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GIMMS⁺ EXPLAINED: HOW TO USE THE PACKAGE
TO PRODUCE MAPS OF THE UNITED KINGDOM
AT THE UNIVERSITY OF LEEDS

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GIMMS* explained: how to use the package
to produce maps of the United Kingdom
at the University of Leeds

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May 1987

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* GIMMS = Geographic Information Management and
Mapping System produced by Tom Waugh
and others at the University of Edinburgh.

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Conditions governing its further use in research are set out in the Conditions of Use specification contained in the form "Application for authority to access the DoE digitized boundary information" issued by the University of Manchester Regional Computer Centre, which is reproduced Appendix A.1. Users should fill in this form and return it to Dr. Joanna Schmidt, University Computing Service, for onward transmission to UMROC.

PERSONAL ACKNOWLEDGMENTS

Our thanks are clearly due to Tom Waugh and his team at the Department of Geography at the University of Edinburgh for producing what is now the standard mapping package in British Universities for producing thematic maps. They answered naive questions on the telephone with care and patience.

Keith Cole of the University of Manchester Regional Computing Centre was extremely helpful in supplying ward level locational data in a form that enabled us to produce polygon files for Family Practitioner Committee Areas (FPCAs). GIMMS is not an easy package for the beginner and we are grateful for his tutoring.

Mike Blakemore of the University of Durham was kind enough to give us access through the Joint Academic Network (JANET) to his set of teaching files of district locational data for Great Britain. These files were produced by Dick Baxter of the Department of the Environment, to whom we and many others are grateful. Peter Jacoby of the University Computing Service, Leeds assisted us by retrieving and remounting a large version of GIMMS on the University's Amdahl 580. Jim Hogg gave helpful advice on using the departmental IBM PCXT and digitizer system, and Mark Birkin listened patiently to accounts of runtime failures, after which the reasons for our errors were crystal clear. Gareth Rees provided helpful insights into the problem of editing zone labels.

You will gather by now that successful use of the GIMMS package requires extensive inter-University team work. We would be happy in return to provide to other authorized users (see official acknowledgments) any fruits of our labours which might prove useful, such as new boundary sets (FPCAs or EC2 level regions) or existing boundary sets extended to the whole United Kingdom (districts, regions). Our JANET addresses are: Phil Rees - GEO6PHR @UK.AC.LEEDS.CMS1; John Stillwell - GEO6JCHS @UK.AC.LEEDS.CMS1; and Peter Boden - GEO5PB @UK.AC.LEEDS.CMS1

In passing on the information and advice we have received from others, we hope we have added value.

1. INTRODUCTION

The GIMMS package provides a means of producing thematic maps of high quality on the computer. For its successful use, it demands, however, much knowledge of both the computing system environment in which it sits and of all the many steps necessary in map production. The main GIMMS manual is comprehensive but rather lacking in examples of how to use commands. Much oral advice is needed for project completion (see the acknowledgments).

This manual is designed to help in the use of GIMMS at Leeds by providing examples of the process of assembling locational data files - the most difficult of the steps in map creation using GIMMS. It also documents procedures on local terminals and output devices (the trivial key presses and commands needed, the lack of which can stymie the user). We have also used the manual to document the procedures used in the construction of a set of boundary files for use in a joint project on Migration in Britain, a subset of which have been placed for general use on the Geography library (GEO6LIB) disk.

The plan of the manual proceeds as follows. The next section provides references to the documents that the user of GIMMS needs to consult. Section 3 provides a simple guide to using BBC microcomputer terminals as GIMMS workstations. The fourth section describes how to use the departmental digitizer, how to transfer the boundary coordinates to a disk file on the IBM PCXT, and how to use KERMIT to transfer that file to the Amdahl mainframe. Section 5 explains the process of creating a map using GIMMS at Leeds. Section 6 provides a comprehensive description of the area boundary files available for Great Britain, Northern Ireland and the United Kingdom, which can be accessed on the Geography Program and Data library disk.

Note that we say nothing about the facilities for producing graphs using GIMMS. Generally speaking, users have been able to use this part of the package with relative ease. Similarly, little need be said about the GIMMS data management capabilities since these are fairly easily learned or can be substituted for by another package (SPSS^x or SAS, for example).

2. DOCUMENTS

It is often said that a software system is only as good as the documents that describe it. Careful study of the software documents before and during use of any package more than repays the time invested. Online HELP systems are useful for the experienced user, but you have to know what to look for, and this is, in our opinion, still much easier using a printed document with a good contents page and detailed index.

2.1 The operating system and editor on the Amdahl 580

To use the GIMMS package at Leeds, the user must be familiar with the CMS operating system, the XEDIT editing package and the use of the

BBC microcomputer as a terminal. See Computing Service (1985) for a guide to CMS and XEDIT, and Naden (1986) on how to use the variety of mainframe terminals available.

2.2 The GIMMS package at Leeds

First, having logged on to the Amdahl in the usual way, issue the command

SETUP PACKAGES

and then type

HELP GIMMS

in which Jacoby (1984) provides details of the Leeds implementation. This may be browsed through in an XEDIT environment.

To obtain a printed copy, type

SPOOL PRINTER CLASS D (or whatever CLASS you desire)

PRINT GIMMS HELPLDS Y.

See section 3 for further notes on using the package.

2.3 GIMMS manuals

The current version of the package at Leeds is 4.5. Within a year version 5 is likely to be delivered but this should consist only of additions and corrections rather than a major revision (Ann Carruthers, personal communication).

2.3.1 The introductory manual

Start with:-

A.W. Carruthers (1985) Introductory User Guide to GIMMS Gimms Ltd,

Edinburgh.

This an excellent starter manual packed with examples on every page which the beginner should read first before going on to the main manual.

Copies: 2 in the Geography Departmental Map Library (reference only)
1 in 47 University Road (see Mark Birkin)
1 in the main building (see Phil Rees).

2.3.2 The main manual

The main manual is:

T.C. Waugh and J. McCalden (1983) GIMMS reference manual Gimms Ltd,
Edinburgh.

This is a dense manual which details all commands and their many options. There are quite a lot of examples but they cover only a fraction of the command options available. These have to be explored by trial and error (hence the importance of using screen plots), and be seeking advice.

Copies: 1 in the Geography Departmental Map library (reference only)
1 in 47 University Road (see Peter Boden)
1 in the main building (see Phil Rees)

The manuals can be obtained via the Information Office of the University Computing Service (9.30-10.30 a.m., see Joan Hatherley or Cathy Britton) or from GIMMS Ltd, 30 Keir Street, Edinburgh, EH3 9EU.

2.4 GIMMS data sets at the University of Manchester Regional Computer Centre (UMRCC)

Available at UMRCC are digitized boundary data sets for all wards in Great Britain. These were compiled by the marketing and software firm SIA under contract to the Department of the Environment, and provided free to authorized users at Universities for bona fide research.

Full descriptions of the data sets are contained in

K. Cole (1985) Notes on using the DoE digitized boundary data base. UMRCC, University of Manchester, which can be listed on the printer as

:WW.INFO.CENSUS.DBD81 at UMRCC

or UMRCCDBD INFO on the Geography library disk.

See Dr. Joanna Schmidt, University Computing Service, to obtain authorization forms.

2.5 Other GIMMS data sets on the GEO6LIB library disk

The boundary data sets for wards in West Yorkshire districts described in Birkin and Rees (1982) are still available together with boundary data sets for 137 zones in Leeds districts that are aggregations of 1981 Census Enumeration Districts. Data for these 137 zones is available via the DATAPAC package (Hirschfield and Rees, 1984). Further details are given in Appendix A.2.

3. USING BBC MICRO TERMINALS AS GIMMS WORKSTATIONS

3.1 BBC workstations

The most convenient terminal on which to carry out GIMMS work is a BBC fitted with a Leeds University Terminal Emulation Read Only Memory microchip, attached to one of the campus networks, and with a dot matrix printer attached. Screen displays of graphics can be obtained, and screen dumps can be effected immediately (useful for recording the progress of map development, rather than the production of maps).

BBC workstations of the above type are located as follows:

- (1) Geography Computing laboratory
3 PAD terminals, 2 dot matrix printers
- (2) 41 University Road
1 WTAC terminal, 1 dot matrix printer
- (3) Staff offices
At least 4 have currently this type of setup.
- (4) Baines Wing Laboratory
We hope to connect the BBCs to the network yielding 9 PAD/X25 terminals also connected to dot matrix printers.

It is possible to carry out GIMMS work on other terminal types but only a few have graphics capabilities. It is essential to use the screen to weed out errors and improve map designs.

3.2 Using the BBC workstation

The stages involved are set out in Table 1. In the body of the table, commands that should be typed exactly as specified are represented in upper case, special keys are enclosed in angle brackets; items in lower case require the user to substitute the appropriate entry. Normally, you press the <RETURN> or <ENTER> key after each command. Where such a key press is indicated, this indicates an extra press after no other entries.

Stage (1) involves switching on the BBC, the monitor and printer, selecting the appropriate screen mode, 3 for a screen of 25 lines by 80 characters of text, 0 for a screen of 32 lines by 80 characters for text or graphics. The command *VDU loads the terminal emulation program.

Stage (2) involves threading through the network to the Amdahl computer. Screen messages inform the user whether the terminals are connected to either the West Terminal Access Controller (TAC) or one of the West (Textiles) Packet Assembler-Disassemblers (PADs).

Stage (3) is the usual logging on sequence, that involves typing your userid and password. The extra <RETURN> is to obtain a

work disk.

Stage (4) involves the user obtaining a 2 megabyte (2 million byte) memory, needed for using GIMMS.

Stage (5) gives the two general commands you will need for running any GIMMS job. `SETUP PACKAGES` connects the user to the P disk, where the program resides. To run the program the user types the keyword GIMMS followed by the name of the file containing the instructions to the package, and the name of the device for which plotter output is to be prepared (e.g. DT22 for screen plots, C1012 for the CALCOMP 1012 plotter, HP for the Hewlett Packard plotter: see `HELP GIMMS` for full details). Normally, stage (5) will be reached only after various files have been prepared of instructions, locational data and non-locational data. The two commands of stage (5) are best embedded in the user's own executive file together with the relevant file definitions statements (see section 5 and 6 for examples).

Stage (6) is necessary if you wish to output the map to the screen and you haven't selected `MODE 0` at stage (1).

Stage (7) enables a map on the screen to be dumped onto a dot matrix printer if one is attached to the BBC via the printer or RS432 ports. The map will be a little crude and a little distorted in the vertical dimension, but does give a reasonable result for research (as opposed to publication) purposes. Screen dumping does take a little time.

Stage (8) is needed if you want to revert to text `MODE 3`. This is only essential if you want to print out text files on the dot matrix printer using the

`AUTOLF filename filetype`

command. In `MODE 0` this works via the Screen Dump facility and you get double-size characters (useful for displays?).

Stage (9) is for use by those who get bored by seeing all maps in light foreground on dark background. See the `VIEW` manual or BBC manual (`VDU 19` command) for explanations.

4. DIGITIZING

The exact procedures in digitizing a map depend on the software that uses the digitized coordinates of the map. Here the digitizing method is designed to digitize boundary segments for use in GIMMS, as described in Carruthers (1985) and Waugh and McCalden (1983).

The stages in digitizing are spelt out in Table 2. First, the map and digitizing plan must be prepared. Secondly, the IBMPC and digitizer must be set up. Thirdly, the software and disk needs to be readied. And fourthly, the digitizing itself can be carried out.

4.1 Preparation of the map and digitizing plan

The map to be digitized should not exceed approximately 50 cm by 50 cm: larger maps must be digitized in parts or be photoreduced prior to digitizing. The digitizing plan will depend on whether points, segments or polygons are to be digitized. Here we describe the strategy for digitizing segments or boundaries that separate one area from another.

Figure 1 shows the boundaries and names of the districts of Northern Ireland, which we wish to digitize. To do this a zone labelling plan and a contiguity matrix are drawn up (Figure 2). All zone labels must begin with a letter. The other numbers are used to capture a hierarchy of areas, each label having the general form

Zrrcodd

where rr = the region number
cc = the "county" number within the region
dd = the district number within the "county"

with districts being arranged alphabetically within county groups. The shaded squares in the diagram indicate which areas share a common boundary. The segments to be digitized number half of the shaded squares and a suitable plan might be to work across each row from the principal diagonal rightwards, digitizing segments thus:

Z300101	Z300102	/
Z300101	Z300107	/
Z300101	Z300303	/
:				
:				
Z300604	Z999958	/

4.2 Setting up the digitizer and the IBMPC

The steps are specified in Table 1: ask someone to show you how the first time you use the facility.

4.3 Setting up the program and data disk

The program that you can use is called DIGIT.BAS and there is a copy on the hard (C) disk. First, load the BASIC compiler by typing BASICA and then load the program. Insert a formatted disk in drive A to receive the digitized data. If the disk is not formatted, type FORMAT and wait for the process to be carried out.

4.4 Digitizing the map

Type RUN and then read and follow the program's instructions (see Table 2). A steady hand, patience and several hours are required to carry out the complete process. The program being used is listed in Figure 3. This writes the digitized coordinates to the data file after each segment is complete. You can therefore carry out the digitizing in several sessions, although you will need to merge the resulting data files before use of GIMMS. Leave the map fixed to the digitizing tablet between sessions. If this isn't possible (or someone removes your map), your data are still usable, provided you digitize four corners of the map with known map coordinates each time you fix the map to the digitizer. If you end up with such separate data files you will need to write a program to transform each set of data to common map coordinates, carrying out translation, rotation and scaling in the process (see McGregor and Watt 1983, - sections 3.1, 3.2). Such a routine is also built into GIMMS but its use requires that all segment data be merged first.

The moral: try to complete the digitizing in one work session, or in as short a time as possible.

4.5 Transferring the data file to the mainframe

Once the digitizing is complete you will need to transfer the data file to the Amdahl. Table 3 sets out the procedures, employing the computer-to-computer interface provided by KERMIT (see the KERMIT HELP file).

5. CREATING A MAP

Most of the information about producing a map using GIMMS is given in the two GIMMS manuals (Waugh and McCalden, 1983; Caruthers, 1985). Here we explain how to set up the map production process most conveniently on the Leeds Amdahl computer. The map production process can be split into two stages: the creation of a polygon file (Figure 4.1), and the compilation of a map (Figure 4.2). You will carry out the first stage only once for a set of maps. The second stage is used for each map or set of maps produced together with further instructions.

5.1 Creating a polygon file

Figure 4.1 shows the files involved in polygon creation. The user assembles a boundary data file (as described in section 4), a commands file of instructions to the GIMMS package. The package produces a listing file that reports on the execution of commands and any errors, a segments file of boundary data for each segment in compressed format and finally a polygon file of compiled and compressed boundary segments for each zone.

5.1.1 The EXEC file explained

Under CMS each file must be explicitly connected via a data set number or channel to the package, and the program must be executed after these file definitions have been specified. This is best done by creating an EXECutive file. Figure 5 shows an example that can be adapted for most polygon creation problems.

line (1): EXEC SETUP PACKAGES

This links the user to the packages disk in case this has not been done already.

line (2): FI 5 DISK &1 GIMMS

The file on channel 5 is to be found on the user's workdisk with a filename to be specified at runtime and filetype of GIMMS. You replace the &1 with an appropriate filename.

line (3): FI 6 DISK &1 LISTING

Output from the package will be written on channel 6 to the user's disk file with a filename to be specified at runtime and a filetype of LISTING. This may be inspected on screen for errors.

line (4): FI 10 DISK &1 DAT

Channels 10-16 are available to users to connect to data files of various kinds. Here channel 10 is assigned to the raw digitized coordinate data for the boundaries we are interested in. The first

portion of such a file for Northern Ireland districts is listed in Figure 6.

line (5): FI 11 DISK &1 SEGMENTS

Channel 11's disk file will be used to create a compressed data file of the digitized coordinates.

line(6): FI 12 DISK &1 GIMMSFIL M4 (RECFM VBS LRECL 1028 BLOCK 3088

The file on channel 12 is assigned to store the polygon output from the GIMMS package. Note the special disk number and file specifications needed.

line (7): EXEC GIMMS &1

The final line issues the executive command GIMMS which accesses another EXEC file which is used to run the package. One argument - &1 must be supplied to this EXEC: that of the filename for the family of files being used.

To initiate a run of the program the user would type the following command at the keyboard:

NIGIMMS NI

5.1.2 The GIMMS file

Figure 7 displays the contents of a sample commands file for polygon creation. See the GIMMS manuals for detailed explanations of each command. Note that the channel numbers specified in FILEIN= and

FILEOUT= options to the *FILEIN, *CHECK and *POLYGON commands must correspond with those specified in the EXEC file. Thus, the data input module,*FILEIN, receives the data via channel 10, and outputs to the SEGMENTS file on channel 11. This file is later connected on channel 11 for input to the *CHECK and *POLYGON modules.

5.1.3 The LISTING file

A portion of the LISTING file is displayed in Figure 8. The user can check whether commands have been interpreted as intended or whether an error has been made. Note that LISTING files are not automatically saved to the user's filestore.

5.2 Map compilation

The second stage in map production is illustrated in Figure 4.2. The polygon created at the first stage is input to the GIMMS package along with the commands file and, if necessary, the non-locational data file.

5.2.1 The EXEC file explained

Figure 9 gives an example of an executive file used to control the creation of maps using GIMMS. This is very similar to the previous EXEC, with the following exceptions.

line (4): FI 10 DISK &1 DATA

Channel 10 now links to a non-locational data file.

line (6): EXEC GIMMS &1 &3

A third parameter appears in the executive file as the second parameter to the GIMMS command. This names the device type for which output is to be produced.

5.2.2 The GIMMS file

An example of a commands file for producing an outline map of Northern Ireland's districts is shown in Figure 9. Note the importance of including the parameter TRUSCALE to obtain a map at the size specified by the MAPSIZE option. Otherwise the map will be drawn at the default size of the device selected. To view a map on a VDU screen the TRUSCALE parameter should be omitted if the intended map size exceeds the maximum screen dimensions (17 cm by 17 cm). The largest map that can be produced at Leeds is one with vertical dimension 36 cm (on the Calcomp 1039W plotter).

5.2.3 The map plots

A screen plot of the map is obtained by issuing EXEC commands such as

UKMAP NI NI DT22

Where NI is the generic filename for the command and polygon files "DT22" is the device name for the screen. A paper copy of this may be obtained via the screen dump command on the BBC micro terminal

<SHIFT> + <F0>

(see Table 1). Figure 11 shows the result produced on a dot matrix printer.

A graph plot of an outline map of Northern Ireland districts is shown in Figure 12.

6. UNITED KINGDOM BOUNDARY FILES

From reading sections 4 and 5 of the manual, you will have gathered that the creation of locational data and polygon files is a time-consuming process that involves considerable care. The more you can use pre-prepared files, produced by other users or other institutions, the easier it is to get on with the job of using computer drawn maps as research tools or devices for displaying research results. This section of the manual describes two sets of locational files for the United Kingdom. The first consists of three standard area geographies for districts, counties and regions. The second set consists of three geographies that either mix units from the standard geographies or adopt another map base. Table 4 sets out the organization of the standard area files and Table 5 the organization of the hybrid area files. Each table contains 9 blocks formed by three row blocks that refer to the areal unit employed and three column blocks that refer to the collectivity of areal units or universe involved. Within each block of the table some 9 functions are identified to which the names of files are attached that fulfill those functions. These functions are those identified in Figure 4 (except for LISTING files which are ephemeral and non-locational data files, with which this manual is not concerned).

Note that the raw data function can be fulfilled by a SEGMENTS file (if this has been created in a previous job) or by POLYGON files (when these are to be merged). The empty blocks in Table 4 result from the absence of counties in Northern Ireland (although we did employ a pseudo-county label for consistency with the Great Britain zone labelling). The empty blocks in Table 5 indicate that the UK file for demographic regions was constructed directly rather than being an amalgam of Great Britain and Northern Ireland polygon files, although these latter could be constructed quite easily using GIMMS' INCLUDE and EXCLUDE options. That is left as an exercise for the reader!

6.1 Locational data files for Great Britain

The locational data files that underlie the Great Britain polygon files for districts, counties and regions have been imported from the University of Durham, courtesy of Mike Blakemore of the Department of Geography. The files originate from the Department of the

Environment, courtesy of Dick Baxter

"The following conditions of use are attached to the outline data:

- a) For mapping in the case of bona fide unpublished research there are no conditions.
- b) If the outlines are used in any map which is to be published, acknowledgement must be made to Dr. Baxter, for the original work, and to Michael Blakemore of Durham University, for making them available.

- c) For any form of commercial or contract work, the user should contact the DoE."
(Blakemore in the GBINFO DATA file).

Three files in the GEO6LIB library disk contain information on the Great Britain locational data:

- (1) GBSEGS DATA contains the coordinates of all inter-district boundaries in Great Britain
- (2) GBINFO DATA describes the data and gives lists of zone labels for regions, counties and districts
- (3) GBOOM DATA gives GIMMS commands for constructing district, county or region polygon files, which have been adapted to produce those files at Leeds.

These files can be used by users to create their own polygon files.

6.1.1 Great Britain districts

Figure 13 lists the two EXEC and two GIMMS files used in the production of the district outline map (Figure 14).

The LIMITS command in GBDIST GIMMS file shows that the map is defined to be 6550 map units across (X axis or easting) and 12100 units up (Y axis or northing). These map units refer to the Ordnance Survey grid, in which point 0,0 is to the south west of the Scilly Isles. Each map unit represents one tenth of a kilometre or 100 metres.

The way in which the production of district polygons is assured is through use of the MINZONE and MAXZONE options. Districts are identified by 7 alphanumeric character labels. Zone Z100101 is the first (Berwickshire) and Z290804 is the last (Swansea) - see GBINFO DATA for the full list. Note that, when the polygon file GBDIST GIMMSFIL is used, the non-locational data must be in the correct GIMMS order specified in GBINFO DATA. This applies to all polygon files: the zone ordering or area list for each is given in the "INFO" file given at bottom of each block of Table 4 and Table 5.

6.1.2 Great Britain counties

The polygon file for counties in Great Britain - GBCOUNTY GIMMSFIL - was produced from the SEGMENTS file produced in creating the districts map. Figure 15 shows the result. Note that Scottish regions are regarded here as the equivalent of English and Welsh counties.

6.1.3 Great Britain regions

The polygon file for Great Britain regions GBREGION GIMMSFIL was produced in the same way as counties with a command file - GBREGION

GIMMS - derived from that supplied by Dick Baxter of DoE - GBCOM DATA. The region outlines are shown on the later United Kingdom map (Figure 18).

6.2 Locational data files for Northern Ireland

6.2.1 Northern Ireland districts

The digitizing of the Inter-district boundaries in Northern Ireland was described in section 4. The original map used was that on p. 15 of Philips' New World Atlas (George Philip, London; 4th Edition, 1981) blown up by 100% on a photocopier, and hence can be regarded as only a first approximation. There is probably a slight Northward displacement of Northern Ireland relative to its true position with respect to Great Britain.

To merge the Great Britain and Northern Ireland district maps, the digitizer coordinates had to be related to the Great Britain Ordnance coordinates (not the Ireland Ordnance Survey coordinates). This was done by using the CONVERT option of the *FILEIN command in which the 4 corners of the Northern Ireland map sheet are given both map and digitizer coordinates:

CONVERT			
0000	4600	4290	7956
0000	6200	4290	12536
2000	6200	9966	12536
2000	4600	9966	7956

These are approximate conversions only and need revision if detailed cartography is to be undertaken. The CONVERT option information was inserted at the head of the NI DAT file after the SEGMENTS option. A polygon file, NIDIST GIMMSFIL, is then created, and checked by being plotted using the same map commands as for Great Britain districts (files NIDMAP GIMMS and NIDMAP PLOT).

6.2.2 Northern Ireland counties

The Northern Ireland zone labels for districts (see Figure 2) have been arranged with the following county codes

01	Antrim
02	Armagh
03	Down
04	Fermanagh
05	Londonderry
06	Omagh

but these are merely aggregations of local authority district areas rather than administrative areas. The equivalent polygon file was not produced, though could be quite easily.

6.2.3 Northern Ireland region

Northern Ireland is the eleventh region recognized in UK official statistics. The files listed in Table 4 were merely used to create a polygon file based on OS(GB) coordinates for later merger with the equivalent GB file.

6.3 Locational data files for the United kingdom

6.3.1 United Kingdom districts

GIMMS provides a procedure for merging polygon files together, and this is used to merge the Great Britain and Northern Ireland district polygon files. Clearly, to do this the two files must have been prepared on the same basis: using the same map coordinates and the same scheme for zone labelling. Hence the need to use the more elaborate GB zone labelling system for Northern Ireland districts, and the need to convert the digitizer coordinates to OS(GB) coordinates.

Figure 16 displays the files required to merge the two component polygon files and to produce a plot file for producing the map shown in Figure 17.

6.3.2 United kingdom regions

The same procedures as for districts are used to merge the regional polygon files for Great Britain and Northern Ireland and Figure 18 shows the resultant outline map.

6.4 Locational data files for Family Practitioner Committee Areas (FPCAs)

The general practice service of the National Health Service is organized by Family Practitioner Committees whose areas cover (roughly) former metropolitan districts and counties in England and Wales. The National Health Service Central Register (at Southport) keeps records of patient transfers between Family Practitioner Committee Areas (FPCAs) and the Office of Population Censuses and Surveys prepares files and listings of these statistics as quarterly and annual records of migration in England and Wales. Migration flows between FPCAs in England and Wales and Scotland, Northern Ireland and overseas are also recorded. Our interest then was to

construct a polygon file that would enable us to map migration variables for the 96 zones of this set of FPCAs in England and Wales (94 zones) together with Scotland and Northern Ireland.

6.4.1 FPCAs in Great Britain

To do this we used two files of digitized boundary information for wards kindly pre-processed (with respect to zone labels) by Keith Cole of UMROC. The first - KCFILE1 SEGSMET - contains the inter-ward segments for the districts of former metropolitan counties; the

second contains inter-ward segments for the districts of non-metropolitan counties. These files are built up from the county ward files described in Cole (1985). It was decided not to attempt to compile the FPCA polygon from one raw data file, given the large size and fine scale (digitizing to the nearest 10 metres) of the complete ward data set for Great Britain).

Many difficulties were experienced in carrying out this task, and we describe here the way these were overcome just in case we or other users may need to create polygon files based on the ward boundary data.

- (1) The large version of GIMMS was required to deal with the large number of points per segment involved (particularly for Scotland as one area). The large version of GIMMS was specially mounted on the package disk and was accessed via an exec LGIMMS EXEC. Since this large version is only likely to be used occasionally, it may well be removed again from the P disk. On request, the Computing Service will remount it.
- (2) Very large scratch files are required by the LGIMMS version to accomplish the task, and the user needs to acquire a large temporary disk on which to do the work. The method for doing this is summarized in Table 7.
- (3) If difficulty is still experienced with the size of the polygon file being created, then employ the REDUCE option to the *POLYGON command in GIMMS which removes points closer together than the parameter which follows the option. In creating the FPCA polygon file, we employed REDUCE 40 so that points closer than 40 map units together (i.e. 400 metres) were ignored.

Figure 19 sets out the stages in compiling the FPCA polygon file. Job A (files with name KCA) created the polygon file for FPCAs in metropolitan counties and Greater London; job B (files with name KCB) created the polygon file for FPCAs in non-metropolitan counties plus Scotland as one zone. Job C (files with name KCC) merged the two together.

6.4.2 FPCAs in the United Kingdom

The next step was to create a polygon file for Northern Ireland as a zone and to add it to the England and Wales plus Scotland file to

yield a UK FPCA zone system. The file of Northern Ireland digitized boundary coordinates had to be modified to be compatible with the FPCA polygon file for GB in two respects: the zone number of Northern Ireland was changed from 30 to 98 and the CONVERT option was changed to increase the number of digits in the OS(GB) coordinates. The LIMITS option in the command file were changed to 0,0,70000,110000 from 0,0,6550,12500 of the previous districts and region polygon files. The Northern Ireland and England and Wales plus Scotland polygon files were then merged. Table 5 lists the files involved in

these procedures.

The final product, an outline map of the United Kingdom FPCA zone system, is shown in Figure 21. The command file used to construct is listed in Figure 20. This listing shows the technique for achieving insets. The FPCAs in each metropolitan area are reproduced at double the general map scale.

6.5 Locational data files for European Community Level 2 regions

European Community Level 2 regions number 20 in the UK. They have been widely used by OPCS in the migration tables from 1971 and 1981 censuses, and have been used for interregional migration modelling and multi-regional population projection by Stillwell (1986) and Rees (1986).

To create the Great Britain polygon file, the district boundary data file used to create the district, county and region maps (Table 4) was modified. The zone labels were carefully extended from the form

Zrrccdd

where rr=region number, cc=county number and dd=district number, to the form

Zzzrrccdd

where zz was the EC2 level sequence number used in the work of Stillwell (1986) and Rees (1986) - see the information file UKZONE LIST for details. Table 5 lists the files involved in the production of the polygon file GBZONE GIMMSFIL.

A Northern Ireland polygon file was then created after modifying the Northern Ireland region number in NI DAT to 01 from 30, and this was merged with the GB zone polygon file to yield the polygon file for the whole UK, UKZEC2 GIMMSFIL. The resulting outlining map is shown in Figure 22.

6.6 A demographic map of European Community Level 2 regions

The final polygon file for a UK geography that has been placed on the library disk is that for a sketch map! The original map was produced by John Craig of OPCS (Craig, 1977) for regions: the boundaries of the region were drawn so that the areas were roughly proportional to population, and as close to a generalized version of their real geographic shape as possible. The map was further modified to represent European Community Level 2 regions, and then digitized directly from a tracing on graph coordinate paper.

Figure 23 shows a listing of the file used to produce the outline map (Figure 24). In this example, because the map is fairly simple and demands relatively few digitized points for definition,

the instructions for polygon creation, the boundary data itself and the instructions for drawing an outline map have all been included in one file for convenience.

6.7 A summary of the files available on the Geography library disk

Only some of the files described in this section of the manual and listed in Tables 4 and 5 have been placed on the common access Geography library (GEO6LIB) disk. They are represented in capital letters in Tables 4 and 5, but have been reproduced for convenient reference in Table 6. Access to the other files referenced in Tables 4 and 5 (located in the filestore of GEO6PHR) can be arranged. Principal use will be made of the polygon files listed in the centre of Table 6 for thematic map production. Polygon creation and map compilation files have been included, also, so that users can develop their own versions from a convenient base. The information files give crucial information on the ordering and definition of zones in each polygon file. Three data files are included so that users can create their own polygon files for any set of polygons that are combinations of districts, or counties or regions.

7. CONCLUDING REMARKS

In writing this manual we have had the aim of making computer mapping more accessible. To achieve this, the manual has documented the procedures for using a powerful and flexible thematic mapping package on the University of Leeds Amdahl computer. It has also documented a set of locational data files which we are currently using in our research and which others may also find of use. Success will be gauged by the numbers of applications for access to the digitized boundary information that are generated, and by the number of maps that roll off the campus graph plotters in future.

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TABLE 1. How to get set up for GIMMS WORK

STAGE (1) STARTING

user actions	SWITCH ON MODE 3 or MODE 0 *VDU <RETURN>
--------------	---

STAGE (2) ROUTING

THROUGH

THE NETWORK

West TAC

West TAC

West TAC

West PAD

North TAC

Central TAC

Central TAC
7171 Controller

Amdahl

Amdahl

Amdahl

Amdahl

user actions

N

C

C

CALL CMS1

A

A

B

<CTRL>+<F4>

BBOMIRO

STAGE (3) LOGGING ON

User actions	LOGON	userid
		password
		<RETURN>

STAGE (4) OBTAINING MORE MEMORY

user actions	CP DEF STOR 2M
	IPL CMS or I CMS
	ACCESS IAI A or ACC IAI A or B

STAGE (5) ACCESSING THE PACKAGE

user actions	SETUP PACKAGES
	GIMMS filename devicename

STAGE (6) OBTAINING MODE 0 FOR SCREEN GRAPHICS

(1) North TAC
or CTAC via A
or PAD

(2) CTAC via B

user actions

<CTRL>+<F0>
<RETURN>

LINEMODE ON
<CTRL>+<F0>
<RETURN>

STAGE (7) SCREEN DUMPING & SCREEN CLEARING

user actions

<SHIFT>+<F0>
<CTRL>+<F6>

STAGE (8) OBTAINING MODE 3 FOR TEXT AGAIN

(1) NorthTAC
or CTAC via A
or PAD

(2) CTAC via B

user actions

<CTRL>+<F3>
<RETURN>

LINEMODE OFF
<CTRL>+<F3>
<RETURN>

STAGE (9) OBTAINING DIFFERENT SCREEN COLOURS

(1) Dark on light on
monochrome monitors

(2) White on blue
on colour monitors

user actions

<CTRL> + <F8>

<CTRL> + S

07000 <RETURN>
<DELETE>
<RETURN>
<RETURN>
<CTRL>+<F8>
<CTRL>+S
10000 <RETURN>
<DELETE>
<RETURN>
<RETURN>

04000 <RETURN>
<DELETE>
<RETURN>
<RETURN>

Glossary of abbreviations used in Table 1

MODE	type of screen supported by BBC micro
VDU	visual display unit
TAC	terminal access controller
PAD	packet assembler and disassembler
West	West computing constituency (grouping of departments) = Colour Chemistry, Geography, Plant Sciences, Psychology, SPHSS, Textiles, Transport, Zoology
North (N)	North computing constituency (Grouping of departments) = Engineering and Applied Science departments
7171	device for emulating IBM 3270 screens on lower functionality terminals
CMS	Conversational monitor system (operating system on Amdahl)
Central (C)	Central computing constituency
Amdahl (A)	the university's largest mainframe
B	command for accessing the Amdahl via the 7171
L	login
CP	control program (operating system on Amdahl)
IPL or I	initial program load
ACCESS or ACC	provide access to named disk or disk with filemode indicated
<RETURN>	return or enter key on keyboard
<CTRL>	control key on keyboard
<F0>...<F9>	function key
LINEMODE ON	non-7171 mode on terminals connected to 7171

TABLE 2. Stages in digitizing a map

STAGE	DETAILED INSTRUCTIONS
(1) PREPARE THE MAP AND DIGITIZING PLAN	<p>obtain a copy of the map at suitable size (not bigger than 50 x 50 cm)</p> <p>Define zone labels and names</p> <p>Draw up a contiguity matrix</p> <p>Draw up a plan for the order of segment digitising</p> <p>Mount the map on the digitizer</p>
(2) SET UP THE DIGITIZER & IBMPC	<p>Connect the digitizer cable to the communications port on the IBM PCXT</p> <p>Switch on the IBM PCXT</p> <p>Load the disk operating system (DOS) usually automatic on switching on</p> <p>Switch on the digitizer</p>
(3) SET UP THE PROGRAM & DATA DISK	<p>Type BASICA (this loads the advanced BASIC compiler)</p> <p>LOAD DIGIT.BAS, (should be available on the hard or C disk)</p> <p>Insert a formatted data disk in the A drive, on which the digits file will be written</p>
(4) DIGITIZING THE MAP	<p>Type RUN</p> <p>Follow the instructions given on the screen by the program to transfer digitized coordinates from the digitizer via presses of the cursor button</p> <p>N.B. First digitize a "dummy" segment consisting of the 4 corners of map, the map coordinates of which are known. This information will be used to convert digitizer coordinates to map coordinates in GIMMS.</p> <p>When you have finished, check that you have the file of digitized coordinates on the data disk via the command:</p> <p>DIR A:filename.fileextension</p>

TABLE 3. Transferring the data file from the
IBMPc to the Amdahl

STAGE	DETAILED INSTRUCTIONS
(1) SET UP THE IBMPc	Make sure the terminal cable is connected to the socket on the wall. If you have just finished digitizing (Table 2), just type SYSTEM otherwise switch on and load DOS (automatically with disk drive door open)
(2) CONNECT TO THE MAINFRAME & AND LOAD KERMIT	Check the line is available and switch to the IBMPc. Load KERMIT The screen prompt should change from C> to KERMIT-MS> Type CONNECT or C
(3) LOGON TO THE MAINFRAME & LOAD KERMIT	<RETURN> to get the TAC message Logon to the Amdahl in the usual way (see stages (2) and (3) in Table 1) When the screen prompt (.) is available, Type KERMIT The screen prompt should change to KERMIT-CMS>. Type SERVER to connect to file server mode type <CTRL>+J (=the ESCAPE character) Then type CONNECT or C to move to the IBMPc
(4) TRANSFER THE FILE	KERMIT-MS> now appears Type SEND drivename: filename.fileextension e.g. SEND A: NI.DAT Wait: KERMIT informs you about the progress of the transfer
(5) FINISHING OFF	When the file transfer is done, type FINISH and then type CONNECT or C to move the mainframe. Press <RETURN> to reaccess CMS Type LIST filename fileextension (D to check that the file has been successfully transferred. Logoff

Note: for details about KERMIT see HELP KERMIT

TABLE 4. Files for standard geographies

UNITS	FUNCTION	UNIVERSE		
		Great Britain (England, Wales and Scotland)	Northern Ireland	United Kingdom (Great Britain, Northern Ireland)
		GB	NI	UK
Districts (D-set)	Data	GBSEGS DATA	NI DAT	GBDIST GIMMSFIL nidist gimmsfil <u>nigbdmrg exec</u> <u>nigbdmrg gimms</u>
	Executive Command Segment	gbgimms exec <u>GBDIST GIMMS</u>	nigimms exec nidist gimms	-
	Polygon	gbsegs segments <u>GBDIST GIMMSFIL</u>	nidist segments nidist gimmsfil	UKDIST GIMMSFIL
	Executive Command	<u>GBMAP EXEC</u> <u>GBDMAP GIMMS</u>	GBMAP EXEC nidmap gimms	<u>GBMAP EXEC</u> <u>ukdmap gimms</u>
	Plot	gbdmap plot	nidmap plot	<u>ukdmap plot</u>
	Area list	GBINFO DATA	NIINFO LIST	UKINFO LIST
Counties (C-set)	Data	gbsegs segments		
	Executive Command Segment	gbgimms2 exec gbcounty gimms	<Not	<Not
	Polygon	gbsegs segments <u>GBCOUNTY GIMMSFIL</u>	produced>	produced>
	Executive Command	<u>GBMAP EXEC</u> <u>gbcmmap gimms</u>		
	Plot	<u>gbcmmap plot</u>		
	Area list	<u>GBINFO DATA</u>		
Regions (R-Set)	Data	gbsegs segments	nidist segments	GBREGION GIMMSFIL niregion gimmsfil nigbmrgr exec nigbmrgr gimms
	Executive Command Segment	gbgimms2 exec gbregion gimms	nigimms2 exec niregion gimms	-
	Polygon	gbsegs segments <u>GBREGION GIMMSFIL</u>	nidist segments niregion gimmsfil	UKREGION GIMMSFIL
	Executive Command	<u>GBMAP EXEC</u> <u>gbmmap gimms</u>	<u>GBMAP EXEC</u> nirmap gimms	<u>GBMAP EXEC</u> <u>ukmmap</u>
	Plot	<u>gbmmap plot</u>	nirmap plot	<u>ukmmap plot</u>
	Area list	<u>GBINFO DATA</u>	NIINFO LIST	UKINFO LIST

See GBOOM DATA for suggested GIMMS commands for use
(after adaption) with GBSEGS

Nomenclature for files:-

- GBDIST GIMMSFIL - on the GEO6LIB library disk (user's 'D' disk)
- gbgimms exec - a listing of file given in text of manual
- ukdmap gimms - file available in GEO6PHR filestore (see author for access)
- gbcmmap plot - example map produced from this file reproduced in the text

TABLE 5. Files for hybrid area geographies

UNITS	FUNCTION	UNIVERSE		
		Great Britain (England, Wales and Scotland)	Northern Ireland	United Kingdom (Great Britain, Northern Ireland)
		GB	NI	UK
Family Practitioner committee Areas (F-set)	Data	kcfil1 segsmt kcfil2 segsmt	nifp data	FPCAWS GIMMSFIL niregfp gimsfil
	Executive	kca,kcb,kcc exec	nigimfp exec	nigbfrmrg exec
	Command	kca,kcb,kcc exec	niregfp gims	nigbfrmrg gims
	Segment	kca,kcb baf	niregfp segments	-
	Polygon	FPCAWS GIMMSFIL	niregfp gimsfil	UKFPCA GIMMSFIL
	Executive	fpcamap exec	-	GBMAP EXEC
	Command	fpca1 gims	-	UKFMAP GIMMS
	Plot	fpca1 plot	-	ukfmap plot
European Community Level 2 regions (e-set)	Area list	KCFIL0 LIST fpseq exec, fpseq fortran	NIINFO LIST	UKFPCA LIST
	Data	gbzsegs data	nizone data	GBZONE GIMMSFIL
	Executive	gbzone exec	nizone exec	nigbzmrg exec
	Command	gbzone gims	nizone gims	nigbzmrg gims
	Segment	gbzone segments	nizone segments	-
	Polygon	GBZONE GIMMSFIL	nizone gimsfil	UKZBC2 GIMMSFIL
	Executive	GBMAP EXEC	-	GBMAP EXEC
	Command	gbzmap gims	-	ukzmap gims
Demo- graphic EC2 regions (P-set)	Plot	gbzmap plot	-	ukzmap plot
	Area list	UKZONE LIST	UKZONE LIST	UKZONE LIST
	Data			UKZONE GIMMS
	Executive			ukzgims exec
	Command	< Not produced>	<Not produced>	UKZONE GIMMS
	Segment			ukzone segments
	Polygon			UKZONE GIMMSFIL
	Executive			GBMAP EXEC
	Command			ukzone0 gims
	Plot			ukzone0 plot
	Area list			UKZONE LIST

Nomenclature for files:-

- UKFPCA GIMMSFIL - on the GEO6LIB library disk (user's 'D'disk)
 UKZONE GIMMS - a listing of the file given in the text of the manual
 nizone data - file available in GEO6PHR filestor (see author for
 access)
 ukzmap plot - example map shown in the text

TABLE 6. Summary of mapping files available on the Geography library disk (GEO6LIB)

File sets and filenames		Description
<u>DATA FILES</u>		
GBSEGS	DATA	Segment file for GB districts: OS coordinates
NI	DAT	Segment file for NI districts: digitizer coordinates
UKZONE	GIMMS	Segment file for UK population zones: graph coordinates
<u>POLYGON CREATION COMMAND FILES</u>		
GBCOM	DATA	Dick Baxter's GIMMS commands for GBSEGS DATA
GBDIST	GIMMS	Adapted version of above for GB districts
<u>POLYGON FILES</u>		
GBDIST	GIMMSFIL	GB districts: OS coordinates (100m)
NI	GIMMSFIL	NI districts: digitizer coordinates (100m)
UKDIST	GIMMSFIL	UK districts: OS coordinates (100m)
GBCOUNTY	GIMMSFIL	GB counties: OS coordinates (100m)
GBREGION	GIMMSFIL	GB regions: OS coordinates (100m)
UKREGION	GIMMSFIL	UK regions: OS coordinates (100m)
FPCAEWS	GIMMSFIL	EW FPCAs+ Scotland: OS coordinates (10m)
UKFPCA	GIMMSFIL	EW FPCAs+ Scotland: OS coordinates (10m)
GBZONE	GIMMSFIL	GB EC2 regions: OS coordinates (100m)
UKEC2	GIMMSFIL	UK EC2 regions: OS coordinates (100m)
UKZONE	GIMMSFIL	UK population zones (EC2): graph coordinates
<u>MAP COMPILATION GIMMS FILES</u>		
GEMAP	EXEC	General executive file for map compilation
GBMAP	GIMMS	GB districts: GIMMS commands for outlines
<u>INFORMATION FILES</u>		
GBINFO	DATA	Zone labels & names for GB districts, counties & regions
NIINFO	LIST	Zone labels & names NI districts
UKINFO	LIST	Zone labels & names UK districts
KCFILE0	LIST	Zone labels & names for FPCAs in EWS
UKFPCA	LIST	Zone labels & names for FPCAs in UK
UKZONE	LIST	Zone label & names for EC2 level regions in UK

TABLE 7. Getting and using a large temporary work disk for use with a large version of GDMS

STEP	CMS COMMAND	MEANING
(1)	DEF T3350 AS 111 CYL 30	Define temporary disk, type 3350 as user's 111 disk, size 30 cylinders (15 times an ordinary work disk)
(2)	FORMAT 111 A	This initiates a procedure for formatting the disk. You need to answer two questions - one to erase existing files and the second to name the disk
(3)	ACCESS 1A1 B	This enables you to access files on your work disk as your B disk
(4)	COPY filename filetype B = = A	Copy over all files needed for the work disk to the temporary disk
(5)	Carry out the polygon creation	
(6)	COPY filename filetype A = = B	Copy over all files needed for future use to the work disk from the temporary disk

N.B. Double check that all work has been transferred , or printed when you have finished. Files on temporary disks are temporary only

FIGURE 1. The districts of Northern Ireland

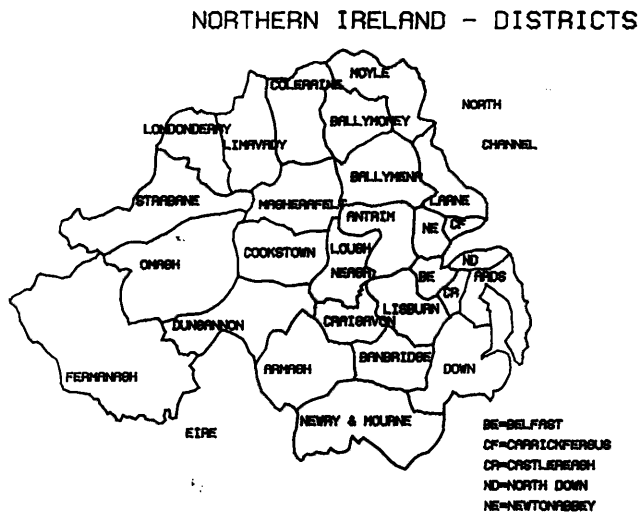


FIGURE 2. A contiguity matrix for Northern Ireland districts

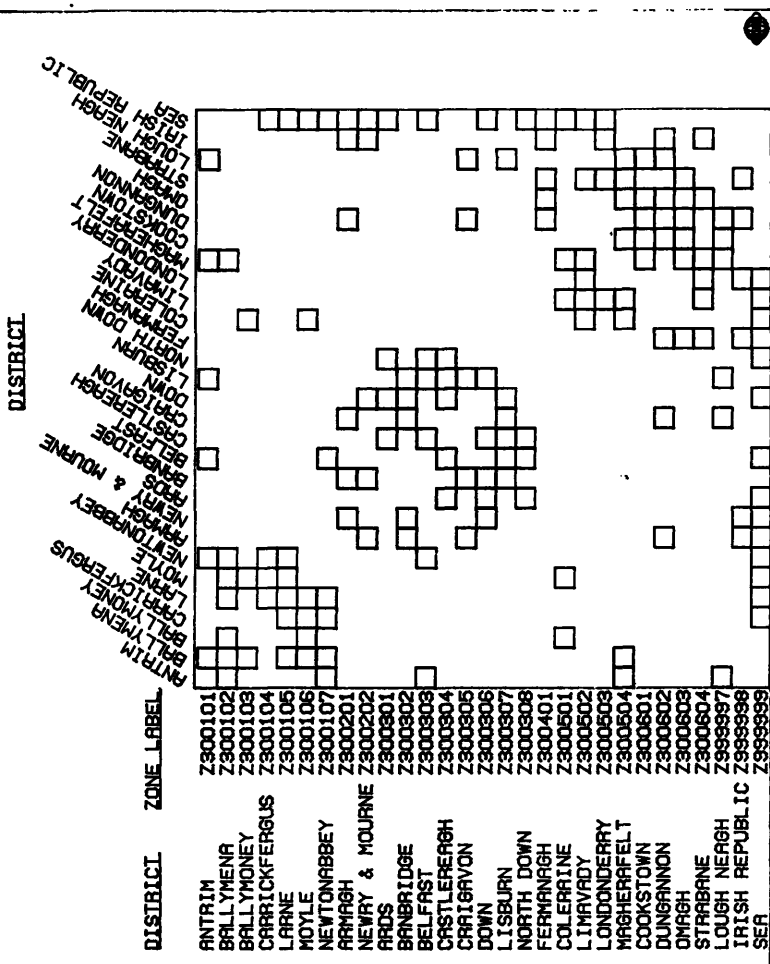


FIGURE 3. A listing of DIGIT.BAS, a digitizing program

```
=====
10 REM DIGIT.BAS = PROGRAM FOR DIGITIZING LINE SEGMENTS
20 REM on the IBMPC XT with the GTCO digitizer
30 REM Adpated from programs by Jim Hogg and Mark Birkin
40 REM Author: Phil Rees, April 1987
45 REM A maximum of 100 points per segment is catered for
50 OPEN "COM1:2400,E,7,1,CS,DS" AS £1
60 DIM X(100),Y(100),POINTS(100)
70 REM The starting screen is set up
75 CLS
80 LOCATE 2,30:PRINT "DIGIT"
90 LOCATE 4,10:PRINT "This is a simple program to digitize"
100 LOCATE 5,10:PRINT "the boundaries of line segments on maps"
110 LOCATE 6,10:PRINT "for use with the GIMMS package."
120 LOCATE 9,15:PRINT "The cursor buttons should be used as follows:"
130 LOCATE 11,15:PRINT "1. to digitize points"
140 LOCATE 12,15:PRINT "2. to digitize nodes (endpoints of segments)"
150 LOCATE 13,15:PRINT "4. to abort the current line segment"
160 LOCATE 16,10:PRINT "Button positions:"
170 LOCATE 18,10:PRINT "4 2 1"
180 LOCATE 19,10:PRINT "0 0 0"
190 LOCATE 20,10:PRINT "8 ?"
200 LOCATE 21,10:PRINT "0 0"
210 LOCATE 23,10:INPUT "Press enter key to continue ";G$
220 CLS
230 LOCATE 1,10:PRINT "To digitize any line segement:"
240 LOCATE 3,12:PRINT "A. type in the first zone name at the keyboard"
250 LOCATE 4,12:PRINT "B. type in the second zone name at the keyboard"
260 LOCATE 5,12:PRINT "C. press cursor button 1 to digitize each point
until the last"
270 LOCATE 6,12:PRINT "D. press cursor button 2 to digitize the end
point (node)"
280 PRINT:INPUT "Enter a short name (<= 6 chars) for the file";FILNAM$
290 FILNAM$="A:"+FILNAM$+".DAT"
300 OPEN FILNAM$ FOR OUTPUT AS £2
310 INPUT "Do you wish to digitize another line segment (Y for yes, N for
no)";A$
320 IF A$ = "N" THEN 1000
330 IF A$ <> "Y" THEN 310
340 PRINT "Line segment digitizing begins:"
350 INPUT "Name of right hand zone (<= 8 alphanumeric characters)";RZONE$
360 INPUT "Name of left hand zone (<= 8 alphanumeric characters)";LZONE$
370 PRINT:PRINT "Input coordinates for current segment"
380 NP=0
390 F$=INPUT$(14,£1)
=====
```

FIGURE 3. Continued

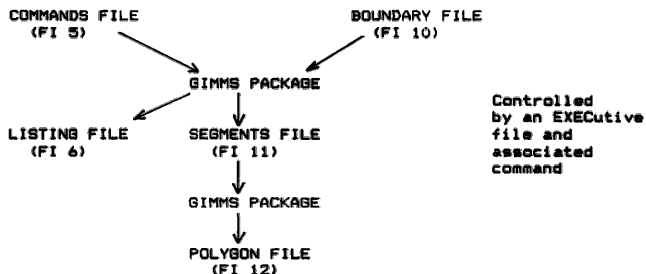
```

=====
400 NP=NP+1
410 PRINT:PRINT F$
420 BUT=VAL(LEFT$(F$,1))
430 XCOORD=VAL(MID$(F$,2,5)):YCOORD=VAL(MID$(F$,8,5))
440 PRINT "XCOORD= ";XCOORD;TAB(3);"YCOORD= ";YCOORD
450 X(NP)=XCOORD: Y(NP)=YCOORD
460 IF(BUT=1) THEN GOTO 390
470 IF(BUT=2) THEN GOTO 500
480 IF(BUT=4) THEN PRINT "Segment deleted": GOTO 310
500 PRINT£2,RZONE$; " ";LZONE$
510 FORM$=" £££££ £££££"
520 FOR I=1 TO NP
530 PRINT£2,USING FORM$;X(I),Y(I)
600 NEXT I
605 PRINT£2," /"
610 GOTO 310
1000 CLOSE£2
1010 END
=====

```

FIGURE 4. Files involved in map production using GIMMS at Leeds

4.1 Creating a polygon file



4.2 Map compilation

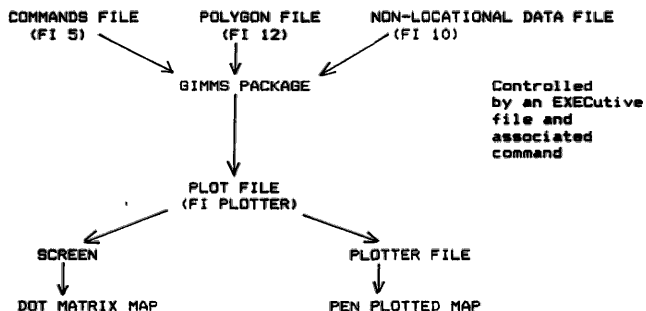


FIGURE 5. An example of an executive file for polygon creation

FILE: NIGIMMS EXEC

=====

EXEC SETUP PACKAGES

FI 5 DISK &1 GIMMS

FI 6 DISK &1 LISTING

FI 10 DISK NI DAT

FI 11 DISK &1 SEGMENTS

FI 12 DISK &1 GIMMSFIL A4 (RECFM VBS LRECL 1028 BLOCK 3088

EXEC GIMMS &1

=====

FIGURE 6. An example of a boundary data file

```
FILE:  NI DATA
-----
SEGMENTS
Z300101 Z300102
  7519  10594
  7560  10594
  7603  10593
  7637  10599
  7672  10610
  7703  10610
  7745  10600
  7779  10591
  7816  10582
  7851  10582
  7902  10589
  7966  10607
  8017  10615
  8064  10624
  8097  10622
  8102  10627
  8152  10614
  8181  10593
  8205  10575
  8224  10561
/
Z300101 Z300107
  8223  10560
  8226  10514
  8224  10466
  8220  10415
  8218  10377
  8217  10324
  8205  10280
  8206  10248
  8208  10206
  8218  10172

  .      .
  :      :
  .      .

/
-----
```

FIGURE 7. An example of a commands file used for polygon construction

```

FILE: NI GIMMS
=====
<----- FILE = NI GIMMS ----->
<----- CRUDE DIGITIZING OF NORTHERN IRELAND ----->
<----- DISTRICTS, PSEUDO-COUNTIES AND REGION ----->
<----- APRIL 1987, PHIL REES, SCHOOL OF GEOGRAPHY----->
*PLOTARM PLOTTER,TITLE='NORTHERN IRELAND BOUNDARIES'
*FILEIN SEGMENT FILEIN= 10 FILEOUT=11 FILENAME=NISEGS
  TITLE= 'NORTHERN IRELAND DISTRICTS, PSEUDO-COUNTIES & REGION'
  LIMITS= 4000,7000,10000,13000 AUTONODE TOL=20
  BEGIN
*CHECK FILEIN= 11, DIAGS=2, EXCLUDE ZONES= Z999997 Z999998 Z999999 *
*POLYGON FILEIN= 11, FILEOUT=12, FILENAME=NIGFIL
  DIAGS=4, NZONES=40, MAXPTS=1500
  EXCLUDE ZONES = Z999997 Z999998 Z999999
  ALPHA, CULDESAC
*STOP
=====

```

FIGURE 8. An example of a listing file associated with polygon creation

```
FILE: NI LISTING
=====
...GIMMS.....GIMMS.....GIMMS.....GIMMS.....GIMMS.....GIMMS...
T.C.WAUGH
GIMMS LTD.
RELEASE : 4.5

>>>>>----- FILE = NI GIMMS ----->
>>>>>----- CRUDE DIGITIZING OF NORTHERN IRELAND ----->
>>>>>----- DISTRICTS, PSEUDO-COUNTIES AND REGION ----->
>>>>>----- APRIL 1987, PHIL REES, SCHOOL OF GEOGRAPHY->
COMMAND:*PLOTPARM

OPTION = PLOTTER
OPTION = TITLE      = 'NORTHERN IRELAND BOUNDARIES'
GINO-F MARK 2.6    1/1/80

GRAPHICS OUTPUT IS TO GINO DEVICE C1012
DEVICE CHOSEN IS PLOTTER

COMMAND:*FILEIN

OPTION = SEGMENT
OPTION = FILEIN      = 10
OPTION = FILEOUT     = 11
OPTION = FILENAME    = NISEGS
OPTION = TITLE       = 'NORTHERN IRELAND DISTRICTS, PSEUDO-COUNTIES & REGION'
OPTION = LIMITS      = 4000
OPTION = YL          = 7000
OPTION = XH          = 10000
OPTION = YH          = 13000
OPTION = AUTONODE
OPTION = TOL         = 20
OPTION = BEGIN

TYPE COMMAND:SEGMENTS
SEQNO NAMES                NODES   START   COORD  FINISH  COORD  PTS
Z300101    Z300102          Z300101   Z300107   Z300101   Z300303
Z300101    Z300307          Z300101   Z999997   Z300101   Z300504
Z300102    Z300103          Z300102   Z300106   Z300102   Z300105
Z300102    Z300107          Z300102   Z300504   Z300103   Z300106
Z300103    Z300501          Z300104   Z300105   Z300104   Z999999
=====
```

FIGURE 9. An example of an executive file for map compilation

```
FILE: UKMAP EXEC
=====
EXEC SETUP PACKAGES
'I 5 DISK &1 GIMMS
'I 6 DISK &1 LISTING
'I 10 DISK &1 DATA
'I 12 DISK &2 GIMMSFIL A4 (RECFM VBS LRECL 1028 BLOCK 3088
EXEC GIMMS &1 &3
=====
```

FIGURE 10. An example of an executive file used for map compilation

```
FILE: NIMAP GIMMS
=====
(:----- FILE = NIDMAP GIMMS ----->
(:--- THE INSTRUCTIONS FOR PRODUCING A DISTRICT MAP --->
#PLOTPROG
  #PLOTPARM DEVICE=PLOTTER
  #NEWMAP MAPSIZE=20,16 FRAME TRUSCALE
  #GIMMSFILE=12 < ----- THE LOCATIONAL DATA FILE ---->
  #SCALE YSIZE=16
  #DRAWMAP OUTLINES=ALL
  #TEXT POSITION= 0.75,14.5 SIZE=0.2
    TEXT= 'DISTRICTS'
  #TEXT POSITION= 0.50,15.5 SIZE=0.2 TEXT='NORTHERN IRELAND'
END
STOP
=====
```


FIGURE 11. A screen dump of an outline map
produced on a dot matrix printer

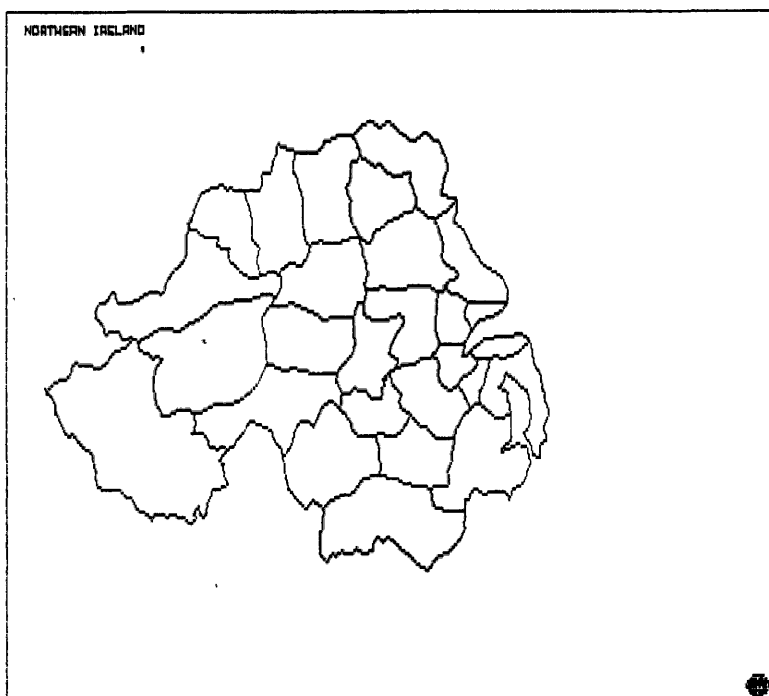


FIGURE 12. A graph plot of an outline map
produced on a plotter

NORTHERN IRELAND

DISTRICTS



FIGURE 13. Files used in producing a polygon file and outline map for Great Britain districts

FILE: GBBIMMS EXEC

```
=====
EXEC SETUP PACKAGES
FI 5 DISK &1 GIMMS
FI 6 DISK &1 LISTING
FI 10 DISK GBSSEGS DATA
FI 11 DISK &1 SEGMENTS
FI 12 DISK &1 GIMMSFIL A4 (RECFM VBS LRECL 1028 BLOCK 3088
EXEC GIMMS &1
=====
```

FILE: GBDIST GIMMS

```
=====
<----- THE INSTRUCTIONS FOR BUILDING A SEGMENT FILE ----->
*FILEIN SEGMENT
  <----- INPUT FILE IS ON 10, OUTPUT FILE IS ON 11 ----->
  FILEIN=10 FILEOUT=11
  FILENAME=GBSSEGS TITLE 'G.B. RAW SEGMENTS'
  LIMITS= 0,0,6550,12100
  NONODES INPUT=10
  BEGIN
<----- THE INSTRUCTIONS FOR BUILDING A DISTRICT FILE----->
*POLYGON
  FILEIN=11 FILEOUT=12
  FILENAME= GBDIST TITLE 'G.B. DISTRICTS'
  NZONES=1000
  LIMITS= 0,0,6500,12100
  MINZONE=Z100101 MAXZONE=Z290804
  EXCLUDE ZONE=Z999999
  ALPHA CULDESAC
*END
*STOP
=====
```

FIGURE 13. Continued

FILE: GBDMAP EXEC

```
=====
EXEC SETUP PACKAGES
FI 5 DISK &1 GIMMS
FI 6 DISK &1 LISTING
FI 12 DISK &2 GIMMSFIL A4 (RECFM VBS LRECL 1028 BLOCK 3088
EXEC GIMMS &1 &3
=====
```

FILE: GBDMAP GIMMS

```
=====
:----- FILE = GBDMAP GIMMS ----->
:--- THE INSTRUCTIONS FOR PRODUCING A REGIONS MAP --->
*PLOTPROG
  *PLOTARM DEVICE=PLOTTER TRUSCALE
  *NEWMAP MAPSIZE=12,17 FRAME
  *GIMMSFILE=12 < ----- THE LOCATIONAL DATA FILE ---->
  *SCALE YSIZE=17
  *DRAWMAP OUTLINES=ALL
  *TEXT POSITION= 0.75,16.5 SIZE=0.2
    TEXT= 'DISTRICTS'
  *TEXT POSITION= 0.50,15.5 SIZE=0.2 TEXT='GREAT BRITAIN'
END
STOP
=====
```

FIGURE 14. An outline map of the districts of Great Britain

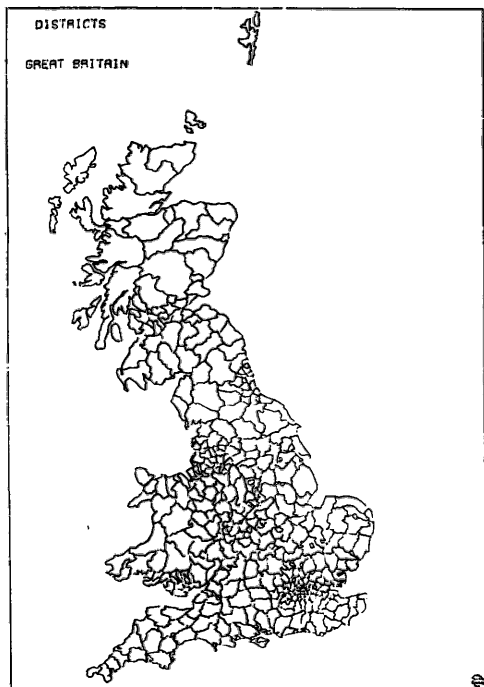


FIGURE 15. An outline map of the counties of Great Britain

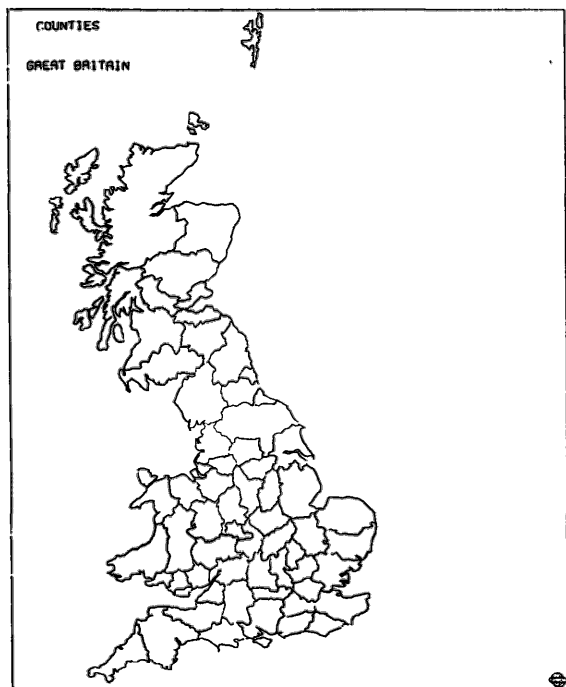


FIGURE 16. Files used in producing a polygon file and an outline map for the United Kingdom districts

FILE: NIGBDMRG EXEC

=====

EXEC SETUP PACKAGES

FI 5 DISK NIGBDMRG GIMMS

FI 6 DISK NIGBDMRG LISTING

FI 10 DISK GBDIST GIMMSFIL A4 (RECFM VBS LRECL 1028 BLOCK 3088

FI 11 DISK NIDIST GIMMSFIL A4 (RECFM VBS LRECL 1028 BLOCK 3088

FI 14 DISK UKDIST GIMMSFIL A4 (RECFM VBS LRECL 1028 BLOCK 3088

EXEC GIMMS NIGBDMRG

=====

FILE: NIGBDMRG GIMMS

=====

*SYSPARM DIABS=1 LINKS=1000

*UTILITIES

*MERGE FILEIN= 10,11

FILEOUT= 14

FILENAME= UKDIST

TITLE 'UNITED KINGDOM DISTRICTS'

*END

*STOP

=====

FILE: UKDMAP GIMMS

=====

<----- FILE = UKDMAP GIMMS ----->

<---- THE INSTRUCTIONS FOR PRODUCING A DISTRICT MAP ----->

*PLOTPROG

*PLOTARM DEVICE=PLOTTER TRUSCALE

*NEWMAP MAPSIZE=20,25 FRAME

*GIMMSFILE=12 <----- THE LOCATIONAL DATA FILE ---->

*SCALE YSIZE=25

*DRAWMAP OUTLINES=ALL

*TEXT POSITION= 0.75,16.5 SIZE=0.2

TEXT= 'DISTRICTS'

*TEXT POSITION= '0.50,16.5 SIZE=0.2 TEXT='UNITED KINGDOM'

*END

*STOP

=====

FIGURE 17. An outline map of the districts of the United Kingdom

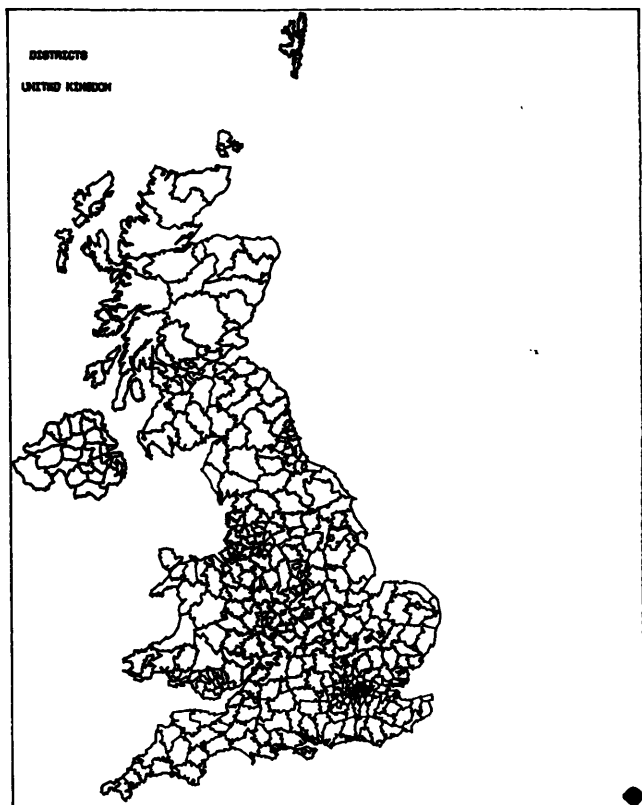


FIGURE 18. An outline map of the regions of the United Kingdom

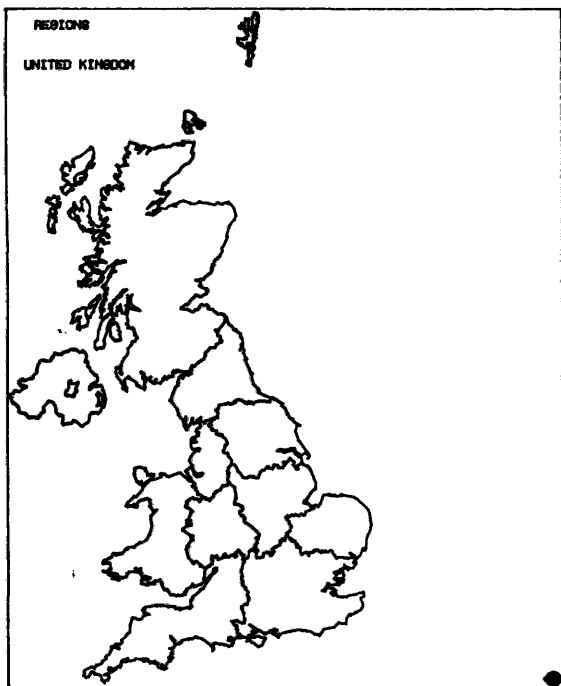


FIGURE 19. Jobs and files used in creating an FPCA polygon file

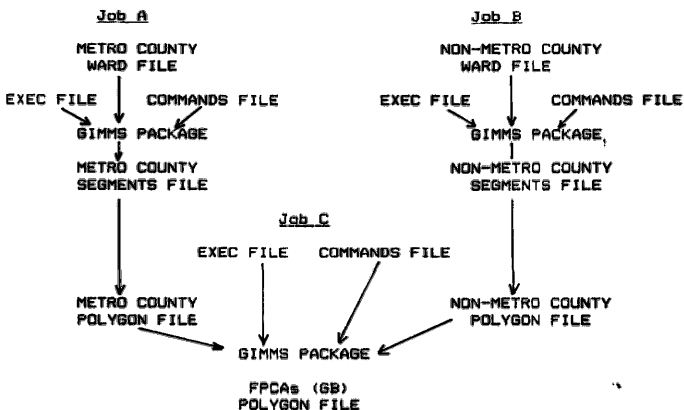


FIGURE 20. A command file for drawing a map of FPCAs for the UK

```

SYSPARM LINKS=1000 DIAGS=1
*PLOTPROG
  *PLOTARM PLOTTER          <DELETE TRUSCALE FOR DT22 PLOTS>
  *NEWMAP MAPSIZE=17,17 FRAME
  *GIMMSFILE FILE=12        <NAME= 'UKFPCA GIMMSFIL' (MERGED FILE)>
  *SCALE YSIZE=17
  *ORIGIN PLOT=1,0
  *DRAWMAP OUTLINES=ALL
----- MAP TITLE ----->
  *TEXT POSITION=7,0,5, SIZE=0.3, TEXT='FPCAS: ENG.&WALES + SCOT.& NI'
----- FRAME FOR THE SHETLANDS ----->
  *FRAME P1= 7.5,13.2 P2= 10,15.7
----- INSET FOR LONDON FPCAS ----->
  *WINDOW P1=12,1,1 P2=15,1,4 FRAME
  *SCALE FACTOR=.0005      <APPROX. DOUBLE SCALE OF MAIN MAP>
  *ORIGIN PLOT=13,5,2,5 MAP=52885,17769
  *DRAWMAP OUTLINES=ALL
----- INSET FOR SOUTH YORKSHIRE FPCAS ----->
  *WINDOW P1=11,8,4,5 P2=15,5,6,9 FRAME
  *SCALE FACTOR=.0005      <APPROX. DOUBLE SCALE OF MAIN MAP>
  *ORIGIN PLOT=13,5,5,5 MAP=44000,39769
  *DRAWMAP OUTLINES=ALL
----- INSET FOR WEST YORKSHIRE FPCAS ----->
  *WINDOW P1=9,5,7,6 P2=12,7,10,5 FRAME
  *SCALE FACTOR=.0005      <APPROX. DOUBLE MAIN MAP>
  *ORIGIN PLOT=11,5,9 MAP=42731,42308
  *DRAWMAP OUTLINES=ALL
----- INSET FOR TYNE & WEAR FPCAS ----->
  *WINDOW P1=9,5,11,1 P2=11,5,13 FRAME
  *SCALE FACTOR=.0005      <APPROX. DOUBLE SCALE OF MAIN MAP>
  *ORIGIN PLOT=10,5,12 MAP=42731,55846
  *DRAWMAP OUTLINES=ALL
----- INSET FOR GREATER MANCHESTER FPCAS ----->
  *WINDOW P1=13,1,7,6 P2=16,1,10,4 FRAME
  *SCALE FACTOR=.0005      <APPROX. DOUBLE SCALE OF MAIN MAP>
  *ORIGIN PLOT=15,9 MAP=38500,40192
  *DRAWMAP OUTLINES=ALL
----- INSET FOR MERSEYSIDE FPCAS ----->
  *WINDOW P1=0,5,4,5 P2=3,7 FRAME
  *SCALE FACTOR=.0005      <APPROX. DOUBLE SCALE OF MAIN MAP>
  *ORIGIN PLOT=1,5,5,25 MAP=33846,38923
  *DRAWMAP OUTLINES=ALL
----- INSET FOR WEST MIDLANDS FPCAS ----->
  *WINDOW P1=0,5,1,5 P2=3,4 FRAME
  *SCALE FACTOR=.0005      <APPROX. DOUBLE SCALE OF MAIN MAP>
  *ORIGIN PLOT=1,5,2,5 MAP=41038,28769
  *DRAWMAP OUTLINES=ALL
*END
STOP

```

FPCAS: ENG. & WALES + SCOT. & NI

FIGURE 22. An outline map of EC level 2 regions for the UK

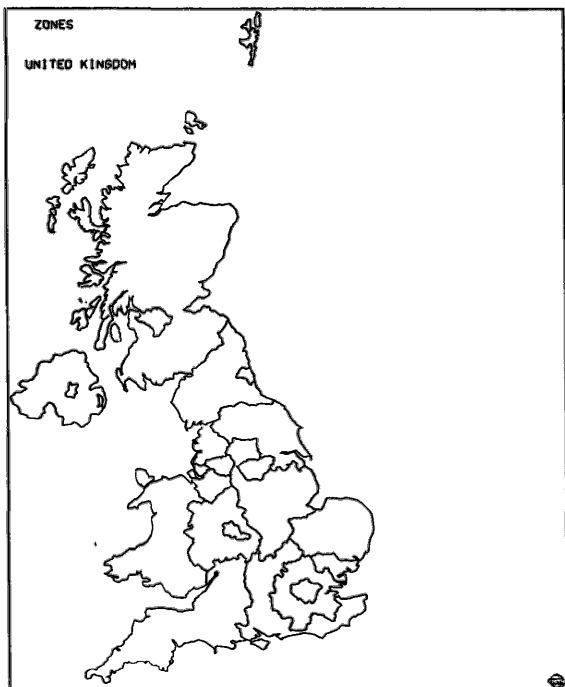


FIGURE 23. The commands and data file for creating a demographic map of EC level 2 regions for the UK

```

FILE: UKZONE GIMMS
=====
<----- FILE = UKZONE GIMMS : FOR CREATION OF DEMOGRAPHIC MAP----->
<----- OF METRO/NON-METRO OR EC2 LEVEL REGIONS IN THE UK ----->
<----- REVISION OF APRIL 1987 PHIL REES, SCHOOL OF GEOGRAPHY ----->
*PLOTARM PLOTTER, 'Test file to generate UK zone map coordinates'
*SYSPARM DIAGS=2 INPUT=5,OUTPUT=6 *
*FILEIN SEGMENT FILEOUT=10 FILENAME=UKSEGS
TITLE='United Kingdom zones: base segment file'
LIMITS 200,300,1100,1300
BEGIN
SEGMENTS
Z01 SEA 321 1020,345 1050,354 1075,395 1092,442 1021,395 990 375 1010
        331 1009, 321 1020 /
Z02 Z03 500 1055,500 1175,580 1175,580 1095,545 1055,500 1055 /
Z03 Z05 660 1112,540 1030 /
Z03 SEA 540 1030,468 1030,465 1040,490 1070,480 1120,470 1121,465 1100
        460 1100,470 1150,475 1180,490 1220,515 1260,580 1260,547 1230
        610 1227,620 1210,599 1171,632 1167,610 1140,648 1139,660 1112 /
Z04 Z05 690 1070,680 1040,610 1000,570 1000,560 1025,675 1100 /

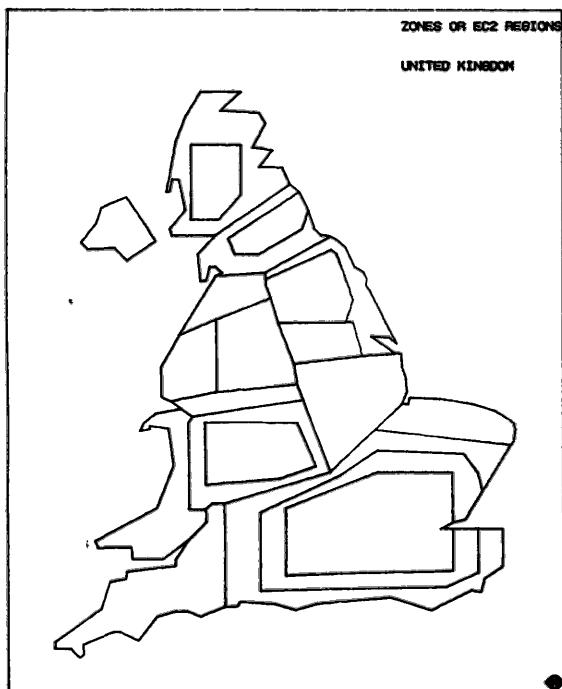
.
.
.
.

Z20 SEA 490 540,450 511,400 512,399 530,345 530
        340 541,440 592,468 660,460 721,430 725
        430 720,414 717,420 730,440 745,482 753 /

END
*CHECK FILEIN=10, DIAGS=2 *
*POLYGON FILEIN=10,FILEOUT=11,FILENAME=GIMMSFILE,DIAGS=4
NZONES=21,MAXPTS 200,EXCLUDE ZONES=SEA
ALPHA,CULDESAC,TITLE='UKZONE COORDINATE FILE'
*PLOTPROG
*NEWMAP MAPSIZE=9,10 FRAME
*GIMMSFILE=11
*DRAWMAP OUTLINES=ALL
*END
*STOP
=====

```

FIGURE 24. An outline map of demographic EC level 2 regions for the UK



APPENDIX A.1 APPLICATION FOR AUTHORITY TO ACCESS
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UNIVERSITY OF MANCHESTER REGIONAL COMPUTER CENTRE

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APPENDIX A.1 APPLICATION FOR AUTHORITY TO ACCESS
THE DOE DIGITIZED BOUNDARY INFORMATION

UNIVERSITY OF MANCHESTER REGIONAL COMPUTER CENTRE

APPLICATION FOR AUTHORITY TO ACCESS THE DoE

DIGITISED BOUNDARY INFORMATION

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(v) Research Council or organisation funding the work in which the data and related material may be used. All sources of funding must be declared.

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APPENDIX A.2 Local polygon files

A set of files are available on the Geography Library disk for wards and enumeration district aggregations in West Yorkshire. The files were originally described in Birkin and Rees (1982). This note updates that information.

Universe	Units	Filename, filetype		Notes
		Online = upper case		
		Offline = lower case		
LEEDS DISTRICT	Wards	leeds81	boundary	Coordinates in GIMMS 3.0 form
		leeds81	gimms	Polygon file in GIMMS 3.0 form
		LEEDS81	MEMO	Information file
		LEEDS81	COORD	Centroids of wards
		LEEDS81	NEWBOUND	Coordinates in GIMMS 4.5 form
		LEEDS81	NEWGIMMS	Polygon file in GIMMS 4.5 form
LEEDS DISTRICT	E.D. groups (new zones)	NEWZONE	BOUNDS	Polygon file in GIMMS 4.5 form
		newzone	labels	Names of new zones in order
		leeds81e	nzones	E.D. membership of new zones
BRADFORD	Wards	bradfd81	boundary	Coordinates in GIMMS 3.0 form
		bradfd81	gimms	Polygon file in GIMMS 3.0 form
		BRADFD81	MEMO	Information file
		BRADFD81	COORD	Centroids of wards
		BRADFD81	NEWBOUND	Coordinates in GIMMS 4.5 form
		BRADFD81	NEWGIMMS	Polygon file in GIMMS 4.5 form
CALDERDALE DISTRICT	Wards	calder81	boundary	Coordinates in GIMMS 3.0 form
		calder81	gimms	Polygon file in GIMMS 3.0 form
		calder81	memo	Information file
KIRKLEES	Wards	kirkls81	boundary	Coordinates in GIMMS 3.0 form
		kirkls81	gimms	Polygon file in GIMMS 3.0 form
		kirkls81	memo	Information file
WAKEFIELD	Wards	wakefd81	boundary	Coordinates in GIMMS 3.0 form
		wakefd81	gimms	Polygon file in GIMMS 3.0 form
		wakefd81	memo	Information

For wards in other districts of England and Wales see Cole (1975), which is reproduced as UMR00BD INFO on the Geography Library disk.

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