



Jones , R.E. (2009) Proton magnetometer survey at the Menelaion and environs. In: Catling , H. (ed.) *Sparta, Menelaion I: The Bronze Age*. Series: Supplementary volume (45). The British School at Athens: London , pp. 176-179. ISBN 9780904887594

Copyright © 2009 The British School at Athens

A copy can be downloaded for personal non-commercial research or study, without prior permission or charge

Content must not be changed in any way or reproduced in any format or medium without the formal permission of the copyright holder(s)

<http://eprints.gla.ac.uk/45554/>

Deposited on: 01 May 2015

Enlighten – Research publications by members of the University of Glasgow  
<http://eprints.gla.ac.uk>

## Appendix J

### Proton magnetometer survey at the Menelaion and environs

by R. E. Jones

Two short seasons of geophysical survey with a proton magnetometer were carried out at the Menelaion and its environs during the excavation seasons in 1974 and 1975 with a view to locating buried structures or other features in the following areas: close to the Mycenaean site, between this site and the Menelaion shrine, around the Menelaion shrine itself, the North Hill and the Chapel site. This report presents the results of the survey of these areas in 1975 which are shown in FIG. J.1. The geological environment and topography of the Menelaion plateau and environs are described elsewhere in this volume.

The instrument used was an Elsec Type 592 proton magnetometer with the bottle height of 1 ft above ground level. Readings were taken (usually two at each survey position, repeatability being  $\pm 2$  gamma) at 1 m intervals (unless otherwise stated) either in the preferred mode of 10 m square grids or, where this was not possible, along linear traverses of varying length. In the former case the raw magnetic data were processed manually to give contour maps, from which anomalies were isolated. Some of these were weak, typically 5 gamma lower or higher in value than background, others ranged up to  $\pm 50$  gamma.

The first season's exploratory survey employed the strategy of excavating immediately the locations of some of the detected magnetic anomalies in order to provide a rapid assessment of the efficacy of the survey method. Overall, the results of this exercise were not encouraging in the sense that what magnetic anomalies were revealed by the survey were more likely to be of geological than archaeological significance. For example, localised changes in soil depth above the conglomerate bedrock seemed to account for several of the anomalies. The geological component of the magnetic anomaly was generally 'drowning' whatever archaeological component may have been present. But more positively, the experience gained in 1974 helped to identify suitable locations for survey the following year.

#### SM75 AREA 1

*Description:* Two 10 m grids, adjacent to K18 and K19, in the top are above the main excavated (Mycenaean) site. Barren, almost flat surface. Bedrock just below the surface, visible in some places. Steep slope down on south side.

*Results:* Two weak anomalies were detected, one of low and the other of high intensity, neither of which was likely to be of archaeological interest. The former was partially associated with the change in soil level at the steep slope down, while the latter was probably due to the effects of the infilling of the excavate area and the change in bedrock level. There was a clear magnetic intensity gradient, the intensity increasing from south to north.

#### SM75 AREA 2

*Description:* Three 10 m grids, three smaller grids and five traverses. Slight but non-uniform sloping area clear of thick vegetation. Some loose stone, especially conglomerate fragments in the southern parts of Area 2. Conglomerate bedrock visible at the edge of both sides of the plateau (X and Y in FIGS. J.1 and J.2).

*Results:* Several very localised anomalies were found, most probably due to buried (modern) iron objects. The main feature was a broad (5 m wide) low intensity anomaly, at least 20 m in length and SW-NE in orientation, which is interpreted as geological on the basis of the results from traverse X-Y in FIG. J.2. This figure clearly shows the intensity decreases unevenly from the western edge (X) of the plateau to reach a minimum, rising to a peak at the eastern edge (Y) whereupon it drops rapidly. Thus the bedrock, which is less than 1 m below the surface at edges X and Y, forms a dip towards the

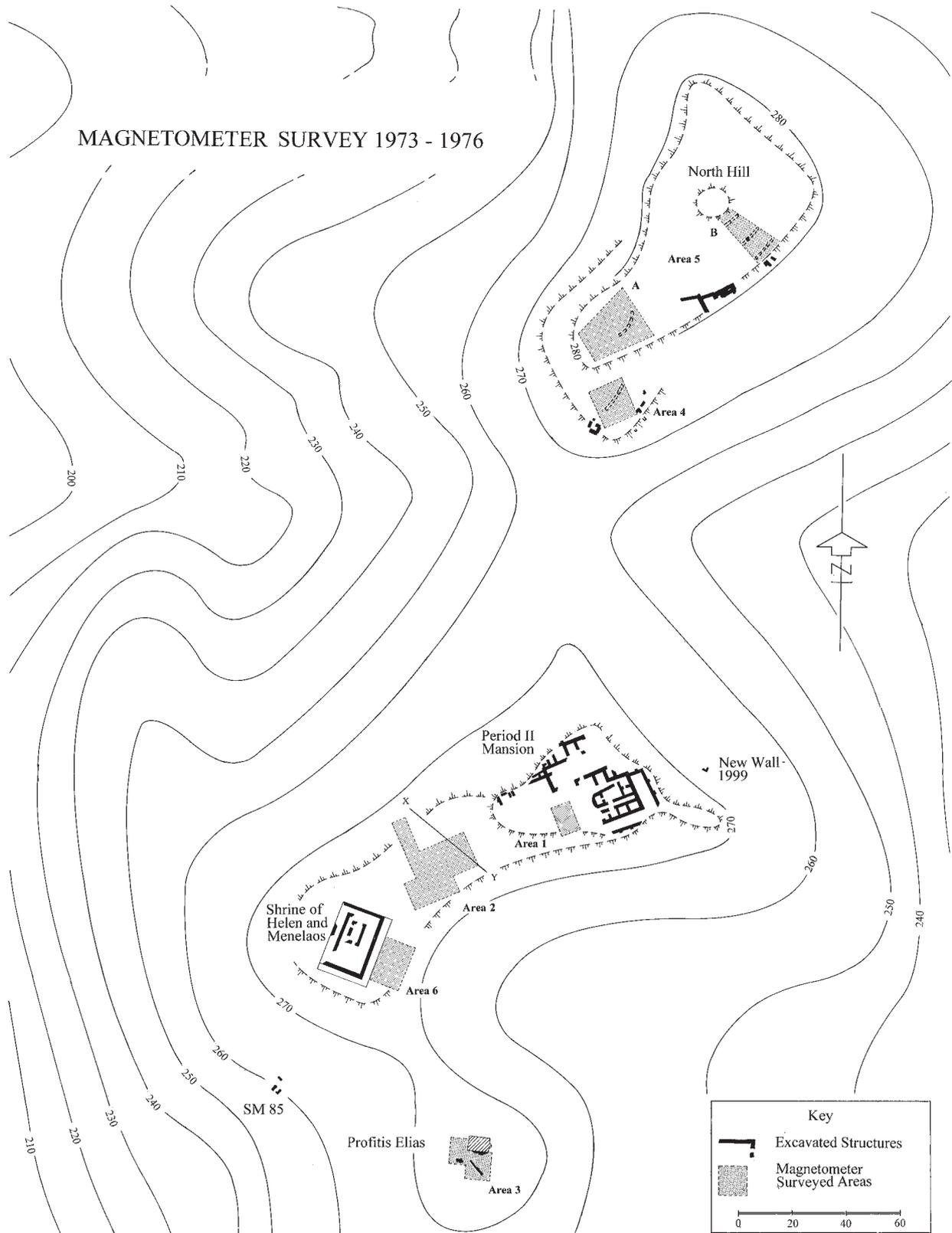


FIG. J.1. Site plan showing Areas 1-6 surveyed with the magnetometer, and for Areas 3-5 the anomalies detected. The anomalies in Areas 4 and 5 (A and B) were observed in individual traverses made within the three areas; they have dotted lines connecting the high intensity locations, shown as small bars approximately 2 m in length. The anomalies in Area ^ are described in the text.

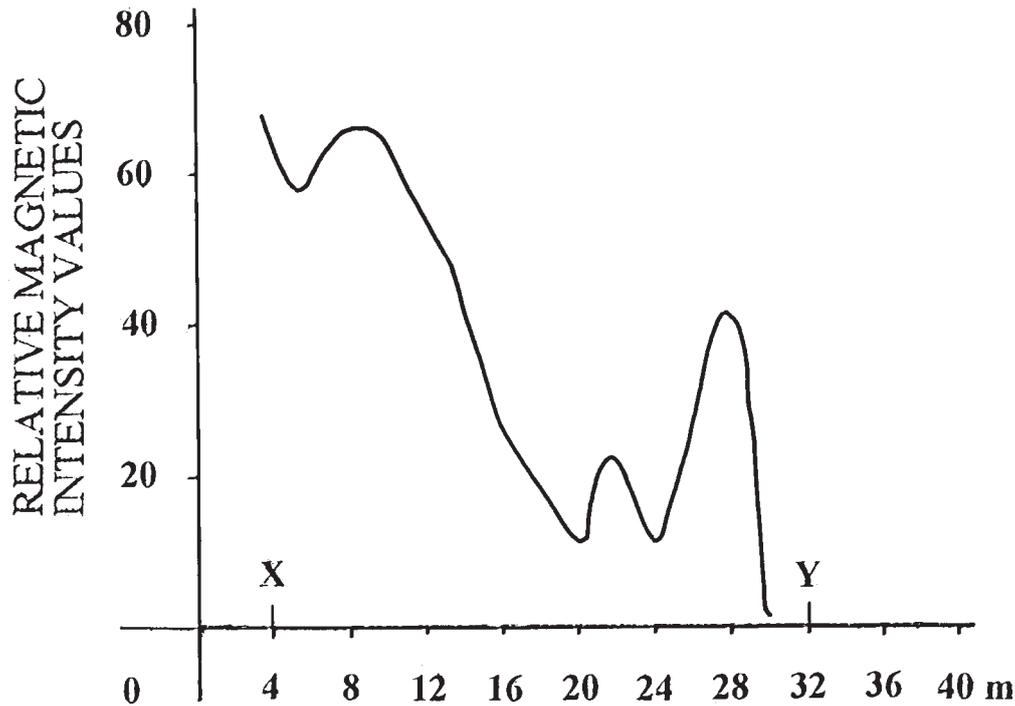


FIG. J.2. Relative magnetic intensity values on the traverse in Area 2. X and Y mark the edges of the plateau.

centre of the plateau in Area 2; it also rises close to the surface in the direction of the Mycenaean structures. No archaeological features were detected.

#### SM75 AREA 3

*Description:* One 10 m grid and one 10 × 7 m grid at the Chapel site. Flat, presumably artificially levelled; fairly clear of vegetation. Some stone, and some loose remains of old roof tiles.

*Results:* Of the three anomalies located (FIG. J.1), one can be ascribed most simply to the chapel foundations. Of the other two, both of low intensity, one is linear and could be a trace of wall. Nothing consistent with a grave was identified.

#### SM75 AREA 4

*Description:* Several linear traverses on Latsis fields, North Hill. Sloping terrain; no obvious evidence of terracing, large bushes and plants, few stones. The site was not suited to grid survey.

*Results:* Each traverse consistently showed one high intensity region, 1–2 m in length; its approximate location is marked on FIG. J.1. The anomalies, which seem to form a linear sequence but curving at the western end, could result from a robbed-out wall or terrace.

#### SM75 AREA 5

*Description:* Several traverses within two areas, whose approximate locations are marked on FIG. J.1. **A:** flat but rough ground, thick vegetation in places, area unsuitable for grid survey. **B:** slight slope, little interference from vegetation.

*Results:* The results, presented in FIG. J.1, are interesting if speculative. Positions of high intensity were found along some of the traverses, as in Area 4, and they indicate a possible curved ditch or robbed-out wall/terrace in **A**. In **B** similar anomalies are found whose axes closely parallel the contours of the hill, and as such they may well be associated with terracing. The middle one seems faithfully to follow a visible 'step down' in the ground level.

## SM75 AREA 6

*Description:* Two 10 m grids, adjacent to the Menelaion shrine.

*Results:* Some interference was encountered from stones, slabs of conglomerate and the edge of the shrine. Two small localised anomalies were detected, probably due to iron. The main anomaly (not shown in FIG. J.1), 1–2 m wide and over 10 m in length running approximately north–south and ranging in distance from the side of the shrine from 4 to 8 m, may be attributable to a combination of the effects of the bedrock and the conglomerate slabs of the shrine. The net effect is an apparent low intensity anomaly which is unlikely to have archaeological significance.

## SUMMARY

Magnetic survey has not found great application at the Menelaion and its vicinity. This was due to the effects of terrain and in particular variable depth of bedrock manifesting themselves more strongly in magnetic terms than the anomalies associated with the generally fragmentary building structures. Subsequent geophysical surveys in the broader area, first as part of the Laconia Survey<sup>1</sup> followed by the Laconia Rural Settlement Survey<sup>2</sup>, experienced similar results, namely poor detection of structures at locations situated well above the valley where there has been marked erosion. Survey at lower lying sites with good soil cover has been more profitable. On the basis of the accumulated experience in the area, it appears unlikely that resistivity survey at the Menelaion would have performed better than the magnetometer. Finally, it is regretted that the area where excavation revealed the one type of structure that the magnetometer would have detected with confidence, the MH kilns, was not surveyed.

## ACKNOWLEDGEMENT

The late David Smyth gave considerable assistance with the topographic aspects of the survey.

<sup>1</sup> W. Cavanagh, R. E. Jones and A. Sarris, 'The phosphate and geophysical surveys', in W. Cavanagh, J. Crouwel, R. W. V. Catling and G. Shipley (eds.), *The Laconia Survey II*. BSA Suppl. 27 (London 1996) 235–62.

<sup>2</sup> N Brodie, in W. Cavanagh and C. B. Mee (eds.), *The Laconia Rural Settlements Survey*. Fitch Laboratory Occasional Paper, in preparation.