed telegraph communication to and from the train either at rest or in motion. It is thus possible for His Majesty to keep constantly in communication with the Home Country and all parts of the world. We have had very satisfactory reports of the performance of the equipment. It is, I believe, the first occasion when high-speed telegraph communication has been effected from a train in motion. The results obtained are a great credit to our engineers.

New Apparatus

During the year important new equipments have been brought into production. In the marine field we have marketed a completely new range of transmitters and are already supplying these sets in large numbers to the Marconi International Marine Company and foreign customers for the re-equipment of merchant ships.

Our marine radar which will give a performance fully in keeping with the high standard expected of the name "Marconi" has undergone most successful trials and will shortly be coming into production. It is worth noting that the application of radar to the best advantage both as a means of securing the safety of life at sea, and as an aid to the mariner, is very different from the war-time applications of this branch of the radio art, and many difficult technical problems have been successfully solved.

Our company continues to play a prominent part in the application of radio to aviation. A special department has been formed to deal with this business. The post-war design of light weight and miniaturised communication and direction finding equipment has been standardised by leading aircraft manufacturers, and a high-power communication equipment is under development for installation in large transport aircraft now under construction.

We are in active development and manufacture of blind approach and navigational aid equipments to meet the immediate requirements of civil aviation.

Broadcasting

In the broadcasting field, many detailed improvements have been made in our standard equipments and we have recently been entrusted by the B.B.C. with their order for the first high-power frequency modulated broadcast transmitter to be established in this country. This marks the beginning of a new phase in broadcasting and will bring to the listener music and speech reproduction of a quality hitherto unobtained and with complete freedom from interference of all kinds. This development will undoubtedly have much influence on the expansion of the foreign business of your company.

As you are aware, the world's first regular electronic television service was instituted in this country in 1936 by the B.B.C., all the transmitting equipment having been developed, designed and manufactured by Marconi's Wireless Telegraph Company.

Television business has, of course, been dormant since 1939, but the B.B.C. service has now been resumed and is to be expanded, while there is growing evidence of interest among our overseas customers. We are extending our research to cover the whole of television with the object of contributing to the growing demand for this equipment.

Age of Instrumentation

We live in an age where scientific instrumentation is of vital importance. Every stride forward in knowledge or technique brings in its train the need for measuring, testing and investigating the results of putting such discoveries into practice. This need is satisfied in many respects by our wholly owned subsidiary, Marconi Instruments, Ltd., whose special function is the design and manufacture of instruments by means of which scientific effects can be properly observed and studied. This subsidiary company is centralised at St. Albans, and is self-contained with its own research and development facilities. It is in the closest touch with the Marconi group of companies and with the English Electric Company, Ltd., and, to cater for the needs of its associates as well as for the demands of other manufacturers and scientific bodies throughout the world, the company has embarked upon an extensive programme of development and production of a wide range of communications, industrial and medical instruments.

In conclusion, I am sure you would wish to record a sincere vote of thanks for the achievements of our management, staff and works' employees.

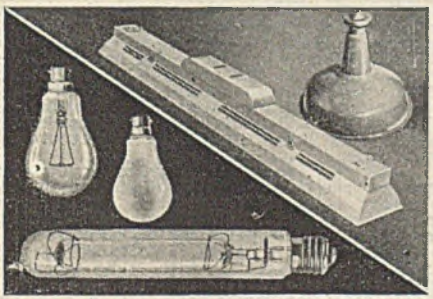
The report was adopted.

Who was "the Gentleman with the lamp"?

In the Crimea, when Florence Nightingale was earning the title of the "Lady with the Lamp", was a certain Midshipman who was himself to carry a light, from waltz-loving Vienna to mysterious Tibet; down coal mines and up mountains. His name was Crompton, and the light he was to carry was electric light.

Colonel Crompton became one of the world's greatest pioneers in electricity. Among his historic undertakings were the electrifying of Buckingham Palace, London's Law Courts and Tilbury Docks. England's first electric house-to house lighting was planned by him.

His leadership in electric light development is still continuing in the laboratories and factories of Crompton Parkinson Ltd.—the firm he founded. His skill in applying the lamp to the need is now the function of a group of experts in modern lighting techniques, the Crompton Lighting Advisory Service.



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The English Electric Company, Limited

Expansion Policy

The twenty-eighth annual general meeting of the English Electric Company, Ltd., was held on March 27 in London.

Sir George H. Nelson, F.C.G.I., M.I.Mech.E., M.I.E.E. (chairman and managing director), in the course of his speech, said:—

Through the purchase of the share capital of Marconi's Wireless Telegraph Co., Ltd., our activity and facilities have been considerably extended by embracing that branch of electrical engineering, known as the mico current field.

I wish to say something on the present economic state of our country and the coal and fuel crises, and in this connection, hope that our stockholders and employees have read and studied the White Paper issued by the Government. No one can read it without feeling that it issues a most serious warning and imposes an immenso responsibility, not only on the Government and industry, but on the community. Too many, for too long, have lived on slogans and superstitions; for instance, on the slogan, "More pay for less work." The White Paper establishes what has long been known to many, viz., that we are dangerously impoverished and are definitely faced with a lower standard of living, unless by enterprise and hard work, efficiently directed, we can create a new wealth and fresh resources.

Important Extensions

With full approval of the Government Departments concerned, and on the assurance that additional labour and a balanced flow of materials would be available, we have embarked on important extensions to our works and have raised substantial new capital to pay for them. That policy was and is undoubtedly the right one both for the country and for our own company. Despite special efforts by us to help ourselves and to obtain labour from the Government, however, results show that we have been bitterly disappointed, as the last twelve months have only resulted in an addition of 300 men, whereas we need several thousands to increase the output of heavy machinery.

It is my own belief that our difficulties have been much aggravated by the diversion of many of the ablest minds in the Civil Service from the pressing tasks of administration, in which their experience and competence are invaluable, to the political and legislative problems of nationalisation, which are of no more relevance to our present troubles than an expedition to Mars.

Similarly many of the ablest brains in industry are unable to concentrate on the proper functions of management. The only solution is to apply our minds and energies in proper order, and I see no reason for pessimism if we face the facts, and put first things first.

Labour and Working Hours

The engineering industry introduced the 44-hour week in the faith and promise that our workpeople would produce at least as much in that time as in a 47½-hour week, and that they would operate the large machines continuously on suitable shift systems. In the light of the present shortage of labour we deplore the proposal to work a double-day in two shifts of 37½ hours each, for what we needed was at least a full 44 hours for each shift, with no absenteeism, and for the next two years, at least, as many additional hours as could reasonably be arranged.

During the shut-down, arising out of the recent power and fuel crises, our officers and employees did wonderful work in installing Diesel engines, etc., in the works affected thus enabling production in many departments to be partially restored. As you know, we were told, without previous warning and late on a Friday afternoon, of the Government decision to cut off power from a large area of industry which included five of the seven main works of our group, and we could obtain no information at any level in Government Departments as to when power would be restored.

We have always considered that one of the responsibilities of industry, and ourselves in particular, is to endeavour to provide stability of employment, and we have fervently striven in this course, but we cannot shoulder the responsibility to pay wages when employment is not possible. This is a responsibility that must be carried by the National unemployment funds, for we have to conserve our resources for the purpose for which they have been provided, namely, production. This stoppage was outside our control, and therefore, much as we regretted it, no other course was open to us than to give notice to those employees who could not be retained in productive work.

Interests of Employees

Such action did not come easily to our company, which has put the interests of its employes in the foremost place, as shown by the fact that it has not only endeavoured to provide reward for honest work, but established over and above those provided by the State(supplementary funds from which those in sickness, and in old age, and the dependents of those who prematurely die, are helped in their needs.

We are indeed glad, however, to have withdrawn the notices and returned to normal conditions again, and we pray that such a disaster will not be repeated.

During the shut-down our officers and employees did wonderful work in installing diesel engines and other plant in the works affected by the stoppage, enabling production in many departments at least to be partially restored. We thank all concerned for their efforts and all our employees for their loyalty.

A Remarkable Performance

You will be glad to know that the performance of our own plant in generating stations throughout the country has been remarkable for efficient reliability. As an example, a 30 000 kW 3 000 r.p.m. steam turbo set installed as long ago as 1930 has an availability factor of 99.8 per cent., and during 1946 it was in operation for 3 800 hours, and was run up and shut down 352 times during the 12 months. Records like this are reflected in the very large number of repeat orders we receive.

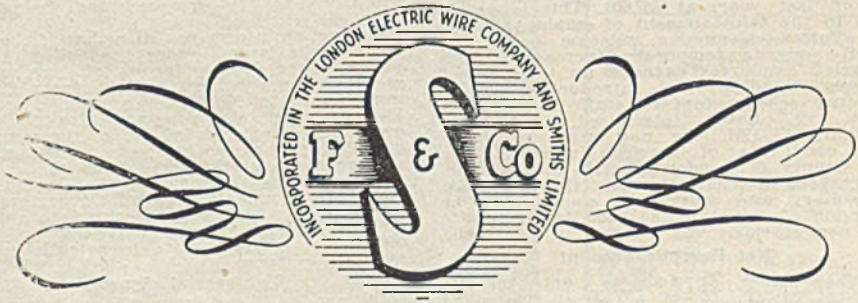
I do not propose this year to review our several classes of orders in hand, except to say that each manufacturing section has an excellent share of the total volume, and in our research department we are proceeding with work of high importance to the whole of our group with the extended research facilities now virtually complete.

I am sure you would wish me to pass on to all our employees a very hearty expression of your appreciation of their services during the past year.

The report was adopted, and a final dividend of 6 per cent. (making 10 per cent. for the year) declared on the ordinary stock.

BARE COPPER Wires

In all sizes and diameters to fulfil every physical requirement from Soft Wire for Cold-Heading, to Hard drawn wire for Overhead suspension.



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Company Meeting

Bournemouth and Poole Electricity Supply

Plant Shortages—The Electricity Bill—Sir Robert Renwick's Views

The annual general meeting of the Bournemouth and Poole Electricity Supply Company, Ltd., was held on March 25 at 46, New Broad Street, London, E.C.

Sir Robert Renwick, Bt. K.B.E., the chairman, said: Ladies and gentlemen,—I will ask the secretary to read the notice convening the meeting and the auditors' report.

(The secretary here reads the notice and the auditors' report.)

I take it that it is your wish that the report and accounts be taken as read.

With your permission, I propose to deal first with the accounts, and in this connection would preface my remarks by saying that I shall be dealing with all amounts in round figures of pounds. You will see from the revenue account that the company has had a very successful year. Our receipts from sale of current are up approximately £88 000, or 11 per cent. over 1945. Sundry receipts at £31 000 have increased by no less than £17 000, largely due to an increase in our showroom trading profit. Our turnover in this respect, in spite of the shortage of materials, having more than doubled as compared with last year. Our total receipts on revenue account are up £105 000 at £922 000. On the debit side of the revenue account, purchase of current has increased by £46 000, due to the increased quantity purchased from the Central Electricity Board.

The next three items, in respect of the distribution of electricity show a total increase of £6 000, of which additional repairs and maintenance account for a considerable proportion. Rates have substantially increased, due principally to the general increase in poundages of local rates. Salaries, wages and directors' fees are nearly £12 000 up on last year, at £67 000. This is partly due to the reinstatement of employees from the Forces whom we welcome back, and partly due to temporary increases to all salaried employees earning up to £600 per annum, pending the introduction of a grading scheme for the staff. I may say that we have introduced, as from January 1, 1947, the new grading scheme and conditions of service, introduced by the County of London Electric Supply Company, Ltd., and put into effect throughout its subsidiary and associated companies. The reaction of our staff has been favourable to the new scheme.

Net Revenue Account

The balance carried to net revenue account at £264 000 is £35 000 in excess of the figure for last year. Turning to the net revenue account you will see that the disposable total is £313 000 including the £264 000 to which I have just referred. You will note a surplus on sale of British Government securities during the year, amounting to nearly £10 000, which arose partly from a switch and partly from the realisation of British Government securities which we have effected during the year and to which I will be referring when I come to the balance-sheet.

On the debit side of the net revenue account, reserve for depreciation at £70 000 is greater by £7 000 than the figure provided for last year. Provision for taxation is also up by £10 000 at £95 000. The next item—provision for contingencies—requires some explanation since you will remember that last year we transferred from contingencies and other reserves no less than £116 000 which was no longer required. On this occasion on account of the uncertainty arising from the present fuel emergency we have deemed it prudent to transfer £20 000 to contingencies. The provision for dividends is, subject to your approval, at the same gross rates as were payable last year.

Balance-Sheet

In view of the Electricity Bill I do not propose to take up much of your time on the balance-sheet. You will see that capital expenditure is up by £353 000 and a large part of this—over £188 000 in fact—is in respect of our new power station at Holes Bay. In consequence we have had to dispose of some of our British Government securities and you will see, under investments, that our total holding of British Government securities has been reduced from £291 000 to £100 000.

Compensation

You will be aware that under the Electricity Bill it is proposed to allot you Government stock, specified so far neither as to terms of issue nor rate of interest, in exchange for your shares valued according to their official quotation on the Stock Exchange on certain dates. Your board estimate that on this basis you will get—

66s. 8d. for ordinary stock.

26s. for each 4½ per cent. £1 preference share.

36s. 9d. for each 6 per cent. £1 preference share, and the holders of 3½ per cent. debenture stock will get £102 6s. 6d.

The basis of compensation—namely, Stock Exchange prices—is thoroughly objectionable. The only fair method of valuing any concern is by independent arbitration in the event of one party to the proposed deal being dissatisfied.

I regret to inform you also that if the new stock to be issued under the Bill yields 2½ per cent., the drop in income of shareholders and debenture holders will be from £122 000 per annum to £83 500 per annum, a cut of 31½ per cent. As you are also doubtless aware, no director or official of the company other than the auditor is to be allowed to represent the stockholders from the vesting date until the allotment of the Government stock is complete. It will therefore be necessary for you, in due course, to appoint a stockholders' representative at a later meeting which may have to be called solely for this purpose.

Commercial Aspects

As you will see from the statement of electricity purchased and sold, on the back of the accounts, our total sales are up approximately 15 per cent. on the year and amounted to 142 millions. Lighting, heating and cooking units sold totalled over 88 millions and are up 25 per cent. Power units are down, as I prophesied last year, but only by approximately 6 per cent., to 33 million units. I believe that in the future our sales of power will be maintained at not less than 30 million units per annum, which is some three times the quantity sold pre-war, although during the war, what with the dispersal, and the setting up of military establishments in our area, the total sales of power were considerably in excess of the present level. Street lighting units, though only a small proportion of the total, show a welcome increase of over 40 per cent. as

Continued on p. 878

Details that Distinguish . . .

In the product of the Specialist there are details of design that distinguish it from its contemporaries.

TYPE 1939
SHEET STEEL HOUSING

. . . designed and built for the job

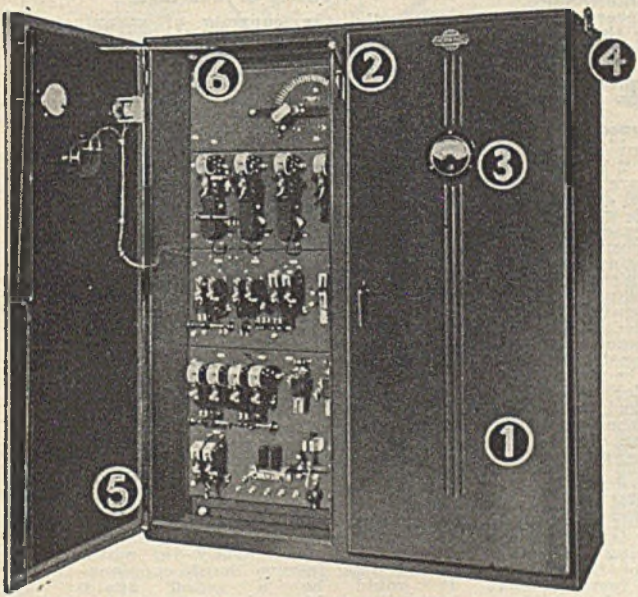

Illustration Shows 3 Motor Control Panel for Boring Machine

1. High quality steel case of pleasing appearance combining strength with light weight.
2. Neat and conveniently placed Interlocked Isolator.
3. Instruments and Switches mounted in door at easily accessible heights.
4. Removable lifting lugs and flush sides facilitate handling and ganging.
5. Concealed hinges.
6. Equipment mounted on independent framework ensures rigidity and easy removal through front door.

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HEAD OFFICE AND WORKS BEDFORD

LONDON · BIRMINGHAM · BRISTOL · CARDIFF · GLASGOW · LEED · MANCHESTER · NEWCASTLE · SHEFFIELD

Continued from p. 876

compared with 1945, and our bulk supplies, mainly to our subsidiary companies, also show a satisfactory increase of 16 per cent. at 19 million units.

Poole Generating Station

You will remember that I reported to you last year that we had been charged by the Central Electricity Board with the responsibility of constructing and operating one of the four new capital generating stations to be established in the South-West of England and that we were about to proceed with the first half of the station, which is to be designed for an eventual output capacity of 200 000 kilowatts.

Hardly had we received the consent of the Electricity Commissioners under Section 11 of the 1919 Act in June, 1946, to the construction of the first section of 100 000 kilowatts than we were approached by the Central Electricity Board with a request to proceed with the second section of the station to provide an additional 50 thousand kilowatts, to be ready for commercial operation by September, 1949.

With the expert assistance and vast technical experience of the County of London Electric Supply Company, Ltd., behind us, we have no doubt about our ability to construct a most efficient station, although owing to site difficulties the cost will be above normal; we estimate this cost, for the 150 thousand kilowatts at approximately £7 millions. Nor would we have any doubt about raising the necessary finance if we were to be left to get on with the work without political interference.

We are, however, gravely concerned at the inordinate delays in obtaining the necessary generating plant. The Central Electricity Board wanted the first 100 000 kilowatts to be in operation by 1948. Completion is, in fact, expected no earlier than September, 1950.

An Intolerable Prospect

As I have stated in a recent speech, this country is at present short of 2 million kilowatts of plant. Only if we are lucky will the country by the end of 1948 get an additional 750 000 kilowatts, which is substantially less than the anticipated increase in demand over the same period. The position, therefore, will be worse at the beginning of 1949 than it has been recently. This prospect is intolerable, and every effort must be made to improve substantially the rate at which plant is produced and installed.

It is some consolation to know that the Government have, in the past fortnight, recognised the importance of the heavy plant committee by placing it under a Minister of the Crown, as indeed it originally was when first created during the war. The tragedy is that, as in the case of coal, the crisis is upon us even before planning at high level is instituted.

Exports of Plant

One of the reasons why this country is starved of generating capacity is because the Board of Trade are encouraging exports of similar plant far in excess of the pre-war rate of export. One finds, for instance, that tonnage of boilers and boiler house plant exported is going up by leaps and bounds. The monthly average was 4.7 thousand tons in 1938 and 9 thousand tons in December, 1946, and again in January, 1947, while the value of boiler plant alone, exported in 1946, was £6.2 millions. These exports are not going to the hard currency countries. To boost exports of generating plant might be good planning, but to make it so, positive steps in other directions should have been, and must now be taken to ensure that industry in this country does not continue to go short of power for many years to come. Unless this is done and unless the steps taken are effective, the Government, as I see it, have no right to allow substantial exports of generating plant to continue.

Methods of Increasing Capacity

There are various ways in which the capacity of our power stations could be stepped up. I will cite only three examples. In the first place, an immediate increased output from existing plant amounting to some 350 000 kilowatts would be obtained if suitable coal were supplied to the power stations. The Coal Board should be instructed to give this matter high priority—after all the industry is only asking for the same quality coal that it received pre-war. Although the proper screening and cleaning of coal at the pit-head would entail a decrease in the statistics of coal output, this would be well worth while, even if politically embarrassing in certain quarters—certainly worth while because this 350 000 kilowatts is in being and available, waiting only for suitable coal.

Surely instead of wasting this plant and waiting some years for a further 350 000 kilowatts of new plant at a cost of some £14 millions, this money and the labour would be better employed in providing coal cleaning and screening equipment at the pit-head—the continued use of dirty and unsuitable coal will also reduce the capacity of additional plant as it comes into service, every kilowatt of which is so urgently needed.

Effects of Shortages

Secondly, the capacity of manufacturers of generating plant is reduced by shortage of labour and certain raw materials, such as silicon, iron ingots, forgings and mild steel plates. One reads that Ministries have met plant manufacturers and boiler makers recently and discussed with them ways and means of increasing and accelerating their output. While this may help, a much broader approach to the problem on the part of Ministries is required. Material assistance in relieving the bottle-necks must come also from others who are absorbing the scarce raw materials, the labour and factory space that might be devoted to work for the extension of power stations. The electric supply industry, with the Central Electricity Board could, I submit, make their own contribution. As a short term policy we could give aid in this direction by the careful pruning of transmission reinforcements—allowing the normal margin to be reduced for the time being. After all it is no use providing reserve capacity on transmission and distribution works so long as there is a shortage of electricity with which to feed them.

Thirdly, and this should have been done 12 months ago, the Government should examine the capacity of Germany and Italy. I believe it would be possible to obtain a useful contribution of partly fabricated materials from Germany and complete plant from Italy—in neither case would this involve hard currency—indeed, it would be a set-off against the expenditure this nation has incurred in these two countries.

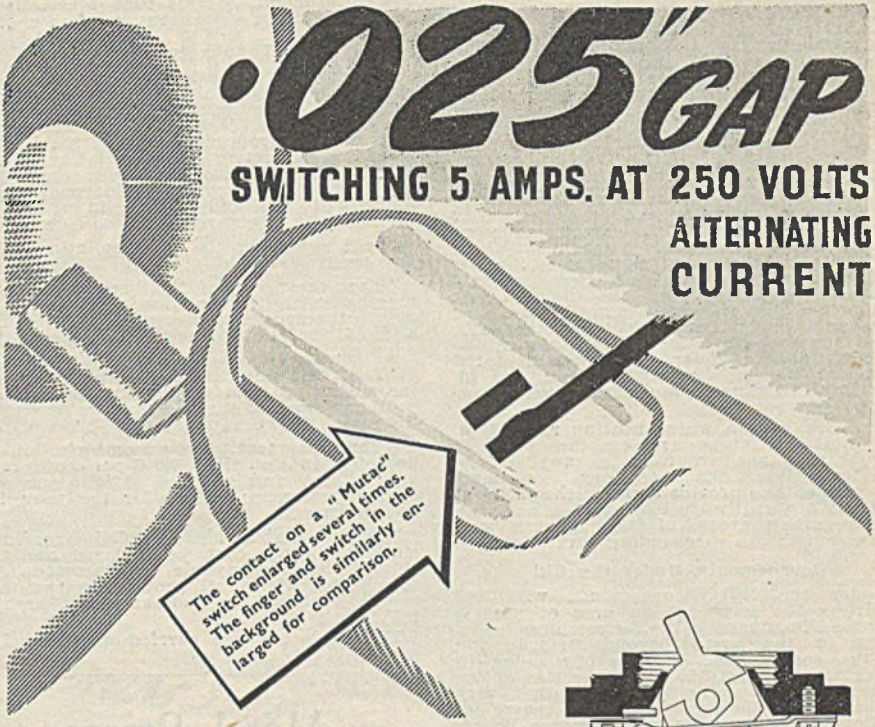
Future Organisation

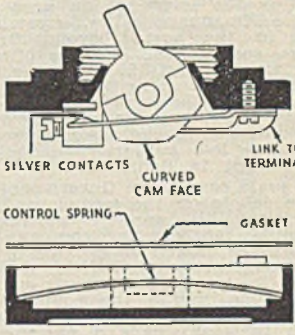
In my recent speech to stockholders of the County of London Electric Supply Company, Ltd., I stated that it was with very great concern that I find in the Bill so little protection for the consumers because of the enormous upheaval to the organisation of our industry promised by this Electricity Bill. This applies particularly in Bournemouth and the

Continued on p. 880

·025" GAP

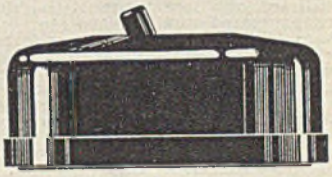
SWITCHING 5 AMPS. AT 250 VOLTS ALTERNATING CURRENT





The mechanism of the G.E.C. "MUTAC" silent A.C. switch is a complete breakaway from orthodox design. Switching is effected through a silent cam-action, operating silver contacts with a gap of only ·025". Housed in a sealed chamber, these contacts are rendered free from dirt, moisture, or interference. Outstanding advantages are:—

- Silent action.
- Long life—designed for 5 amps., tests show a useful life of over 100,000 operations at 100% overload, i.e. 10 amps.
  (B.S.1299 Part 1/1946 calls for 15,000 operations at normal rating.)
- Positions of fixing holes and terminals, and size (2¼" dia.) are all normal to facilitate replacement of existing switches.



Detailed leaflet S9868 available upon request.

"MUTAC" Silent A.C. SWITCHES by G.E.C.

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

Continued from p. 878

surrounding districts served by us. Last year I described our 364 square miles in Bournemouth and the surrounding districts serving nearly 300 000 people as perhaps in some ways an ideal area, since it comprises a large urban nucleus with a growing volume of industry and surrounding rural districts.

It is true that the higher management is dealt with by the County of London Electric Supply Company, Ltd., but this has been a source of strength and, to overcome the distance from London, we have always had one local director and in addition our regional manager has the benefit of being on our board and therefore speaks with full authority. The regional manager is in close contact with people in his region, not only members and officials of the various civic authorities but also with many others. Our consumers in Bournemouth enjoy the same rates for supply as they had pre-war, the running charge under the two-part tariff being at ⅝ths of a penny per unit and ¾d. per unit, in the urban and rural areas respectively.

We also have a water heating rate of ½d. per unit. Charges are, on the whole, I should say, as favourable as any in the country. Our aim, as our consumers appreciate, is to provide them, at the cheapest cost, with a really efficient service, not only in the urban areas of Bournemouth and Poole, but in the surrounding rural districts.

Bournemouth Under the Bill

Under the Bill Bournemouth will find itself on the fringe of an area of no less than 6 477 square miles, stretching to a point in the north beyond Oxford, and in the east to the confines of London—in other words, nearly 20 times the size of the present undertaking. Bournemouth very probably will be far from the centre of activity of the Area Board. The Area Board, if the Bill goes through as at present drafted, may have less authority than the present management in Bournemouth.

The main case of the Government, as stated in the debate on the second reading of the Electricity Bill, appears to rest on the possibility that existing company undertakings will be broken up because of the power conferred on local authorities under the Act of 1882 to purchase company undertakings' assets lying within the boundaries of the local authorities. Our own affairs at Bournemouth therefore have a nation-wide significance, since, as will be known to you, certain of our local authorities, during the war, expressed their intention of seeking powers to buy part of our undertaking. It is right, therefore, to get this point in its proper perspective. I doubt very much whether the right conferred under the 1882 Act will apply over the next 10 years to more than approximately 15 per cent. of the industry, and it is by no means certain that local authorities would in every instance wish to exercise their option. Furthermore, in any case by the Electricity Acts, the Electricity Commissioners are empowered in the public interest to apply a veto, and where such veto is applied, can prescribe conditions relating dividends to prices.

I feel that our friends in Bournemouth and many other local authorities would much prefer retention of the local company principle to the alternative proposed by the Government—remote control from the headquarters of a distant Area Board which itself will be liable to overriding instructions from the Central Authority or the Minister.

Your board are continuing to oppose this unfortunate and revolutionary Bill. We consider that it is a profound mistake for the Government, at this time especially, to initiate such an experiment on such a scale.

Thanks to Staff

I wish on your behalf to thank all our staff and employees of the Bournemouth companies for their loyal and excellent service during the year. We get up in London, from time to time, from consumers in the Bournemouth area, letters of appreciation of the service they receive from our employees. The regional manager at Bournemouth is lucky in his staff and they are, in my opinion, fortunate in their regional manager.

I will now move the first resolution before the meeting which is:—

"That the report of the directors produced together with the balance-sheet and statement of accounts to December 31, 1946, duly audited, be now received, approved and adopted.

"That the interim dividends paid, less income-tax, on the preference shares and ordinary stock of the company on account of the year 1946, be confirmed.

"That payment, less income-tax, of the final dividends on the 75 000 4½ per cent preference shares and on the 190 250 6 per cent. second preference shares for the year 1946, be confirmed.

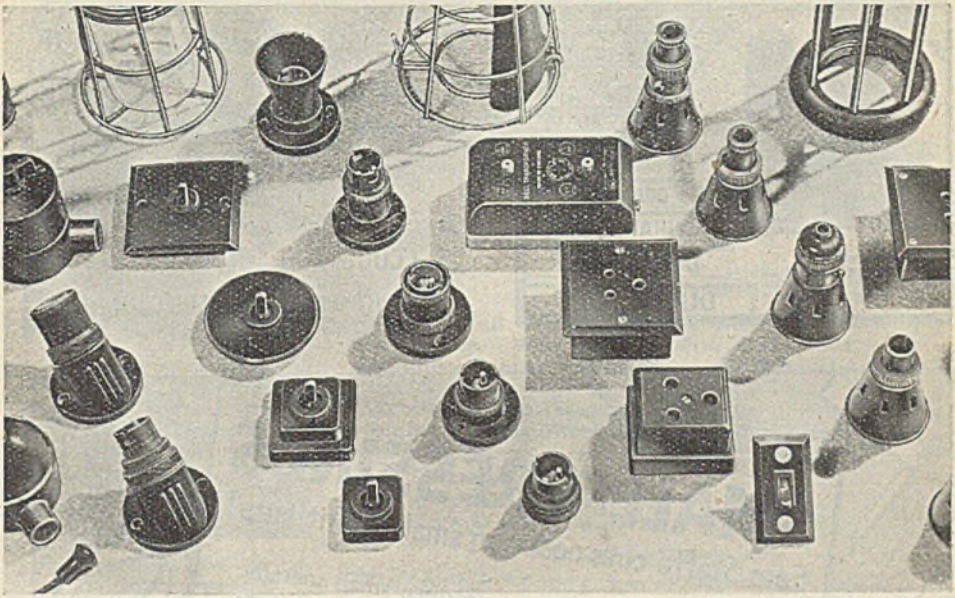
"That a final dividend on £745 769 ordinary stock at 7½ per cent. be declared and that this dividend be payable, less income-tax, on March 26, 1947, to all proprietors registered in the books of the company on March 11, 1947."

The resolution was carried unanimously.

Metal Prices

		Monday, March 31 Price	Inc.	Dec.
Copper—				
Best Selected (nom.)	per ton	£135 10 0	£10	—
Electro Wire bars	„	£137 0 0	£10	—
H.C. Wires, basis	„	£155 0 0	£11	—
Sheet	„	£178 10 0	£10	—
Bronze Electrical quality 1% *Tin*—				
Wire (Telephone) basis	per ton	£177 15 0	£12	—
Brass (60/40)—				
Rod basis	„	1s. 2¼d.	¾d.	—
Wire	„	1s. 6½d.	¾d.	—
Iron and Steel—				
Pig Iron (E. Coast Hematite No. 1)	per ton	£8 19 0	—	—
Galvanised Steel Wire (Cable Armouring) basis 0.104 in.	„	£34 5 0	—	—
Mild Steel Tape (Cable Armouring) basis 0.04 in.)	„	£21 15 0	—	—
Lead Pig—				
English	„	£91 10 0	£20	—
Foreign and Colonial	„	£90 0 0	£20	—
Tin—				
Ingot (minimum of 99.9% purity)	„	£440 10 0	£50 10	—
Wire, basis	per lb.	5s. 6¾d.	8½d.	—
Aluminium Ingots	per ton	£80 0 0	—	—
Spelter	„	£70 0 0	—	—
Mercury (spot)	per bott.	£21 0 0	—	—

Prices of galvanised steel wire and steel tape supplied by C.M.A. Other metal prices supplied by B.I. Callender's Cables, Ltd. The latter prices are nominal only, and do not include any allowances for tariff charges.



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

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

Your enquiries will receive our careful attention.

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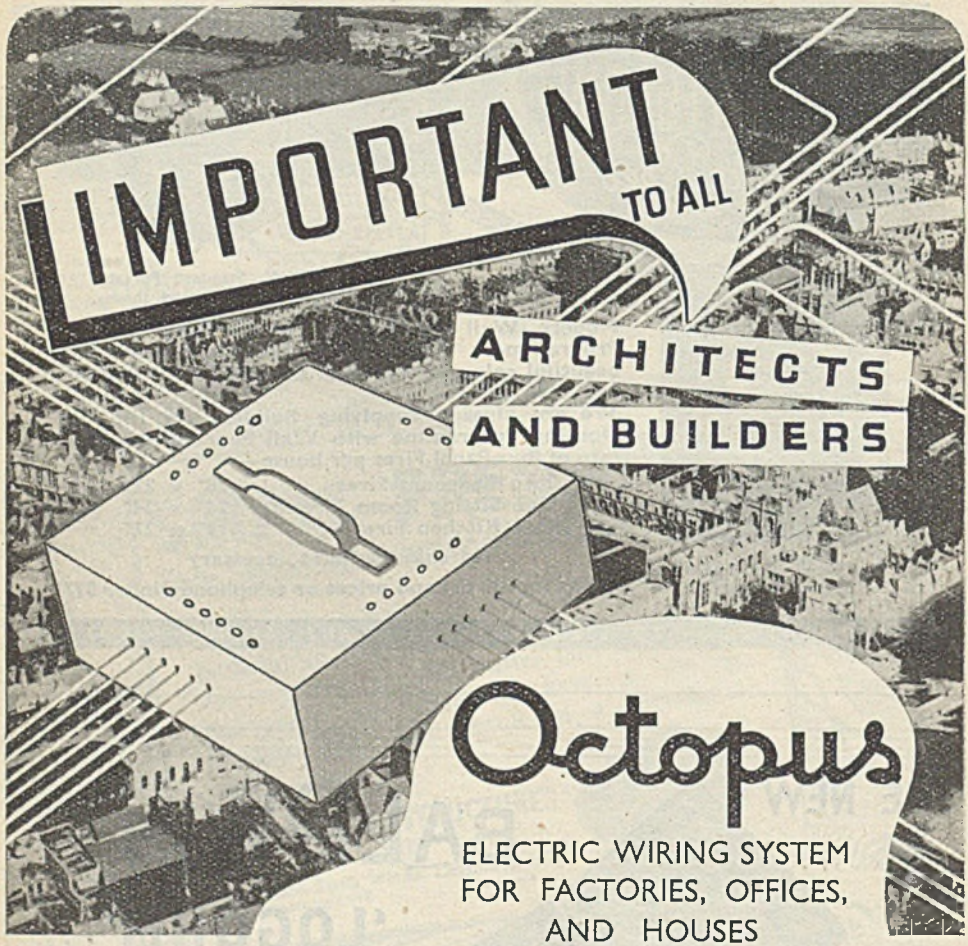

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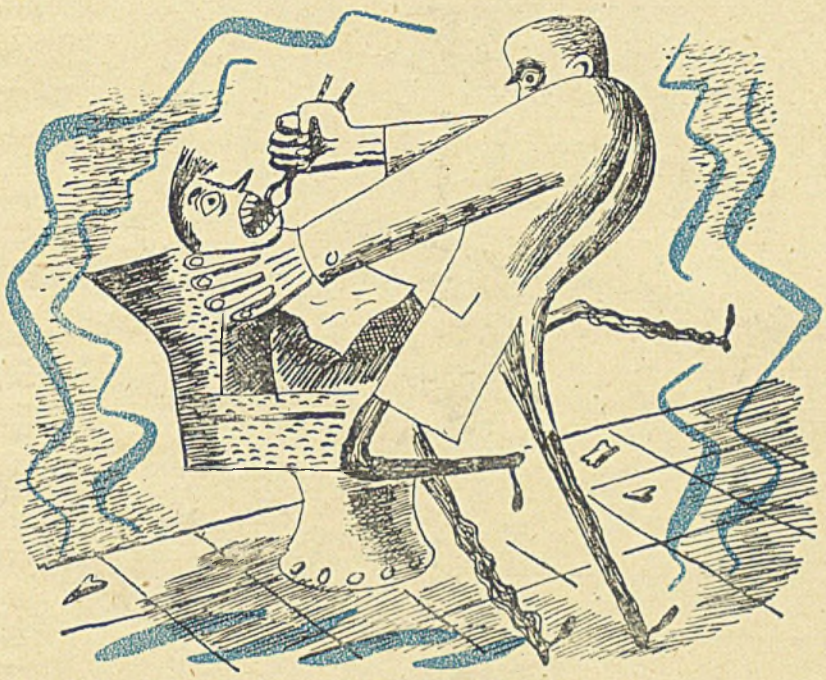

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