THE papers submitted to the 1955 Commonwealth Survey Officers' Conference, held recently at Cambridge, were of a highly specialized nature, those on air survey subjects dealing more with surveying techniques and with the results yet to be obtained from the flying aspect. Indeed, the aeroplane was a notable absentee at the otherwise comprehensive exhibition of survey instruments displayed for the conference—partly, no doubt, for purely practical reasons and partly because many of the aircraft flying in the conference's early part of the year were military types; the Lockheed P-38 Lightning, D.H. Mosquito, and B-17 Flying Fortress are examples that come to mind. The conference was of particular interest to read in a paper entitled "An Aerial Survey Operation Overseas," by W. P. Smith (Air Survey Co., Ltd.), that a Dakota was used for high-altitude photographic survey in the Zambezi River valley last year. The operating height was 25,000 ft. and the aircraft was fitted with Pratt and Whitney R-1830-90C engines.

A point that emerged in the discussions at the conference is the extent to which the cameras are playing an essential part in mapping operations in roles other than the principal one of carrying the surveying camera; in addition to transporting men and equipment over the long distances involved in the routine work of Colonial surveying, aircraft of both fixed- and rotary-wing types are being increasingly used for flying surveyors directly to the points on high ground from which the basic visual triangulation can be started. This is a matter of a major contribution in this and similar roles, and one which will further increase when performance under tropical conditions and at high altitudes is improved.

The papers submitted to the conference were necessarily esoteric in their appeal, but there emerged from them, and from the ensuing discussions, two points of wider interest; first, the way in which different countries have adapted the techniques of navigation and survey photography to their own conditions and technical resources and, secondly, the progress that has already been made, and will evidently continue, in the use of electronic devices for facilitating the survey aircraft and for securing the actual survey data.

Both these points were well brought out in a paper—"Modern Survey Methods Adapted to Canadian Conditions"—presented by Mr. W. H. Miller, Director of the Surveys and Mapping Branch of the Department of Mines and Technical Surveys, Dominion of Canada, and prepared by Mr. E. J. White, Topographic Survey, and Lt.-Col. J. I. Thompson, Army Survey Establishment.

The first part of this paper dealt with a new photographic technique developed in Canada and known as the bi-camera method. In its essence, the aircraft carries two bi-cameras, one pointed vertically downward in the conventional manner and one mounted obliquely and directed in the line of flight with its axis of projection at an angle of depression of the oblique camera is such that the photograph will include both the horizon and a small portion of the area covered by the vertical camera. The effect of this arrangement, the paper went on to prove, is that permits of the terrain ahead, taken by the forward-looking camera, to be precisely determined. By flying along the right bisector between two stations, the system can be used to measure the inter-station distance; the measurement of lines in the other direction, ranging about 200 miles in length, is the basis of triangulation and the survey technique, which has been widely used in a large area of Canada with great success. It is interesting to note that the mainland of Northern Canada has been covered by Shoran triangulation nets, over 90 stations having been established.

Shoran is also used as a position-fixing system for the aircraft, with the result that photographs taken of a place, can be determined by their correct positions on the earth's surface. Since 1948 Shoran has been extensively used in Canada for the control of air photography, first by the R.C.A.F., and later by contract to civilian firms. The photographs are 45,000 square miles were covered in the first contract, and in 1953 the same contractor made the most of good photographic weather and of the lessons learned from the previous year, covering over 132,000 square miles. The 1954 season was equally successful, and in three seasons a lattice of Shoran-controlled photography spaced at about 20-mile intervals covered 100,000 square miles. The Canadian paper also referred to the increasing use of radio altimeters for "vertical control" in air survey.

Electronic aids to surveying have come into being only in the decade since the war, and the recent Survey Officers' Conference was the first of a series held at roughly four-yearly intervals to include a paper devoted entirely to this subject. (Radio Aids to Aerial Surveying" by C. P. Talbot, of the Dominion Survey Establishment). After a review of current radio and radar position-fixing systems, in which it was shown that the wavelength on which the system operates determines within close limits its operational scope, the author described the Shoran Navigator system in detail, with special reference to its current use in various types of survey operation. On the air side, an interesting example was the control of the accurate navigation required for large-scale air photography under the U.K. Terminal Decca service, and the current use of Decca has been specified for this work for some years past and was made necessary by the close spacing of the parallel photographic tracks and the high accuracy of tracking required (e.g., plus or minus 20 yards at the large photographic scales used).

The Decca Navigator, being a long-wave system, could be used only for navigation in a line almost entirely over featureless country and by 1951 had mapped a total of about 150,000 square miles. The Canadian paper also referred to the increasing use of Decca has been specified for this work for some years past and was made necessary by the close spacing of the parallel photographic tracks and the high accuracy of tracking required (e.g., plus or minus 20 yards at the large photographic scales used).

The Decca Navigator, being a long-wave system, could be used only for navigation in a line almost entirely over featureless country. In this, the authors pointed out, was the essential basis of all development work in the area concerned. Equally important, however, was the preparation of maps recording land use, soils, forestry and geology, these being grouped under the general heading of "resources surveys." Aerial photography played just as vital a part in the production of a resources survey as in the making of a topographic map, and the paper included examples of this type of survey operation.

Survey in Africa

Recent and current aerial survey work on the African continent was described in a paper—"Aerial Photography in Nigeria," by Mr. H. A. Stammers Smith, Director of Federal Surveys. The first aerial photography of Nigeria of any magnitude was by the Decca Navigator system, in which different countries have adapted the techniques of navigation and survey photography to their own conditions and technical resources and, secondly, the progress that has already been made, and will evidently continue, in the use of electronic devices for facilitating the survey aircraft and for securing the actual survey data.

Points from the Commonwealth Survey Officers' Conference

The papers referred to have been concerned with the means of achieving a completely satisfactory position-fixing system during the survey operation. It is perhaps appropriate to conclude this brief review of a few of the conference papers by mentioning one of those that dealt more with the end-product of the survey. The paper, entitled "Aerial Photography and Resources Surveys," was presented by Mr. T. D. Weatherhead, director and general manager, Hunting Aerosurveys, Ltd., and Mr. V. C. Robertson, manager, Department of Surveys Department, Hunting Aerosurveys, Ltd. The principal products aside from the topographic map, and this, the authors pointed out, was the essential basis of all development work in the area concerned. Equally important, however, was the preparation of maps recording land use, soils, forestry and geology, these being grouped under the general heading of "resources surveys." Aerial photography played just as vital a part in the production of a resources survey as in the making of a topographic map, and the paper included examples of this type of survey operation.