

Midlands Survey

—by Airborne Magnetometer:
Anglo-Canadian Co-operation
at Derby

ALTHOUGH extensively practised in the more remote areas of the world, aerial geophysical surveying on a large scale has had little practical application in this country. Only recently has the sight of a lone Anson, patrolling 90-mile beats and trailing an airborne magnetometer "bird," become familiar—or as familiar as the grey murk of the Midlands would allow—to many English observers.

This project, the first large-scale airborne geophysical survey in England, covers almost 11,000 square miles, and is being carried out by Canadian Aero Service, Ltd., in association with Derby Aviation, Ltd., for the Geological Survey, South Kensington. It is being financed by the Nuffield Foundation, on the recommendation of the Department of Scientific and Industrial Research. To date, the flying side of the operation has been completed, and the resulting data is being correlated and studied.

The basic information which is being obtained comprises the distribution of the earth's magnetic field over the area shown shaded on the map (sheets 11 and 15, quarter-inch Geological Survey maps of England and Wales) or, more specifically, the variations in the earth's magnetism caused by the location and degree of magnetization of the rock strata. From these variations (finally presented in the form of "magnetic contour" maps) much can be deduced concerning the strata themselves.

The probable mineral resources of an area can also be deduced from this information, and indeed this has been the main purpose of many overseas surveys. For the Midlands survey, however, the primary purpose is not to discover new mineral resources, but rather to supplement the considerable existing geological knowledge of the area. The results will show whether the extensive use of such surveys in Britain would be justified.

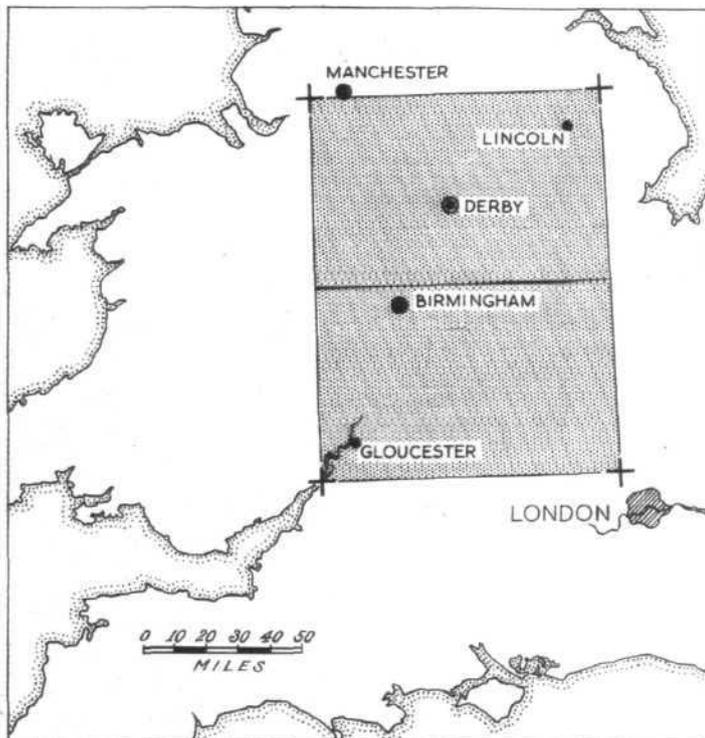
Overall supervision of the project is the responsibility of Dr. C. J. Stubblefield, F.R.S., assistant director of the Geological Survey, and Dr. W. Bullerwell, head of the Survey's geophysics department. At Derby Airport, where flying operations began in mid-August, the work is very much a joint effort between Canadian Aero Service, the survey company, and Derby Aviation, who own and operate Anson G-AMDA, with Thomas Rowlands of the Canadian company as project manager. Pilot of the Anson is Dick Wallis of Derby Aviation.

The aircraft itself is comprehensively equipped for its survey rôle. The magnetometer, which measures the magnetic field, has its detector head fitted in the torpedo-shaped "bird" which, as shown in the photograph, is trailed at the end of a 100ft cable during runs. Inside the machine are mounted the other sections



of the magnetometer installation, together with a continuous recorder; vertical continuous-strip 35 mm camera; radio altimeter and recorder; Decca Navigator Mk 8 receiver and Flight Log, together with camera; an intervalometer; and the cable winding-in mechanism.

Two separate electrical systems are used: normal aircraft services are operated on a 12-volt system from the starboard generator; and the special survey equipment on a 24-volt system from a 1.5 kW generator on the port engine. The aircraft differs from the original Mk 1 Ansons in having a Cheetah 19 (with compressor) on the port side; the starboard power unit is a Cheetah 9.



Area covered by the survey (shown above) totalled 10,800 sq. miles. Left, Messrs. P. O. Blass (Decca), T. Rowlands (project manager, C.A.S.), H. Jensen (commercial manager, C.A.S.), R. R. Paine (technical director, Derby Aviation), and W. DesLaurier (data chief, C.A.S.) examine the detector head of the airborne magnetometer.

Flying Technique.—The area was covered by a network of east-west runs, 90 miles in length and spaced at one-mile intervals. Different techniques were employed for the northern and southern sections. In the former, a constant height of 1,000ft above the terrain was maintained (the radio altimeter and recorder being used), while in the southern area the procedure was to fly at a constant height of 1,800ft above sea level. These respective methods are discussed later; the relative heights were so chosen as to give good continuity of readings at the north/south boundary, which lay at an average altitude of 800ft.

Visual navigation and photographic position-fixing were specified for the project, together with the experimental use of the Decca Navigator system for the latter function. Thus the normal procedure was for the pilot and navigator to use a one-inch Ordnance Survey map for navigation (permissible track error was only $\frac{1}{8}$ mile), a permanent record of the ground flown over being obtained by the use of the vertical mounted camera. In this

