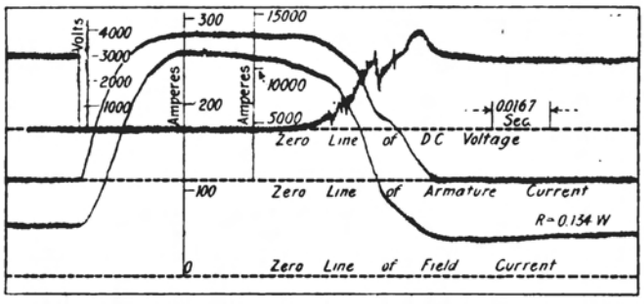
Digest of Electrical Literature

Including Brief Abstracts of and References to
Important Articles Appearing in the Scientific and Engineering Press
of the World

Generators, Motors and Transformers

Mechanical Design of Large Turbo-Generators.—M. A. SAVAGE.—It is said that one pound of material in the present 5,000-kw. turbo sets does the work required of five pounds in the first 5,000-kw. set built in this country. Stator construction has reduced itself to the simplest form as the requirements of rigidity, light weight and flexibility are best fulfilled by such a design. However, high speeds and increased capacities have introduced real difficulties in the construction of rotors. The centrifugal stresses have necessitated the use of a solid forged rotor, and in the largest machines it has been desirable to use a three-piece rotor because of the great length and weight of a solid one-piece forging. Ventilation, which is of prime importance in the modern turbo-generator, is briefly referred to in this article.—*General Electric Review*, February, 1920.

Three-thousand-Volt Motor-Generator Sets.—DAVID HALL.—These motor-generator sets were built for use on the electrified systems of the Chicago, Milwaukee & St. Paul Railroad. Each set consists of a 2,800-hp., three-phase, 60-cycle, 2,300-volt, 514-r.p.m. synchronous motor which drives two direct-current, 1,500-volt, shunt-wound, commutating-pole, compensated generators, the armatures of which are connected in series to give 3,000 volts. The motor is installed between the two generators, with one exciter for the motor and one for the generators, all mounted on the same shaft. It is said that the



OSCILLOGRAM OF SHORT-CIRCUIT TEST AT 3,000 VOLTS

success of high-voltage direct-current equipment may be held to hinge upon commutation. Consequently in the design of these generators great care was exercised to embody every feature that would assist in the obtaining of inherently good commutating characteristics. In severe short-circuit tests the current is reported to have reached values of twenty times normal without flashing over. The photograph shows what took place in one of these tests in which the generators operating at 3,000 volts were short-circuited with no resistance in the external circuit except the necessary connections and circuit breaker, representing the greatest shock that it was possible to impose upon the generator. The oscillogram shows that from the moment of short circuit the current increased at the rate of about 1,250 amp. every thousandth of a second, reaching 5,000 amp. in 0.004 second, 10,000 amp. in 0.010 second, and a final current of 13,000 amp. in about 0.020 second. The circuit was completely opened in one-tenth of a second from the time of closing. Oscillograms of further tests are shown in the article.—*Electric Journal*, January, 1920.

On the Origin of Certain Accidents and Breakdowns in Electrical Machinery.—C. W. WORRAL.—In citing a number of cases where severe breakdowns followed carelessness in construction, use of low-grade insulating material and apparently insignificant faults of design, the author urges the necessity to study during operation the condition of insulation in electric machinery, and if a fault occurs, not merely to repair it but to seek its origin and get to the root of the trouble, thus preventing a recurrence.—*Revue Générale d'Electricité*, Nov. 22, 1919.

A High-Current Transformer.—A furnace transformer of remarkable proportions has recently been built by the Brown-Boveri Company. The transformer is rated at 15,300 kva. at a primary voltage of 20 kv. and gives a secondary current of 52,000 amp. A photograph of this transformer is exhibited which clearly shows the peculiar arrangement of the secondary windings, whereby eddy-current losses are cut down and reactance drop is kept at a few per cent. The windings are reinforced by sturdy coil-spring clamps, enabling the entire winding to be slipped off the core for repairs.—*Elektrotechnische Zeitschrift*, Nov. 6, 1919.

Lamps and Lighting

Modern Street Lighting.—How to obtain the best light with the minimum of expenditure is considered in this article. Distribution curves of sources of light of good character are considered in connection with the distribution obtained in the street under different conditions of spacing.—London *Electric Times*, Jan. 5, 1920.

Application of Industrial Lighting Codes.—This article contains a rather complete statement of the state lighting codes as well as the federal regulations governing the lighting of shipyards, arsenals and other government properties which were established during the war. The state codes which are included are Wisconsin, New York, New Jersey and Pennsylvania. These codes are considered with special reference to the recent progress which has been made and include extensive discussions.—*Transactions I. E. S.*, Dec. 30, 1919.

Some Notes on Lighting in the Textile and Clothing Industries.—J. S. DOW.—In textile industries, as in others, the fundamental principles of good lighting are: (1) Sufficiency of illumination on the work; (2) reasonable constancy and uniformity of illumination over the area of work; (3) the placing or shading of sources so that the light from them does not fall directly on the eye of the worker, either when engaged on his work