

ENGINEERING LABORATORIES OF THE HYDRO-ELECTRIC POWER COMMISSION.

THE Hydro-Electric Power Commission of Ontario has a very complete and extensive system of research and testing laboratories, the equipment of which, due to the rapid expansion of the Commission, has been greatly increased both in volume and in variety during the past year or two. The system includes laboratories for high-tension and general testing; cement testing; lamp testing; standards and meter testing, and an illuminating engineering laboratory; and also a photographic laboratory for the use of the various departments. These laboratories have been placed on a self-supporting basis by the adoption of a scale of charges slightly in advance of cost, which applies to the other departments of the Commission and to municipalities and others for whom

an arrangement whereby testing circuits in different departments of the laboratories may be interconnected, thus avoiding a large quantity of temporary wiring when special tests are conducted. This board also carries meters for indicating and recording all incoming power; contact making voltmeter and relays for the voltage regulator; and the terminal jacks of the storage batteries and other direct current circuits.

The battery charging set, and a 50-kv.a., 60-cycle motor generator set, for use with the high-voltage testing transformer are installed in the same room with the switchboard. The storage battery layout, located in a room near the transformer room, is made up of two separate sets, 70 cells each, of 80-ampere-hour "Tudor" cells. Provision having been made on the front of the main switchboard for any desired interconnection between these batteries, a wide assortment of direct current is available for all work where a source of steady potential is required.

High-Tension and General Testing Laboratory.

—The high-tension section of the laboratories is equipped with transformers and connecting equipment suitable for making high potential tests at any voltage from 1,000 to 400,000 volts 60 cycles, and up to 225,000 volts at 25 cycles. Sixty-cycle power for this purpose is supplied by the 50-kv.a., three-phase alternator mentioned above. It is wound to give a normal voltage of 1,100 or 2,200, and is driven by a 75-h.p., three-phase, 220-volt induction motor. Excitation for the alternator is provided by the battery charging set. The high-tension testing set consists of two transformers wound to give 75,000 volts and 300,000 volts respectively.

This high-tension set is used for making dielectric tests on transformers, transmission line materials, series lighting fixtures, or any other high voltage electric apparatus. Considerable time and much study is devoted

to high-tension transmission line troubles, especially of line insulators, both pin and suspension types, and much valuable information has been obtained. In several instances this has led to changes in design of insulators by the manufacturers, and, in a word, has had a salutary effect upon the manufacturers in causing them to exercise greater care in factory processes, in order to get a more perfect product.

Under this department, tests have been performed on several types of 13,200-volt power fuses under severe operating conditions, the tests being made with large generating and transforming capacity and 100 miles of 110,000-volt and 25 miles of 13,200-volt line in the test circuit. The ability of the fuses to open a "dead short" across the 13,200-volt bus was investigated, and observations taken of the attendant phenomena by means of the oscillograph and the camera.

A certain percentage of the small transformers purchased by the Commission are tested before being put into service, and this has led to frequent eliminations in the laboratory of transformers which would have broken down

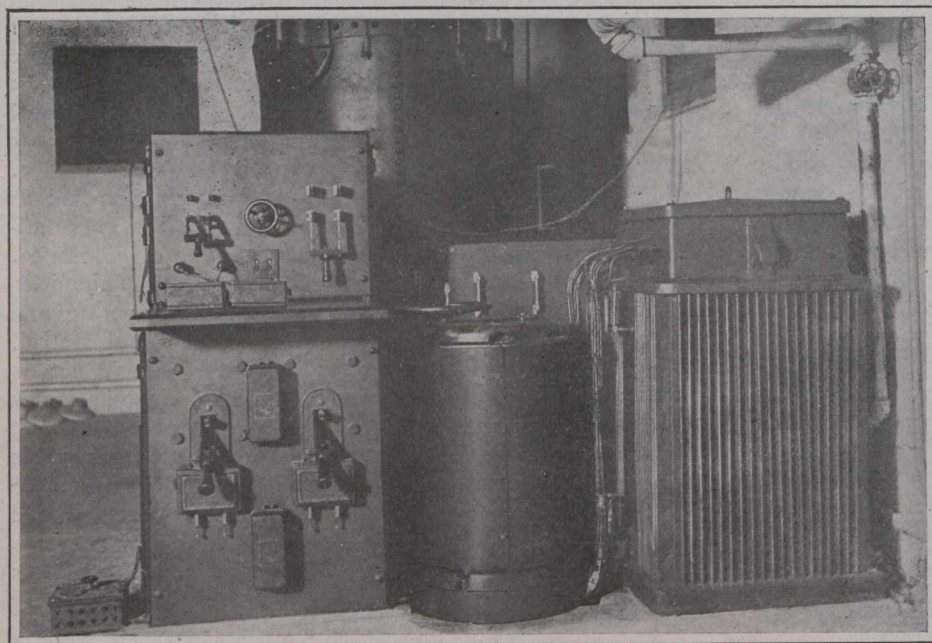


Fig. 1.—Control Board for High-Tension Testing Transformers, H.-T. Laboratory.

tests are made. The following notes, from the Commission's 1914 report, indicates in some measure the nature of the equipment and of the work done:—

The electrical equipment necessary for widely differing classes of work done in the departments of the laboratories has been selected and installed with a view to promoting the greatest flexibility of use, thus enabling one piece of apparatus to be used for as many different classes of work as may be consistent with the accuracy required. The power used in the building is fed directly from the Strachan Ave. sub-station at 13,200 volts through an underground cable to transformers located in a special room in the basement of the laboratory building. The transformer equipment comprises three 50-kv.a. units so connected that three-phase power may be obtained from them at 220 or 110 volts. This power is carried through a set of interlocking oil circuit breakers to the laboratory switchboard, situated in another part of the basement. The switchboard, of special design, consists of seven panels, each for its own separate and distinct class of work, and includes, besides the necessary switches and circuit breakers for distributing power to all parts of the building,