RPS Planning, Transport and Environment

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Road Number 1113	Date May 1990
Contractor Wessex Archaeology	
County	
OS Reference	
Single sided Double sided	
A3 22 Colour C	

REPORT ON GEOPHYSICAL SURVEY

M3 Bar End - Compton
May 1990

Client: Wessex Archaeology

GEOPHYSICAL SURVEYS
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REPORT ON GEOPHYSICAL SURVEY

Survey Number: 90 / 33

Site: M3 Bar End - Compton, Winchester Bypass

Date: May 1990

Location and Topography : The area under investigation is located on Twyford Down immediately south of Winchester. Lying on chalk downland, most of the site occupies a plateau position, except for the western end which slopes steeply downhill towards the present line of the A33 Trunk Road. Parts of the site are covered by a thin clay capping, elsewhere chalk is visible on the surface. At the time of the survey, the field was under young crop.

Archaeology: The proposed new road will affect a number of Scheduled and other major archaeological sites. These include settlement sites, field system and burial sites, from a variety of periods in the past.

Aim of Survey: To identify areas of archaeological interest along the corridor of the proposed new road.

Instrumentation:

Magnetometer: Geoscan FM36 with ST1 automatic trigger

Resistance Meter:

Survey Method:

Magnetic readings are logged at 0.5m intervals along one axis (in 1.0m traverses, 800 readings per 20m x 20m grid) over the survey area. The data are then transferred to a Compaq SLT/286 and stored on 3.5" floppy discs. Field plots are produced on a portable Hewlett Packard Thinkjet. Further processing is carried out back at base on a Mission 386 linked to appropriate printers.

The location of the survey areas are shown in Figure 1.

TECHNICAL AND DISPLAY INFORMATION

The following is a description of the equipment and display formats used in **GEOPHYSICAL SURVEYS** reports. It should be emphasised that whilst all of the display options are regularly used, the diagrams produced in the final reports are the most suitable to illustrate the data from each site. The choice of diagrams results from the experience and knowledge of the staff of **GEOPHYSICAL SURVEYS.**

(1) Instrumentation

(a) Fluxgate Gradiometer - This instrument comprises two fluxgates mounted vertically apart, at a distance of 500mm. The gradiometer is carried by hand, with the bottom sensor some 100-300mm from the ground surface. At each survey point, the difference in magnetic field between the two fluxgates is conventionally measured in nanoTesla (nT) or gamma. The fluxgate gradiometer suppresses any diurnal or regional effects. If multiple readings are logged then, unless specified elsewhere in the report, it may be assumed that they are taken in the direction of grid north.

(b) Resistance meter - This measures the electrical resistance of the earth, using a system of four electrodes (two current, two potential). Depending on the arrangement of these electrodes, an exact measurement of a similar volume of earth may be acquired. In such a case the amount measured may be used to calculate the earth resistivity. Using a 'Twin-Probe' arrangement the terms 'resistance' and 'resistivity' may be interchanged. This arrangement involves the pairing of electrodes (one current and one potential), with one pair remaining in a fixed position whilst the other measures the resistivity variation across a fixed grid. Resistance is measured in ohms, whilst resistivity is measured in ohm-meter.

(c) Magnetic susceptibility - the instrument employed for measuring this culturally enhanced phenomenon is a laboratory based susceptibility bridge. Standard 50g soil samples are collected in the field.

(2) Display Options

The following is a description of the display options used. Unless specifically mentioned in the text, it may be assumed that no filtering or smoothing has been used to enhance the data. For any particular report only one type of display mode may be used, although where necessary a number of the options may be presented.

(a) X-Y Plot - This involves a line representation of the data. Each succesive row of data is equally incremented in the Y axis, to produce a 'stacked' profile effect. This display may incorporate a 'hidden-line removal' algorithm, which blocks out lines behind the major peaks and can aid interpretation.

(b) Dot-Density - In this display, minimum and maximum cut-off levels are choosen. Any value that is below the minimum cut- off value will appear 'white', whilst any value above the maximum cut-off value will appear 'black'. Any value that lies between these two cut-off levels will have a specified number of dots depending on the relative position between the two levels. The focus of the display may be changed using different levels and a contrast factor (C.F.). When the contrast is equal to 1, then the scale between the two cut-off levels is linear. A C.F.>1 helps to enhance the higher readings. To assess lower than normal readings involves the use of an inverse plot. This plot simply reverses the minimum and maximum values, resulting in the lower values represented by more dots. In either representation, each reading is allocated a unique area dependant on its position on the survey grid, within which numbers of the dots are randomly placed.

(c) Contour - This display joints data points of an equal value by a contour line. Displays are either generated on the computer screen or plotted directly on a flat bed plotter / inkjet printer. The former will generate either colour or black and white copies depending on the printer used.

(d) 3-D Mesh - This display joins the data values in both the X and Y axis. The display may be changed by altering the horizontal viewing angle and the angle above the plane. Again, the output may be either colour or black and white. A hidden line option is occassionally used (see (a) above).

(e) Grey-Scale - This format divides a given range of readings into a set number of classes. These classes have a predefined arrangement of dots, the intensity increasing with value. This gives an appearance of a toned or grey scale.

(3) Interpretation

This is the most important part of the report and is based on a consideration of not only the display plots , but also a study of the raw data. It should be emphasised that the final interpretation is not based only on the diagrams reproduced in this report.

In some instances geological and pedological anomalies may arise which are impossible to distinguish from those normally associated with archaeological features - in all cases of doubt trial excavation work is recommended to ascertain the nature of the observed anomalies.

All survey reports are prepared and submitted on the basis that whilst they are based on a thorough survey of the site, no responsibility is accepted for any errors or omissions.

Report on Geophysical Survey 90/33

Introduction

The geophysical survey on Twyford Down was commissioned by Wessex Archaeology, on behalf of English Heritage and the Department of Transport. The survey forms part of the archaeological evaluation in advance of the proposed new M3 by-pass around Winchester. It was hoped that geophysical survey work, in conjunction with other archaeological fieldwork, would help identify areas of interest, with a view to planning a programme of excavations.

The fieldwork was carried out by two teams of operators using two magnetometers. The 20 metre survey grids were tied-in to the 'hectare' grids which had been established by Wessex Archaeology personnel. It should be noted that there is an overlap between several of the grids due to the 'curving' baseline. The numbering of these 'hectare' grids matches the archaeologist's base plans and is outlined in Figure 1.

The results of the survey for each 'hectare' grid are displayed as dot density plots and as X-Y traces (1:500). A simplified interpretation plot, (Figure 18 - 1:1000), is included at the end of the report. It should be noted that the highlighting of many of the anomalies is, of necessity, somewhat arbitrary. Due to the complexities of the site (see below), interpretation of the results is very difficult. In view of this, it is recommended that if test pits are going to be employed, some these should include a sample of the geophysical anomalies identified. In addition, random areas away from anomalies of potential interest, would also benefit from archaeological investigation.

Results

At the outset it is worthwhile making a few general comments about the problems of interpreting the geophysical results. Although significant anomalies are undoubtedly present, there are only a few areas where they form a recognisable plan which looks archaeologically interesting. In other areas anomalies are very weak or ill-defined and their archaeological significance is difficult to assess. A similar picture has been obtained on many chalk sites and in some instances apparently minor magnetic anomalies were found to be associated with substantial archaeological features. This factor should be borne in mind when evaluating the results.

The difficulties of interpretation arise partly due to a lack of magnetically enhanced deposits, perhaps because they have been removed by ploughing. In addition, if the features are covered by clay deposits, or hillwash, these could have the effect of masking the features.

In general, the survey results are divided into two broad areas either side of 'hectare' 1005 (there is no 'hectare' 1004). To the east the magnetic responses are particularly quiet. To the west, whilst the level of activity is hardly noisy, there is nevertheless a noticeable increase in the density of magnetic anomalies. For convenience these two areas will be considered separately.

'Hectares' 1001, 1002, 1003 and 1005

A major magnetic anomaly of archaeological interest is the clear ring ditch in 'hectare' 1003. Measuring approximately 17 metres in diameter, the results suggest that the western half of the feature may be slightly more damaged than the remainder. There appears to be an internal feature visible on the dot density plots, but the X-Y traces show that there are probably two buried ferrous objects at this point. Whether the iron objects are associated with the barrow is impossible to say. The magnetic anomalies which form the ditch co-incide with a slight mound visible at ground level.

Beyond the barrow, apart from linear trends in the data, there appears to be a lack of magnetic anomalies. Some of the trends are stronger and these would appear to correspond with ditches and old field boundaries. Other trends reflect geological and ploughing effects. There is a lack of occupation type anomalies. It will be interesting to see if excavation also confirms a genuine absence of settlement evidence.

'Hectares' 1005 - 1018

As referred to above, a peculiar series of anomalies running through 'hectare' 1005 co-incide with a change in the magnetic responses at the site. It is difficult to say whether the anomalies in 1005 are associated with actual archaeological features, or with a thin clay capping lying over the chalk in this area. To the west of this line there is a definite increase in magnetic noise, presumably associated with a greater density of archaeological features.

Unfortunately it is difficult to see any major patterns in the magnetic anomalies. Apart from the obvious pit alignment / ditch and the probable pits / small-scale 'industrial' type anomalies, the anomalies are poorly defined. Possible reasons for this have been outlined above, but given the clear responses associated with the ditch / pit alignment, blank areas on the survey may genuinely be devoid of major archaeological features.

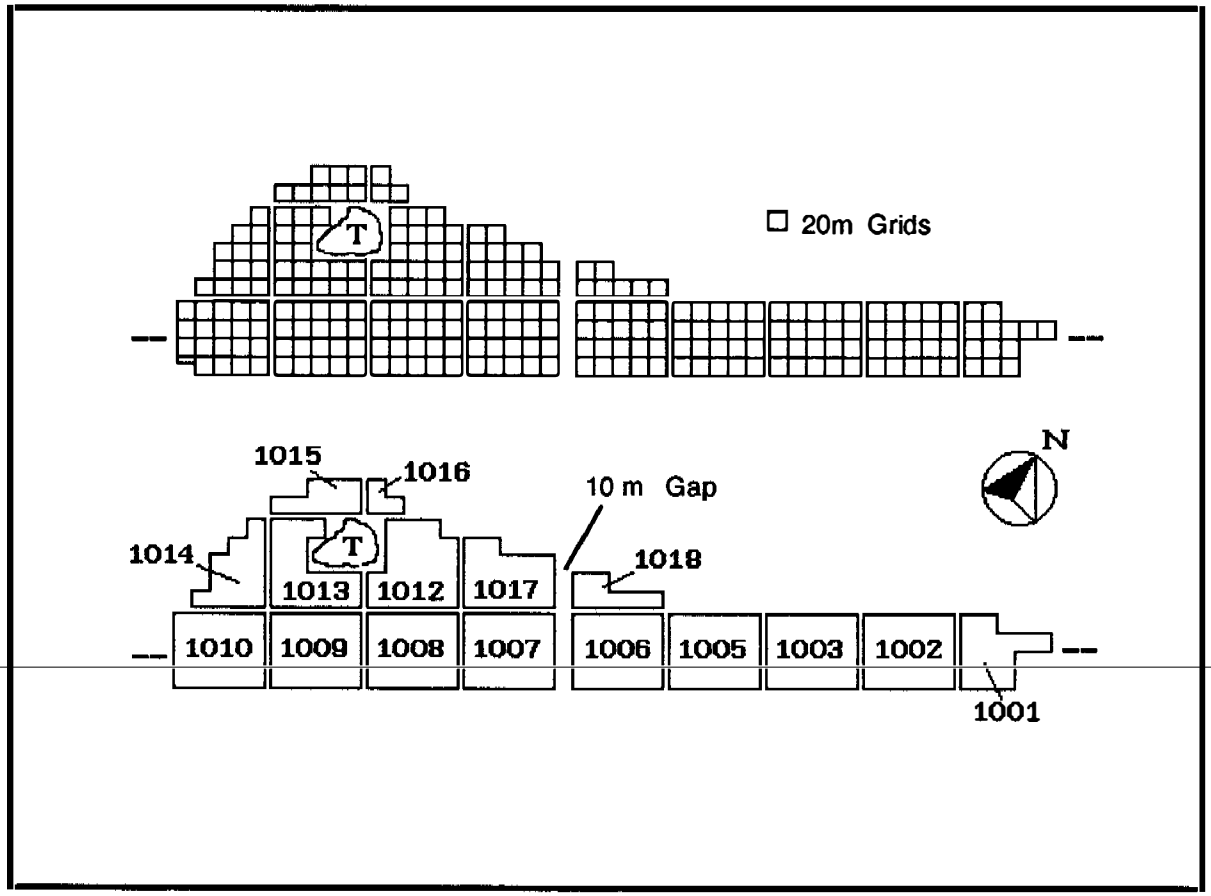
Conclusions

The magnetometer survey has helped to identify numerous anomalies of potential archaeological interest, and as such will clearly help with the planning of excavation trenches.

Unfortunately, at this stage of the evaluation, it is difficult to gauge whether the density of magnetic anomalies is a true reflection of the density of archaeological features surviving at the site. It will be particularly interesting to compare the geophysical results with other archaeological information from the site.

J Gater & C Gaffney

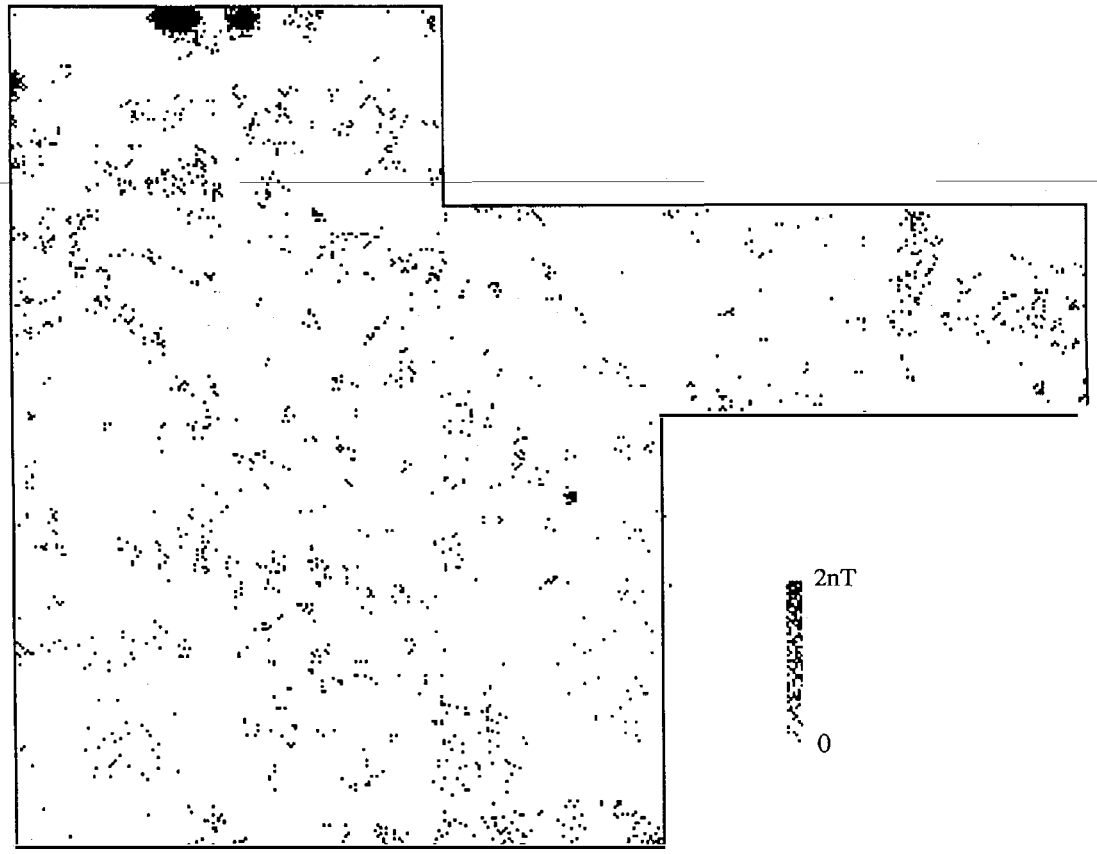
June 1990

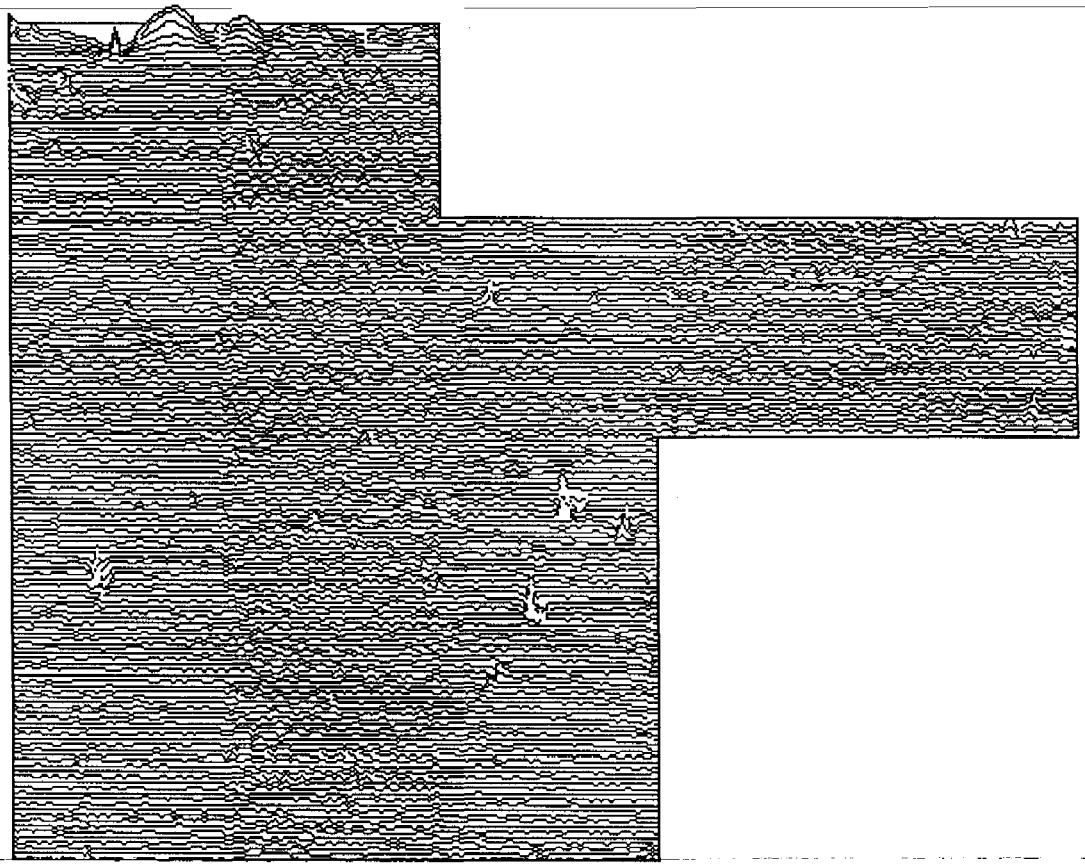


M3 Bar End to Compton (Winchester Bypass)

'Hectare' Grid Numbering Relates to Wessex Archaeology Survey Grid

Figure 1



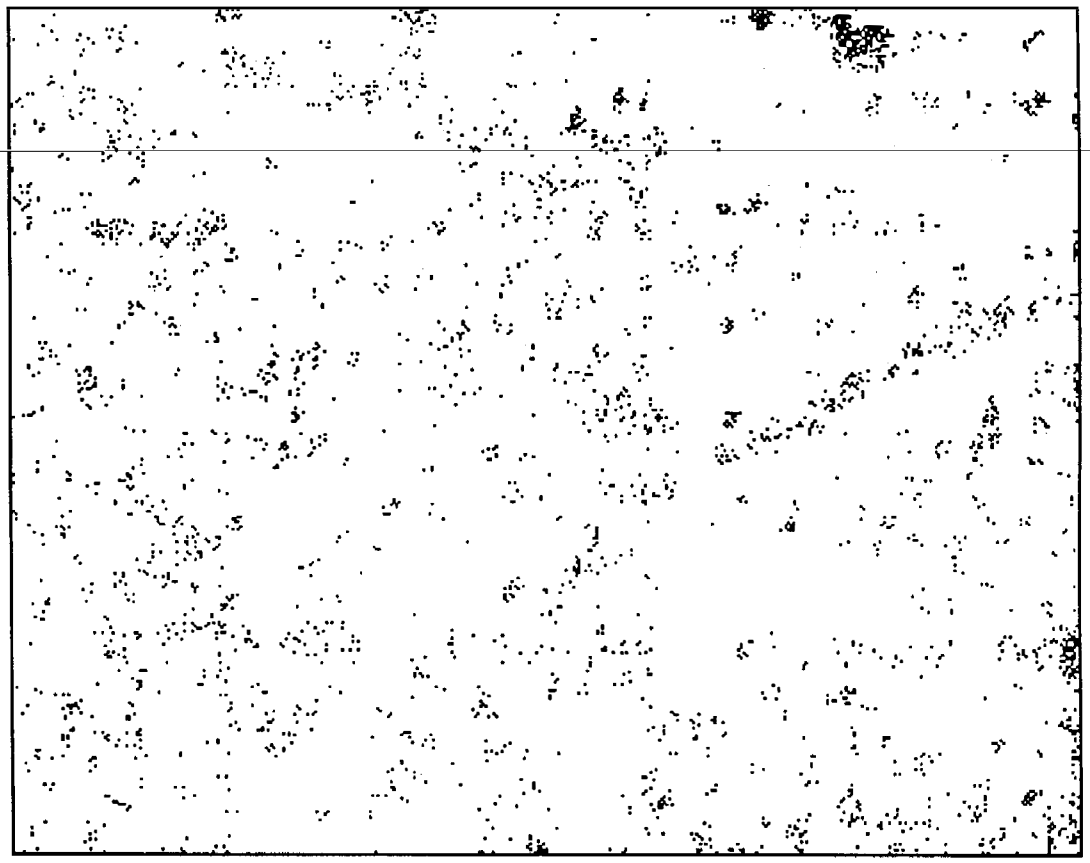


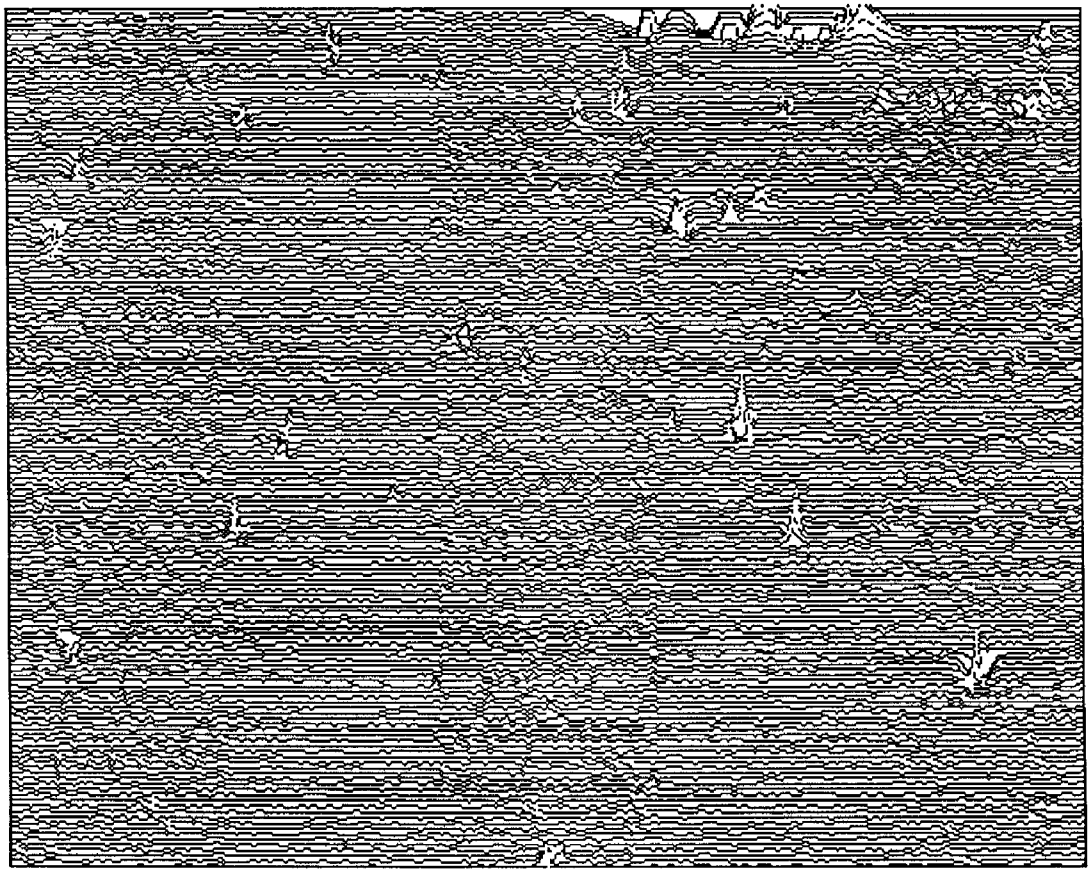
M3 Bar End to Compton (Winchester Bypass)

ORIGINAL AT A3

Magnetic Data
'Hectare' Grid 1001

Figure 2



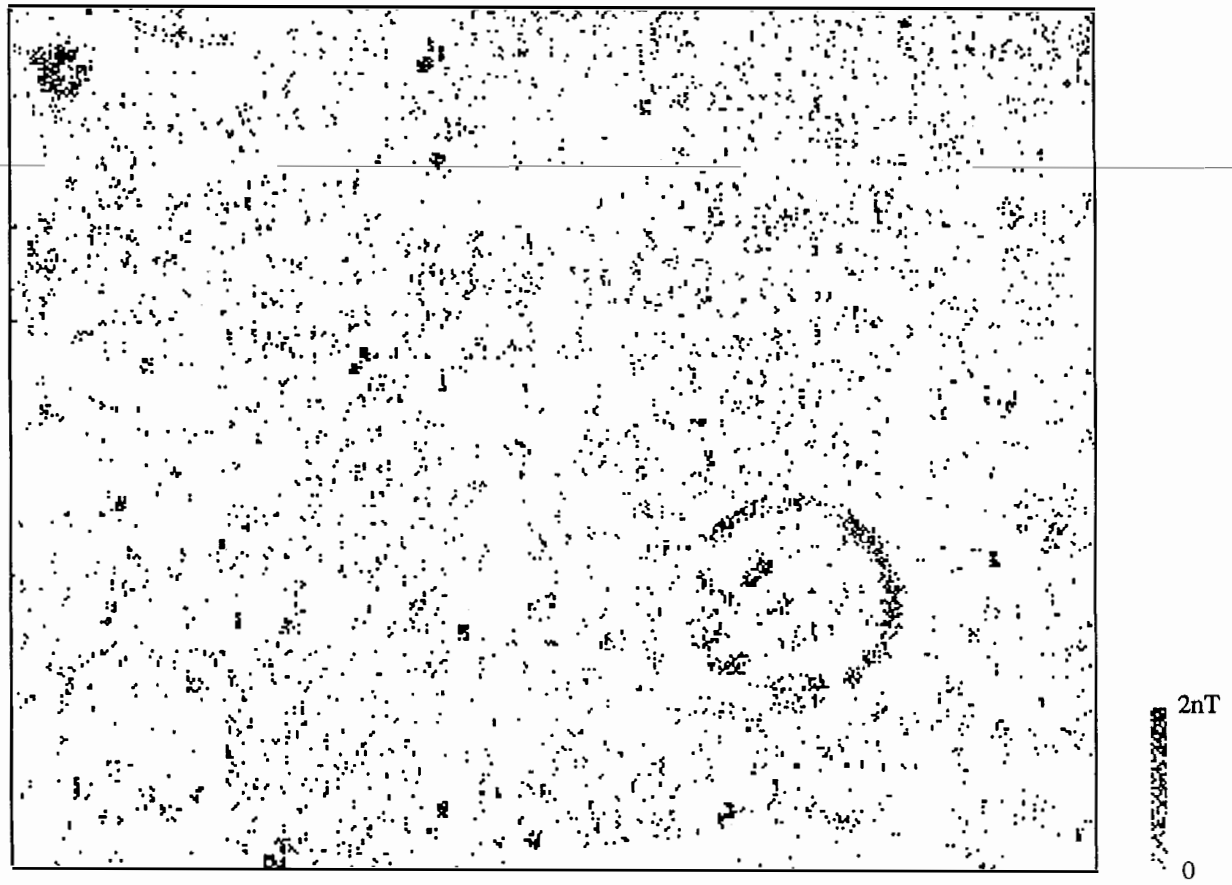


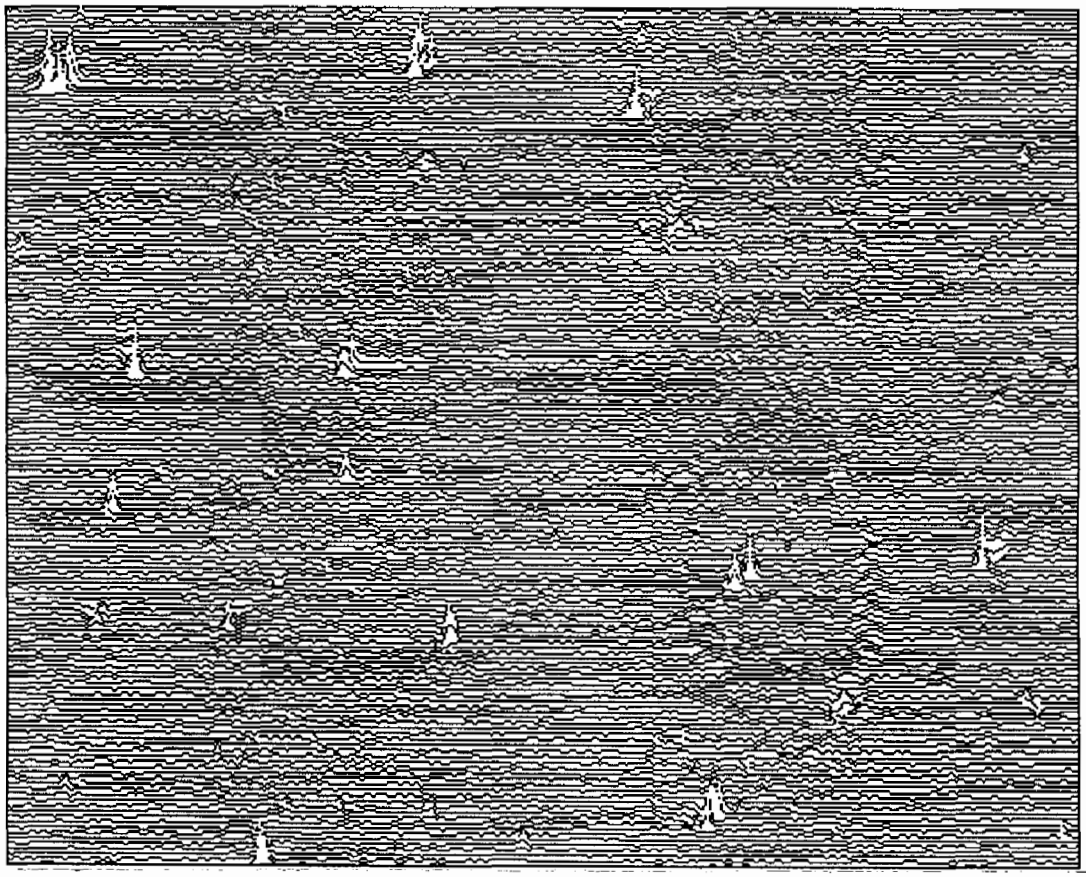
M3 Bar End to Compton (Winchester Bypass)

ORIGINAL AT A3

Magnetic Data
'Hectare' Grid 1002

Figure 3



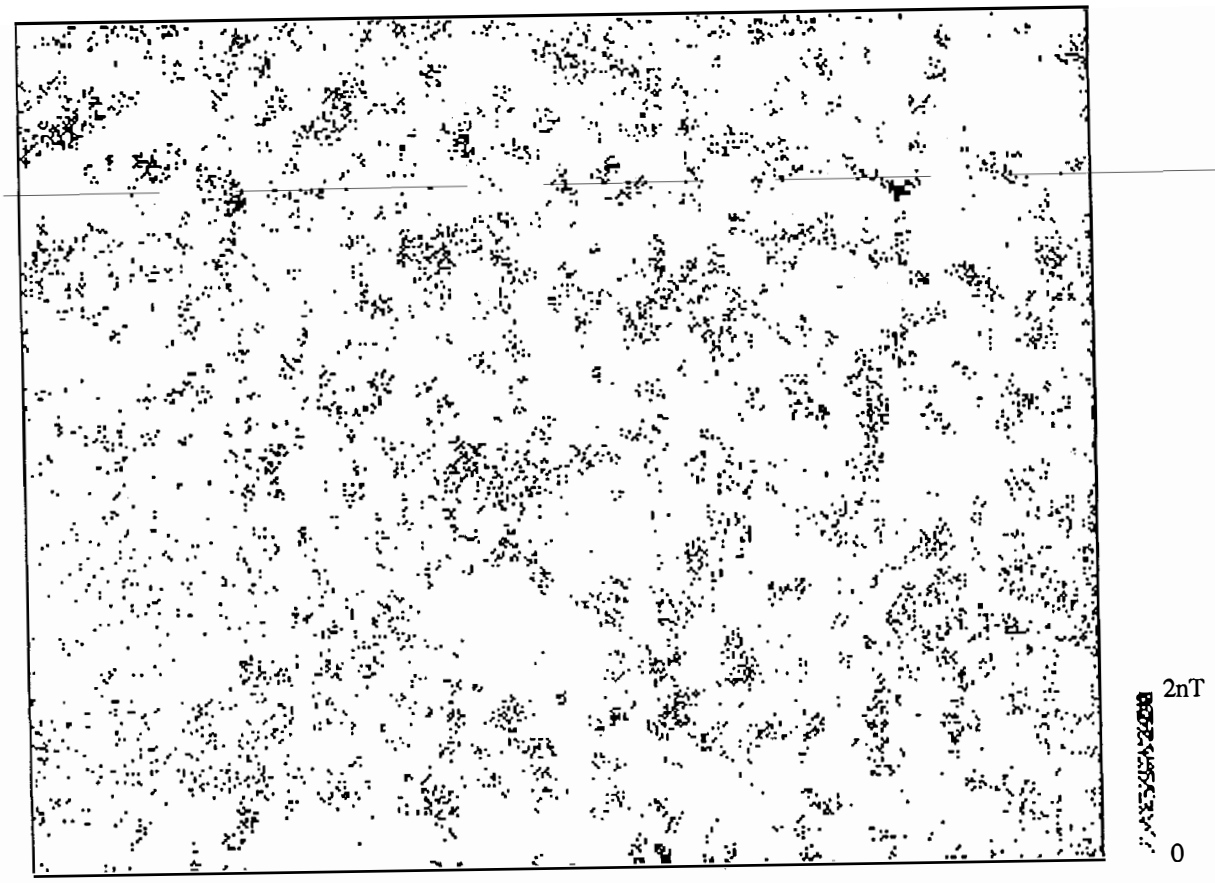


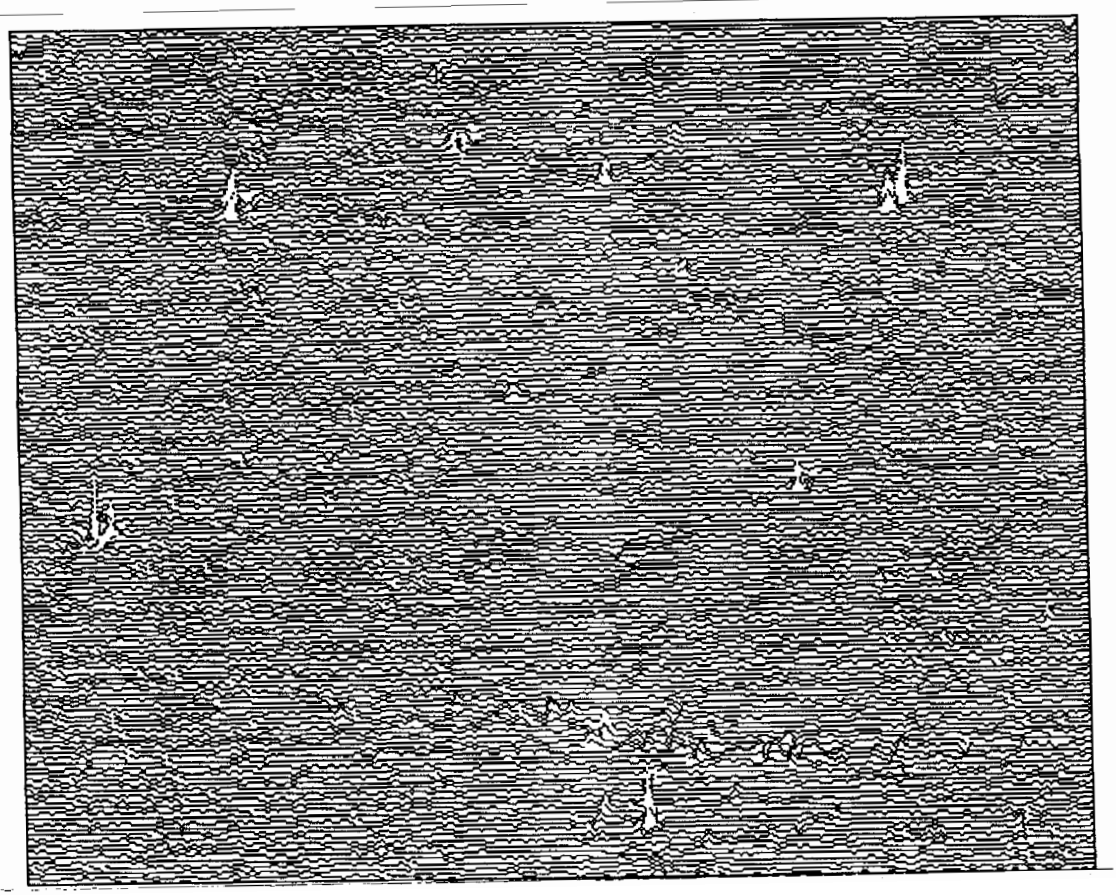
M3 Bar End to Compton (Winchester Bypass)

Magnetic Data
'Hectare' Grid 1003

ORIGINAL AT A3

Figure 4



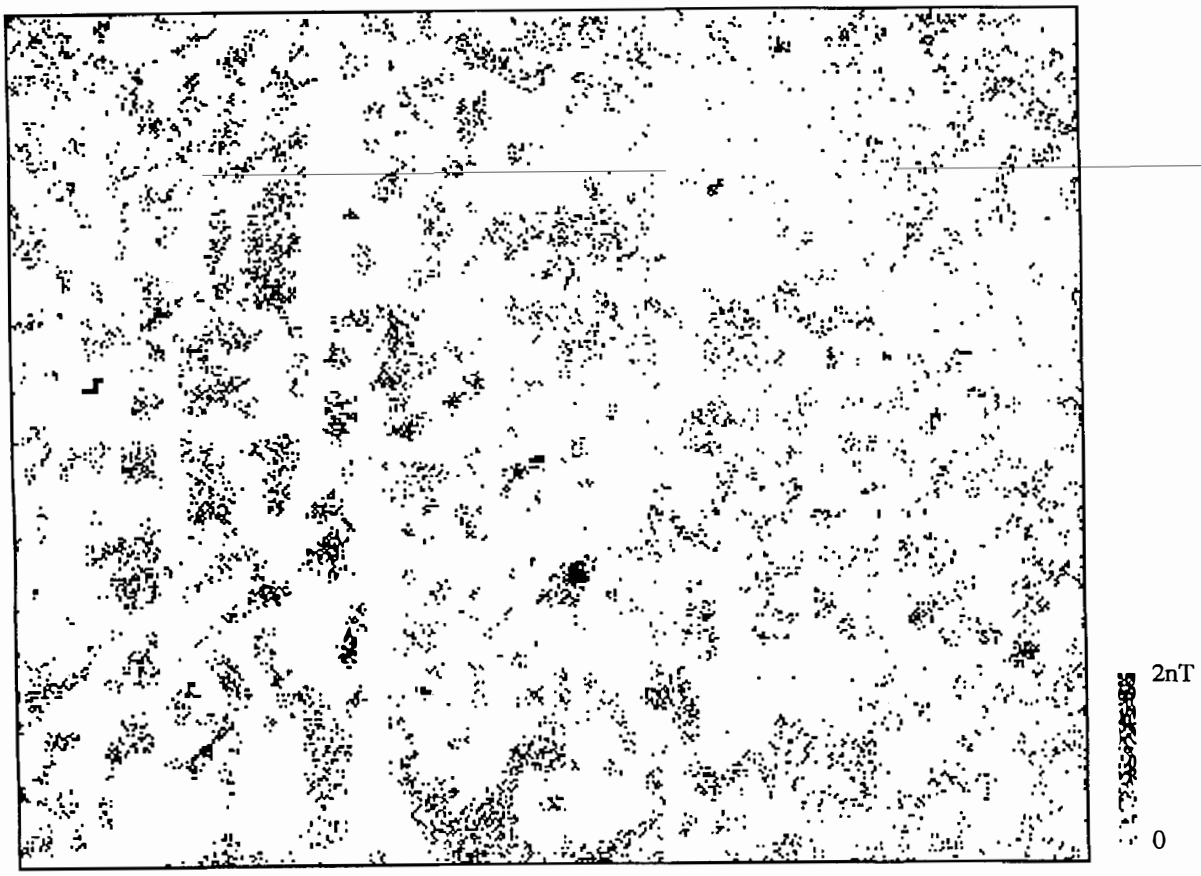


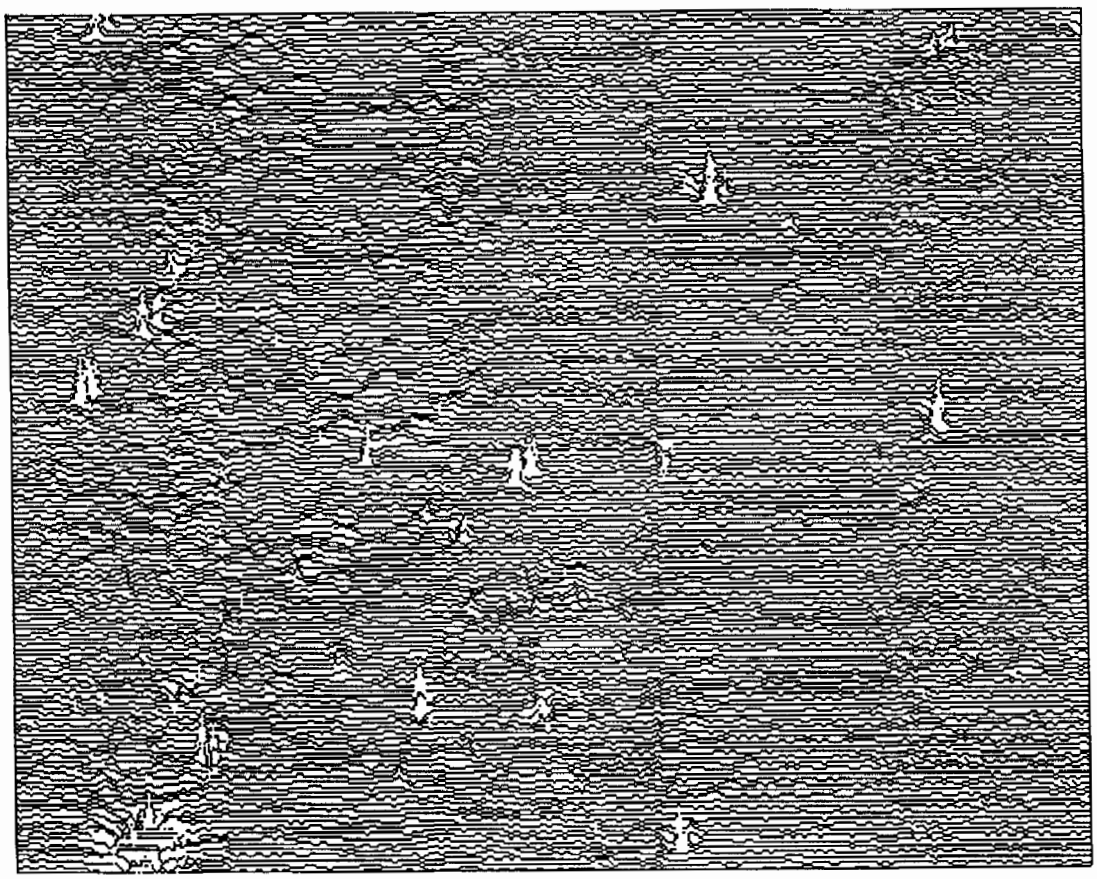
M3 Bar End to Compton (Winchester Bypass)

ORIGINAL AT A3

Magnetic Data
'Hectare' Grid 1005

Figure 5



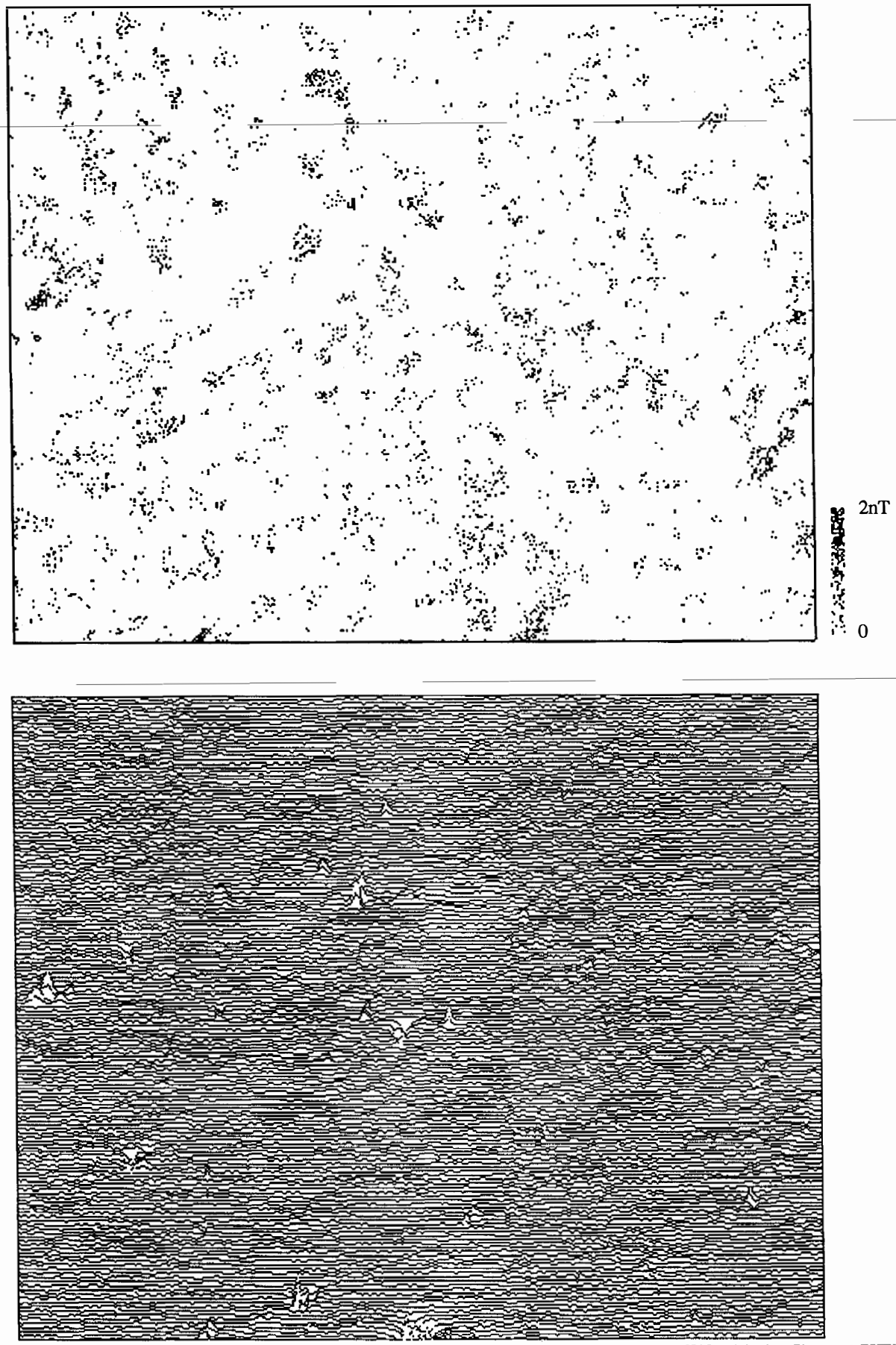


M3 Bar End to Compton (Winchester Bypass)

ORIGINAL AT A3

Magnetic Data
'Hectare' Grid 1006

Figure 6

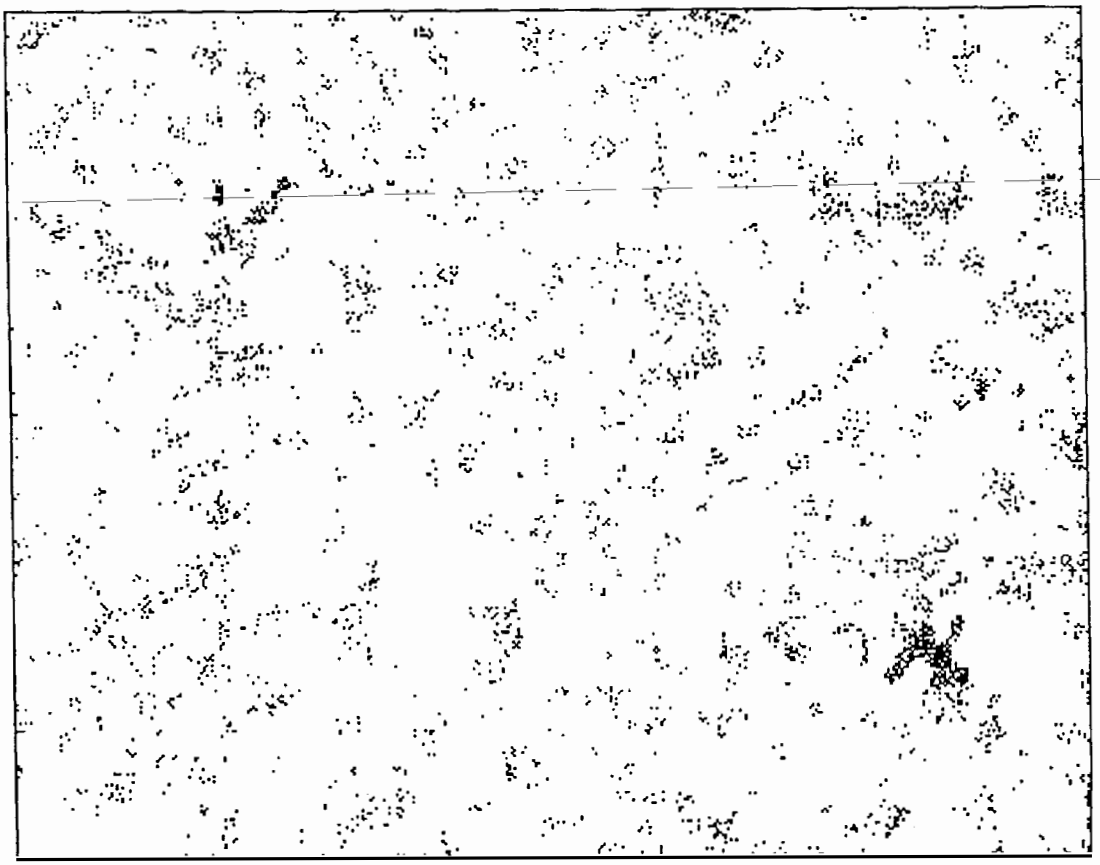


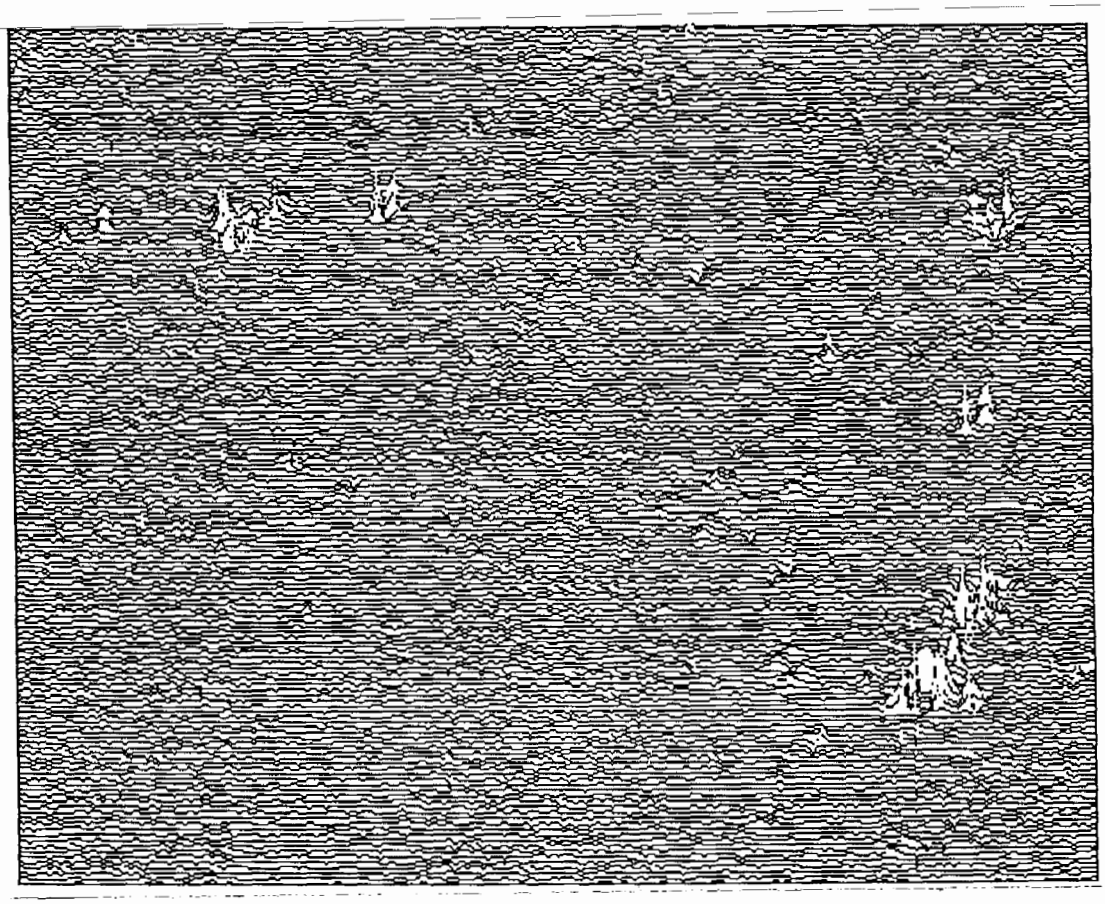
M3 Bar End to Compton (Winchester Bypass)

Magnetic Data
'Hectare' Grid 1007

ORIGINAL AT A3

Figure 7



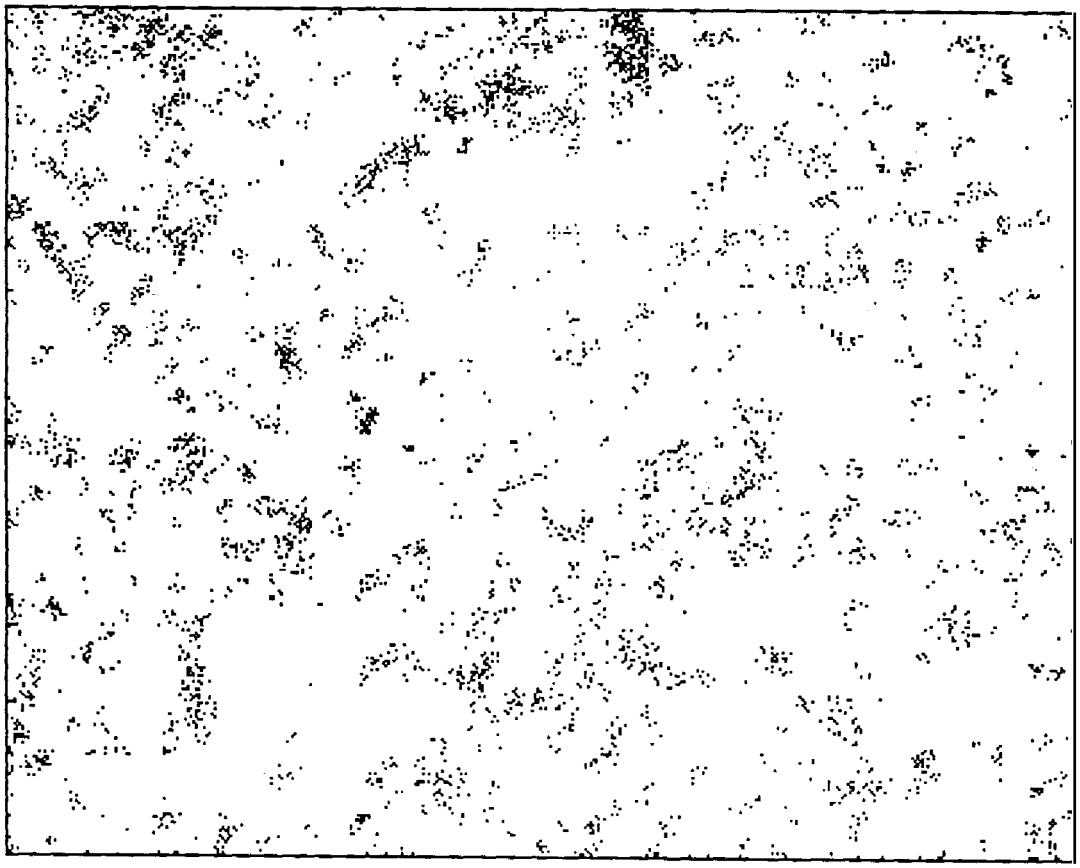


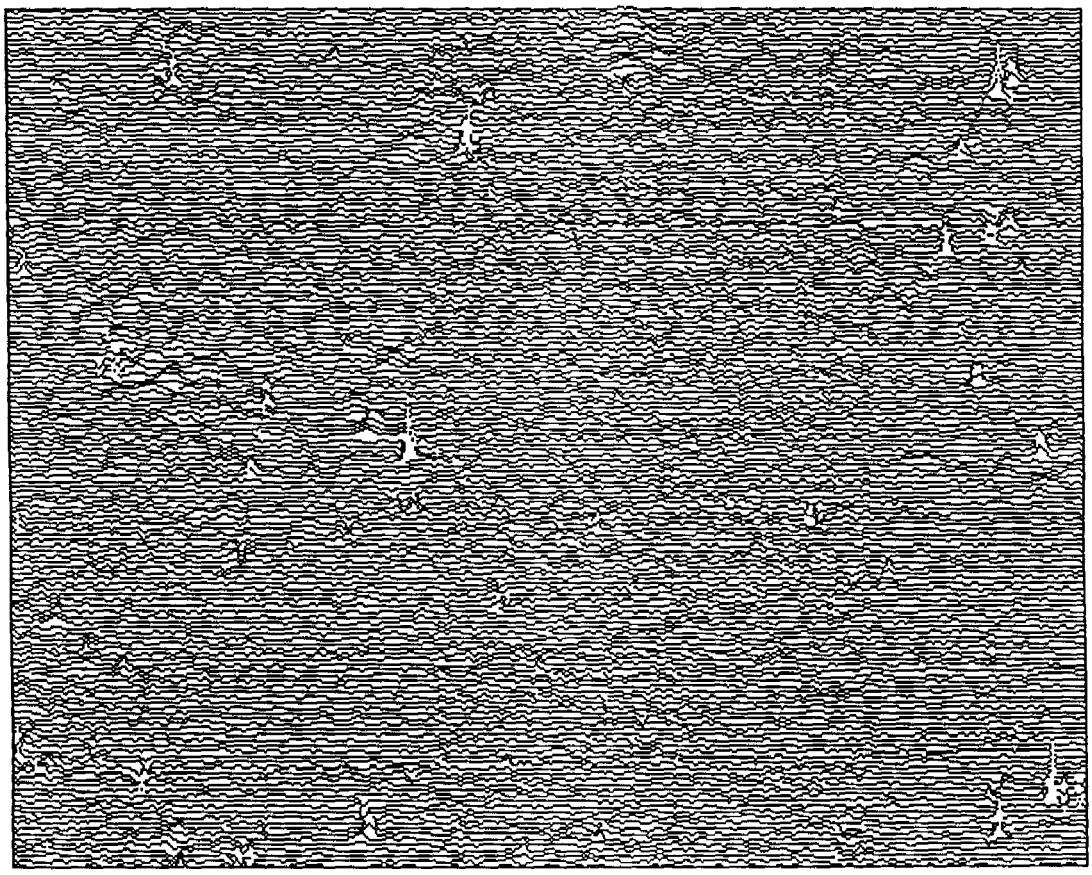
M3 Bar End to Compton (Winchester Bypass)

Magnetic Data
'Hectare' Grid 1008

ORIGINAL AT A3

Figure 8



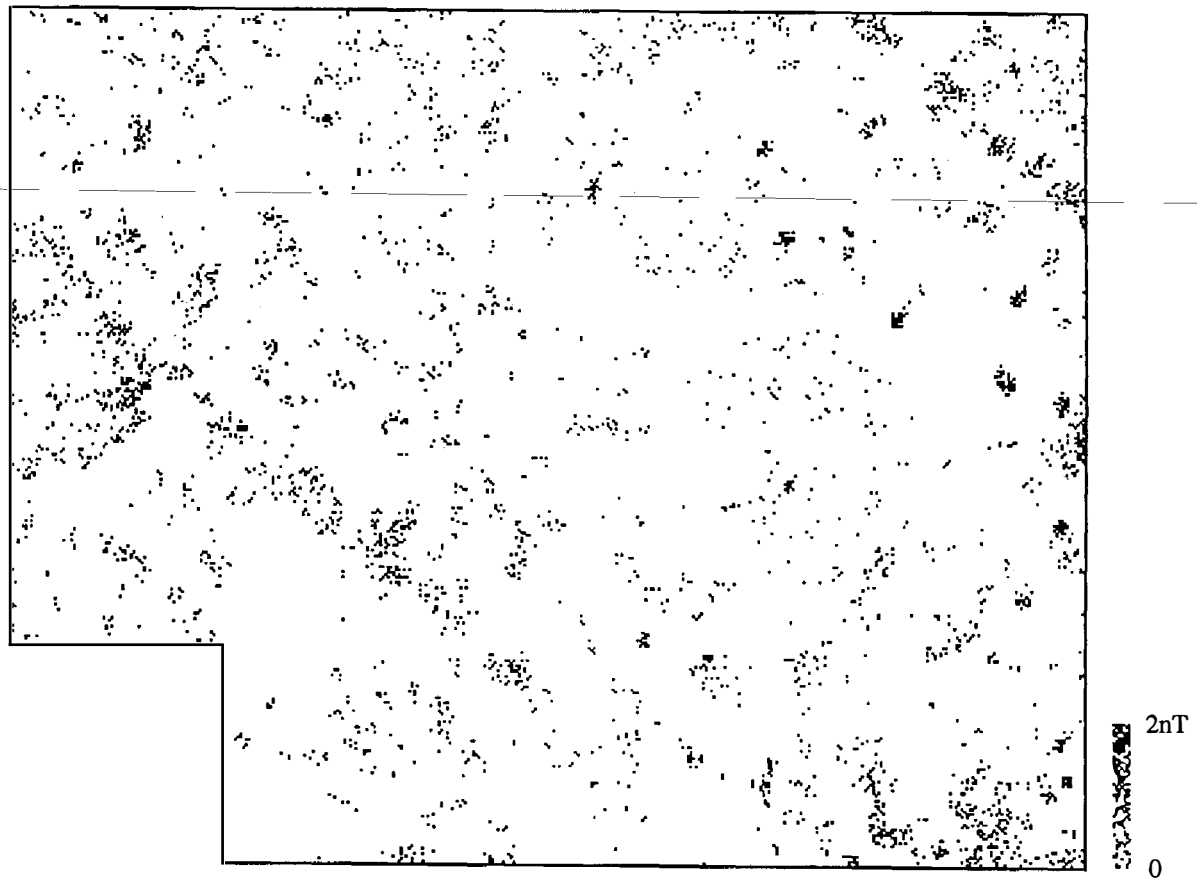


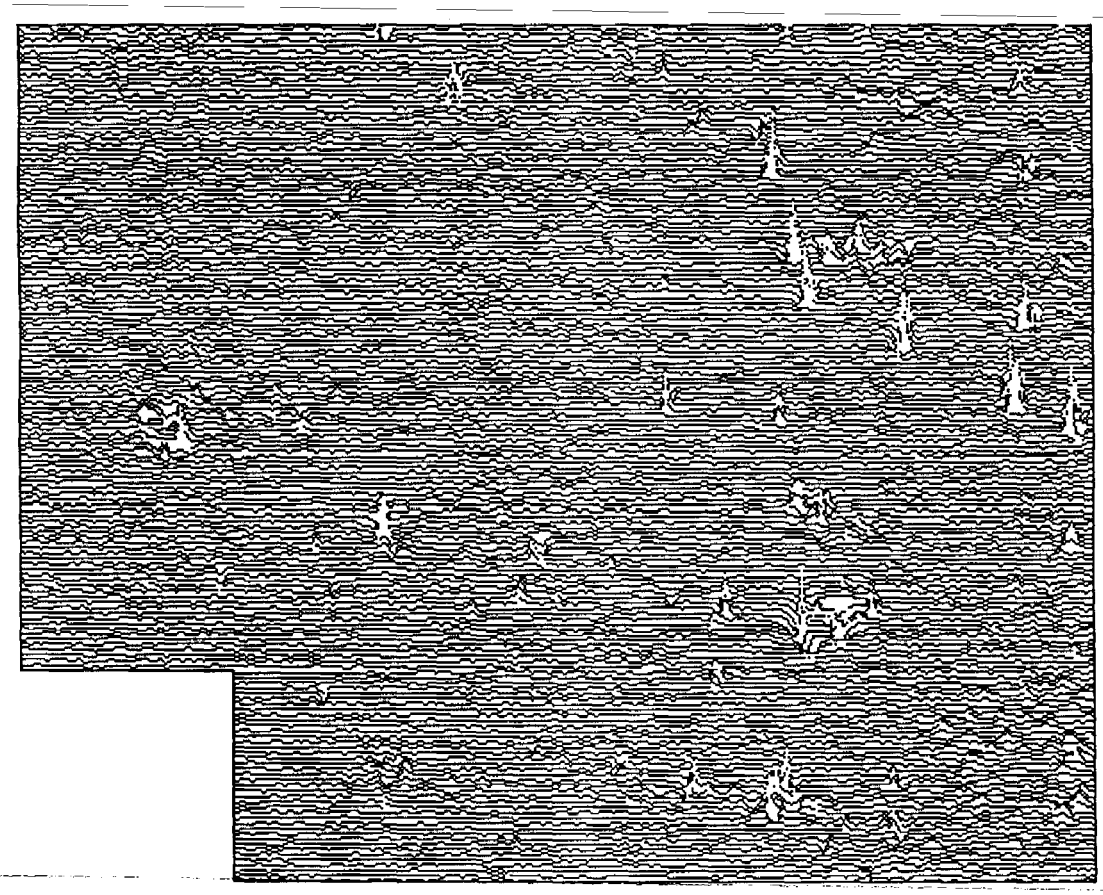
M3 Bar End to Compton (Winchester Bypass)

ORIGINAL AT A3

Magnetic Data
'Hectare' Grid 1009

Figure 9



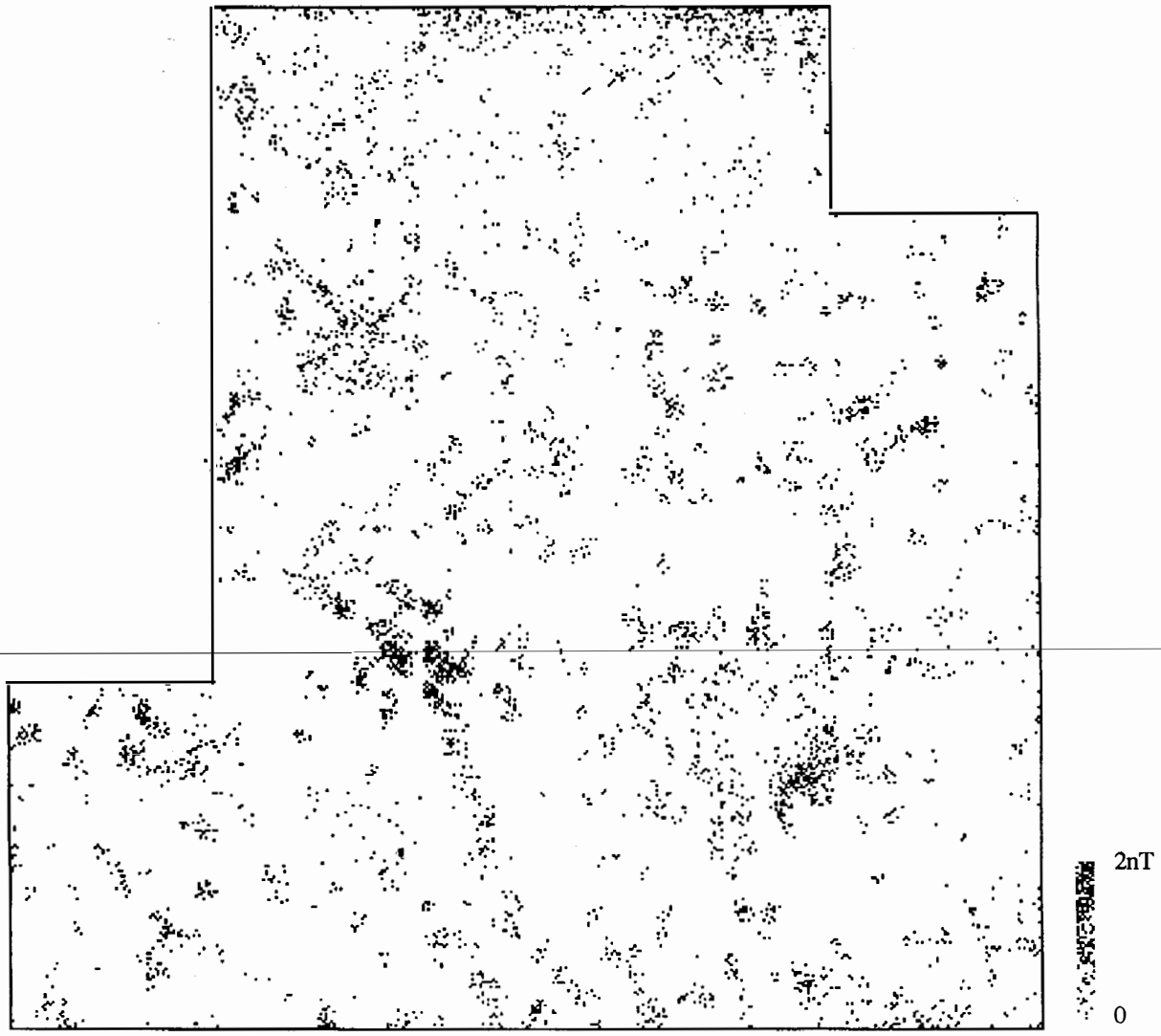


M3 Bar End to Compton (Winchester Bypass)

Magnetic Data
'Hectare' Grid 1010

ORIGINAL AT A3

Figure 10

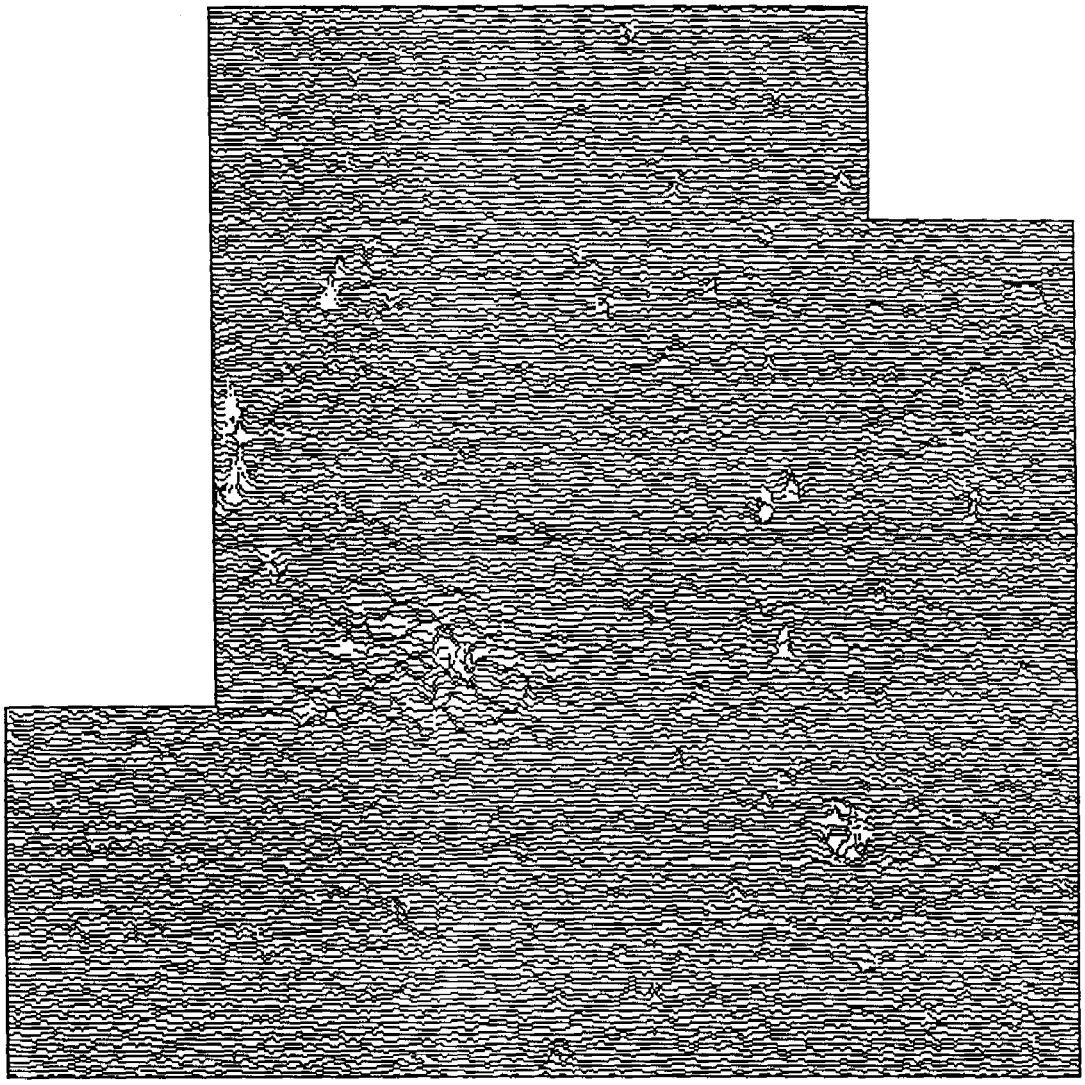


M3 Bar End to Compton (Winchester Bypass)

Magnetic Data
'Hectare' Grid 1012

ORIGINAL AT A3

Figure 11A

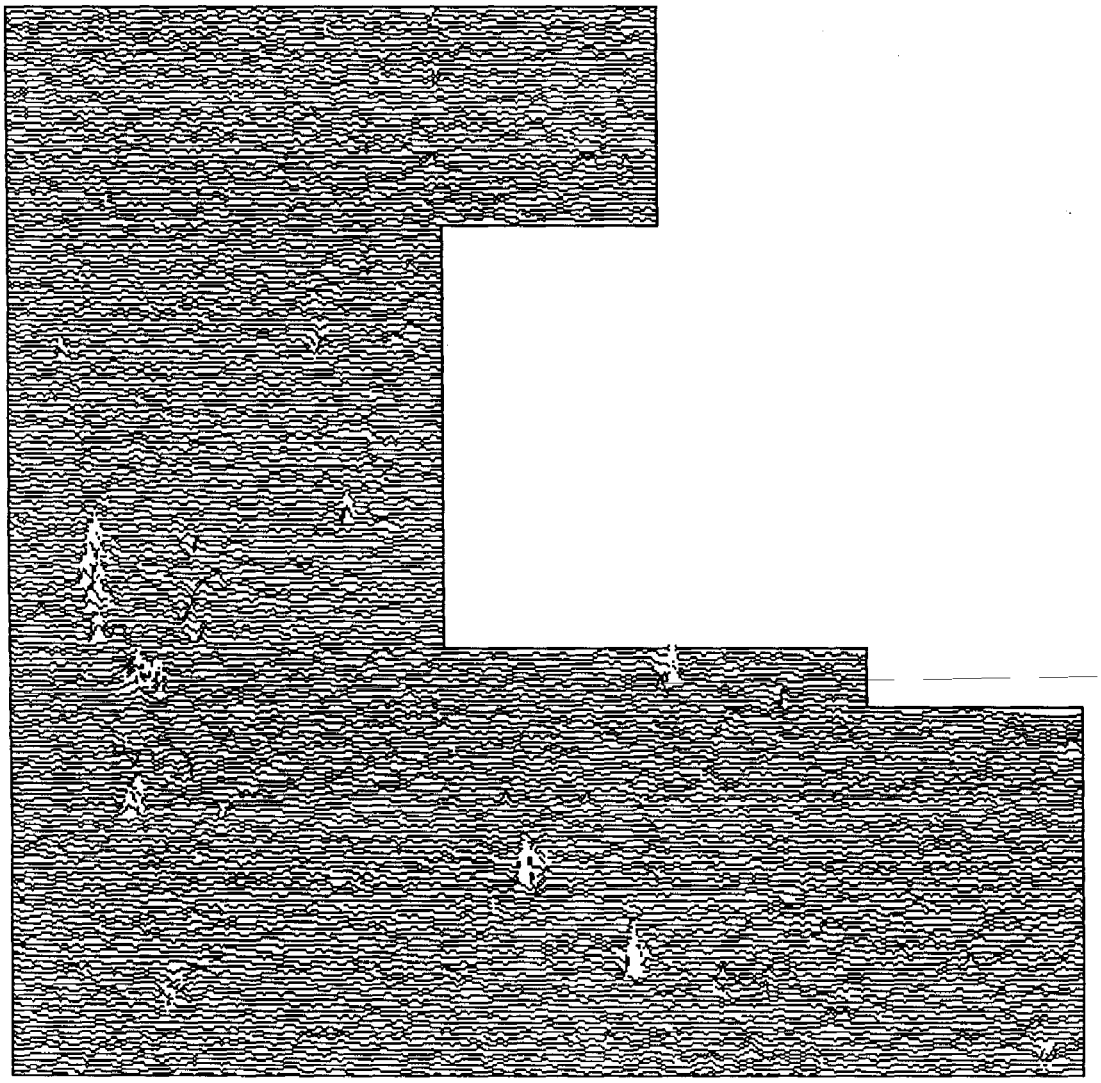


M3 Bar End to Compton (Winchester Bypass)

Magnetic Data
'Hectare' Grid 1012

ORIGINAL AT A3

Figure 11B

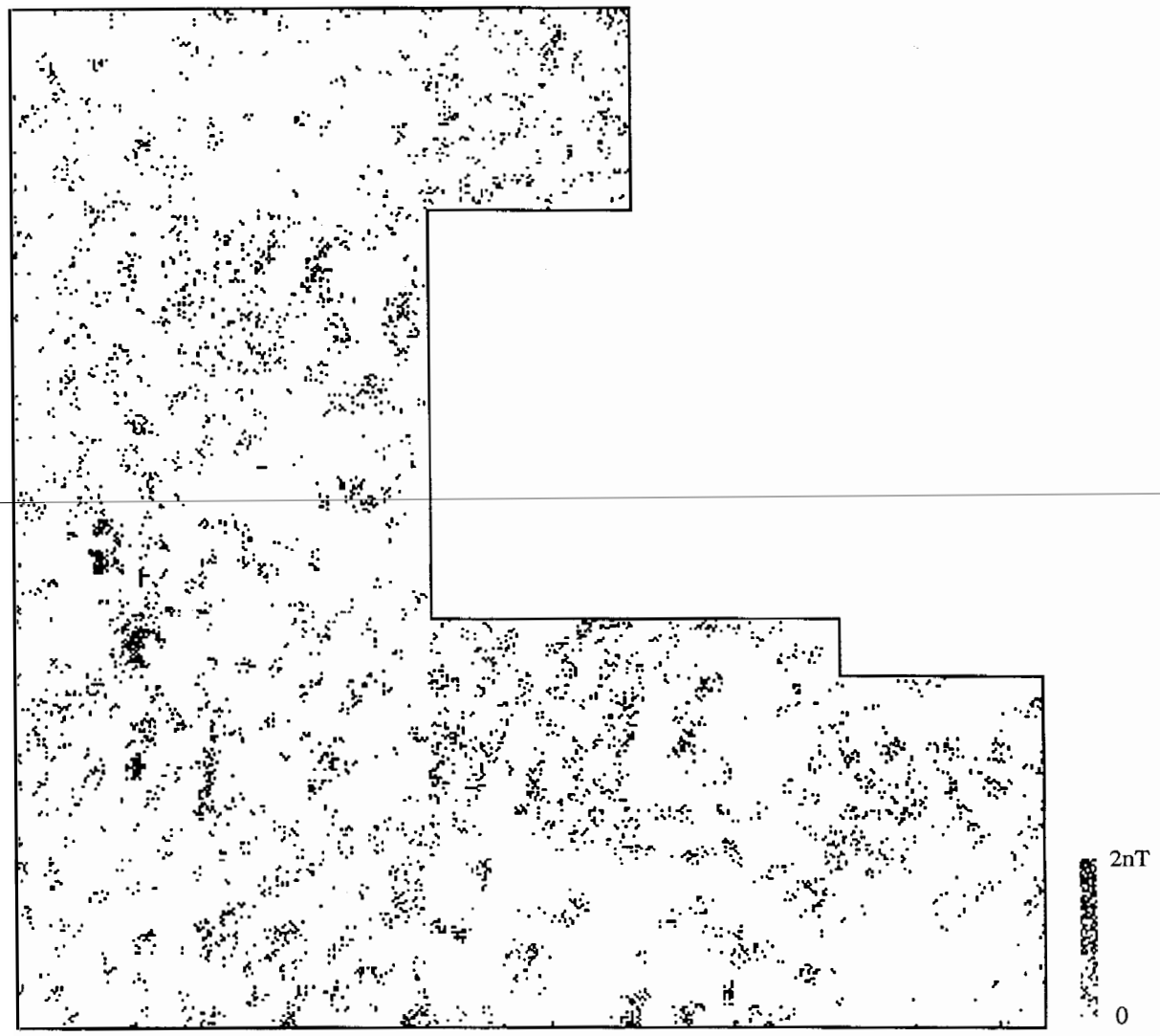


M3 Bar End to Compton (Winchester Bypass)

Magnetic Data
'Hectare' Grid 1013

ORIGINAL AT A3

Figure 12A

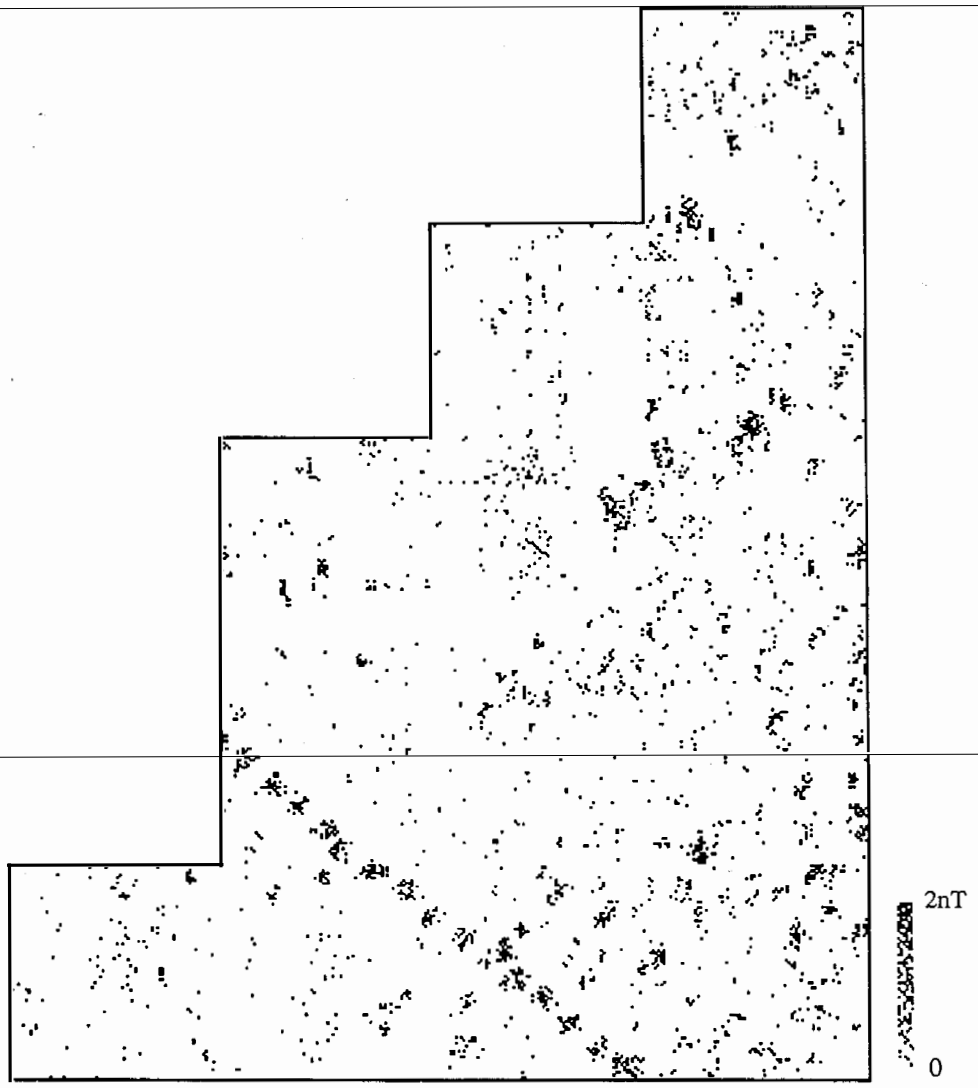


M3 Bar End to Compton (Winchester Bypass)

Magnetic Data
'Hectare' Grid 1013

ORIGINAL AT A3

Figure 12B

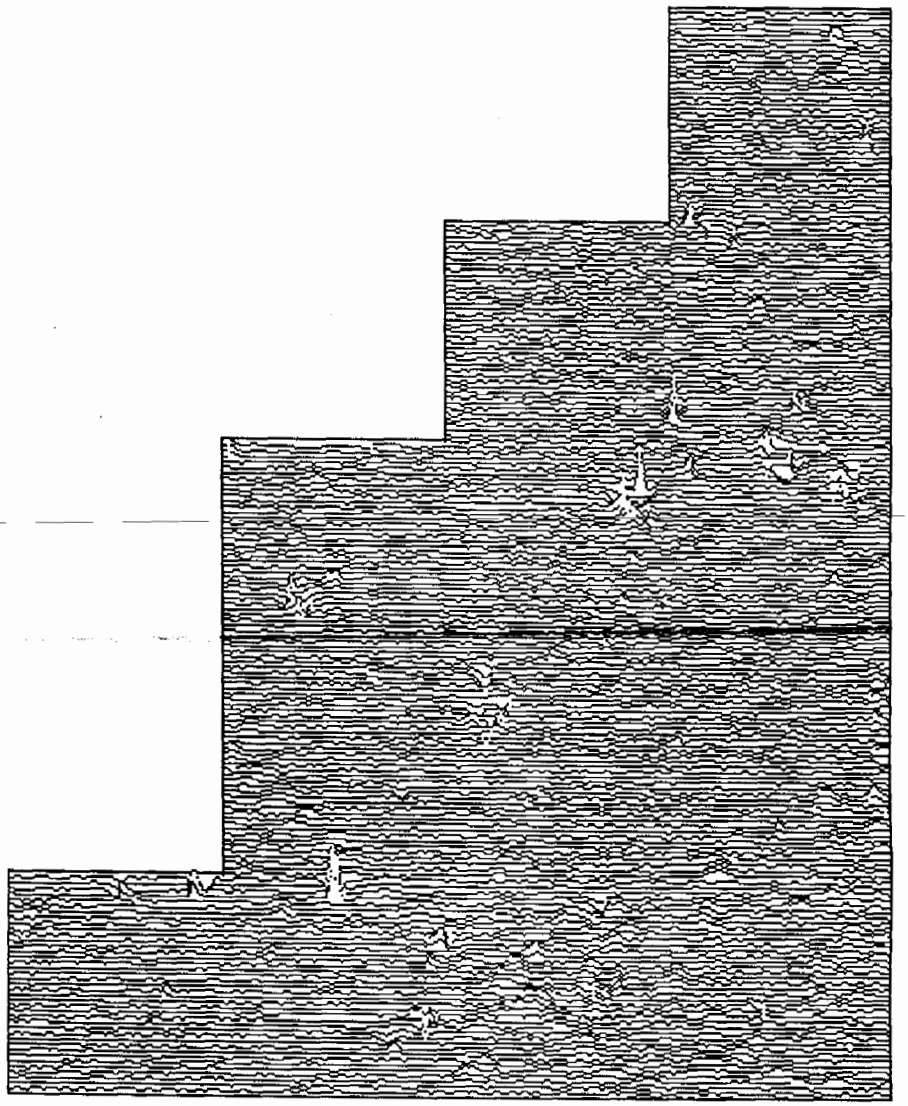


M3 Bar End to Compton (Winchester Bypass)

Magnetic Data
'Hectare' Grid 1014

ORIGINAL AT A3

Figure 13A

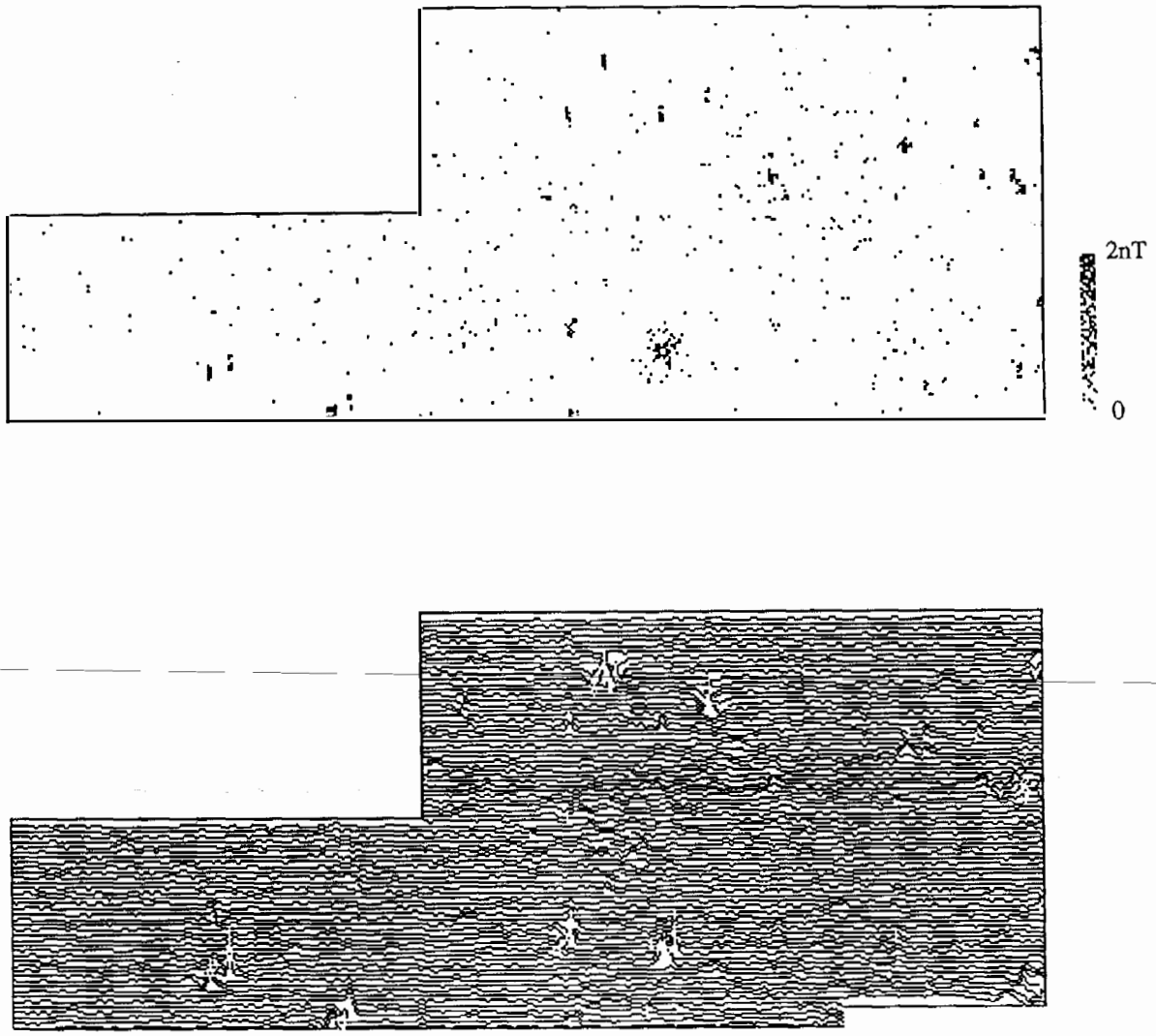


M3 Bar End to Compton (Winchester Bypass)

Magnetic Data
'Hectare' Grid 1014

ORIGINAL AT A3

Figure 13B

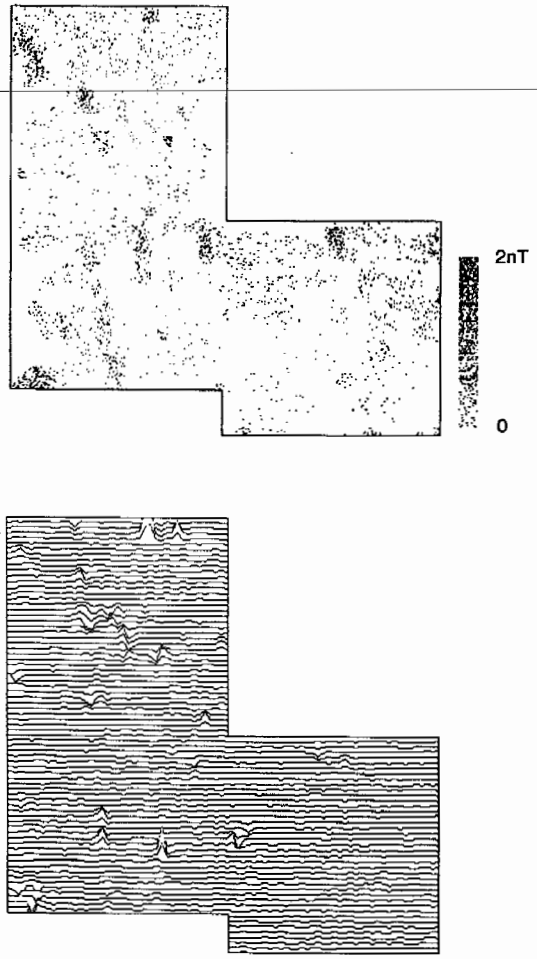


M3 Bar End to Compton (Winchester Bypass)

Magnetic Data
'Hectare' Grid 1015

ORIGINAL AT A3

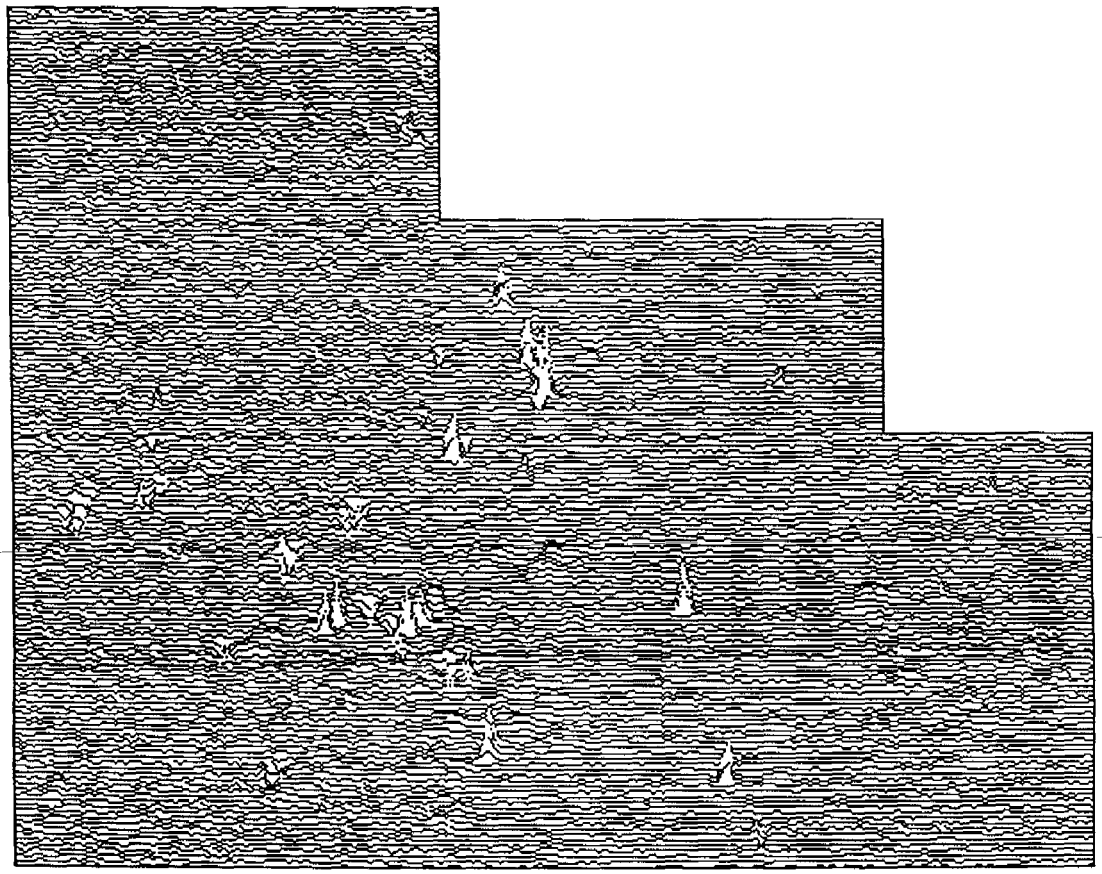
Figure 14



M3 Bar End to Compton (Winchester Bypass)

Magnetic Data
'Hectare' Grid 1016

Figure 15

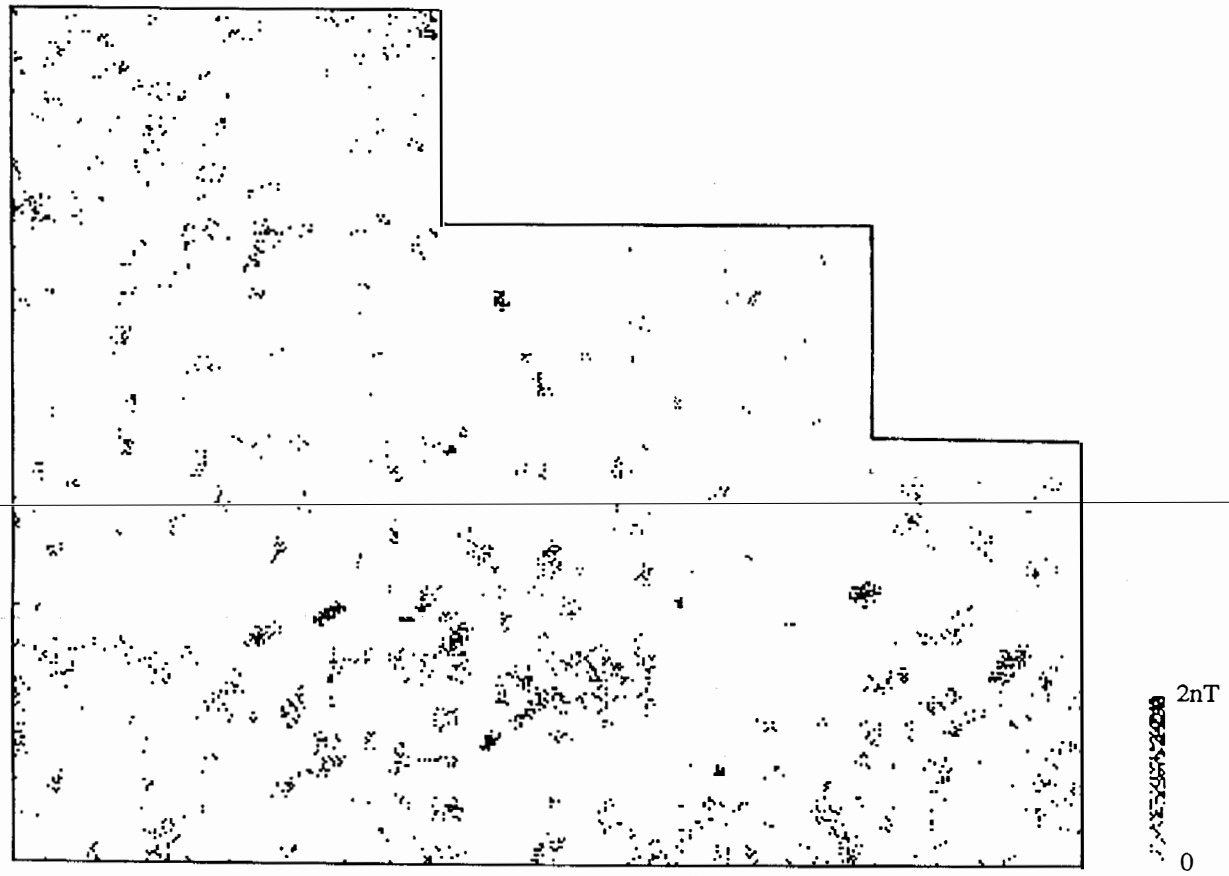


M3 Bar End to Compton (Winchester Bypass)

Magnetic Data
'Hectare' Grid 1017

ORIGINAL AT A3

Figure 16A

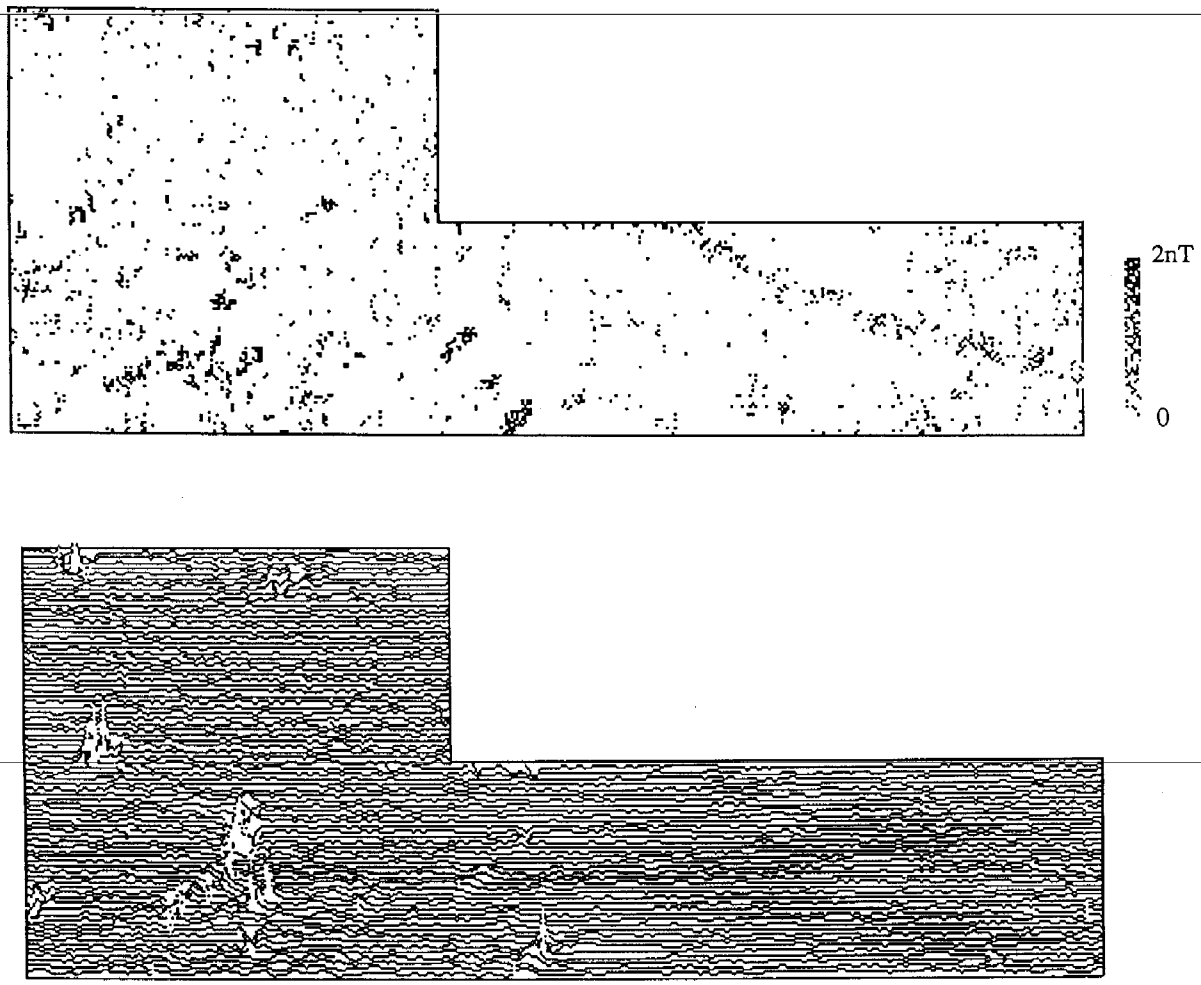


M3 Bar End to Compton (Winchester Bypass)

Magnetic Data
'Hectare' Grid 1017

ORIGINAL AT A3

Figure 16B



M3 Bar End to Compton (Winchester Bypass)

Magnetic Data
'Hectare' Grid 1018

ORIGINAL AT A3

Figure 17

M3 Bar End - Compton
Magnetic Anomalies

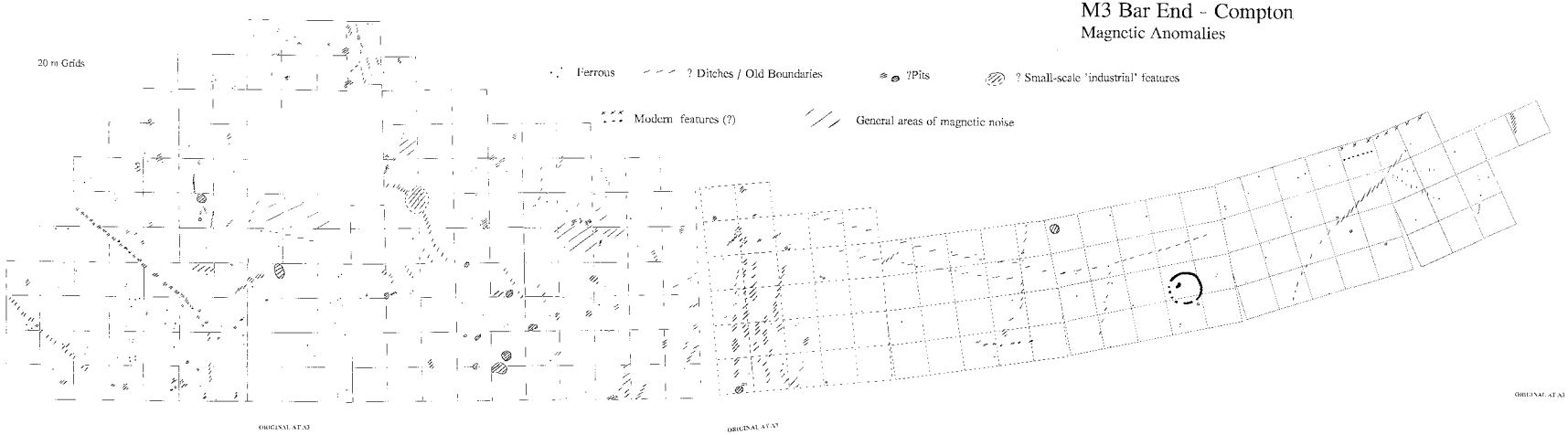


Figure 18