CONFEERENCE - REPORT

ABOUT THE 1962 SESSION OF THE INTERNATIONAL CONFERENCE

ON LARGE ELECTRIC SYSTEMS (CIGRE) IN PARIS

AND THE VISIT TO SACLAY (SATURNE - DEPARTMENT)

The reporter attended the 1962 Cigré Conference in Paris between the 15... 26 May. This Conference, which is held every two years, deals primarily with the development and progress of heavy power electrical engineering, especially with the production, transmission and distribution of electric energy at high and extra high voltages (H.V. and E.H.V.) and is thus of special interest to the ENG. Division. However, some of the problems discussed and treated in the reports may be of a larger interest, and contribute to our general engineering and applied physics effort. Later on, I shall try to indicate which reports could be of general interest.

The Conference gave an impressive survey of the electric energy production increase all over the world, an increase which still amounts to 7... 10 c/o per annum, i.e. in a doubling of the world production every decade.

To meet this demand, power stations with generator units as large as 1000 MVA are planned and ready to be realized. Transmission lines at 500 kV a.c. - now a standardized admitted voltage - are operating in several countries, U.S.A., U.S.S.R., Finland, Sweden, Canada and according to an
almost unanimous opinion of specialists, technical problems are now solved for the next step - 700 kV ... 800 kV a.c. transmissions capable of transporting several 1000 MW over distances of 1000 km and more.

Although some differences of opinion exist about the switching and protecting devices for such E.H.V. lines (circuit-breakers and surge diverters) it is generally felt that the first 700 - 800 kV lines will come into service in 2...3 years time.

It is evident that such progress could only have been achieved by important research work and technological development, summarized in about 200 special Cigré - Reports, which are available in the ENG. Division.

The following items have been discussed at the Conference:

1.) **Transformers, especially the increase of rating, corona discharges, and short circuit forces.**

   It is generally felt that an increase of at least 10 o/o in the nominal rating of power transformers by allowing a 10°C higher oil temperature rise is perfectly feasible.

   A large number of reports deals with the generation, measuring and prevention of corona, both inside transformers as well as outside, on bushings etc. It is felt, that some of these reports may be of general interest, especially for the LINAC Group, maybe also for the Separator Group.

   Reports about short circuit forces in transformer windings give a comprehensive survey of the calculation, measurements and mastering of these forces, and about the static and dynamic behaviour of conductor and insulation materials under short circuit stresses. Some of the data will certainly contribute to our problems of electromag-
netic forces in large magnets (e.g. Bubble Chamber Magnets).

2.) Circuit - Breakers.

Reports and discussions about testing methods and performances of various types of breakers under different fault and switching conditions. Interesting proposals to use grid-controlled valves and semiconductor-rectifiers as large current switches were presented.

3.) Capacitors.

Although primarily concerned with problems of H.V. and E.H.V. reactive power generating capacitors, certain reports give valuable information about the progress achieved in capacitor manufacturing technology; of interest e.g. for our pulsed current supplies.

4.) Generators and Stability.

Certain papers about semiconductor-rectifier excitation of a.c. generators and its regulation could be of interest to the ENG. Division.

5.) Substations.

Of interest for the ENG. and SB Divisions. Attention is drawn to reports about substations with complete dry (epoxy-resin) insulation and to reports about the layout and protection of low voltage recording and measuring equipment and cables against overvoltages.

6.) Coordination of Insulation.

The problem of switching surges, its magnitude, shape and influence on different H.V. equipment was examined, as well as the possibilities of an artificial generation of such surges for testing purposes.
7.) Extra High Voltages.

Questions related to this item have already been mentioned.

The reporter also visited the Research Centre of the "Electricité de France" at Fontenay, one of the largest high voltage and high power centre of this kind in Europe. With its well equipped laboratories, digital and analoguous computers and a large engineering and scientific staff, the centre made a very favorable impression. It is felt, that a cooperation between CERN and this centre in certain fields of electrical engineering - which for the time being does not exist at all - could be advantageous for both sides.

As an example I would mention the E.d.F. realizations of measuring equipment such as potential free oscillographs for µs- and ms-pulse measurements on potentials up to several 100 kV high precision d.c. and surge voltage dividers as well as shunts for surge currents up to 50 kA and more. The E.d.F. centre already collaborates with many industries and laboratories in France and Europe. A documentation about the E.d.F. centre at Frontenay is available in the ENG. Division.

At Saclay the "Saturne" accelerator, the power house, beam transport magnets as well as the 30 cm and 55 cm bubble chambers were visited. Messrs Allard and Lefrère gave information about the results obtained with the first glass-cathode "Bernard" type separator, who has just been transported to CERN. So far, the results are rather discouraging; only 520 kV at 10 cm gap without magnetic field were reached. It is however hoped, that with systematic tests at CERN, this value could be raised to, say, 600 kV, which is still less than the expected 700 .. 750 kV. The current regulation system for beam transport magnets is much simpler than ours, as no special requirements are asked for (polarity reversal, simultaneous regulation etc.). Only operators are for the time being allowed to regulate the magnet current.
Among the beam transport magnets, the impedances of which are not yet standardized, a 20 x 70 cm gap- 20 kG-, H-type deflection magnet, made by "Jeumont" drew special attention by its conception and realization.

It is interesting to note, that all beam transport magnets at Saclay have a block insulation of the coils, a solution we never accepted because of the justified apprehension about the consequences of an insulation damage.

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