Magnetic Geophysical Prospecting

by Adrian Challands

Over the last decade costs of archaeological excavation have risen dramatically due to a number of factors, including the high cost of removing topsoil on large sites. In order to clear archaeological sites for essential development quickly, expensive earthmoving machinery must be employed. As archaeological funds are limited, the maxim must increasingly be to make the most of available time and equipment.

Aerial photographs that show buried archaeological sites in the growing crop are a valuable technique for site location and preliminary interpretation (*Durobrivae* 7, 1979, 26f.). One problem is that most aerial photographs are oblique and difficult to plot on a map with a degree of accuracy which could save excavation costs. In addition, depending on the underlying geology, type of crop and the ground's moisture content, up to 90% of the archaeological features may not show up at all!

Archaeological geophysical prospecting is a rather off-putting technical term for what amounts simply to measuring the differences between the archaeological and the normal properties of the subsoil. Its main value lies in its ability to pinpoint archaeological features which may or may not show up on aerial photographs. So excavation costs are reduced and information is gained in advance of excavation.

In 1958 the Waternewton Excavation Committee, later the Nene Valley Research Committee, was one of the first archaeological organisations to employ magnetic geophysical methods to plan a series of rescue excavations on part of the suburbs of Durobrivae which were destined to be destroyed by the re-alignment of the A1 trunk road. Dr Martin Aitken of the University of Oxford Research Laboratory for Archaeology and the History of Art had developed an instrument for detecting slight changes in the earth's magnetic field, known as a Proton-Magnetometer. Most clays when burnt attain appreciable magnetic properties and this means that Roman pottery kilns are an ideal subject to seek and locate. Dr Aitken and his team rapidly surveyed the road-line and achieved their objective of accurately locating a number of Nene Valley Roman pottery kilns (Hartley (1972), 13-15). During the survey, an exceptionally important observation was made, that the instrument was also capable of locating weakly-magnetic pits and ditches. Thus the archaeological survey-potential of the instrument was widened.

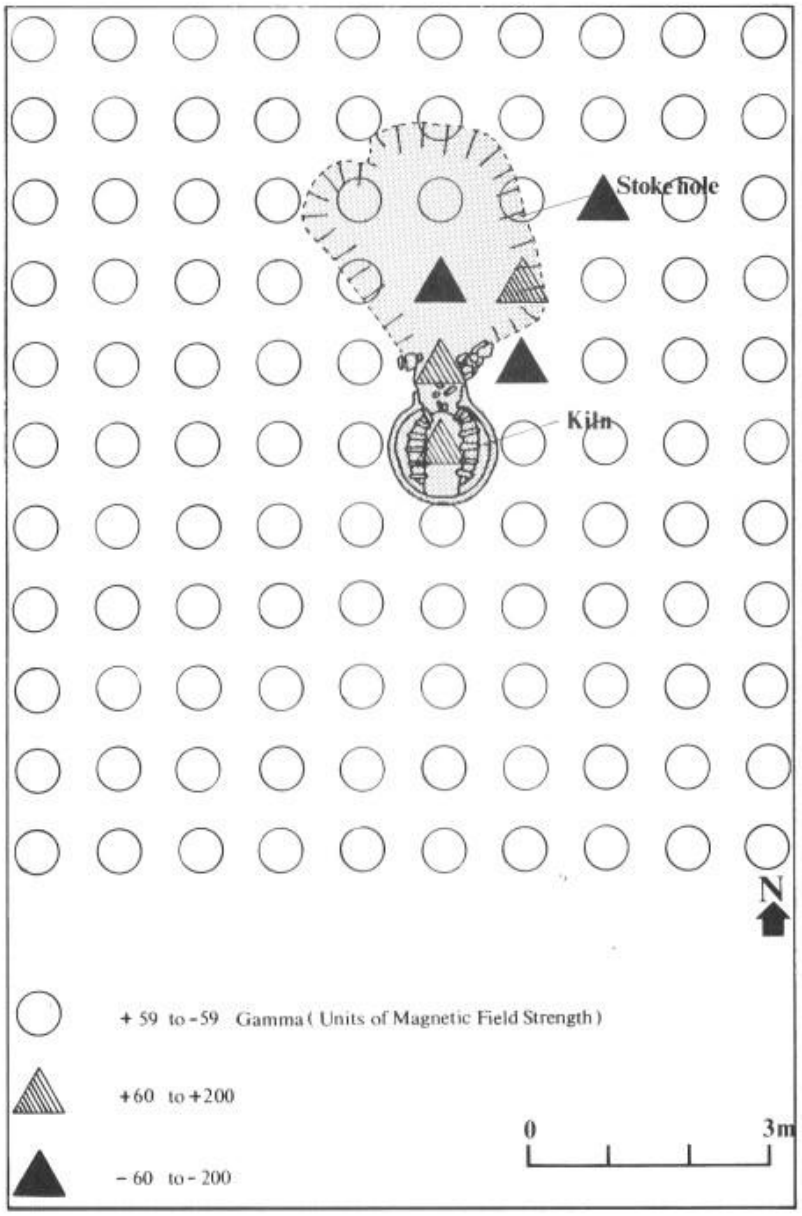

Fig 12 *Geophysical survey of a Roman kiln at Stibbington*

The proton-magnetometer is subject to considerable external magnetic interference caused by wire fences etc. To overcome this problem two detectors, one above the other, were employed; the resulting reading represented the strength of the archaeological anomaly deducted from the external magnetic effects. An improved and simplified version of this system, known as the 'Proton Maxbleep', was developed and commercially manufactured. This was the instrument which in past years the Committee borrowed or hired from various institutions and used to carry out major surveys within the New Town area at such sites as Normangate Field, Longthorpe and Orton Hall Farm.

The Committee has always kept abreast of progress in geophysical surveying techniques and when the 'Proton Maxbleep' went out of production and became increasingly difficult to repair, an alternative improved instrument was sought. Ultimately, in 1979, the Committee approved the purchase of the easily portable Fluxgate Gradiometer which has the added advantage of giving a continuous reading. With this instrument linked to an automatic plotting system instant site-analysis may be obtained.

Roman pottery kilns at Stibbington, first located by Dr Martin Aitken in 1968 using a proton-magnetometer and excavated in 1969 (Wild (1973), 135-138), were left *in situ*, providing a useful realistic test-bed for geophysical instruments. It was on this site that the new Fluxgate Gradiometer was tested. The appended small section of the survey shows large positive and negative readings where the kiln is situated. The furnace and stoke-hole of Kiln G are shown superimposed over the readings.

Bibliography

Hartley (1972) — B. R. Hartley, *Notes on the Roman Pottery Industry in the Nene Valley*, 1972.

Wild (1973) — J. P. Wild, 'A fourth-century potter's workshop and kilns at Stibbington, Peterborough' in *Current Research in Romano-British Coarse Pottery*, ed. A. P. Detsicas, 1973, 135-138.