RESEARCH AND DEVELOPMENT

Summer Lightning

RESEARCH has begun into the possibility of providing Britain with an electricity transmission system of up to one and a half million volts. Since August, scientists at the Central Electricity Research Laboratories (CERL), using a gantry forty metres high and a Ferranti impulse generator capable of an open circuit output of 5.2 million volts, have been working on the basic problems of such a system.

The CEGB's new 400 kV supergrid is not yet fully commissioned but CERL has started work on ultra high voltage (uhv) because the time required to make a system operational means that research must be many years ahead of possible application. So far, each time a higher voltage network has been added, the voltage has roughly doubled —from 132 to 275 kV in 1950 and from 275 to 400 kV in 1960—but it has been suggested that the next step ought to be a trebling rather than a doubling of present levels—to 1,300 kV rather than 800 kV—because of the capital cost involved. It is also unlikely that demand will exceed the capacity of a 1,300 kV network in the foreseeable future.

Work on the basic data for an 800 kV system has already been completed and CERL is at present trying to find insulators capable of resisting lightning strikes and the surges resulting from switching in a uhv system. With higher voltages there are ever increasing difficulties with insulation and it has been suggested that uhv transmission will prove impossible; at CERL, however, they are confident it can be done and hopeful that it will prove possible to carry uhv on a single circuit eight conductor bundle on towers no higher than those used at present.

The porcelain insulators at present under test have withstood simulated lightning strikes of up to 5 million volts without breakdown but switching surges, which can be expected to reach two and a half times the nominal rating of a transmission system, are tending to break down at about 2.25 million volts.

The facilities, sited at Leatherhead on the edge of the Surrey green belt, are the world's first completely all-weather uhv test facilities; they will be used in close cooperation with the CEGB's Brighton site where work will shortly begin on the other main problem of transmission, the reduction in insulation efficiency due to pollution. Salt in the atmosphere is the worst enemy, and the Brighton site, right on the coast, is ideal for studying this.

The capital cost of the Leatherhead and Brighton sites is about £500,000. Cost was one of the two main factors that resulted in outdoor sites—to put only the Leatherhead facilities indoors would have cost another £2 million. The other factor was the firm belief of Dr John Forrest, director of CERL, that a uhv grid will finally have to work outdoors so it might as well start that way. The power frequency tests, which need to be done indoors, can be accommodated later in the existing laboratories.

The CERL facilities at Leatherhead showing the Ferranti 5.2 million volt impulse generator and the test gantry that permits possible tower designs to be examined, and substation plant to be tested alongside. Eight conductors in a metre bundle are suspended from the gantry on the porcelain insulator strings.

It is in fact doubtful if a grid of more than a million volts will ever be built. If the predicted 5.5 per cent per annum load growth rate for the later 1970s continues, then the present 400 kV network will be good for the next 20 years. Whether a 1,300 kV network (the likeliest voltage to be adopted over one million volts) will then be built will depend on the nature of power transmission by the 1990s; centralization resulting in fewer, bigger generating plants might well demand it, but a change in public attitudes to the siting of nuclear power stations near large towns, for example, would make it unnecessary. Whatever happens, uhv will not replace but only supplement the 400 kV network, and it is likely to be used only for the large-scale, long-distance transmissions from, say, the Midlands to London.

SOVIET SCIENCE

Industrial Research

THE recent "Scientists for Industry" seminar held in Rostov-on-Don on October 13–15, 1971, has again brought to the fore the apparent lack of contact between research and development and industrial application in the Soviet Union. The Rostov seminar was devoted to problems of expanding research in technical colleges, in accordance with the dictates of industry, but background material published in the Russian press suggests the existence of a more urgent problem than was dealt with at the Rostov meeting.

Writing in Pravda (No. 278, 1971), Academician Aleksandr Ishlinskii, chairman of the All-Union Council of the Scientific-Technical Society of the USSR, stresses the need for the development of research and development laboratories within factories that could provide one of the chief links in technological progress. Unfortunately, in many establishments, they are poorly equipped outbuildings, unsuitable for serious research and many factory directors consider them to be second-class departments. Although specialists working in these laboratories are entitled to a similar salary to that of scientists in pure research institutes, very few directors are willing to implement such payments. Accordingly, there is a serious leakage of scientists from industry, particularly in the highly qualified classes.

A closer cooperation between science and industry was one of the principal resolutions of the Twenty-Fourth Party Congress held earlier this year, and the factory laboratory has often been commended as an excellent means of implementing this cooperation. But, without more attention and funds, they may act as a deterrent to cooperation.