

University College Cork

Computer Bureau Newsletter

Spring 1988

Editorial

It has been some while since a full newsletter appeared, for which neglect I can only plead shortage of time and pressure of work. I hope that the information we have collected together in this issue will help to bring everyone up to date on what has been going on.

The most important change is in the nature of the support we offer to computer users in a period of reduced staffing. In common with most universities, we have been subject to an enormous increase in the demand for information, ranging from "What is an 'ENTER' key?" to "Can you help with a complete review of UCC's entire computing setup?". I hope that only rarely do we have to say 'No' to a request, but in order to cope with the demand we have had to change our tack somewhat.

In the old days, a computer centre would do the entire job for the user, from inputting data through writing programs to printing results. This was sometimes referred to as "changing the user's nappies": certainly it got the work done, but it left the user very little wiser as to *how* it was done, and often with a feeling of not being able to control just *what* was being done. It often absorbed huge amounts of staff time on one job, sometimes to the neglect of other users' work.

Instead, we are now trying to give the users the information they need to do the job themselves. By equipping users with this knowledge, we hope to

1. put the users in control of their own work;
2. raise the overall level of understanding of computing in UCC;
3. be able to allocate more time to improving the facilities available for all users, rather than to doing individual jobs for a few select users.

The trial period of one-day courses last September indicated that there is a very large number of people who clearly want to learn how to do the job themselves. We will be running more of these courses this coming summer: details will be published during May and June.

Providing knowledge is more than just running courses, so we are preparing a series of information sheets, not just on the fundamental matters like logging in, editing and using elementary commands but also on the techniques and technicalities of other commonly-requested facilities such as file handling, electronic mail and networking.

In addition, we have obtained some video tapes on a variety of computing facilities, and we hope to add to these during the year. The tapes will be available for viewing in the Bureau by arrangement. A list of the technical notes and videos is printed in this issue.

Asking for help — electronically

In order to improve the quality of response to queries, and to enable us to keep up with the increase in numbers of requests, we are having to enforce the rule introduced last year *of contacting the Bureau by electronic mail when at all possible*. All mainframe and mini users have this facility: details are available both in Technical Notes and Via the HELP command on the machines. Anyone who needs to contact the Bureau at all frequently can have a UserID if they do not already have one. We are trying hard to ensure that cabling for terminal access is handled with a minimum of delay.

The benefits of this are twofold: firstly, it enables

staff to give a more careful and considered response to a request for information, because they will be giving your message the whole of their attention at the time, instead of trying to deal with other matters simultaneously; and secondly, they will not be interrupting work for someone else to deal with an enquiry: it could be your work they have to interrupt to handle someone else's query!

We will normally only be able to deal with telephone calls from people *without* access to a terminal. The electronic mail addresses of all Bureau staff are printed on the centre pages of this issue.

Peter Flynn CBTS8001

HELP FACILITY ON THE VAXen

To get the most out of the HELP facility on the VAX and μ VAX computers, remember the following:

- There is help available on-line for almost all the facilities of the computer.
- **HELP INFO** provides information on the facilities and services available locally on the Bureau VAX.
- Commands or topics with related functions may be classified into categories, such as *Command Procedures* or *Directory Operations*. For each of these categories
 - HELP HINTS lists the relevant commands.
 - HELP BEGINNERS gives examples of using these commands.
- **HELP HELP** and **HELP INSTRUCTIONS** provide detailed assistance on using the HELP facility itself.
- For most topics there is a subtopic *Examples* which illustrates different facets of the command. Examples of commands showing some uses of their parameters will be found there, with explanations of what they do.

Loretta O'Connor ADVISORY

LASER PRINTING

Laser printers have been coming onto the market with great speed recently and a lot of users have been asking about them. They come in three basic flavours: *simple*, offering little more than fast printing with perhaps two or three common emulations; *advanced*, with more emulations, several graphics options, slightly higher throughput and more on-board memory for buffering and graphic manipulation; and *language-driven*, where the generation of the image is actually done in the printer itself, following instructions in a Printer Definition Language (PDL) which the computer transmits to it; the other two kinds of laser printer require any graphic image to be generated in the computer and transmitted as a bit-pattern, much as with a dot-matrix printer.

The Bureau acquired its first laser printer last year, the QMS KISS, which was installed on a PC for the high-quality printing of wordprocessing texts. This was a relatively simple and cheap machine, but has been heavily used, and has proved popular for the printing of theses. It offers Epson FX, Diablo 630 and Qume Sprint emulation, and the usual selection of Pica (10-pitch), Elite (12-pitch) and Epson Compressed (16-pitch) typesizes. This machine is available in the Bureau beside the printout distribution shelves, on a PC which is also connected to the VAX. The VAX 'local print' command `@LIB:SIDECAR filename.type` can be used to print a VAX file locally on this printer. There is no charge at the moment for using it, but you must provide your own A4 paper (standard photocopier paper gives the best results).

For longer runs, including graphics and typesetting,

there is more advanced machine, a Hewlett-Packard LaserJet Series II, attached to a PC/AT running a variety of software, including Harvard Presentation Graphics, T_EX and dBase III+. This machine costs 5p per page, payable at Bureau Reception.

On the VAX, there is an LN03+ on a print queue called LASER. This handles plain text, such as program listings or RUNOFF (DSR) output on A4 paper in portrait orientation, or 132-column output in landscape mode; Tektronix graphics emulation; T_EX output; and shortly we hope to add PostScript output capability. There are several useful setup and forms type options available on the queue: type `HELP LASER` for details. It provides really excellent quality printing and should be of particular interest to the T_EXers.

That was the good news! The bad news is that at time of writing, user documentation isn't yet ready. Over the next week or two, we hope to try out new fonts and so on and complete the user docs. Suitably euphoric announcements will be appearing in the Log Message in due course.

The really bad news is that we will have to invoice any departments making use of the LN03+, at the 5p per page rate. Unfortunately, this item doesn't come cheap and (to quote Mrs T.) "there is no alternative!".

More details later. . .

John Murphy CBSY8001

VAX 11/780 LIBRARY PROGRAMS

A number of routines have been installed or updated recently on LIB:, the Bureau VAX library. A summary of these follows:

- **BINARY.COM** — translates a given integer to a binary number.
- **DM.COM** and **DM.EXE** — Directory Management routine from VAXSIG DECUS tape.
- **GETKEY.COM** and **GETKEY.EXE** — stores a pressed key in a DCL variable.
- **HELPPMDF.COM** — details of all PMDF (mail agent) facilities.
- **LOOKUP.COM** — searches for BITNET, HEANET and JANET network nodes, local userids, owners of local userids and telephone extensions of UCC staff.
- **MAKE.EXE**, **MAKE.HLB** and **HELPMAKE.COM** — UNIX-style utility for maintenance of files that are grouped together for execution purposes.
- **ODIR.COM** — lists the date and size of any files that have multiple versions — helpful to use before purging your directory.
- **RUNOFF.HLB** and **HELPRUNOFF.COM** — details on RUNOFF commands.
- **SETUP.COM** — defines appropriate logical assignments and global symbols to facilitate the use of many software packages on the VAX. Type `SETUP ?` and `SETUP ???` for details.
- **SIDECAR.COM** — prints a specified file (with specified character size) on a printer attached to a

VT100.

To use any of the above with filetype of .COM give the command:

```
@LIB:filename
```

If a file does not have an accompanying file with filetype of .COM then to use the program, give the command:

```
RUN LIB:filename (filetype .EXE is assumed)
```

If a file has a filetype of .HLB and there is not an accompanying file with filetype of .COM then to get help on the program in question give the command:

```
HELP/LIBRARY=LIB:filename filename
```

The above are just some of the routines on LIB: — for details on all files on LIB: enter

```
TYPE LIB:$$READ.ME$$
```

There is a complete list of all the routines on this library elsewhere in this issue. If you have a useful utility you have written (or been sent), why not send it to ADVISORY — maybe it might be useful to others, and could be included in the library.

Loretta O'Connor ADVISORY

WORD PROCESSING ON THE VAX 11/780

Wordprocessing facilities on the VAX up to now have consisted of just RUNOFF (an antiquated but versatile DEC utility) and LEX (a sort of early WYSIWYG — more or less — package). LEX has had some adherents here over the past few years. Alas, though, it costs a disproportionate amount to support it for the few people now left using it, and requires an unreasonably large amount of systems support to make even the most trivial changes.

In view of the diminishing number of users of LEX and the fact that most departments now have their own local PC-based WP facilities, it has been decided to drop LEX from the VAX when the current support contract comes to an end in May. RUNOFF will of course remain available, and T_EX is now in place on the VAX for high-quality work.

At time of writing, the main replacement for LEX (there will be several options eventually) isn't quite ready to use. All I can reveal (said he in hushed tones) is that it will be a highly-tailored version of a public-domain utility on the DEC User Group VAXSIG tapes called VPW.

VPW stands for VAX Professional Workstation and as well as just word-processing facilities (currently based on RUNOFF, alas!) it has lots of other 'frills' like a built-in Calendar, Personal Diary, Spell Checker and so on. In due course, we hope to include an implementation of WPS (written in TPU and also available from the VAXSIG tape) providing the system overheads aren't too substantial.

As usual, read the Log Messages for more details over the next few weeks. . .

John Murphy CBSY8001

WORDPROCESSING TIP

Short of disk storage? Who isn't these days? But do you use large lefthand margins in your documents? A lot of users either like or require a generous margin for binding purposes, and for some reason, people seem to think that this means starting every line they type with (say) fifteen blanks to get a 11½" left margin.

But think of it! Sixty lines per page and fifteen blanks at the start of each line: 60 × 15 = 900 spaces per page. Say you have a 50-page report like that: 900 × 50 = 45000 spaces in all — that's ⅛ of your entire floppy disk taken up just by spaces! No wonder you're running out of space.

So what's the answer? Read The Manual (RTM) — almost all half-way decent wordprocessors have an 'adjust-left-margin' command which lets you type in your text hard up against the lefthand edge of the screen, but which will insert the required number of spaces in the margin when you print.

For example, with RUNOFF you put in a line at the top of the file saying .l15 and with PC-WRITE you do the same with *Alt-G.x:15*. Other systems will have similar facilities. So before you weep over the amount of storage you are getting through, check to see how much you can save!

Peter Flynn CBTS8001

THE FORTVS COMPILER

The FORTVS compiler on the Academic IBM 4341-1 system is generated as a Discontiguous Saved System, (DCSS for short), with a load address of '210000'X, which is 2162688 bytes or 2112K bytes. It does not allow other saved systems to overlap it in any given virtual machine.

This in effect means that if you have FORTRAN programs which require a large virtual machine to run in, then the size of your virtual machine cannot be greater than 2112K for the compilation only. Once your program is compiled you may increase the size of your virtual machine.

It is a good idea to IPL CMSL rather than IPL CMS for virtual machine sizes greater than 1408K. The CMSL saved system is loaded at '800000'X or 8Mb.

Michael O'Halloran CBSY8004

LIBRARY AUTOMATION

As a result of a study contract finalised with IBM, the Boole Library is to have its own dedicated computer. The machine, a 9375 model 60, is one of the IBM 9370 Information System family, a series of compact, modular and versatile processors employing System/370 architecture and designed to run in a normal office environment. As such, it will be sited in the Boole Library and installed by a joint Library/Computer Bureau team. Delivery is expected shortly

and planning for the installation is already at an advanced stage. It is hoped to migrate the automated library system DOBIS/LIBIS, currently running on the Administrative 4341 under OS/VSE to the 9370 under DOS/VSE within six months of delivery (all going well). The main operating system on the 9370 will be VM.

Under the terms of the 2-year study contract, UCC will become a support centre for DOBIS/LIBIS. This means we will have access to enhancements and pre-releases of the application software for testing and evaluation. Working in close cooperation with other such support centres (University of Liverpool and Emory University in Atlanta) we can influence and assist in future development of the product.

Demonstration facilities, marketing assistance and technical advice will in return be given to IBM as required. An Irish language version of the DOBIS/LIBIS dialog screens will be added to the system; conversion programs to and from DMARC — an internal DOBIS format for bibliographic information exchange — must be written, and a backup circulation control system using a token ring network must be tested. The IBM office system PROFS will also be evaluated for local use.

To finish, for those who might not yet know, public access to the DOBIS catalogue is now available from terminals/personal computers in departments which have a line to the MICOM switch in the Computer Bureau. Further details may be had from Max McCarthy at x2331 in the Boole Library.

Jerry Buckley ADLB8002

USER LIBRARY ON VM/SP

The re-designed UserLibrary facility on the IBM has by now been in use for about 15 Months. It was written (mainly in Assembler) by Tom Kiely, a then Final Electrical Engineering student, while working for the Computer Bureau during the Summer Vacation in 1986.

Apart from the facility for restoring “lost” files being a bit slow and cumbersome, the system has been an outstanding success and has proved exceptionally reliable. Response times have also been even better than originally anticipated.

The only bug noted so far is caused by the 128-file limit per user — and that will be fixed “real soon now”.

On behalf of the 500+ users who have files stored in the UserLib, can I say “Well Done, Tom!” (if you ever get to read this).

John Murphy CBSY8001

FORTTRAN CORNER

An occasional series of helpful hints on FORTRAN programming.

Optimising array usage

Study the following two programs:

```
(1)
      REAL*4 XARRAY(1500,1600)
C
C Initialise IARRAY to 1's.
C
      DO 100 I = 1,1500,1
        DO 200 J = 1,1600,1
          XARRAY(I,J) = 1
200 CONTINUE
100 CONTINUE
      STOP
      END
```

```
(2)
      REAL*4 XARRAY(1500,1600)
C
C Initialise XARRAY to 1's.
C
      DO 100 I = 1,1600,1
        DO 200 J = 1,1500,1
          XARRAY(J,I) = 1
200 CONTINUE
100 CONTINUE
      STOP
      END
```

What is the difference? The second program will run in a shorter time.

Explanation: The reason is because arrays are stored as groups of contiguous or linear locations which is usually known as column major order, with the leftmost subscripts varying most rapidly (order of subscript progression).

For example in the sample programs the array XARRAY will require $4 \times 1500 \times 1600 = 9600000$ bytes 29375Kbytes of virtual memory.

Since virtual memory is divided up into pages, (4096 bytes on VM/SP or 512 bytes on VAX/VMS), the array will span over a number of virtual memory pages.

If your program references a cell in the array that is on a virtual page that is not currently in memory then a page fault occurs. The operating system must bring that page into memory. To do this an existing page in memory may have to be removed. This process, called paging, takes time.

In the programs the array XARRAY is stored as

```
(1,1) (2,1) (3,1) ... (1500,1) ... (1,2)
(2,2) (3,2) (1500,1600)
```

So by varying the left subscript most as in the second program each consecutive cell referenced is local to the previous referenced cell. The amount of paging is minimised.

An easy way of checking the amount of paging going on is to use the CP IND USER command on VM/SP and CTRL-T on VAX/VMS.

Michael O'Halloran CBSY8004

PC PRICES

The Apple hardware prices are UK list prices +25% VAT converted to Irish Pounds less 30% discount. Otherwise all prices include 25% VAT and academic discounts if available.

IBM and compatible PCS

8086 Processor

IBM PS/2 Model 30, DD, 640k, Mono	1276
IBM PS/2 Model 30: DD, 640k, VGA Colour	1589
IBM PS/2 Model 30, 20MB HD, 640K, Mono	1647
IBM PS/2 Model 30, 20MB HD, 640K: VGA Colour	1960
Amstrad PC 1640, DD, 640K, Mono	949
Amstrad PC 1640, DD, 640K, EGA Colour	1374
Amstrad PC 1640, 20 MB HD, 640K, Mono	1499
Amstrad PC 1640, 20 MB HD, 640K, Colour	1874
Amstrad Portable PC, DD, 640K	550
Ensontech PC/XT 640K, 20MB HD, Mono	830

80286 Processor

IBM PS/2 Model 50, 20MB HD, 1MB, Mono	2543
IBM PS/2 Model 50, 20MB HD, 1MB, VGA Colour	2856
IBM PS/2 Model 60, 44MB HD, 1MB, VGA Colour	3860
IBM PS/2 Model 60, 70MB HD, 1MB, VGA Colour	4178
Ensontech AT, 40 MB HD, DD, 640k, EGA Colour	1904
CAS 286AT, 20MB HD, 640K, EGA Colour	1638
Walthers Baby AT, 20MB HD, 640K, EGA Colour	2389
PCU THE-286, 44MB HD, 1MB, EGA Colour	2307
Epson PC AX, 20MB HD, 640K, EGA Colour	3493

80386 Processor

IBM PS/2 Model 80, 44MB HD, 1MB, VGA Colour	4548
IBM PS/2 Model 80, 70MB HD: 2MB, VGA Colour	5234
Walthers 386, 40MB HD, 2MB, EGA Colour	3785
CAS 386AT, 20MB HD, 640K, EGA Colour	2848

Apple PCs

Macintosh SE/HD 20	1750
Macintosh II, 20MB HD, Mono	3360

Acorn PCS

Archimedes	POA
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PRINTERS

Epson LX-800 150/25cps	404
Epson FX-800 240/40cps	631
Epson LQ-800 180/60cps	919
Epson SQ-2500 540/150cps	2639
Diconix 150 portable Ink-Jet	300
IBM Quietwriter III + Sheet Feeder	1210
IBM Proprinter X24	530
IBM Proprinter XL24	683
Kyocera Laser Printer F1000	3438
HP Laserjet Plus	3550
Cannon II Laser	2361
QMS P8800 (Postscript) Laser	5549
Apple Laserwriter Plus	3743

SOFTWARE

.5em] IBM Compatible[.5em] PC-Write (manual)	20
Displaywrite 4	344
Nota Bene	390
T _E X (manual)	45
Lotus 123	537
Multiplan Junior	98
Supercalc 3.1	85
Supercalc 4	550
dBase III	563
FoxBase + 2.0	400
Reflex	125
Graph-inaBox	75
PSTAT	600
PCL	120
ProDesign II (CAD)	250

Borland Products

Turbo Pascal, C, Basic etc.

New educational price list available shortly

Norton Utilities v.4 Advanced edition	115
PC-Tools 3	44
Crystal Expert System	POA
VP Expert	105

Apple Macintosh

MacWrite	94
MacPaint	94
MacDraw	94
Hypercard	38
MacTerminal	50
MacPascal	94
Microsoft Works	188
Microsoft Word 3.0	406
Superpaint	225
Pagemaker 2	688
Microsoft Excel	581

Michael Gordon CBOP8006

BUYING A PC

Departments wishing to purchase PCs and software are encouraged discuss their requirements with the Bureau. (To place an order, we require an order form from your department, with the accounts charge code in the box at the bottom so that the invoice can be directed to you when the goods arrive.

Individuals buying PCs or software for their personal use can avail of the same discounted prices provided they place their order through the Bureau. Terms are cheque or cash on delivery (sorry, we don't take American Express!).

What to look for

The golden rule is: decide what you want it for first, *then* look for the software which will do the job, *and only then* look for the hardware to run it on.

As a general guideline, we would not nowadays recommend anyone to buy anything less than a machine with 640Kbytes memory and 20Mbytes hard disk unless they were certain that their application was trivial. The things you need to specify are as follows (1Kb = 1,024 characters; 1Mb = 1,048,576 characters):

1. Operating System — this is the built-in program which makes the computer work. The current standard operating system, DOS is in use on an estimated 5,000,000 machines worldwide and will be with us for quite some time yet. The new operating system is (OS2), which will run on the new PS2 IBM machines and in part on some of the 286 and 386 clones. Most software written for DOS will also eventually become available for OS2. The new machines of course also run DOS until the new system goes on sale. Some DOS software, however, may not run under OS2.
2. Memory — 640Kb is the maximum memory size for machines running DOS; OS2 requires at least 1Mb to be useable. Many packages now require at least 640Kb in any case.

3. Floppy Disk Storage — plain PCs and XTs normally use 5¼" floppy disks holding 360Kb of data, known as 'double density' or DD. The newer ATs use the same physical size of disk, but holding 1.2Mb of data ('quad density' or 'high density'). They can read and write the 360Kb disks, but the PCs and XTs cannot use the 1.2Mb disks. All three types of machine can be fitted with the new 3½" disks: in this case the storage available is 720Kb. The PS2 machines use only 3½" disks, but at a higher density of 1.4Mb.
4. Hard Disks — these are built-in (non-removable) disks with much higher capacity and much faster access, coming in 10Mb, 20Mb, 30Mb and 40Mb capacities upwards. How much you will need depends on how much software and data you need to store. In general, 20Mb is a good size to start with.
5. Speed — the original processors were 8086 chips running at 4.77MHz. The XTs used the same chip at around 8–10MHz (about double the speed). The ATs use an 80286 chip and can normally go up to about 12MHz. The newest chips are 80386s, running at speeds up to 20MHz (around 4–5 times the speed of plain PCs). You pay your money and take your choice.
6. Mathematics — for higher level maths work, FORTRAN, some CAD, graphics and statistics packages you may need the extra mathematics coprocessor chip (8087/80287/80387 depending on the ordinary processor installed).
7. Screen — the early machines had a plain monochrome text screen, not much used nowadays. The first standard for graphics was the low-resolution CGA (Colour Graphics Adapter), also available in monochrome (simulating colour with 4–16 shades of grey). Beyond that there is the EGA (Enhanced Graphics Adapter) which can run to 64 colours (there is also a Professional Graphics version, PGA). The new PS2 machines use the VGA (Video Graphics Array) which is even higher resolution. The higher resolutions are normally needed only for graphics applications such as CAD.

These are only simple guidelines: the details of your application are best discussed with Bureau staff.

Peter Flynn CBTS8001

SITE-LICENCED SOFTWARE

There has been considerable expenditure by the College on software for user departments and individuals purchasing PCs in recent years. The growth in PC software usage has been on a very much ad hoc basis in that users have had to buy most of their software on a one-time basis (albeit with an academic usage discount). The equipment supplied has tended to be

'bare-bones', with few facilities apart from any packages the user might have ordered at the time.

As from now, all PCompatible machines supplied will come with simple file editing and wordprocessing (PC-WRITE) and communications (PROCOMM or KERMIT) at no extra charge to the purchaser. This has been made possible by some site-licensing of packages at a very low rate. The object is to give new users the basic software they need to get off the ground, without involving them in further expense over and above the cost of the machine. We hope to add graphics to the free list at a later stage.

Naturally, as your capabilities grow, you will be free to spend your own (or departmental) funds (as permitted) on other, more sophisticated, packages as you need them.

Although the software is provided free, and startup documentation is supplied with it, full manuals for these systems will be chargeable, as they are printed, and that costs.

One application that we have not yet been able to licence at an acceptable rate is a database management system. Regrettably, these are still relatively expensive compared with the software which we are able to provide. Perhaps during the year we will be able to identify a suitably priced package for this area also.

As well as the software mentioned above, we have site-licenced the T_EX system for PCompatible machines. This means that users can get started with desktop typesetting at no extra cost, but as T_EX requires around 5Mb of a hard disk system to run on, and not all users may need it, it is being supplied on request, rather than by default. Details of the system are given elsewhere in this issue.

Peter Flynn CBTS8001

OPERATIONS

The Operations Section of the Bureau is responsible for the day-to-day running of the following computing facilities:

Mainframes	Users
IBM4341.1	Academic Staff & Students
IBM4341.2	Administration & Library
VAX11/780	Academic Staff & Postgrads
CS μVAX	Undergraduates

Microcomputers	Location
Graphics Laboratory	Science Building Basement
MicroCentre	Boole Library Basement

The Microcomputer Centre, (in the basement of the Boole Library) is divided into three separate laboratories, each with its own PC network and printer. Two of these are IBM's PCNET, one of which has colour/graphics facilities. The third network, Novell, which was recently installed, has replaced the old

Corvus Network and with its new Trimatrix printer has greatly improved the service in this area. It is hoped to be able to bring the numbers of machines back up to complement in the next few Weeks.

Opening hours for the above facilities are as follows:

	Mon–Fri	Sat (in term)
MicroCentre	8.45–9.30	10.00–6.00
Graphics Laboratory	8.45–8.30	10.00–6.00

Diskettes, both 5¼" and 3½" are available in the MicroCentre at £1.30 and £2.00 respectively.

User registration, booking of mainframe terminal rooms and PC laboratories are all handled at the MicroCentre Office.

Any new data or programs required on the PC networks should be supplied, on diskette, to the MicroCentre office. In this regard, the amount of available space on the network disks is becoming extremely limited and your help in alleviating this shortage, by returning lists of obsolete files, would be greatly appreciated.

It is in the interest of the user community that all hardware faults (mainframe terminals as well as micros) are reported to the Operations Section (x2227) of the Computer Bureau, as soon as possible.

Denis O'Sullivan DENIS

BUREAU STAFF

Bureau Staff can be contacted at the following UserIDs. Please use the telephone only if you cannot send electronic mail. The nodenames of the mainframes are:

- IBM 4341 (Academic) — IRUCCIBM
- IBM 4341 (Administration) — UCCADMIN
- VAX 11/780 (Academic) — IRUCCVAX

Initial enquiries, new projects and requests for help should be directed to the Help Desk.

Name	Responsibility	UserID
Geraldine Buckley	Operations	CBOP8017
Jerry Buckley	Library System	ADLB8002
Margaret Buckley	Admin Applications	ADRE8102
David Chandler	Operations	CBOP8008
Roy Cummins	Admin Applications	ADRE8002
Robert Dumigan	Operations	CBOP8015
Brian FitzGerald	Admin Applications	ADRE8003
Peter Flynn	General Management	CBTS8001
Michael Gordon	Administrative Projects	CBOP8006
Paul Keegan	Operations	CBOP8018
Donal Kingston	Documentation	CBDO8001
Catherine Malone	Operations	CBOP8019
John Murphy	Systems Management	CBSY8001
Loretta O'Connor	Academic Advisory	ADVISORY
Michael O'Halloran	Systems Programmer	CBSY8004
Henry O'Keefe	Systems Programmer	CBSY8002
Denis O'Sullivan	Operations Management	DENIS
Nora ní Riabhaigh	Operations, Micro Centre	OPERATNS
Paul Waters	Help Desk, consultancy	HELPDESK

HEANET AND THE WORLD OUT THERE

Belatedly the international community has begun to settle on standards for network addresses. This is a good idea, but unfortunately, the standard selected is different to that adopted originally by HEANET (and our UK counterparts in JANET). Therefore we have to change to stay in step with the rest of the world. There are three main differences:

- a) The country code is now .IE instead of .IRL;
- b) The .HEA subdomain has been dropped;
- c) The order of the address is reversed (ARPA-style).

For example, the VAX at UCC which was previously called IRL.HEA.UCC.VAX1 becomes (by 1st February 1988)

- by (a) IE.HEA.UCC.VAX1
- by (b) IE.UCC.VAX1 and thus
- by (c) VAX1.UCC.IE which is the new form.

The same applies elsewhere, e.g. IRL.HEA.TCD.CSVAX1 is now CSVAX1.TCD.IE. Also JANET sites have been reversed — UK.AC.RL.IB is now IB.RL.AC.UK.

The MAIL interface too has been changed to simplify its use and to allow users to reply to a greater number of network mails. The general form of the mailing address now is:

NETWORK"user@site"

e.g. to mail to JOEBLOGGS on the TCD CS VAX you use

To: HEA"JOEBLOGGS@CSVAX1.TCD.IE"

In order to use HEANET you must enter SETUP HEANET or include that command in your LOGIN.COM file. For further details enter HELP HEANET.

Henry O'Keefe CBSY8002

MAILING LISTS AND DIGESTS

To introduce you to the world of electronic mailing lists and file servers, etc. a publication of the BITNET User Services Library has been installed on the IBM VM/CMS system. This document will assist novice network users become acquainted with the services available through BITNET. The following items are explained by giving the command SETUP followed by the command HELP BITNET SERVICES.

- File servers
- Name servers
- Electronic magazines
- Mailing lists and digests
- Relays
- List servers
- Finding people in BITNET

A companion file — BITNET SERVERS — lists the currently available servers and services. This file is also available as DB2: [ADVISORY.NET]BITNET.SERVERS on the VAX.

Loretta O'Connor ADVISORY

Many staff and students using the VAX and IBM are subscribed to mailing lists (eg IBMPC-L, NUTWORKS,

TEXHAX-L etc). It is obviously undesirable to have multiple copies of a particular Digest being sent here and cluttering up *both* the network lines *and* disk space locally. (In some instances, a single copy arrives and is automatically re-distributed to local users — but that is only in *some* instances.)

Before users rush pell-mell into subscribing to a particular Digest, it is advisable to check if it is already being received by somebody here. Where there is enough general interest, Digest files can be copied to a publicly accessible disk area for all and sundry to browse. Just drop a note to JFM@IRUCCVAX if you want to know if such a digest file is already being sent on here. Likewise, if you are already receiving a digest file that you suspect may be of interest to others, just drop a line. . .

John Murphy JFM

MAIL ALIASES

Traditionally, we have rigidly adhered to a structured UserID format **ffddynnn** — where **ff**=Faculty, **dd**=dept code, **y**=year and **nnn**=number-within-group.

Sometimes, users ask why can't we set up UserIDs like **JBLOGGS** — as is done at most sites. Frankly, there isn't any watertight case for not doing so other than the 'Old Spanish Custom' syndrome. Admittedly, the routine for setting up UserIDs would have to be radically overhauled to cater for any alternative approach — so that in itself is a disincentive to change.

However, if anybody feels strongly that they ought to have a 'personalized' mail address, then there is no problem in accommodating them. The VAX MAIL utility is able to cater for 'aliasing' — for example, mail sent to the 'aliased' UserID PF is directed to CBTS8001, which is Peter Flynn's ID, and mail to JFM is directed to CBSY8001. On the IBM, the Crosswell Mailer also provides a similar facility.

If you are ego-maniac enough actually to *want* something suitably personalized and descriptive like **GREATLOVER@IRUCCVAX** or whatever then just mail to my own alias (**JFM@IRUCCVAX**) and I'll do the necessary.

John Murphy JFM

VIDEOTAPES

The following tapes are available for group training by arrangement with the Bureau.

Tape Numbers	Description
4906 v.1, 4907 v.1, 4907 v.2, 4910 v.1	VM/SP CMS: Using the Conversational Monitor System — Facilities and use; definitions; creating files; modifying files; CMS utility commands.
4492 vv.1-5	Using VAX/VMS — Introduction to VAX/VMS; files directories and logical names; Digital Common Language; editing; communicating with others; symbols, command procedures and batch processing.

6011 vv.1, 2, 3, 5, 15	IDMS/R — Introduction to Database management & IDMS; data items; records; location modes; areas; the Set construct and types of IDMS sets; index sets; naming standards; data structures; understanding the runtime DBMS.
3620 vv.1, 2	Understanding X.25 — Fundamentals of X.25 parts 1 & 2.
4446-4449, 4452	VSE/VSAM and Access Method Services — VSAM data sets; VSAM coding rules; DEFINE CLUSTER and REPRO commands; VSAM catalog and alternate indexes; backup/restore and recoverable catalog.
1420 vv.1, 2, 3, 4, 5, 19	Computer Literacy: making it count — Introduction and preview; history of computing; information representation; hardware overview; software overview; computer aids to management.
6251 v.1	IBM PC Guide — A beginner's guide to the IBM PC.
3988 vv.1, 2	Technology Perspective — Understanding the IBM 9370.

TECHNICAL NOTES

A series of Technical Notes on the following subjects is now available and may be collected from the Advisory Office, Room 401.

- Subdirectories and Search Paths** — Explains the use of subdirectories on the IBM PC and its compatibles, and suggests a method of using search paths to allow users to access any of their software from any subdirectory of any disk.
- Introduction to Electronic Mail on VAX** Explains how to use the mailing system on VAX 11/780 to send and receive messages locally, nationally and internationally.
- Logging into the VAX 11/780** — Explains how to login to the VAX 11/780 computer from a VT100 terminal or equivalent (such as an IBM PC).
- Files and File Naming** — Explains how information is stored in computer files, and describes some of the conventions observed in naming files.
- EARN (BITNET) Networking** — Describes the facilities of the European Academic and Research Network (EARN/BITNET) on IBM VM/CMS and VAX/VMS computers, with the exception of electronic mail (documented in Technical Note 2).
- Using the VAX/VMS editor (EDT)** — Explains some elementary commands you can use to create or modify the contents of a file on the VAX using the EDT editor in fullscreen mode on a VT100 terminal.
- VM/CMS Commands and Facilities** — Lists the basic commands of the VM/CMS operating system used on the IBM 4341.
- VAX/VMS Commands and Facilities** Lists the fundamental VMS commands used on DEC's family of VAX computers.
- VAX/VMS Concepts** — Explains the concepts of the VMS operating system used on DEC's family of VAX computers.
- Using the VM/CMS editor (XEDIT)** — Explains the commands necessary to create and change files using the XEDIT editor on the IBM 4341.

NEWLY-INSTALLED VM/CMS UTILITIES

The following functions have been made available on the IBM VM/CMS system recently to facilitate your work. Give the command **SETUP** to gain access to the minidisk containing these functions.

- **SEARCHER EXEC** — routine to search through a specified file for any occurrence of a specified string and write the line number and line.
- **SEARCH EXEC** — utility to find what files contain a given character string.
- **REXFORM XEDIT** — an XEDIT macro which will justify all **Do**, **Select** and **If-then-Else** statements to make the file more readable.
- **CHCASE XEDIT** — an XEDIT macro which allows the user to easily change the case of a word via a PF key.
- **TRANSLAT EXEC** — a utility to translate a file from ASCII to EBCDIC or vice-versa.

Loretta O'Connor ADVISORY

VAX AND MICROVAX BULLETIN BOARD SYSTEM

The PFC Bulletin Board System is a public domain (i.e. free) utility which was developed at MIT. It has been available on the Computer Bureau VAX 11/780 and on some of the μ VAXen since about Spring '87. Possible uses of the Bulletin Board System are:

1. Notices by Clubs, Societies
2. Extracts from (or even entire) Staff and Student Newsletters
3. Notices by Individuals (Bike for sale, Personal message services etc!)
4. Discussion/Conference Groups

The only restriction on usage is that nothing obscene, defamatory or copyright should be included in Bulletin Board entries. Political or religious propaganda isn't particularly welcome either.

Outline Description

PFC BULLETIN is a utility which displays bulletins to users when they log on to the DEC VAX or MicroVAX Computers. Submitting and reading bulletins is easy to do via a utility very similar to the VMS MAIL command.

Folders can be created so that bulletins pertaining to a single topic can be placed together. Folders can be made private so that reading and writing is limited to only users or groups who are granted access. Alternatively, folders can be made semiprivate in that everyone is allowed to read them but write access is limited.

Users are always notified at login of new bulletins in the **GENERAL** folder. Bulletins have expiry dates and times, and are deleted automatically. 'Permanent' bulletins (which never 'expire') can also be created.

An optional feature allows bulletins to be created by users of other systems connected via DECNET. A username can be assigned to a folder and any mail sent to that user is converted to bulletins and stored in that folder. This feature originally was designed to duplicate the bulletin board feature that exists on some ARPANET and BITNET/EARN sites. However, with the addition of folders, another possible use is to assign a BITNET or ARPANET mailing list to a folder.

For example, one could have an INFOVAX folder associated with an INFOVAX username, and have INFOVAX mail sent to INFOVAX. Users could then read the mailing list in that folder, rather than having INFOVAX sent to each and every user.

For outline details type **HELP BULLETIN** at your VAX terminal. For usage details type **BULLETIN** then **HELP**.

John Murphy CBSY8001

THE VSE/SP OPERATING SYSTEM

The Virtual Storage Extended/System Package is an IBM operating system for 9370 and 4300 series machines. It can run under VM as a guest system or natively on the 'raw' computer. Among the products it supports are VTAM and CICS. The latter is, of course, at the heart of the DOBIS/LIBIS library system.

VSE is often referred to as DOS/VSE (or similar variations) and should not be confused with PC-DOS or MS-DOS. It is essentially a batch operating system which allows a number of jobs to run at the same time by using different memory partitions for each job, each partition getting its turn on the CPU. In this regard it is similar to OS/VS1.

Although DOS is one of the older IBM operating systems it still remains one of the most widespread and IBM continue to maintain and enhance it. Version 3 is the most recent upgrade.

Henry O'Keefe CBSY8002

T_EX ON THE BUREAU VAX AND PCs

T_EX, the software package for computer typesetting, is available on the VAX 11/780 and on micros running PC-DOS or MS-DOS. This system is used to obtain book quality output from your source document. It is capable of producing most linguistic and scientific symbols, and is therefore ideal for doing technical, linguistic, scientific and mathematical typesetting as well as for plain text.

The manuscript which you type in using a text editor contains, in addition to your text, instructions to T_EX on how to typeset your document. You are aided in this task by *macros* (expandable commands) which contain T_EX *primitives* (fundamental typesetting commands) and *control sequence definitions* (other defined commands). You may also define your own macros for

any series of instructions which you find you are using frequently in formatting your text. This will lessen your typing load considerably: for example, if you want numbered sections in your text, you can define a macro to automatically number the sections and put a section heading in a different typefont for you, with any extra spacing or formatting you need.

The output will be a *device-independent* file (`.dvi` file) which contains the font (i.e. the size and kind of typeface) and the location for each character that is to be printed. This file is then put through a device driver program which will translate the above codes to those which will drive a particular printer. Suitable device drivers for various printers are available on the VAX 11/780 and on microcomputers running PC/MS-DOS. To run \TeX on the VAX, give the command:

```
SETUP TEX
```

which will give you access to the \TeX fonts and macros. Then to process a file you have created, issue the command:

```
TEX filename
```

(the filetype is assumed to be `.tex`). Run the driver program for your particular printer. In the case of the VAX, the printer (a DEC LN03 laser printer) is shared so running the appropriate program (`DVI2LN3`) produces a file which must be queued for printing. The following two commands will accomplish the above:

```
DVI2LN3 filename
```

(the filetype is assumed to be `.dvi`)

```
PRINT/QUEUE=LASER -
```

```
 /FORM=LN03_PORTRAIT filename.ln3
```

To run \TeX on a PC, you must have a hard disk and at least 512K memory. The original \TeX software itself is in the public domain, so the PC implementation is relatively cheap, and we have obtained a site licence: this means we can supply the PC version to any student or member of staff for the cost of the manual only (£45), including a dot-matrix printer driver; the more advanced driver programs (for laser printers, unfortunately, still have to be paid for, around £200.

Ensure that your search path contains `C:\pctex`. Give the command:

```
TEX filename
```

(the filetype is assumed to be `.tex`). There are various drivers available for different printers — type the driver name followed by the filename (filetype `.dvi` assumed). This will activate the printing of your file. However, in the case of the Hewlett-Packard LaserJet Series II located in the Bureau Reception office, a file is produced so you can keep it for later re-printing. The file will have the same name as yours, but with a filetype of `.hp`. To print it, type

```
COPY/B filename.hp PRN:
```

For more information on \TeX a document called *TeX Basics* is available from the Computer Bureau or online in DB2: [TEX.INPUTS]BASICS.TEX on the VAX (you must first `SETUP TEX`) and in the directory

`\PC-TEX\TEXINPUT\BASICS.TEX` on the PC. There are also a few copies of *First Grade TeX* available for loan from the Advisory Service. The full manual (the *TeXbook*) is available for reference and also for purchase (£45) with the PC version.

Loretta O'Connor ADVISORY

INDEX OF FILES IN DIRECTORY LIB: ON THE VAX 11/780

Items marked * have been added in the past few months.

ARC.EXE;1	For 'ARCING' and 'deARCING' files
BINARY.COM	To display a decimal number in binary
CALC.COM	Desk Calculator
CALC.EXE	Another Desk Calculator
CONVUPPER.INC	Fortran Subroutine to convert a string to UPPERCASE
CVTAB.EXE	Convert spaces in a file to tabs (to save disk space) (Info)
DECOMMENT.COM	To De-comment .COM file (for marginal speedup)
DECOMMENT.COM.MENTED	Original (with comments) version!
* DM.COM	Directory Management Routine from VAXSIG DECUS Tape
* DM.EXE	— " —
EDTCAI.COM	EDT Computer-Assisted Instruction Course
* FIXMAIL.COM	Converts old HEANET FTP mail headers to a 'repliable' form (Info)
* FIXMAIL.HLP	Traps key depression at terminal
* GETKEY.EXE	Sample usage of GETKEY.EXE
* GETKEY.COM	Help details of all PMDF Facilities etc
HELPPMDF.COM	Help details of SSP Subroutine Library
HELPSSP.COM	Library
LED.COM	Edit the first available file matching a wild-card specification
* LOOKUP.COM	Look up local UserIDs, BITNET/EARN/HEANET/JANET nodes etc
LISTMAIL.COM	List all Mail Subject Headings in all your Mail Folders
MAILINFO.COM	Displays info from VMS-MAIL.DAT
MAILQUERY.COM	Check for outstanding MAIL messages
* MAKE.EXE	UNIX-style utility for program/package maintenance
* HELPMAKE.COM	Help details on MAKE
MFTU.EXE	Translates binary files to text for network mailing and also compresses files (Info)
MFTU.DETAILS	(Info)
* ODIR.COM	DIR/DAT/SIZ all multiple versions of specified file(s)
PCD.COM	Sets prompt to Default Directory name
PHOTO.COM	Writes terminal O/P to a specified file
PID_CHECK.COM	Check if a user is logged in multiple times

PID_CHECK.HLB	(Info)
PSYCHNET.COM	Facilitates BITNET communication with the Educational Psychology Department of the University of Houston
QSORT.DOC	Sort subroutine for small files
QSORT.FOR	(Source)
RELAY.COM	Simplifies RELAY chatting on BITNET (after 18:00 only)
* REPLACE.COM	Replace a specified string in specified file(s)
RNOEDIT.COM	Work on a RNO file
* RUNOFF.HLB	HELP File for RUNOFF Commands (a little out-of-date!)
* HELPRUNOFF.COM	To invoke help details on RUNOFF Commands
SCRUBBER.COM	Delete 'empty' files
* SD.COM	Set the default directory to a specified subdirectory
SETUP.COM	Setup routine for a whole range of packages
* SIDECAR.COM	Print file on attached printer (if your VT100 has one!)
SPLIT.EXE	Split FORTRAN program into separate files-per-subroutine
SPLIT.FOR	(Source)
SPLIT.HLP	(Info)
STRIPPER.COM	Strip trailing blanks from a file
STRIPPER.EXE	— " —
TALKTO.COM	Enables use of send command without intrusive prompt.
TAPEAE.EXE	Dump files <i>from</i> disk to magnetic tape (ASCII-to-EBCDIC)
TAPEAE.FOR	(Source)
TAPECOPY.EXE	Load files from magnetic tape (EBCDIC etc) <i>to</i> Disk
TAPECOPY.FOR	(Source)
TIDY.COM	Utility for working on groups of files
* TPC.COM	Fast Tape Dump utility (<i>caveat emptor</i>)
* TPC.EXE	— " —
* TRANS.COM	Bulk Transfers files to another HEANET Machine
TREE.COM	Show hierarchy of subdirectories in a given directory.
* UNDIGEST.COM	Converts a BITNET 'mail-digest' in mail folder DIGEST to 'ordinary' mail messages in folder UNDIGEST
UUDECODE.EXE	Makes a binary file transportable via network mail
UUDECODE.PAS	(Source)
UUENCODE.EXE	Converts a UUENCODED file back to binary format
UUENCODE.PAS	(Source)
VAXUSAGE.GUIDELINES	Policy guidelines for all computer users — PLEASE READ!
VMSSWEEP.EXE	Similar to UUDECODE
VMSSWEEP.FOR	(Source)
WORK.COM	Oddjob routine to simplify working on a file
VAX_TOOLBOX.*	Copies of the BITNET/EARN Magazine on VAX matters (please don't print them — just extract useful bits!)

John Murphy CBSY8001

BITNET (EARN)

The changes being implemented at time of writing regarding HEANET domain naming (i.e. the changeover to ARPA-style domain addresses) are already detailed elsewhere in this newsletter by Henry O'Keeffe.

Access to BITNET/EARN — and thence to other international Academic and Research Networks — is currently via a leased line between UCC and UCD. This line was originally funded by IBM when we joined BITNET/EARN but the cost of such lines now has to be provided by the participating institutions.

Mail access to BITNET/EARN by HEANET sites (outside of just UCD and UCC) is obviously desirable. Unfortunately, it can only be achieved by provision of a so-called 'Gateway' facility — where a site on both network A and network B is able to receive mail from users on A and re-route it to B and vice-versa.

An unofficial stop-gap Mail Gateway between HEANET and BITNET/EARN was developed over two years ago by Peter Flynn (in fact, it is still in occasional use by certain sites on the ARPANET who have not got gatewaying software). The 'official' gateway, however, is now fully functional and working reliably at UCD. Thus, it is now possible for a user on *any* of the HEANET nodes to send mail *via* the UCD Gateway to international networks like BITNET/EARN, ARPA, UUCP and so on.

This raises the question of whether UCC will be able to justify the cost of two routes to BITNET/EARN. We aren't really 'keeping our options open' for mailing purposes by retaining the leased line — it is connected to the AMDAHL at UCD which, in any case, also runs the official gateway facility. . .

There would, however, be implications for other network services should we decide to drop direct access to BITNET/EARN:

1. The facility to exchange certain types of files with users, servers and so on would be curtailed. Files such as binary data, object code and executable programs would have to be sent in a specially encoded form within a mail 'envelope'. This is no great deal, but it nearly doubles the file size to transfer. This method is a work-around, but things start to get a little convoluted at this stage. Access to servers which require plain files, and cannot accept mail messages, would disappear completely.
2. The facility to (literally) talk directly to other users on BITNET/EARN would disappear, as would all access to remote servers which accept interactive messages as their commands. The conversational access to other users is one of the 'nice' features of BITNET/EARN — though hardly the most vital and it can place a significant overall load on the network if misused. The inter-

active access to servers, however, is a significant source of information.

3. Users on the μ VAXen wouldn't (for the present, anyway) be able to conveniently send and receive mail to and from other networks at all.

The whole subject is under review and we hope to have more details on developments in the next Newsletter.

PMDF AND DELIVER

Two public-domain packages which greatly extend and simplify the facilities for dealing with E-Mail to and from the outside world have been installed on the Bureau VAX in the the past year. These are PMDF and DELIVER.

PMDF 822

PMDF stands for 'Pascal Memo Distribution Facility' and was developed by Ned Freed *et al* of Harvey Mudd College in California. PMDF is, in effect, both an extension to the standard VAX Mail utility and a 'gateway' facility enabling users on adjacent DECNET nodes (in our case, the CIVIL, ELEC, STATS MicroVAXen and the VAXen at NMRC) to send and receive mail to and from other networks.

Before PMDF was installed, μ VAX users had to log on to the Bureau VAX (providing they had a userid there!) to access BITNET/EARN etc. What PMDF provides is the ability to give each of our DECNET nodes a so-called 'Domain Name' and route mail appropriately.

Thus, a user on the STATS MicroVAX could have mail sent to him/ her by somebody on ARPANET using the address

```
uid@STATS.UCC.IE
```

The mail item would then travel to the UCD gateway, be forwarded to MAILER@IRUCCIBM and thence to PMDF on the Bureau VAX. PMDF then forwards it appropriately. Users on HEANET can mail directly to a UCC μ VAX UserID *providing* they route their mail *via* the UCD BITNET/EARN gateway.

PMDF is transparent to the users — all the user does is invoke the mail command:

```
$ MAIL
```

```
MAIL> SEND
```

```
To: IN%"userid@node.domain" (Bureau VAX)
or BUREAU::IN%"userid@node.domain" (DECNET)
```

The DELIVER Utility on the VAX

To process incoming mail on the VAX, one normally invokes the MAIL utility, followed by the DIRECTORY command. Then each item has to be viewed, deleted or filed away. Normally, this is a trivial task. However, many users receive large numbers of mail items (say 30+ daily). The DELIVER utility should be of interest to these users.

DELIVER makes it possible for incoming mail messages to be automatically processed and 'filtered' as they arrive — without the user even having to log on!

The type of processing that can be carried out is governed by a set of 'rules' specified in a file called MAIL.DELIVERY in the users main directory (SYS\$LOGIN)

The 'filtering' actions specified in MAIL.DELIVERY take place immediately on receipt of a mail item and could include, for instance,

- a) Appending mail from a particular user to a disk file
- b) Forwarding mail from another user to somebody else
- c) Deleting or returning recognizable 'junk mail'
- d) Just letting it be. . .

For an example, enter TYPE LIB:MAIL.DELIVERY. For full details, TYPE PMDFROOT:[DELIVER]DELIVER.MEM.

The one imperative *before* using DELIVER is to disable the COPY-SELF facility within MAIL. This avoids the risk of infinite looping when the DELIVER facility is 'filtering' mail.

John Murphy CBSY8001

NEW LANGUAGE

A new PC language has been making some headway recently, called PCL (Personal Computer Language). This is an interpreted language, and combines the ease of use of BASIC with the procedural structure of PASCAL and C, but has a large range of additional functionality built-in, such as terminal emulation, automated windowing, powerful string-handling and advanced access to machine-language calls. Its biggest plus, however, is its speed, some 7–25 times faster than MS-BASICA 3.1, and even twice as fast as Turbo PASCAL 3.0. Although classified as interpreted (because there is no facility for saving the object code or run-time image), it in fact compiles and runs in one go — its speed results from its having been written specifically for the 8086/7–80286/7 instruction set, rather than having been ported down from a mainframe environment. PCL costs UK£100 and can be ordered through the Bureau.

Peter Flynn CBTS8001



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