ELECTRICAL ENGINEERING

New Transmission System Permits Wide D-C Use

Short Circuit Causes Drop in Power Instead of Increase; Makes Nation-Wide Network of Lines Possible

A NEW system of direct current electric power transmission which may overthrow present alternating current methods was presented before the New York meeting of the American Institute of Electrical Engineers.

The new system, described by B. D. Bedford and Dr. F. R. Elder of the General Electric Co. and Prof. C. H. Willis of Princeton University, has possible ramifications—although not mentioned officially at the meeting—in the field of government generation and transmission of power such as T.V.A. and the use of great direct current generators as are foreshadowed by the 10,000,000 volt apparatus of Prof. Robert Van de Graaff of the Massachusetts Institute of Technology.

Radical Changes Forecast

So highly is the system regarded in some electrical circles that the editor of the *Electrical World* remarked, "Engineers have only themselves to blame if they miss hearing why direct current transmission is just about to crowd the heels of present transmission practice."

Biggest drawback of direct current power transmission systems in the past, and one of the major reasons why today most systems use alternating current, was the danger of flashing sparks of miniature lightning whenever the d-c system short-circuited. This obstacle, it is claimed, has now been overcome.

The new system is so arranged that when the short circuit occurs power in the circuit decreases instead of increasing. Thus the greatest handicap of d-c transmission in its competitive battle with a-c is overcome. Once the problem of high current short circuits in d-c systems is conquered electrical engineers can take advantage of the long-known benefits of this type of system.

One advantage is that a number of generators can be fed into a single transmission line at different places. With present a-c systems this is possible but a problem of great technical difficulty, for each generator station must be in step, or synchronized, with all the others. With d-c systems all talk of phase relations and such technical subjects is removed.

The picture envisioned by the new system includes great, nationwide power lines fed at intervals by either steam or hydroelectric plants. Power networks could be strung out indefinitely.

Giant Vacuum Tubes

In experimental installations at Schenectady direct current of 15,000 volts was obtained from alternating current lines by the use of phanotron and thyratron tubes. These giant vacuum tubes turned the incoming power supplied to the buildings at 13,800 volt, sixty cycle, three-phase, alternating current, into d-c at 15,000 volts and 200 amperes.

After being transmitted through 15,000 feet of underground test conductor the d-c was turned back into the alternating current line with the necessary characteristics. Complete control by the operator was effected at all times.

Among demonstrations showing that short-circuits are not serious in the new system, the electrical engineers tried to create an arc across one of the large insulators used on 11,000 volt transmission lines by short-circuiting it with a small wire. The voltage on the line fell almost to zero but the current remained constant. When the short-circuit was removed the voltage returned rapidly to its full rating and the current was still constant. The experiment with short-circuiting insulators is similar to that encountered when lightning strikes a high-powered transmission line.

The tests indicate that overhead lines can be built with fewer insulators than is now required for a-c transmission, because, while there may be an arc over during a lightning strike, the dynamic current of the system is limited and the arc will extinguish itself. Each insulator on such a system therefore becomes a lightning arrester to clear the line of any high-voltage transient currents.

A new type of electric motor which scientists hail as revolutionary was described before the meeting by the world-famous Swedish-born electrical engineer, Dr. E. F. W. Alexanderson, who is consultant for the General Electric Co.

Here is what makes Dr. Alexanderson's new motor revolutionary:

1. It can be "plugged in" right across the leads of a 2,300 volt circuit and start gently and easily and not burn up.

2. It uses electron tubes to turn alternating current into direct current, so that the motor, although it runs off a-c, has the characteristics of a variable speed d-c motor.

3. Instead of being started with a special resistance device for controlling the current supplied to it, the new motor can start from the beginning at "full throttle." The starting of the motor can thus be made entirely automatic from a remote point miles away if desired.

In describing the new application of electron tubes to the field of electric motors Dr. Alexanderson, in his paper presented with A. H. Mittag, of General Electric Co., told how the thyratron tubes employed take the place of the commutator in the usual motor.

A commutator, Dr. Alexanderson indicated, consists of the copper segments at the end of the rotating part of an electric motor. Brushes, usually of carbon, bear against it and pass current through the rotor in the proper way. The make and break of such arrangement finally leads to sparking at the brushes, which requires a cleaning of the commutator and a reshaping of the brushes. With the electron tube commutator device such hindrances are avoided.

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MEDICINE

Thunderstorms Vitiate Asthma Treatment

THUNDERSTORMS and asthma have baffled a group of scientists at the University of Illinois Medical College, Chicago.

These investigators, Drs. Tell Nelson, B. Z. Rappaport, William H. Welker and A. G. Canar, know they can relieve asthma sufferers by putting them in an air-conditioned ward or room, but they are up against a blank wall as to why the thunderstorm sets the patients back. Some factor other than pollen, temperature, humidity and ozone must play a part in bringing on asthma attacks, they believe.

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