

testing facilities for circuit-breakers of a maximum capacity of 250 million volt-amperes with a voltage limit of 11 kilovolts.

(3) That if the existing testing stations could place the necessary facilities at the disposal of the D.S.I.R., this seemed to be the most economical method of meeting the situation.

The Department saw the advantage from the national point of view of utilizing the existing facilities, and it has now been agreed that the ASTA will collectively place at the disposal of the D.S.I.R. facilities equivalent to one 'test bay' a year for testing circuit-breakers up to the agreed limits of capacity and voltage, and, further, that the D.S.I.R. will appoint a resident officer at any test plant where testing is being carried out, with a view to certification of the results by the National Physical Laboratory. These arrangements will enable the N.P.L. on request to undertake, supervise and certify the

results of tests of switchgear manufactured by non-members of ASTA. Manufacturers wishing to have short-circuit tests carried out by the Association with a view of obtaining a certificate from the N.P.L. should apply in the first instance to the director of the National Physical Laboratory, Teddington, Middlesex.

The testing stations are at Hebburn-on-Tyne, Trafford Park (Manchester), Stafford, and Witton, Birmingham. The generators are of unusual design, capable of short-time rated outputs in excess of the normal outputs of the largest power stations, and mechanically constructed to withstand the stresses resulting from repeated short circuits. The privacy of all tests is rigidly ensured, but a reasonable number of persons nominated by a client are welcome to witness them. Members of the Association do a considerable amount of research work, not only for manufacturers, but also in the general interests of the electrical industry.

'TIME-OF-DAY' ELECTRIC TARIFFS

DURING the last few years, electrical engineers have given much study to the development of tariffs for electric power which will benefit both consumer and producer and lead to an increased demand for their product. Dr. Hopkinson pointed out fifty years ago that a steady load could be generated much more cheaply than a variable load, although their total loads for a given time were the same. This follows because with a steady load you require less machines in reserve than you do when there are peaks in the load for which much reserve plant is required which is only used for a comparatively short time. The total annual costs of a supply station depend on the running costs and the overhead costs, the former usually being only about one eighth of the latter. Hence any saving in the capital costs of the reserve plant enables appreciable savings to be divided between producer and consumer and would probably attract new consumers. One way of securing a uniform load is by means of a 'time-of-day' tariff. The rate at which the meter registers could be controlled by a ripple current superimposed on the supply current. The ideal case of continuous variation would be difficult, but if the rate at which the meter registers was changed at the supply station two or three times a day, the consumers being notified of the times of these changes, most of them would naturally be careful to keep down their consumption during the times when the meter was registering a high charge. This would increase the 'diversity' of the load and make it more uniform, thus lowering the station cost.

At first sight, this seems unpractical and far-fetched, but as several European cities use a 'time-of-day' tariff the discussion of one of these methods given in a paper by D. J. Bolton of the Regent Street Polytechnic, to the Institution of Electrical Engineers, on May 10, entitled "Superimposed Control Applications with Special References to Tariffs and Load Levelling", is worth studying.

The following are the details of the tariff of a Paris company. Consumers are divided into groups according to the 'size' of their installation. The size is defined by the maximum power consumption and

depends on the number of rooms. The charge is 2 kw. per day for a one-room apartment, 3 kw. per day for two to four rooms, 4 kw. for five to six rooms, etc. Consumers whose power demand is less or equal to this amount are supplied through a single dial meter, and are charged at the following rate. If the first 'block' of the amount is charged at 3*d.* a unit, the second block will be charged at 1½*d.* per unit, and the remainder at 0.54*d.* per unit. The size of the first block is dependent on the number of rooms, and the second block size is always half the first block size. Large consumers can have supplies on a two-part tariff consisting of a small fixed charge to cover lighting consumption and a running charge varying with the time of the day. The fixed charge depends on the number of rooms and ranges from 1*s.* to £2 a year for a one to six room flat. In addition to this fixed charge, all the energy passes through a special meter having three registrations. These are put into operation at appropriate times of the day by means of timed relays on a centralized control system.

A Paris company was started in 1924 at a special rate for off-peak consumption but was changed into the three-rate tariff system outlined above. This tariff is little used in the purely domestic field, but there is a definite and growing utilization of it in the commercial field for large-scale cooking, oven heating and thermal storage. There would probably soon be a growing demand for it for domestic purposes, if the cost of the special metering required were reduced. This Paris company's charges for the peak period are 2.5*d.* per unit. This period lasts from 3 until 6 p.m. during the winter months. For the 'day' period, which lasts from 7 until 11 a.m. and 2 until 3 p.m. in the winter months and from 2 until 6 p.m. in summer, the price is 1.3*d.* per unit, and for the night period and all other times it is 0.53*d.* per unit.

Mr. Bolton concludes that the function of a 'time-of-day' tariff in Great Britain, both in the commercial and domestic field, would be to develop new loads not yet reached. It should supplement rather than supplant existing methods of charge.