

done in the office under well controlled conditions. The Department is constantly investigating and developing new and better photogrammetric techniques to reduce the cost of mapping and to keep maps up to date and useful.

Geodetic Surveys.—The Department's Geodetic Survey provides the framework of control, i.e., horizontal and vertical control, for mapping and engineering operations carried out in Canada. The horizontal control network consists of a series of points, usually marked by survey tablets, the latitudes and longitudes of which have been accurately determined. The work progresses from points whose positions are already known to unknown points. The vertical control network consists of a series of points, usually marked by survey tablets and referred to as bench marks, whose elevations above sea level have been accurately determined.

The Geodetic Survey has extended first-order horizontal control over the ten provinces and into the territories, as shown on the accompanying map. It is gradually extending this precise control in the North and, at the same time, is increasing the density of control in the southern areas. In the North, the network of precise control will gradually replace that established by the Survey by means of shoran trilateration between 1948 and 1957 over the territories and the Arctic Archipelago to permit the reconnaissance mapping of this vast remote and isolated region. Shoran is an electronic method of measuring distance by air.

The Canadian precise level network consists of 44,500 miles of levelling, mostly along highways and railways south of the 55th parallel. The principal lines in the more northerly regions follow the railways to Churchill, to Lynn Lake and to Waterways; the Mackenzie Highway to Hay River on Great Slave Lake; and the Alaska Highway to Yukon Territory and Alaska. There are also a few lines in the Peace River district of Alberta and in northern British Columbia and Yukon Territory. In all, some 15,000 bench marks have been established in the course of this levelling and, in addition, there are about 16,000 miles of second-order levels, most of which were established prior to 1930. The ultimate goal of the Geodetic Survey is the establishment of at least one horizontal and vertical control point within ten miles of any point in Canada.

Topographical Mapping.—The basic requirement for resource development is, of course, suitable topographical maps of the country's vast land mass. The Department, through its Topographical Survey and in conjunction with the mapping agency of the Department of National Defence, is pressing forward with the topographical mapping of the country at the medium scale of 1/250,000, or about four miles to the inch, which it hopes to achieve by 1967, and with the larger scale mapping at 1/50,000 in the more settled areas and areas of greater economic importance. About 35 p.c. of this task has been completed. The third objective is to provide topographical mapping at a scale of 1/25,000 to assist the orderly planning and development of areas of special economic significance such as urban, suburban, mining and industrial districts. The progress the Survey is making in the mapping of the larger Canadian centres at this scale is also assisting it in carrying out a fourth objective—the systematic revision of out-dated maps. The rapid growth of industrial areas in Canada during the past two decades has completely changed the topographical face of these areas and made necessary the updating of existing maps.

Currently, topographical field parties in one field season cover a total of some 225,000 sq. miles for the average production of 30 maps at 1/25,000, of 300 maps at 1/50,000, and of 45 maps at 1/250,000. In one of its most challenging projects, the Survey, in co-operation with the Army Survey Establishment of the Department of National Defence, carried out the topographical mapping of the 500,000 sq. miles of territory of the Arctic Archipelago in the period 1960-63, and hopes to have these maps available for the public by 1967.

An idea of the amount of work done by a field party and the calibre of men on these parties may be gained from an account of the activities of one of the parties engaged in the mapping of the Arctic islands. In 1962 a party of 14 men, including aircrew, was