

THE BEDFORDSHIRE COUNTY SITES AND MONUMENTS RECORD
DATABASE MANAGEMENT SYSTEM

Jonathan C. Moffett

Institute of Archaeology, London

ABSTRACT

This paper describes the Bedfordshire County (B.C.) Sites and Monuments Record (S.M.R.) Database Management System (D.B.M.S.).

This has been developed to replace the present S.M.R. optical coincidence card system (O.C.C.), as well as storing more data than can be put on an O.C.C. It will allow for quicker and more thorough searches while it is also possible to add, delete and update existing S.M.R. data. There is a security system of user names and passwords which will allow only authorised users to have access to the information stored in the database.

1. Introduction

Several county S.M.R.s have been stored on to computer, although this is the first attempt to use a network database management system on a microcomputer. The aim of the database has been to replace the optical coincidence card system which had been used by the Bedfordshire County Planning Department. The advantage of the computer over a manual search is that it will not miss any records, as long as the original data has been stored. Also the computer allows a certain amount of extra information to be stored in the database so that instead of getting a list of numbers and then having to go back to the cards for more information, the computer can retrieve the essential data directly. However, it was not intended to store a complete record in the database because there was not enough storage space on the disk. However, the basic requirement was that the database management system should be able to search the list of primary records as quickly as possible fulfilling certain conditions.

2. The S.M.R. Data

The S.M.R. data stored in the database is based around the first side of the primary record card (Figure 1). However, this only contains a minimum of information, and more detailed records are also kept. The 10 fields which are used in the computer system are as follows:

1. The Primary Record Number. This is the record identifier and is unique to each record.
2. The Name. This is the name of the site or monument to which the record refers, and often incorporates some keyword information, such as "MOAT" or "ROMAN POTTERY", followed by an address.
3. Parish. There are 124 parishes in Bedfordshire, and a record can refer to at least one of these, more if it is a linear feature such as a roman road. There is also a "PARISH UNSURE" keyword in case the information reported does not indicate which parish the record refers to.
4. District. These are the four administrative districts in Bedfordshire.
5. National Grid Reference. This is either on the SP or TL Ordnance Survey sheets and is two groups of either 2, 3 or 4 figures, depending on the accuracy or extent of the record. There is also another type of grid reference, the MARGINAL reference which refers to those records which have no location recorded for them.
6. Period. There are 22 currently defined period descriptions.
7. Status. There are 13 currently defined status keywords.
8. Condition. There are currently 19 condition keywords defined.
9. Record Type. There are five record types, indicating the types of physical records, such as photographs and slides, that exist for a record.
10. Descriptive Category. There are some 500 descriptive keywords that can be associated with a record. These range from the object(s) found to the type of site.

Searches of the S.M.R. usually involve fields 3 to 10, and fields 3, 4, and 6 to 10 are all stored on the the optical coincidence card system.

3. The Database Structure

The main purpose of storing the data on to the computer is to facilitate searches of the S.M.R. data. This usually revolves around the use of the keywords and so the database has been designed to fulfill this function first. However, searches are also required using the National Grid references as well as the individual Primary record numbers.

The database structure is illustrated in figure 2. The database is centered around the Primary record database record or P.R.N. record. This contains one field of an integer. There will probably be about 25000 records once the S.M.R. is complete and 25000 of these database records have been stored in the database. They can be

accessed directly from two main paths: "unused" and "prns". The first set contains all those numbers which have yet to be used, while the other contains all those numbers which have been used. There are currently 12000 records in use. There are two other sets associated with this database record, "search1" and "search2", both of which are used to store those P.R.N.s found during searches.

Because one of the primary functions of the database is to aid searches all the keywords for the fields 3, 4 and 6 to 10 above have been stored in one set called "keywords", where a KEYWORD record contains one field of 35 characters. However, to preserve their field identity there is another record type called FIELD, which again has only one field within it, of 10 characters which stores the S.M.R. field name. Each one the seven FIELD records is then linked to its own set of keywords through the set "contains". This means that it is possible to list out all the keywords that can be used to search, using the "keywords" path, or to list them with respect to the field they belong to by the path "fields,contains".

The record numbers are linked to the keywords by two sets. The advantage of a network database management system is that any one database record value only occurs once in a database, links to other records are then taken care of by pointers. These two sets are both many-to-many sets, that is one S.M.R. number can be linked to none, one or more keyword database records, while one keyword can be linked to none, one or more S.M.R. number. Thus the set "keys" is the principal link, but there is a second called "rubbish". The purpose of this set is to preserve links between S.M.R. numbers and keywords which are known to be wrong, but which may have been published at one time so that if the County Archaeologist receives an enquiry he can inform the enquirer of the error.

The National Grid references are stored in the database record type N.G.R., which comprises two four character arrays. There are three direct access sets, "tlngrs", "spngrs" and "mnggr", referring to references form the TL, and SP sheets and to Marginal records respectively. These are linked separately to the P.R.N., although this method of storing this data is currently under review, and in the next version of the database they will be stored as a single set.

The name of a record is stored in the database record type NAME, which contains a single field of 20 characters. To store longer names there is an overflow set called "extra", which is a one-to-many set, in first in first out order. Thus, the first 20 characters of a name owns the one or more extra name records, the second set of 20 characters being the first member in the extra set.

4. The Computer Hardware

The database has been set up on a Sirton Computer Systems Midas 3HD. This system is a Z80A microprocessor-based microcomputer with a 64 Kilobyte memory, a single eight inch, one megabyte floppy disk drive and a 20 Megabyte hard disk. The computer system is controlled by a Televideo 925 and an Epsom printer is used to provide hard copies

of information.

5. The Computer Software

The database management system used to control the database is M.D.B.S. 1. This a commercial network database management system (see Moffett this volume). The data manipulation commands can be embedded in most high level languages, but for the purposes of this D.B.M.S. they are embedded within Pascal. The version of Pascal used is Ithaca Intersystems Pascal/Z. Both these packages operate under the CP/M 2.2 operating system.

6. The Database Management System

The management system is actually made up of 30 programs written in Pascal, which can chain to each other in predefined sequences. However, there is only one way into the D.B.M.S. and that is through an entrance program which asks the user for their user name and password. If a user attempts to start the D.B.M.S. from another program, that program automatically chains to the entrance program.

When the user is required to make some decision they are either asked a question or are presented with a menu or list of alternative courses of action. Once the user has successfully entered the database they are presented with a menu of four options:

Database Management Control Menu

Choose option:

- A - Search database
- B - Edit database
- C - List database
- D - Database contents statistics

- * - Select output destination

- ! - Help!!!!
- \$ - Leave database/return to CP/M

(A-D/*/!/\$)?

6.1. Searching

The aim of any search is to provide the user with a list of primary record numbers which fulfill certain conditions. The user can search using the keywords and the national grid references. To specify a keyword it is put inside double quotation marks, e.g.

"anglo-saxon"

whereas the national grid reference is currently entered in the form:

NGR=TL 234 456

where the square required is on the TL sheet, and extends from 2340 to 2349 on the easting axis and 4560 to 4569 on the northing.

It is possible to specify a combination of keywords and grid references using the two logical operators AND and OR, e.g.

"bead" and "anglo-saxon"

will find all primary records which have these two keywords associated with them. This example takes about 2 minutes when executed, and results in the finding of 15 primary records, which form the intersection of two sets of 40 and 150 primary records respectively. On the whole searches are of the order of minutes, mainly due to memory constraints.

The search results can currently be displayed in two forms, either as a list of just the record number and the site name, or as a card on the screen. This takes a form similar to the original record card as follows:

NAME:	PRN =
	Parish:
NGR :	
Subject Categories	District:
	Period:
	Status:
	Condition:
	Record Type:

6.2. Editing

This option allows the user to add, delete or change part of the database. This applies to the fields, keywords, names, grid references as well as a complete record. At present the user is prompted with questions whenever data is to be entered, e.g.

```
*** Add keywords to database ***
Enter field name:SUBJECT
Enter new keyword($ to stop):ROAD
*** Keyword ROAD already exists ***
Enter new keyword($ to stop):ROMAN ROAD
*** Keyword added successfully ***
Enter new keyword($ to stop):$
```

It is not yet intended to develop an on screen card format editor, although this may be written at sometime in the future.

6.3. Listing

On entering this option the user is presented with the following menu:

- A - List all keywords in alphabetical order
- B - List all field names
- C - List all field names and associated keywords
- D - List all keywords for a particular field
- E - List parishes for each district
- F - List all site names
- G - List cancellation records
- H - List information by primary record number
- I - List information by parish
- J - List information by national grid reference

This option is designed to let the user know what is stored in the database.

6.4. Database contents statistics

This option allows the user to examine the quantity of data stored in the database, so that its growth can be monitored. The following list of options are available:

- A - List unused primary record numbers
- B - Database contents statistics
- C - List number of PRNs for all keywords
- D - List number of PRNs for a single keyword
- E - List number of keywords for all PRNs
- F - List number of keywords for a single PRN

6.5. General options

There are four general options. The first allows the user to set the destination of output as either the console screen, the printer or a file on disk. At most levels there is a help command, which displays the contents of a help file on the screen. It is also possible to jump between options as well as leaving the database and returning to the operating system.

7. Future Developments

The D.B.M.S. has a greater flexibility and is easier to use than the conventional system, although both should run in parallel. It is hoped to integrate a set of text files in to the D.B.M.S. which will be stored on floppy disks, and which will contain more detailed information about a particular Primary Record. This will be incorporated at the program level. Other information such as photograph and slide numbers will also be stored in the next version of the database.

One of the problems with an 8 bit microcomputer is the small amount of memory that is available. 64 K bytes is really not sufficient for database purposes, as can be seen in a comparison of search times. The more complex the search expression, the longer the search will take. However, even then there is probably a large saving in time over that taken by a manual search. It may be possible to upgrade the d.b.m.s. to a 16 bit microcomputer as the Midas can itself be upgraded while M.D.B.S. 3 is a 16 bit version of M.D.B.S. 1, although with a number of additional features.

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BEDFORDSHIRE COUNTY COUNCIL
SITES and MONUMENTS RECORD Primary Record Card

Name _____

Map Reference

O.S. $\frac{1}{10,000}$ Sheet No.

O.S. $\frac{1}{2500}$ Sheet No.

RETRIEVAL SYSTEM		Parish	_____
		District	_____
Status		Period	_____
		Ref No.	_____
Other Status		_____	_____
Constraints Map		_____	Conservation Area _____
Digest Maps		_____	_____
Condition		_____	_____
Record Types		_____	_____
Descriptive Categories		_____	_____
_____		_____	_____
_____		_____	_____
_____		_____	_____
_____		_____	_____
_____		_____	_____
_____		_____	_____

Figure 1: B.C.S.M.R. Record Card

Figure 2: B.C. S.M.R. Database Structure

