BRITISH ELECTRICAL AND ALLIED INDUSTRIES
RESEARCH ASSOCIATION

ANNUAL REPORT

THE chairman of the Council of the British Electrical and Allied Industries Research Association, Mr. F. H. Bramwell, refers in the opening paragraph of his foreword to the annual report of the Association to the loss sustained in the death a little more than a year ago of its director, Dr. Stanley Whitehead. Dr. Whitehead's successor, Dr. H. G. Taylor, took up duty on May 1, 1957, the day of the annual general meeting of the Association.

During the year under review, the Association has transferred the major part of its research activities to new laboratories at Leatherhead, which were formally opened by Lord Mills, Minister of Fuel and Power, on June 26 (see p. 260 of this issue).

The list of reports issued during the year represents all but one of the twenty sections into which the Association's work is divided. Much effort continues to be devoted to work on dielectrics, but it is stated that increasing pressure on the Association to extend its investigations to cover new dielectric materials and processes is tending to reduce the scale and scope of the fundamental work on dielectrics, much of which served in earlier years as the foundation upon which the present developments were based. Intensive study is being given to the factors determining the electric stress at which discharge is initiated in void-free impregnated dielectrics. Work is continuing on the revision of intrinsic electric strength measurement following the discovery, previously reported, of electro-mechanical breakdown. A new investigation is in progress to test a hypothesis suggested by the results of life-tests on paper dielectric capacitors, namely, that one of the factors limiting life is a distribution of weak spots in the dielectric much larger than that corresponding to the known number of conducting particles.

Progress is reported in theoretical work on electronic emission from the metal cathode of an electric arc. The spark discharge in uniform fields is being investigated in relation to formation times by means of a new technique in which a stabilized d.c. supply is used to energize an impulse generator. Further work on gas breakdown at ultra-high frequencies has included measurements in sustained oscillatory fields.

Work on the ratings of transmission and distribution cable includes an extensive programme of field-tests designed to produce data which will enable the fullest utilization of cables to be attained. One aspect of the investigation is the determination of moisture displacement and consequent drying out in the vicinity of loaded cables and the resulting reduction in heat dissipation.

Practical progress in circuit breakers and contactors has resulted from the work on circuit interruption at high vacuum. Work on air-blast circuit breakers has included the study of the voltage distribution across gaps in series in multi-break circuit breakers. Fundamental theoretical work on the elec-

trical and thermal processes of the steady-state arc has suggested that higher arc temperatures occur than had previously been supposed. These predictions, which have been confirmed by spectrographic measurements, have important consequences in relation to the dynamic behaviour of arcs in switchgear.

Progress is reported in the several branches of work on flame-proofness and intrinsic safety. Among these may be mentioned measurements made simultaneously at four points of the transient pressure associated with explosions in the 800 h.p. motor at the Safety in Mines Research Establishment, the machine running at normal speed.

Work continues on the extension of steam tables to 750° C. and 15,000 lb./sq. in., and it is noted that these researches provided a substantial contribution to the Fifth International Conference on the Properties of Steam held in London in July 1956. The programme of work on the creep and corrosion resistance of steel for high temperatures continues, and mention is made that the test rig for the investigation of steampipe welds which was being installed at Brimsdown power station is now in operation.

The Association has long been concerned with work on electrical interference. The authoritative work on inductive interference which has been in preparation for some time is now in process of publication.

In the field of rotating machines, a new theory of tooth ripple flux penetration into laminated pole faces has been developed and has been substantially confirmed by experiment.

The analysis of the behaviour of power systems under steady-state and transient conditions will be greatly facilitated by the completion of the network analyser which is now in partial operation in the new laboratories.

It is interesting to note in passing that the one section of the Association's work not represented by publications is that dealing with the transmission of power at high voltages. Much of the activity of this section has been devoted in recent years to studies of high-voltage direct-current transmission. This work had been in abeyance during the past year, but it may well be that the decision to utilize high-voltage direct current for the cross-Channel power link with the Continent will revive activity in this field.

It is noteworthy that, at the beginning of the report, mention is made of possible future restriction of the Association's development in the absence of increased financial support from industry. The opening of the Association's new laboratories should provide a powerful stimulus to the industry to give increased support to the work of an association which, during the past thirty years, has made a major contribution to the advancement of knowledge and to practice in the electrical engineering field.

J. GREIG