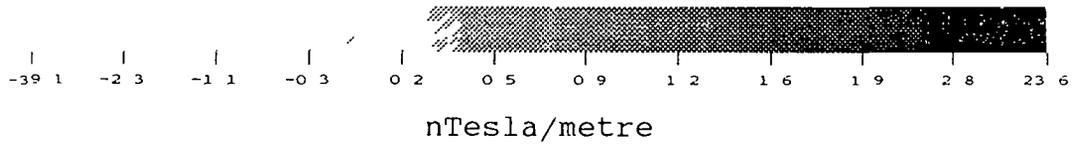


FIGURE 9

Results of the geomagnetic survey of the southern part of site RPS164
Refer to the scale below for absolute values



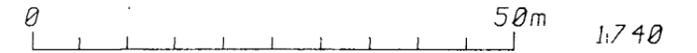
ANOMALIES

A64 YORK-
MALTON

RESULTS OF GEOPHYSICAL SURVEY
IN AREA RPS164 (South)

■ Positive

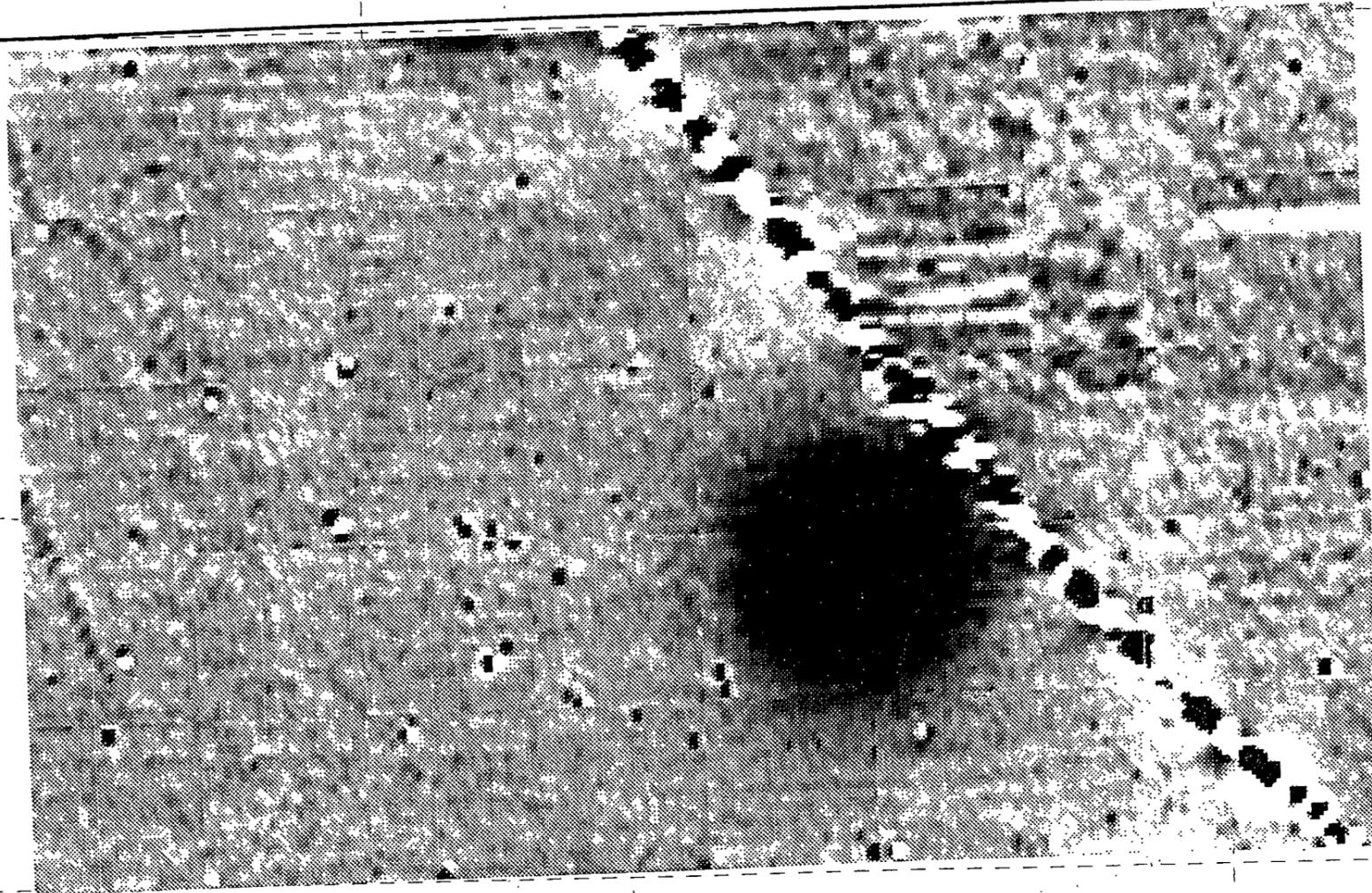
□ Negative



SURVEY BY **GeoQuest**
ASSOCIATES

ON BEHALF OF  THE DEPARTMENT
OF TRANSPORT

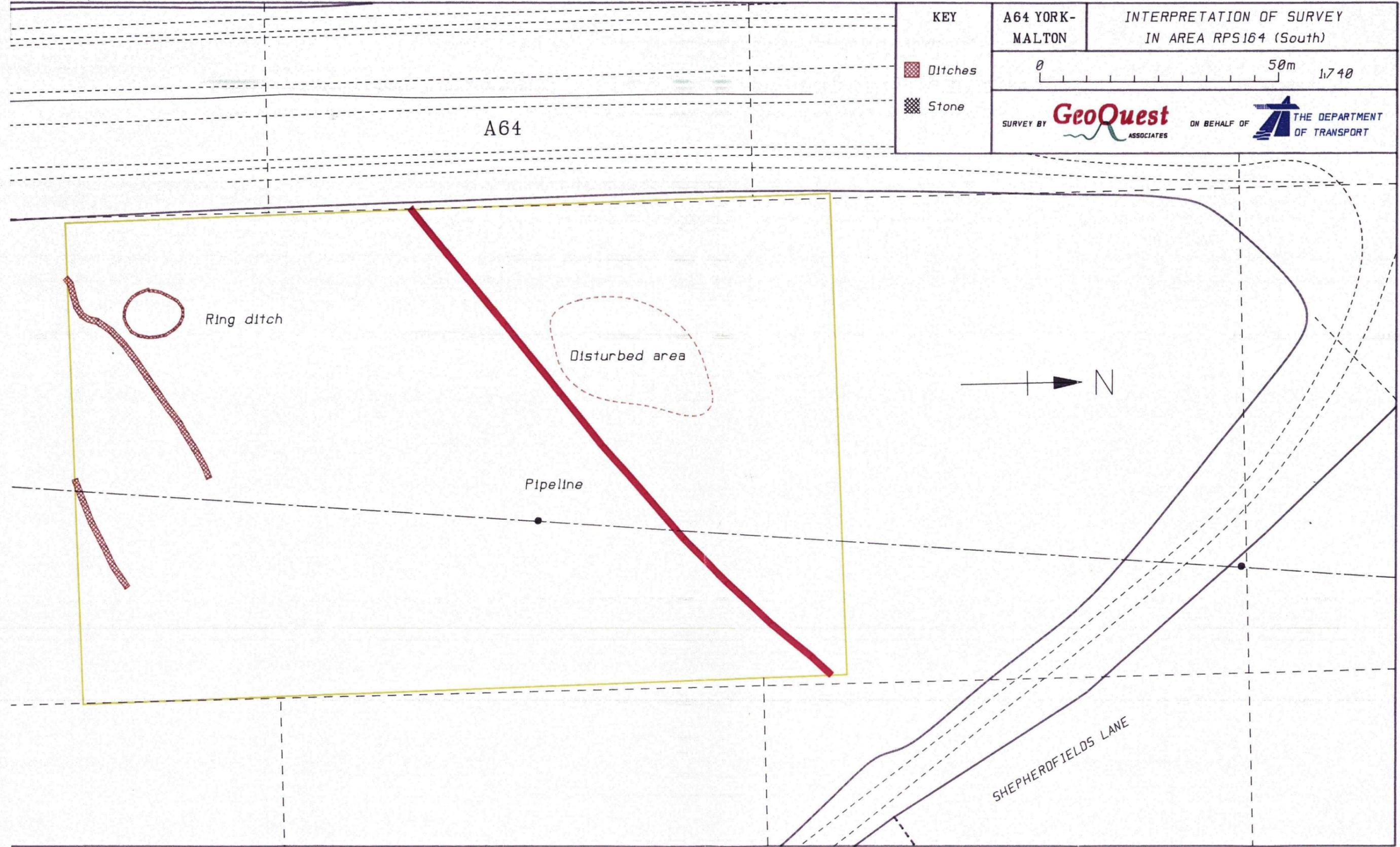
A64



SHEPHERDFIELDS LANE

FIGURE 10

Physical interpretation of the survey results obtained within the southern part of site RPS164. Refer to the key for an explanation of the symbols used.

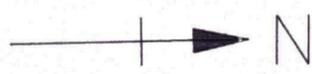


KEY	A64 YORK-MALTON	INTERPRETATION OF SURVEY IN AREA RPS164 (South)
	<p>■ Ditches</p> <p>■ Stone</p>	<p>0 50m 1:740</p> <p>SURVEY BY GeoQuest ASSOCIATES ON BEHALF OF THE DEPARTMENT OF TRANSPORT</p>

Ring ditch

Disturbed area

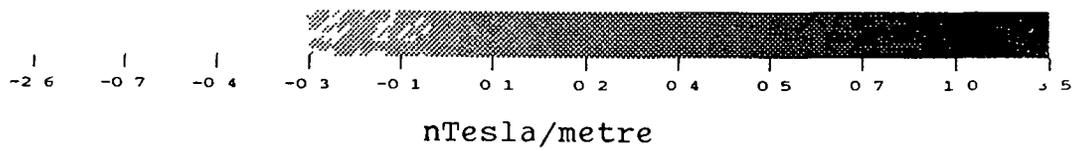
Pipeline



SHEPHERDFIELDS LANE

FIGURE 19

Results of the geomagnetic survey of site RPS163 Refer to the scale below for absolute values

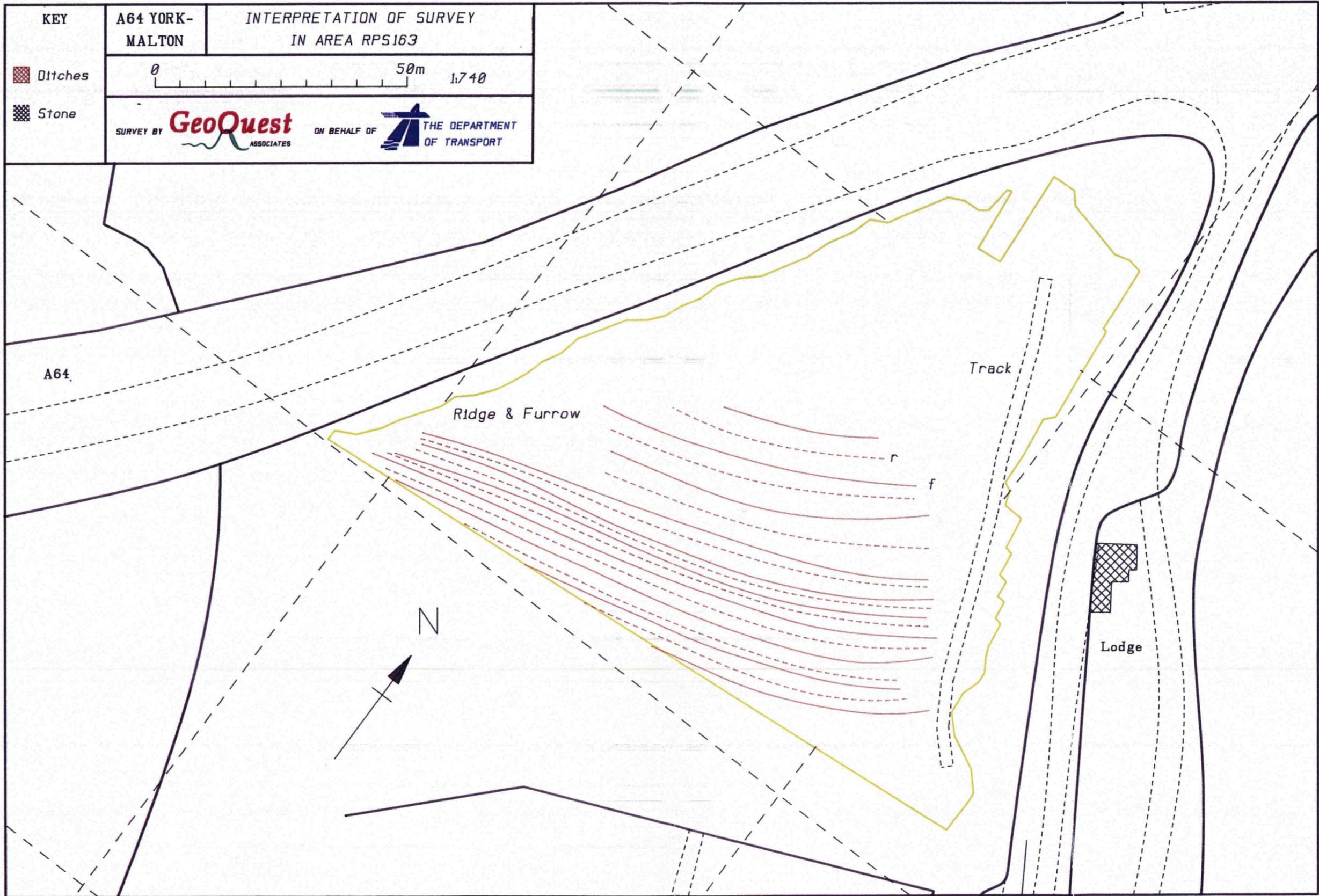


ANOMALIES	A64 YORK- MALTON	RESULTS OF GEOPHYSICAL SURVEY IN AREA RPS163	
		0 50m 1:740	
	<input checked="" type="checkbox"/> Positive <input type="checkbox"/> Negative	SURVEY BY GeoQuest <small>ASSOCIATES</small>	ON BEHALF OF  THE DEPARTMENT OF TRANSPORT



FIGURE 20

Physical interpretation of the survey results obtained within site RPS163
Refer to the key for an explanation of the symbols used



APPENDIX A

Theory of Geomagnetic Surveying

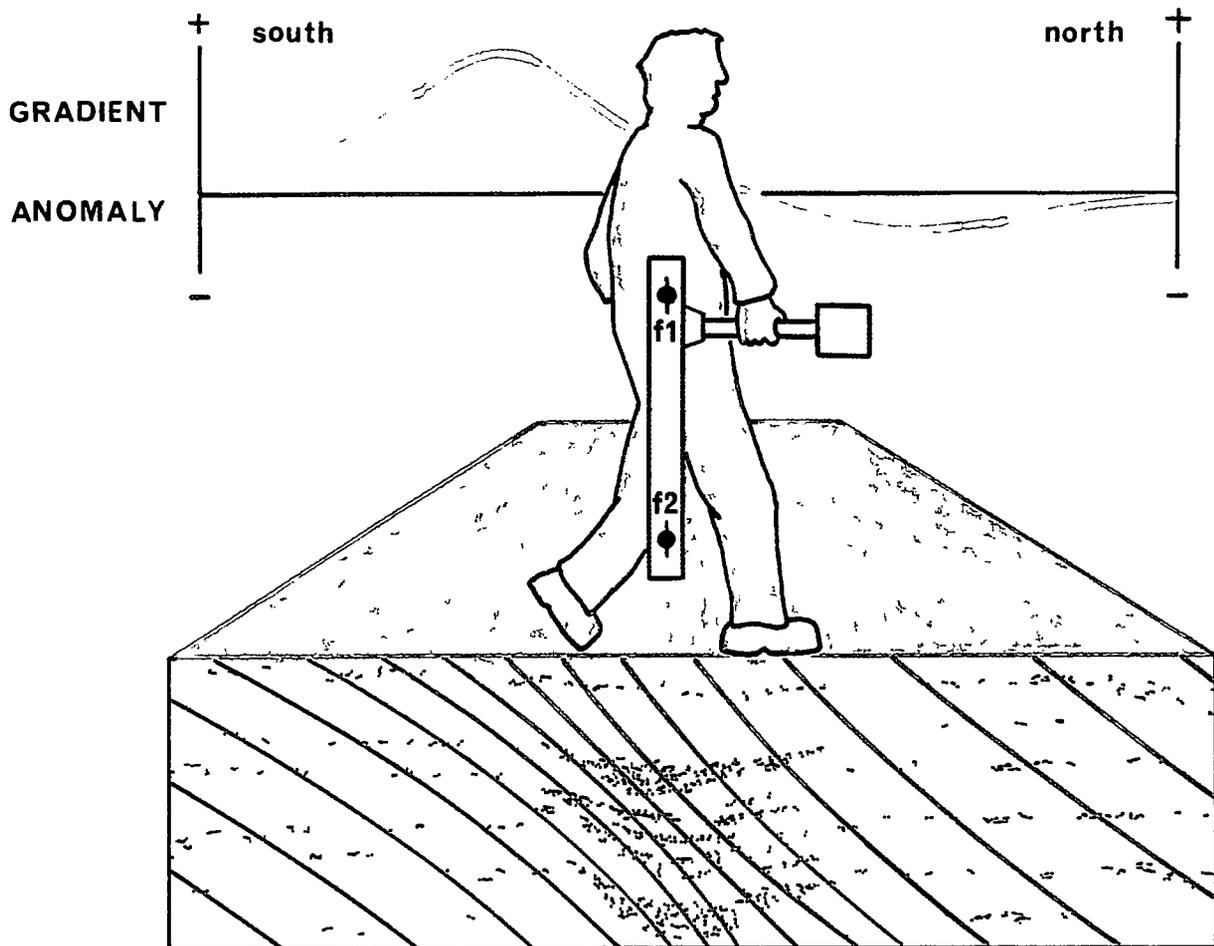
Geomagnetic prospecting detects subsurface features in terms of the perturbations or 'anomalies' that they induce in the Earth's magnetic field. In contrast to resistivity, seismic or electromagnetic surveying, no energy is injected into the subsurface and hence this is one of a class of *passive* geophysical techniques that includes gravity and thermal surveying. In an archaeological setting two types of magnetic anomalies can be distinguished:

- 1 Anomalies arising from variations in *magnetic susceptibility* which will modulate the component of magnetisation induced in the subsurface by the Earth's magnetic field. For most archaeological sites, this is the dominant factor giving rise to geomagnetic anomalies. In general, susceptibility is relatively weak in sediments, such as sandstones and enhanced in igneous rocks and soils, especially those which have been burnt or stratified with organic material.
- 2 Anomalies due to large, *permanently magnetised* structures. Such permanent magnetisation or 'remanence' arises when earth materials are heated to above $\sim 600^{\circ}\text{C}$ and cooled in the geomagnetic field. Thus kilns and hearths are often detected as strong permanent magnets causing highly localised anomalies that dominate effects due to background susceptibility variations. Remanence can result from other physical and chemical processes but these give rise to anomalies that are usually unimportant for geophysical prospecting.

There are several approaches towards the practical measurement of geomagnetic anomalies. In this study measurements were made using a Geoscan FM36 fluxgate gradiometer which records the change with height in the vertical component of the Earth's magnetic field, as shown overleaf. This method has the advantage of being insensitive to diurnal variations while the Geoscan instrument also benefits from an integrated data logger. Note that in mid northern latitudes the magnetic anomaly will be asymmetric with the main peak displaced to the south of the archaeological feature. Thus, a ditch filled with a soil of enhanced susceptibility, for example, will generate a positive anomaly to the south, mirrored by a weak negative anomaly north of the feature. When portrayed as an area map of grey tones this gives rise to a 'shadowing' or pseudo relief effect which must be borne in mind when making an archaeological interpretation.

Two techniques can be used to survey gridded areas using the fluxgate magnetometer. In the parallel method the instrument is used to scan the area along traverses which are always in the same direction. This method minimises 'heading errors' due to operator and instrument magnetisation but is time consuming. The alternative zig-zag method is significantly faster and suitable for areas where anomalies are large compared to these and other sources of error.

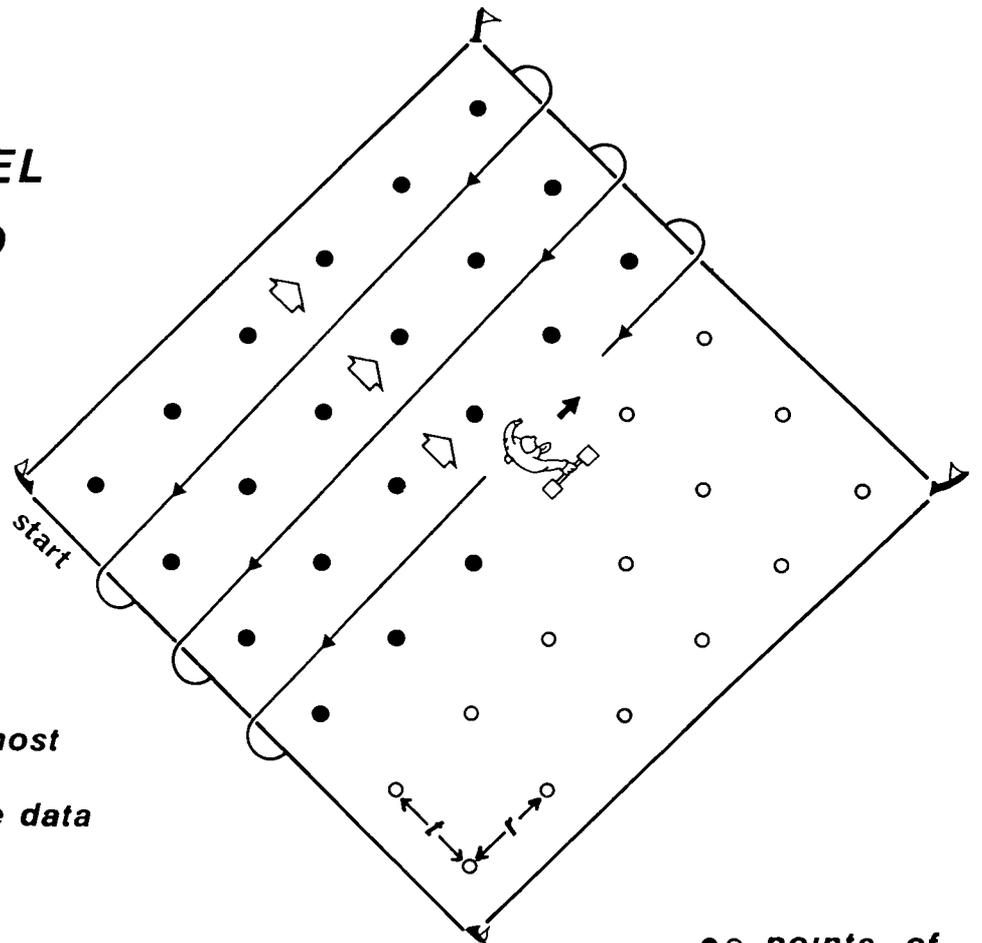
MAGNETIC SURVEYING



SURVEY SCHEMES

PARALLEL METHOD

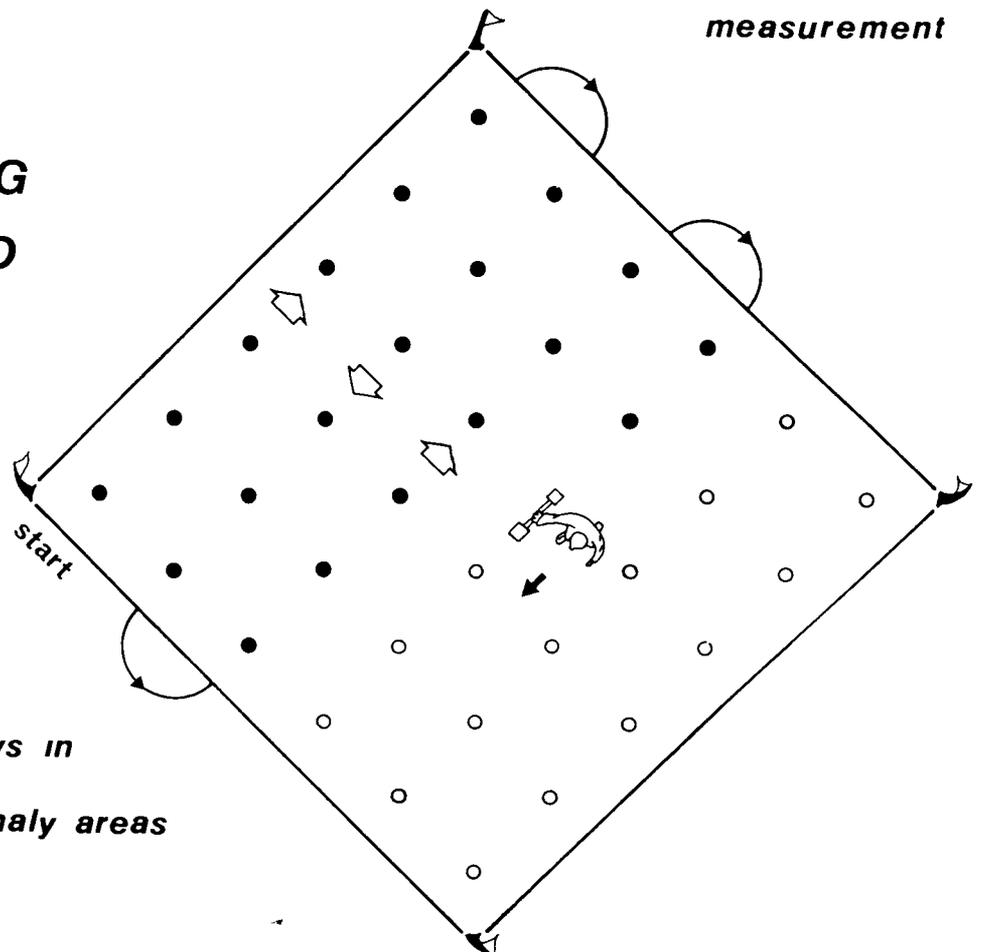
*slower but
minimises most
errors in the data*



●○ points of measurement

ZIG-ZAG METHOD

*suitable for
rapid surveys in
strong anomaly areas*

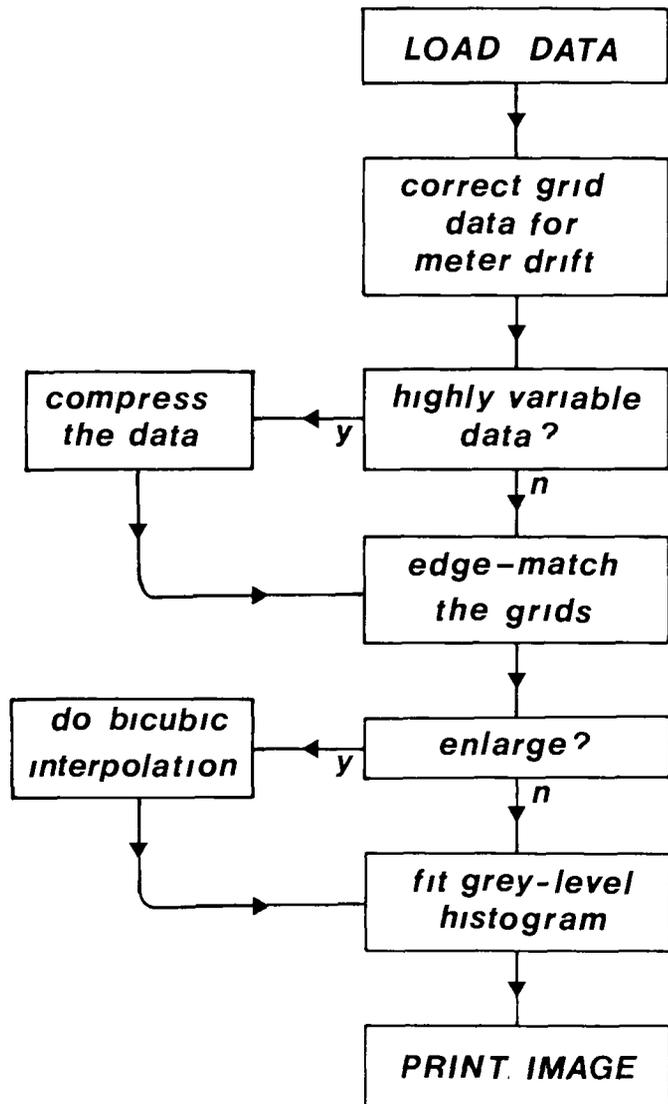
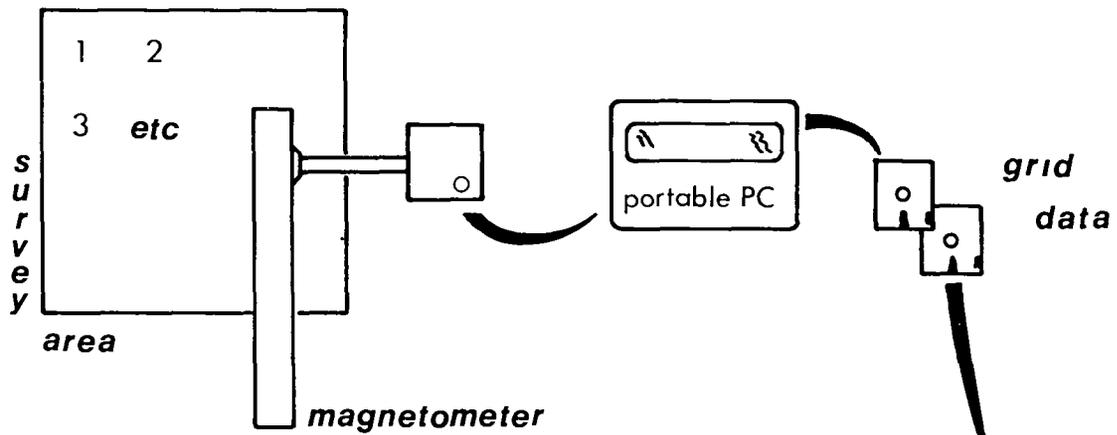


APPENDIX B

Data Processing Procedure

The various stages involved in gathering and manipulating the field measurements are summarised in the flow diagram overleaf. Data are downloaded from the magnetometer or resistivity meter to a portable computer, via a serial cable, inspected graphically and then stored on disc. Once the survey is completed, the data from individual grids are corrected for instrument drift (typically a few % per hour for the magnetometer) and then their dynamic range reduced if they contain highly variable values. This is often necessary where an area contains strong dipole sources if one is to make the best use of the grey scales available from the printer. Next, the area image is constructed by 'tiling' together adjacent grids. To achieve this, a special graphical technique is applied that minimises 'seams' in the image which would otherwise mask the anomalies of archaeological interest. If enlargement of a selected area is required, then this is achieved by expanding the data with bicubic splines, an approach which helps to reduce blurring. Finally, the data are numerically mapped to a set of 33 grey levels (true half tones) which are programmed to have a normal distribution in the printed image. From experience, it has been found that such a distribution is pleasing to the eye and by adjusting the mean density and variance the appearance of the anomalies can be optimised. All processing is carried out by proprietary GeoQuest software.

DATA PROCESSING



NOTES

SNY8113

Figs 11-18 & 22-22 not scanned

Please see Parish File for originals