

Radio Communication in Mountain Areas.—Tests have been conducted on behalf of the Tourist and Publicity Department using two-way radio-telephone equipment which showed that successful communication could be achieved over distances as great as twenty-three miles in mountainous country, and equipment is approaching completion.

Marine Radar.—Routine inspection and maintenance of marine radar has proceeded during the year; the list of vessels visited includes "Rangitira," "Wahine," "Waikemo," "Hinemoa," "Rakaia," "Lautoka," "Rangitikei," "Rangitata," &c.

Transmission of 3 cm. and 9 cm. Radio Waves in Tropical Areas.—The efficiency of microwave radar in tropical areas is seriously affected by rainstorms owing to absorption of energy by the rain and to interference caused by energy reflected back to the receiver from the rain. Equipment developed and used in England for measuring the absorption has been received and will be used in the Auckland area, where rainstorms can approach tropical intensity. Observations of reflection from the rain will be made simultaneously, using 3 cm. radar.

Prediction of Transmission of Radio Waves.—Studies have been undertaken in an effort to improve the reliability of predictions of radio circuit operation. Data derived from the analysis of circuit performance records and observations of phenomena associated with changes of performance will be correlated. Observations are available from various sources on sunspots, solar noise, magnetic storms, earth currents, ionosphere conditions, and aurora.

THE CANTERBURY PROJECT

The Canterbury Project is a long-term investigation in radio meteorology to determine the effect of the Canterbury Föhn wind (nor'wester) on the propagation of ultra-high-frequency radiation in the troposphere. The influence of the sea breeze is also being investigated. The results of the experiments will be of world-wide application, and the United Kingdom has taken an active part in assisting with personnel, material, and finance. The United States of America has contributed a quantity of meteorological equipment on loan.

The bulk of the personnel and equipment arrived at headquarters area of the project at Ashburton Aerodrome in May, 1946, and there followed a period of installation and organization work which was not concluded until mid-September. The United Kingdom party of six arrived in June, followed shortly by their equipment.

Full operations commenced towards the end of September, but since that date there has been a phenomenal paucity of north-west conditions, and only a meagre quantity of data has been collected this spring and summer. By late November it was apparent that the investigation would have to be extended to the end of 1947 to ensure the collecting of sufficient data to answer the various problems involved.

The quality of the data obtained in field observations has been of good standard, and improvement in techniques as the summer progressed has resulted in the maximum of useful information being obtained in an operational period with the facilities available. Final analysis of a large section of the results is being undertaken by Telecommunications Research Establishment in the United Kingdom, and they have expressed themselves gratified with the data furnished to them to date.

The results obtained during the spring and summer allow no more than a few tentative and very general conclusions to be made at present, but they indicate that, with a normal season next spring, ample data should be obtained to ensure a satisfactory solution to the problems. When conditions are not favourable for work on the main project, the party is engaged on a subsidiary research programme related to current radar and meteorological problems.

ENGINEERING LABORATORY

Precision Moulding Technique.—Investigations have been started on the production of non-ferrous castings by the investment process.

Photoelastic Investigation of Knee-joints.—In order to widen the available knowledge on the stresses set up in a rigid frame structure, photoelastic models have been made up for analysis. Particular reference is being made to the type of haunch.