

Practical Computing

90p March 1985
Volume 8 Issue 3

Public Networks

Plug into the world
of databases and
electronic mail

Reviews:

**Research Machines'
80186-based Nimbus**

**Three BBC Logos
compared**

Sanyo 775 transportable

Enterprise revisited

68K/OS for the QL



Symbiotic Computer Systems has been at the forefront in the development of mass storage and networking products over the past three years designing and manufacturing systems to enable the full range of **Apple** microcomputers to form a business facility, powerful enough to rival many mini-computers on the market.



Symbfile – Symbiotic's Winchester hard disk system can now be used with both the **Macintosh** and the **Apple IIc** as well as the **Apple II** range. The Symbfile is available in capacities up to 42 megabytes – enough space to store about 25 thousand pages of data! which can be accessed at extremely high speeds and contained on much larger volumes than even the highest capacity floppy disks.



Symbnet – the Symbiotic tree and branch local area network, allows up to 127 computers to access one Symbfile. Symbnet is one of the few commercially available network systems that uses fibre optic technology. Fibre optic cable is unaffected by electrical interference and can run up to 9 Km between stations with no degradation of signal and can now also be used with low cost twisted pair cables for distances up to 30 metres. This allows the user

to mix both fibre optic and twisted pair cable to suit their exact requirements, providing one of the most cost effective and noise immune systems available.

Symbstore – is the answer to secure back up; it utilizes inexpensive cassettes each capable of holding 10.5 Megabytes of data, that can be used quickly and efficiently to stream a complete Symbfile image to tape. The full range of Symbiotic products are also available on the **BBC Micro**.

The Symbiotic group of Companies distribute their products through a wide network of dealers covering virtually the whole of western Europe.



For more details contact one of the following Symbiotic group companies –

Symbiotic Computer Systems Ltd

Duroma House, 32 Elmwood Road, Croydon, Surrey CR9 2TX, England.
Tel: 01-683 1137 (PBX) Telex: 928202 SYMPLC

Symbiotic Computer Systems (Benelux)
Symbiotic Computer Systems France
Symbiotic Computer Systems A/S
Symbiotic Computer Systems Inc

Keizersgracht 26, 5611. GD. Eindhoven, Netherlands. Tel: 040 456055
2 Rue Henri Chevreau; 75020 Paris, France. Tel: 349 06 80
PO Box 354, O. Tryggvassons 4, 7000 Trondheim, Norway. Tel: 07-53 20 27
PO Box 1431; Fairfield CT 06430, USA. Tel: 203 374 5910

● Circle No. 172

The complete solution...
winchester sub systems · local area networks · tape streamers

>LIST

PRACTICAL COMPUTING

MARCH 1985

>NEWS

13 COMPETITION REPORT
We name the names of the lucky winners in our Apricot F1 and DRG printer competitions.

15 HARDWARE NEWS
Atari's wonder micros, HP's Unix portable, price cuts from Sinclair and Acorn, and Goupils invade the U.K.

21 IBM NEWS
Mostly software this month: Superproject, for project planning, and Top Class, the authoring and presentation package.

23 SOFTWARE NEWS
Two QL assemblers and a BBC cassette to disc utility.

25 GAMES NEWS
QL war games, Macintosh card games, Ghostbusters and The Ancient Art of War.



29 WHICH COMPUTER? SHOW REPORT
The Birmingham show seemed awash with IBMulators, with the Tandy 1000 looking good.

31 PRINTOUT EXTRA
Our man with the gavel, Chris Bidmead, reports on computer auctions.

>FEATURES

88 THE LEVY SERIES
David Levy and the Funny Jumping Knights Game.

111 OPEN FILE
Free software for the BBC, Commodore, Amstrad and Atari machines

112 TIMETABLE
Donald Travers' timetable program for a teacher's Pet.

116 SUBMIT FROM MBASIC
David Dawe shows you how to mimic the action of CP/M's Submit from MBasic.

120 MORE SECRETS OF THE BBC ROM
Roger Cullis continues to delve deep into the BBC operating system.

>REVIEWS



62 RM NIMBUS
Ian Stobie admires the silver lining of a cheap, fast British machine, which has amazing graphics and runs MS-DOS.

68 SANYO 775
A Japanese colour transportable that gives the Compaq a run for its money. Robert Piper investigates.

70 THE ULTIMATE BASIC?
Bill Bennett concludes his review of the Enterprise with an in-depth look at IS-Basic.

76 LOGO ON THE BBC
Susan Curran compares three leading implementations.

80 68K/OS
The original operating system for the QL reviewed by Chris Bidmead.

84 BBC UTILITY ROMS
David Osborne checks out Caretaker and Toolkit.

137 VISICALC BOOKS
Peter van der Linden looks at books on an evergreen old-timer.

>PUBLIC NETWORKS

91 PUBLIC KNOWLEDGE
An introduction to our special feature on using your micro as a window on the world.

92 ELECTRONIC MAIL
Is the postman doomed? Chris Bidmead reports.

96 VIEWDATA
Jack Schofield looks at Prestel, Micronet 800 and the gateway to the future.

101 ON-LINE DATABASES
Plug in to a billion words. Glyn Moody investigates the database boom.

>REGULARS

5 EDITORIAL
Is Basic past it?

7 FEEDBACK
Your letters about computer mysteries and multi-column text on WordStar.

53 CHIP-CHAT
Ray Coles on a chip with built-in Basic.

55 COMMS LINK
PSS and more bulletin boards from Ben Knox.

56 SOFTWARE WORKSHOP
Two table-searching techniques described by Mike Lewis.

59 ASK PC
You ask, John and Timothy Lee answer.

108 FICTION
RAM SPACE
David Cleden's tale of a guest in the machine.

141 LAST WORD
The Grand Llamamaster himself, Jeff Minter, lists his best blasts.

The Disk to launch a thousand programs

Here it is at last. One disk that will prove to be the solution for many business problems. A disk which will allow you to develop your own programs. Exactly the way you want.

The disk contains one of the most revolutionary programs of the year. Sycero. No matter whether you are a computer novice or a seasoned programming professional, Sycero enables you to build any type of business program.

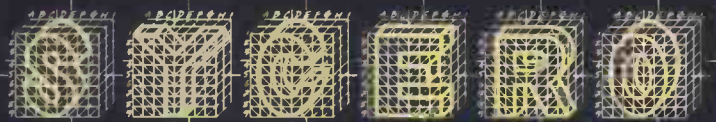
No matter what your business.

From traditional business applications like stock control, invoicing, database management and inventory to an unimaginable number of specific industry applications.

And the beauty of Sycero is that it takes no time at all to build a simple program for yourself. When you've built one, expanding it, or building other, more complex programs, is easy.

Once you start developing your own programs you'll wonder how you ever got on before. And no longer will you have to bend over backwards to make do because the program you bought off the shelf does things differently to the way you wanted.

No matter what your business, there's now one program for the job.



*The Businessman's
Program Builder*



System C Limited
Tel 0622 55142

System C Limited
7 Mill Street Maidstone
Kent ME15 6XW
Tel 0622 55142

Practical Computing

Basically OK

EDITORIAL 01-661 3609

Editor Jack Schofield

Assistant Editors Ian Stobie Glyn Moody

Production Editor John Liebmann

Sub-editor Carol Hammond

Editorial Secretary Sue Jordan

Consultants Chris Bidmead Peter Laurie

ADVERTISING 01-661 3612

Advertisement Manager Nitin Joshi 01-661 3021

Assistant Advertisement Manager Neil Marchant 01-661 8626

Advertisement Executives Richard Milbourn 01-661 8100 Janet Thorpe 01-661 3468 Ian Walker 01-661 8425

Advertisement Secretary Joan Borrell

Midlands office David Harvett 021-356 4838

Northern office Geoff Aikin 061-872 8861

Classified Lucy O'Sullivan 01-661 8163

Group Advertisement Manager Shobhan Gajjar 01-661 8441

PUBLISHING DIRECTOR Chris Hipwell

Published by Electrical-Electronic Press, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS. Tel: 01-661 3500. Telex/grams 892084 BISPRS G.

Distributed by Business Press International Ltd, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS.

Subscriptions: UK £14 per annum; overseas £20.50 per annum; selling price in Eire subject to currency exchange fluctuations and VAT; airmail rates available on application to Subscriptions Manager, Business Press International Ltd, Oakfield House, Perrymount Road, Haywards Heath, Sussex RH16 3DH. Tel: (0444) 459188.

Printed in Great Britain for the proprietors Business Press International Ltd by Greenaway Harrison Web Offset Division, Southend-on-Sea. Typeset by Lithotype Design, London EC1.

© Business Press International Ltd 1985 ISSN 0141-5433

Would-be authors are welcome to send articles to the Editor but PC cannot undertake to return them. Payment is at £35 per published page. Submissions should be typed or computer-printed and should include a tape or disc of any program.

Every effort is made to check articles and listings but PC cannot guarantee that programs will run and can accept no responsibility for any errors.

IT IS 20 YEARS since Basic was born. Since then argument has raged about whether its advent was entirely a good thing.

The initial impulse behind the development of Basic can hardly be faulted. It first appeared on a mainframe of the time, situated at Dartmouth College in the U.S. John Kemeny and Thomas Kurtz, professors at the college, set out to produce a computer language that was easy to use, even for novices. The standard commands were English-like, and did more or less what you expected. So, for example, Print did print something out, and Goto 350 took you to line 350.

Much of this structure was taken from Fortran, widely used then as now for scientific applications. Fortran suffered from the fact that it was designed for punched-card data entry. It was also compiled where Basic was interpreted.

This meant that instead of feeding in an entire program, compiling it, then running it and praying, as in Fortran, you could check each line for errors as the interpreter swept through the program line by line. Instead of a list of unhelpful error statements. Basic told where you went wrong, as you went wrong.

The benefits for the learning process are clear. Instead of being isolated from your program as it was entered and run in batches, you could work directly with the computer — that is, interactively.

The whole structure of Basic pre-figured the micro revolution. This has largely been about distributed computing power, putting a personalised processor on your desk that you can then control and interact with directly. When it came to choosing a language for the new machines, Basic fitted like a glove. Similarly, once the first hobbyist phase was over, Basic became popular with the later waves of users because it was so easy to learn and operate.

But, the price paid for this ready accessibility is lack of control. You can do almost anything with Basic — including things that you probably shouldn't. Perhaps the most in-

famous example is the dreaded spaghetti syndrome.

One of the most powerful commands of Basic is Goto. If your program throws up an awkward special case, or goes off in a direction you never intended, things can usually be sorted out with a Goto or two. Unfortunately this kind of ad hoc tampering is so easy that many people use it to write entire programs. The result is a mess of intertwining execution paths that are impossible to follow, and therefore to debug or modify.

Critics of Basic insist that what we need is structured programming. This locks programming habits into specific patterns that are thought to be logical and clear. Perhaps the most popular of these evangelical languages is Wirth's Pascal.

But even Pascal has failed to catch on in a big way. For all that Basic is castigated for being an inefficient solution to programming problems, and likely to inculcate irremediable faults, it just goes from strength to strength.

One positive result of the Basic debate is that new Basics are increasingly becoming more structured. BBC Basic was one of the first, and still one of the best. Recent releases have included the QL's SuperBasic and the Enterprise's IS-Basic. These new versions combine all the manipulative power of old Basics in terms of screen handling, sound production and error-handling routines; with more advanced features like procedures, local variables and While-Wend loops.

As Basic becomes more wonderful there is, though, a correspondingly greater danger that people will come to think of programming as Basic and nothing more.

With the advent of machines like the Sinclair QL with 128K RAM, there is no longer any excuse for other languages not to be seriously considered for programming micros. Apart from standard ones like Fortran, Pascal, Cobol and Logo, more exotic languages like Lisp, Prolog, BCPL and even APL are now coming through. They all have their own particular strengths, just as Basic does.

5 Years ago ... Fewer chips, compact design, volume production — more power per pound! The ZX-80 owes its remarkable low price to its remarkable design: the whole system is packed onto fewer, newer, more powerful and advanced LSI chips. A single Super ROM, for instance, contains the Basic Interpreter, the character set, operating system, and monitor. And the ZX-80's 1K byte RAM is roughly equivalent to 4K bytes in a conventional computer, because the ZX-80's brilliant design packs the RAM so much more tightly. (Key words, for instance, occupy just a single byte.) To all that, add volume production — and you've had that rare thing: a price breakthrough that really is a breakthrough. The Sinclair ZX-80. Kit: £79.95. Assembled: £99.95. Complete! Advertisement in PC Volume 3 Issue 3



My job takes me away from my P.C.—but nothing takes me away from my Hewlett Packard Portable.

Working away from the office means working away from the facilities you need to work. Unless you have The Portable.[®]

The Portable is a fully portable micro computer, weighing under 9 pounds – yet it has all the features you would expect from a desktop machine.

Programs stored in ROM mean you can go to work with full Wordprocessing on MemoMaker, and statistical and spreadsheet functions with Lotus 1-2-3.[™]

The Portable uses industry standard MS-DOS,[™] so you can also run all the special software your profession needs.

Work when you are away from work, and plug in to your desktop P.C.* when you get back to the office. Or you can use our battery powered range of Portable drives, printers and modems, which can travel with you wherever you go.

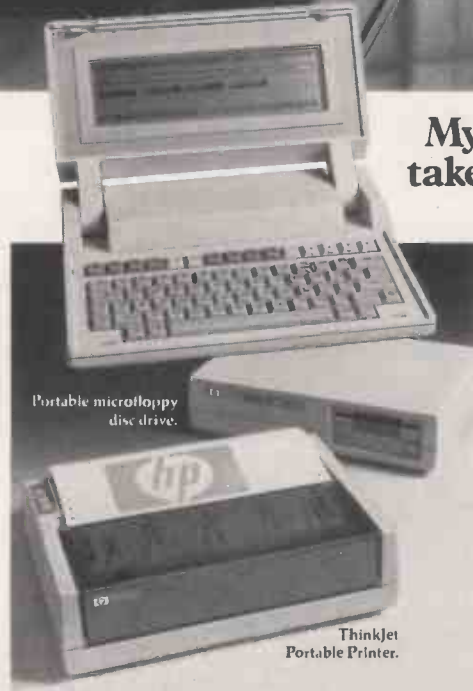
272 Kbytes of RAM, 16 x 80 characters

LCD, 128 x 480 pixel bit-mapped graphics – and a full-sized keyboard – The Portable has more power than many 'full-sized' computers. And a 'Help' function will make sure you can start using your Portable right away.

In fact, with The Portable, you might never want to go back to the office at all.

For more information complete the coupon, or call your nearest HP Dealer for a demonstration.

MS DOS[™] is a trademark of Microsoft Inc.
Lotus 1-2-3[™] are trademarks of Lotus Development Corp.
*The Portable is data-compatible with the IBM PC.



Portable microfloppy disc drive.

ThinkJet Portable Printer.

Telephone your nearest dealer now. ABERDEEN (02244) Grampian Comp. Facilites. 693903. Hamilton Rentals. 770816. Tyseal Computers. 647368. BARKING (01) Munro Computers. 3917000. BASINGSTOKE Interface Network. 0256 461191. BELFAST Cardiac Services. 0232 625566. BELPER Midtron. 0773 626811. BIRMINGHAM (021) Crellon Microsystems. 643 6368. Hamilton Rentals. 236 3561. Hoskyns Group. 434 5811. John Mabon Associates. 643 6381. United Sunlock. 745 8616. BRADFORD Elec Computers. 0274 723312. BRIGHTON Office Machinery Eng. 0273 689684. BRISTOL (0273) Decimal Business Machines. 214093. First Computer. 277033. MBS Rentals. 277236. United Sunlock 276685. CAMBRIDGE Hi-Tek Solutions. 0223 213535. CRAWLEY W.H. Smith Bus. Comp. Centre. 0293 29778. CROYDON Computacenter. 01-686 3646. EDINBURGH: Computarland. 031-225 3693. Holdens. 0506 827906. GLASGOW (041) MBS Rentals. 248 3665. Robox Data. 221 8413. Strathand. 946 6497. HARLOW: STC Micro. 0279 443421. HEMEL HEMPSTEAD: Data Efficiency. 0482 60155. HIGH WYCOMBE: Rapid Recall. 0494 26271. KENTON: Compucorp. 01-907 0198. KINGSTON-UPON-THAMES: Interface Network. 01-541 1095. LEEDS (0532) Holdens. 459459. Lieb Systems. 453545. LEICESTER: Sunlock Computer Systems. 0533 29673. LIVERPOOL: KBS Systems. 051-236 6257. LONDON (01) NW10 Hamilton Rentals. 961 6777. SE1 Microplan Communications. 378 6691. SW1 MBS Logic. 222 1122. Protek. 245 6844. SW11 01 Computers. 224 2207. ECI Anita Business Systems. 233 2444. Concept Computers. 7291300. Satellite Business Systems. 279 3366. United Sunlock. 250 0503. ECI Computacenter. 638 4274. First Computer. 626 2103. ECI Anita Business Systems. 621 1306. ECI Midtron/Guestel. 248 0416. MBS Rentals. 626 2181. Merchant Systems. 93 6776. Patrick and Leah. 246 0464. United Sunlock. 624 0487. W1 First Computer. 499 3046. First Computer. 491 7487. Interface Network. 486 9121. W8 Taha Business Systems. 937 7896. W11 Computacenter. 602 8408. WC1 First Computer. 242 1418. Interface Network. 404 4667. WC2 Digibus. 378 6768. Hoskyns Business Centre. 242 1931. Inform. 240 8832/240 0041. Microplan (Strand). 930 0417. LUTON: First Computer. 0524 436282. GREATER MANCHESTER AREA (061) Computeland 8399337. Hamilton Rentals. 648 9338. Manicos Computer Services 840 6600. SALE: Hoskyns Business Centre. 949 3611. STOCKPORT: Automated Business Equipment. 432 0708. WILMSLOW: Holdens. 0625 529466. NANTWICH: Rapid Recall. 0270 627505. PETERBOROUGH: Geest Computer Services. 0733 48087. READING (0734) Care Software Technology. 35321. C.S.E. Computers. 07357 4774. Computacenter. 309911. ROYSTON: Electroplan. 0763 41171. SHEFFIELD: Datron Micro Centre. 0742 284990. SLOUGH: Crellon Microsystems. 06266 4434. Data Supplies. 0753 823620. First Computer. 0753 621543. ST ALBANS: Alberta. 0727 34361. SWINDON: Computacenter. 0793 694997. TUNBRIDGE WELLS: D. J. Herriott. 0892 44918. TWICKENHAM: Simmons Magee Computers. 01-891 4477. WARRINGTON: Applied Micros. 0925 819939. MBS Rentals. 0928 822261. WASHINGTON: Micro Computing. 091 4176018. WINDSOR: MBS Rentals. 07833 68176. WOKING: West Surrey Computers. 04867 88561. WORTHING: Office Machinery Eng. 0903 207292. CHANNEL ISLANDS: The Processor Centre. 0934 79707.

Send to: Freepost, Enquiry Section,
Hewlett-Packard Ltd, Eskdale
Road, Winners, Wokingham,
Berkshire RG11 1BR.
Please send me full details on
the Hewlett-Packard Portable.
Tick here if you already have a
desktop computer.



PC type _____

Name _____

Position _____

Company _____

Address _____

Postcode _____

Telephone _____



**HEWLETT
PACKARD**

PRCOM.01

Multi-column text

IF HE WANTS multi-column text, R M Tobin — see Feedback, January 1985 — should use Spellbinder rather than WordStar for preparing text for printing. If his medium is the daisywheel, then Spellbinder's Macro programming language — which is like CP/M's Submit with knobs on — allows for printing in any format and for automatic changes of format every single line if one so wishes. Simple two-column printing is nothing. Three columns? Columns that "walk around" photos, diagrams, or free-shape artwork? Columns shaped like the mouse's tale in *Alice* or like a Christmas tree or an upside-down pyramid? No problem. With a little experiment, you can soon knock out a macro that will achieve any of these formats. Also the macro will store like any other text file, ready to be read back into memory and reused any time you want.

If you are formatting text for a photocopier, as in trad-

itional letterpress or litho printing, the ability to batch any number of commands into one single executable program is an absolute godsend. I have now formatted several novels, each more than a megabyte in length, and could not possibly have managed it with WordStar or any other WP program that lacks this facility.

Commercial programs for formatting WP text for photo-setting cost from £5,000 upwards — far beyond the pockets of most writers. Anybody who is in the business of turning ASCII text files into print, whether by daisywheel or by photocopier, and who does not have Spellbinder cannot — to borrow a phrase — possibly be serious.

Malcolm Macdonald,
Offaly,
Ireland.

Dealer for the deaf

I READ David Myers' article in the January 1985 edition of *Practical Computing* and am prepared to take up his challenge to a dealer who is prepared to help the deaf.

We have just prepared a special offer list of equipment for Email. This starts with the Brother EP-44, is followed by the NEC-8200 and then the Epson HX-20 and PX-8. All of these are bundled with all the equipment, cables, and either a modem or coupler.

The prices on the list are already slightly discounted, but I am prepared to offer an extra discount to genuinely deaf people on the condition that they can be established as bona fide. Do you have any suggestions as to how this can be done? I know that the blind are registered; is there any similar system for the deaf?

Leonard Gelblum,
Betos Systems Ltd,
Nottingham.

Atari Type-Ahead

I RECALL having seen and used one or more of Frank O'Dwyer's utilities for the Atari, and his very fine and useful Type-Ahead in the December issue is now another firm favourite in my files.

However, this was only

successful after a little dis-assembly of the program. I suspect that Frank is a cassette-based user because as it stands the program does not seem to work for disc users such as myself. The routine uses the cassette initialisation location on Reset then returns control to the hardware. As set, this returns control to the cassette and after pressing Reset the computer does not know that disc exists.

Fortunately, the answer is quite simple. In Data line 1020 Atari disc users should replace the first number 2 with 3. The effect is to Poke a 3 into location 9 instead of the 2 Poked by the original program. This then sets the routine in the same way as before but returns control either to cassette or disc as may be connected and switched on.

Eric J Nicholson,
Newcastle,
Staffordshire.

8087 software

HERE IS some information to supplement that given in the Ask PC column, November 1984 issue, regarding the 8087 chip. The 8087 can process real numbers, and in addition integers with a length of 16, 32 or 64 bits, and also 80-bit decimal numbers. Microsoft MS-Fortran, Digital Research DR-Fortran 77, Gino and Framework are some of the packages available which can use the 8087 co-processor. For

number-crunching programs, the 8087 may speed execution times by a factor of about 10.

H G Trevor,
London.

● **John and Timothy Lee reply:** We have not used the software you mention. We would strongly advise readers to make quite sure that the version they buy will support the 8087, since we heard of a version of DR Pascal bought recently which does not, even though advertisements claim the latest version does.

Further information on the 8087 can be found in two books from Intel, *The 8086 Family User's Manual* and *The iAPX 86,88 User's Manual*, or in *The 8087 Primer* by J F Palmer and S P Morse, published by John Wiley.

NEC user group

WOULD YOU happen to know of a users' group for the NEC PC8201A lap portable computer?

John Laidlaw,
Lytham St. Anne's,
Lancashire.

● **The editor replies:** Any offers?

CP/M file transfer

IN YOUR December issue is a letter from Mr Hayes in which he asks for a method for transferring CP/M programs for his Newbrain system. The answer you give is not the easy way.

There are two far easier ways to solve this problem. First use the Configur program supplied with your CP/M system to re-configure drive B as an Osborne SSDD drive. Second, use the various utilities which can be obtained from the user group, NBUG, which automatically changes the drive B to act as an Osborne SSDD drive. In that way you can transfer the files from drive B, where your software on Osborne format is, to drive A by using Pip.Com or Sweep.Com. Also, public domain software can be obtained from the CP/M users' group.

You can only try these methods if you have two drives and the expansion interface. Alternatively, you can contact me to change your software from the mentioned format to your Newbrain format — 200K or 400K SS.

The second method also
(continued on next page)

Our Feedback columns offer readers the opportunity of bringing their computing experience and problems to the attention of others, as well as to seek our advice or to make suggestions, which we are always happy to receive. Make sure you use Feedback — it is your chance to keep in touch.

(continued from previous page)

works on programs in Kaypro, Morrow, Superbrain, IBM CP/M-86 and various other formats. To use the programs simply type SystemXYZ B: and drive B will act as a drive of the SystemXYZ computer. You can also write files to drive B which can then be used on the other computer's system.

Ton Tonies,
Grotestraat 21,
5368 AJ Haren (Gem. Megen)
N.Br.,
Holland.

WE WERE INTERESTED to read the piece called "Transferring Disc Files" in the Ask PC column of December 1984.

For 12 months we have been advertising a file transfer service in your magazine which offers a precise solution to your reader's problem. We can copy files to and from over 250 disc formats. Our charge is £10 plus disc plus VAT.

Iain Rangely,
Grey Matter,
Ashburton,
Devon.

Calendar addition

A HEART TRANSPLANT is needed by S Dimitri's Calendar program — see BBC Open File, — January 1984. The day of the week algorithm PROC-bepaaldag does not work properly.

I would recommend the one given by Knill and Fawcett — see Commodore Open File December 1982 — which, on conversion to BBC Basic, takes the form

```
2000 DEF
  FNweekday(D%,M%,Y%)
2010 IF M% < 3 THEN M% =
  M% + 12: Y% = Y% - 1
```

```
2020 W% = D% + (13*(M%
  + 1))DIV 5 + (5*Y%)DIV 4
  - Y% DIV 100 + Y% DIV
  400
```

```
2030 = W% MOD 7: REM 0 =
  Sat,.....,6 = Fri
```

Another function which operates as a perpetual calendar and enables calculation of number of days between dates is

```
2000 DEF
  FNfactor(d%,m%,y%)
2010 IF m% < 3 THEN =
  FNcommon(y% - 1) + 365
  FNcommon(y%) -
  (4*m% + 23)DIV 10
2025 REM weekday =
  FNfactor(D%,M%,Y%) MOD
  7 (0 = Sat...)
```

```
2030 DEF FNcommon(y%)
2040 = d% + 31*(m% - 1)
  + 365*y% - (y% - 3*(y%
  DIV 100 + 1))DIV 4
```

Finally, to quote the old saw: "30 days hath September" (line 850).

Andrew M Simpson,
Craigie,
Perth.

Computer mysteries

AS A MEMBER of the Association for the Scientific Study of Anomalous Phenomena I am interested in cases of anomalous computer effects.

Can I appeal to readers for any information, at first or second hand, no matter how bizarre, concerning inexplicable malfunction or unexpected output? All accounts will be treated in strictest confidence.

Roger C Morgan,
15a Kensington Court
Gardens,
London W8 5QF.

Newbrain codes

RECENTLY I found that the Newbrain's Graphics key can act as a Shift key similar to that on the ZX-81 and Spectrum to

	Line start	Line end
1 GRAPHICS Q :	DIM	POS
2 GRAPHICS W :	OPEN	LOG
3 GRAPHICS E :	GOTO	^
4 GRAPHICS R :	ON	ABS
5 GRAPHICS T :	SAVE	COS
6 GRAPHICS Y :	?	SIN
7 GRAPHICS U :	LOAD	EXP
8 GRAPHICS I :	IF	<>
9 GRAPHICS O :	END	RND
10 GRAPHICS P :	STOP	PI
11 GRAPHICS = :	LET	NOT
12 GRAPHICS - :	READ	TRUE
13 GRAPHICS A :	LIST	+
14 GRAPHICS S :	OPTION	ATN
15 GRAPHICS D :	RUN	/
16 GRAPHICS F :	GO TO	&
17 GRAPHICS G :	GOSUB	AND
18 GRAPHICS H :	GO SUB	OR
19 GRAPHICS J :	INPUT	<=
20 GRAPHICS K :	FOR	>=
21 GRAPHICS L :	NEXT	=
22 GRAPHICS + :	POKE	ASC
23 GRAPHICS Z :	RET	SQR
24 GRAPHICS X :	CLOSE	SGN
25 GRAPHICS C :	PRINT	*
26 GRAPHICS V :	RANDOMIZE	INT
27 GRAPHICS B :	NEW	-
28 GRAPHICS N :	REM	
29 GRAPHICS M :	RETURN	>
30 GRAPHICS (:	RESTORE	TAN
31 GRAPHICS) :	DATA	
32 GRAPHICS () :	RESTORE	FALSE

Newbrain codes.

generate Basic language commands within programs. For example, if a line of program is being entered and Graphics-Q is pressed at the start of the line, the normal graphics symbol appears on the screen immediately following the line number. However, on listing the line is reprinted with Dim following the line number thus showing that this command has been entered into the memory. Should Graphics-Q be entered anywhere along the line except immediately following the number, the graphics symbol is changed to Pos on listing. As Dim is always needed at the

start of a line and Pos only within a line, this feature can be put to use in entering commands.

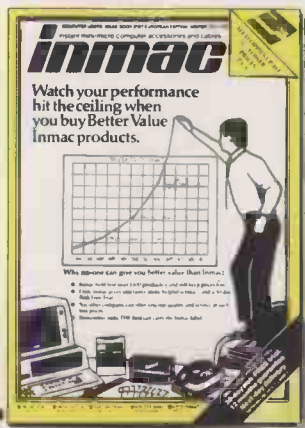
In the listing you will find that in all cases the symbols have this same characteristic with respect to their position in the line.

I have not yet found any way of generating the remaining Basic Words, and I have no idea why Goto and Gosub are represented twice but with a space in the second instance, nor why Restore has two possible keyings.

Wilfred Ashworth,
London W5. ☐



Q Where can you find a floppy that gives 100% read/write accuracy guaranteed for life?



A Page 5 of the Inmac Ideas book.

The answer to all your computer supplies problems FREE

**SEND FOR YOUR FREE COPY.
OR PHONE FOR 24 HOUR SERVICE**

Please send me my FREE copy of the Inmac Computer Users Ideas Book - with details of Inmac disks, cables, furniture and datacom equipment - everything I need to make the most of my computer system.

01-740 9540 **09285 67551**
LONDON RUNCORN

inmac

Inmac (UK) Ltd, 16 Silver Road, London W12 7SG
Inmac (UK) Ltd, Davy Road, Astmoor, Runcorn, Cheshire WA7 1PZ

634

Name (Mr, Mrs, Miss) _____

Title _____

(PLEASE PRINT)

Company _____

Address _____

Post Code _____

Tel No _____

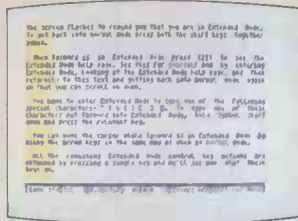
My Computer System is _____

Tasword Two word processor

Turns your ZX Spectrum into a high-quality word processor!

Tasword Two has all the essential features of professional word processing packages – move and copy, insert, margin settings, 'help' pages, find and replace, and much more.

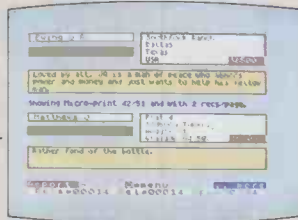
Written by Tasman Software Ltd.
Usual price (RRP): £13.90.



Masterfile filing system

Address lists... personal files... stock inventories... stamp or album collections... club records... recipes... if you can file it, you can Masterfile it!

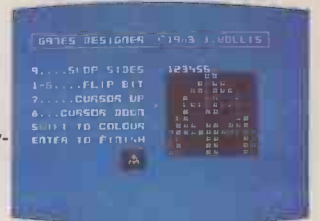
Masterfile is a menu-driven filing and retrieval system of immense power. Display formats are user-defined, so the range of applications is enormous. Written by Campbell Systems Ltd.
Usual price (RRP): £16.95.



Games Designer

Now, all you need to create original games are original ideas – and Games Designer! It has eight, very different, pre-programmed games for you to play as they are – or modify out of all recognition!

There's never before been an easier, more enjoyable, way into games design.
Written by Quicksilva Ltd.
Usual price (RRP): £14.95.



Ant Attack

The all-time classic 3D strategy game. Ant Attack combines stunning Escher-like graphics with fast-moving action and a real tactical challenge.

Your task is to enter the walled city, seek out your captured partner, and escape. At all times you can choose from four angles of view. But beware: the city is patrolled by giant ants...
Written by Quicksilva Ltd. Usual price (RRP): £6.95.



All programs run on a 48K Spectrum or Spectrum+. Recommended retail prices are for each program on cassette.

...includes this great set of Microdrive programs!



The unique ZX Microdrive system sets the Spectrum apart from all other home computers.

It gives you all the advantages of floppy disc drives – at a fraction of the cost. And tests show the Microdrives are faster than some disc drives.

Now, the complete Microdrive system comes in one package – together with four of the

best-ever Spectrum programs, on Microdrive cartridges.

This software alone would normally cost you over £50.

Yet the Sinclair price for the complete ZX Spectrum Expansion Pack is just £99.95!

You'll find full details of its contents in the panel opposite.

ZX Microdrives – another Sinclair first!

The ZX Microdrive is a revolutionary fast access/mass storage device. And it's the only truly affordable alternative to disc drives...

- Loads or saves up to 85K of program or data from Microdrive cartridges.

- Just 3.5 seconds to access a typical file.

- Only 9 seconds to load a typical 48K program.

The ZX Microdrive cartridge – a unique storage medium.

Smaller than a matchbox, the ZX Microdrive cartridge packs in a massive amount of data and programs.

Each Microdrive cartridge holds at least 85K bytes of data or programs (that's 30 pages of A4 text). And you can store up to 50 different data files per cartridge, identified by titles of your choice.

Every cartridge comes in its own protective case. Simply remove the cartridge, slot it into the Microdrive, and it's ready to use.

ZX Interface 1 – adds powerful new capabilities to your Spectrum.

ZX Interface 1 connects to the back of your Spectrum and controls up to 8 Microdrives. (Additional Microdrives are available for £49.95 each.)

It also gives you:

- An RS 232 interface – to link your Spectrum with full-size printers, other

computers using RS 232 (the industry-standard interface) and provide data transmission over telephone lines, via modems.

- ZX Net – lets you set up a local area network of up to 64 Spectrums, for high-speed data communications between you and Spectrum-owning friends.

At your local Sinclair stockist – today!

The ZX Spectrum Expansion System adds an exciting new dimension to Spectrum and Spectrum+ computing. At £99.95 it's superb value too.

To find out more, call in at your local Sinclair stockist now!

Sinclair Research Ltd,
Camberley (0276) 685311.

© Sinclair, ZX, ZX Spectrum, ZX Microdrive, ZX Net and ZX Interface are Trade Marks of Sinclair Research Ltd.

sinclair

INTEGRATED, HIGH PERFORMANCE, EXPANDABLE & COST EFFECTIVE

Multi-User Computer

LOOK AT YOUR CHOICE OF TECHNOLOGY BEFORE CHOOSING YOUR MACHINE

STU PRESS
IMPOS now supports genuine multi-user MS-DOS as well as Concurrent CP/M 3.1, CP/M 2.2 and CP/M 86 simultaneously in any combination for up to 16 users

An Obvious Choice...

Time Sharing Micros

Typical multi-user micro machine are doomed by CPU degredation being based on time-sharing principles. Altos, Fortune and IBM PC/AT are in this class.

An Alternative Choice...

Networked PC's

Networks are too expensive and tedious. They do not offer a truly integrated multi-user system or speed. Networked IBM PC's and Apricot are such examples.

The Wise Choice... Multi-Processing

The choice you didn't know you had . .

In Multi-processor SuperStar, each user has its own dedicated processor with up to 1Mbyte of RAM each, working at full CPU speed regardless of the number of terminals. The tremendous increase in power resulting from having up to sixteen 16-bit processors compared with time-sharing a single processor must be plain. Because it is a network on an internal bus, it is very much faster than conventional serial networks — yet it is much less expensive because all the processors are integrated into one desk-top unit instead of being distributed among the various PCs

SuperStar is a genuine multi-user system with record/file locking and with printer spooling. All MS-DOS and CP/M (all variants) programs run without modification. It is ideal for a cost-effective Office Automation system for any or all of the following functions in any combination.

- ★ *Word Processing and Spread-sheets*
- ★ *Database and Information Management*
- ★ *Telex, Electronic Mail and Communications*
- ★ *Genuine Multi-user Data Processing, such as Stock Control, Order Processing, and Integrated accounts.*



417-421 Bromley Road, Bromley, Kent BR1 4PJ
Tel: 01-697 8933 Telex 896691 TLX1RG

● Circle No. 119



Rather than slow time-sharing micros or expensive networked PC's more and more companies are choosing multi-processing to meet their multi-user requirements, including:

- BUPA*, BRITISH TELECOM,**
- HILL SAMUEL*, MORI, PHILIPS*,**
- MONSANTO, SOUTHAMPTON**
- UNIVERSITY, BROMLEY HEALTH**
- AUTHORITY, BANHAM ALARMS* AND MANY MORE.**



*Case studies of their installations are available on request.

SuperStar is a trade mark of Bromley Computer Consultancy. CP/M is a trade mark of Digital Research. MS-DOS is a trade mark of MICROSOFT.

SuperStar-16 has a 16-bit Master Processor which runs IMPOS (BROMCOM designed true 16-bit controlling operating system). IMPOS supports CP/M, MS-DOS and shortly Xenix in slave processors in any combination and it is fully upward compatible with ACTION DPCIOS, Televideo MmmOST and TurboDOS.

JUST LAUNCHED! MULTI-USER MS-DOS

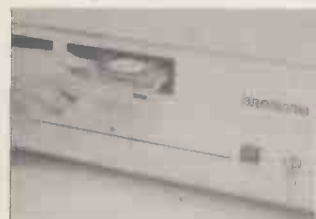
MS-DOS is an established 16-bit operating system for a single user PC. BROMCOM has incorporated MS-DOS 2.11 into SuperStar-16/MS to offer a genuine multi-user environment through multi-processing. This development opens the door to a tremendous opportunity for exploiting the widely available applications software developed in MicroSoft Basic (MBASIC) which can run only under MS-DOS in 16-bit. Record and file locking are fully upward compatible with Televideo MmmOST, DPC/OS, TurboDOS and MP/M. Floppy disks are compatible with IBM-PC and full PC-DOS compatibility will be available early in 1985.

16-BIT MASTERS/ SLAVES



In a given configuration, say 8-users (maximum 16 — more with networking), SuperStar has eight 16-bit slave processors, each with up to 1Mbyte RAM, and an additional 16-bit Master processor also with up to 1Mbyte RAM. All processors are iAPX186 with optional 8087 co-processors. This demonstrated the immense power and capacity of the system against time-sharing systems where a single processor serves all eight (or more), users. SuperStar's multi-processor architecture also enables each user to choose his own different operating systems environment, e.g. CP/M or MS-DOS — one more of the superior features that cannot be found in other systems.

INTEGRAL 1/4in CARTRIDGE TAPE BACKUP



SuperStar-16 has an optional tape backup facility, totally integrated in the system and built into the desk-top unit.

SuperStar-16 must be one of the most powerful, flexible and complete systems available on the market.

For information see opposite page.

Competition report

Anagram result

NOVEMBER'S competition to win an Ensign NLQ printer was not as easy to enter as we claimed. The main task was to form as many words as possible from the letters of the word "practical". We said we would be checking dubious words in the *Collins English Dictionary*, penalising invalid ones.

A conventional anagram program is hopeless for this task as it will just generate literally hundreds of pages of output, leaving you with the massive job of picking out valid words from the meaningless permutations.

Only one reader, Ken Smith of York, came up with a useful way of employing their machine. His program first extracted a word list for each of the letters occurring in "practical" from his spelling checker, which was Electric Webster running on a Tandy. It then scanned the lists, rejecting all words with letters not occurring in "practical" or using too many of them. This procedure netted him 66 words. Although the technique is sound he was not the winner:

Electric Webster does not contain enough words.

In fact entries fell quite neatly into three distinct groups: those claiming around 60 or 70 words, those claiming 100 to 150, and a small group of five maniacal readers claiming over 200 words. The small number of entries falling outside these ranges suggests each group was applying a different method to solve the problem. The 60- to 70-word group appeared to be working with the unaided brain, while the 200-plus group appear to have been using a disciplined dictionary-scanning technique on the right dictionary.

Robin Hamilton from Loughborough, the eventual winner who got all of the 219 words we recognised as valid, explains the technique he used: "Words don't only begin with one letter, they begin with two. There are only 44 possible combinations of two letters to be formed from 'practical', and thus it isn't a matter of going through the whole of *Collins*, but simply checking out a maximum of 44 groups of

words, many of these groups are non-existent and others fairly small."

Choice of dictionary in fact is fairly crucial, as having specified no minimum word length we were compelled to accept all sorts of odd, abrupt words found in *Collins*. This of course made the competition fairly arbitrary, but at least many of our readers will have learnt that "ai" is really a variant name for the three-toed sloth, whatever it says elsewhere on this page.

That the winning technique should be purely manual also illustrates the difficulty of applying the power of computers to some problems which at first glance they seem ideally suited to.

For the tie-breaker we asked for a name for a new NLQ — near letter quality — printer. Readers had few good ideas, but the best had a slightly cynical flavour: the Notta Lot Quieter, the Lottadotta, and the NotKwife Riter.

We would like to express our thanks to DRG Ltd for providing the prize.

Spot the Micro

OCTOBER'S Spot the Micro competition drew a large response from readers. It was heartening to see that nearly everyone knew their onions and could spot the micros. For the record, the correct answers are: 1. Sharp PC-5000; 2. Grid Compass; 3. ACT Apricot; 4. HP 110/Gypsy; 5. ABS Orb; 6. Kaypro 10; 7. Wren; 8. IBM PC; 9. Sinclair QL; 10. Osborne Executive.

Consequently the winner was chosen on the basis of the tie-breakers. The first of these, defining artificial intelligence, drew some predictable responses such as Margaret Thatcher, Ronald Reagan, Terry Wogan and so on. Another line was the "AI think therefore AI am" or "I Lisp therefore I am" approach.

Nearer the mark were definitions which suggested AI had

arrived when a computer made the same mistakes as a human, only faster or to 15 decimal places. An alternative definition was when computers could con their users into lending them a fiver. A cynic suggested that AI was an expression used by computer scientists to impress their friends and qualify for research funds.

We felt we were getting close to the answer with a definition that AI was "A dolphin that loves Picasso". This was clearly profound, witty and insightful, but had to be disqualified on the grounds that we could not understand it. But it did point in the direction of the final winner.

This was Mr A E Ward, who lives in Clwyd. His design for a second tie-breaker was in the form of an algorithm

GOTO SECOND POSITION ON
RACK
GET TIE
IMMERSE IN LIQUID
NITROGEN UNTIL STIFF
STRIKE WITH HAMMER
UNTIL BROKEN

This also suggests that a definition of artificial intelligence might be "something a machine would possess if it could produce the above winning solution to the second tie-breaker". After all, it is precisely this capacity for lateral thinking that represents one of the ultimate challenges for AI research.

Practical Computing would like to thank ACT for generously donating the prize, an Apricot FI system, with printer, colour monitor and software. We would also like to thank everyone who took part for the many witty entries. □

MICRO·SIGHT

IMAGE ANALYSIS SYSTEMS FOR MICROCOMPUTERS



MICROSIGHT I

An image scanning system which enables video images to be captured and stored in a micro-computer's RAM at a resolution up to 256 x 256 with 255 grey levels. Complete with camera and interface, MicroSight I will store images on disk or output them to a printer.

MICROSCALE II

An image analysis package which enables the user to define windows in the image and derive areas, perimeters, particle counts and size distribution.

MICROSIGHT IIR

A framestore based image acquisition system which can capture a 512 x 512 video picture at 64 grey levels. Complete with camera interface and video output MicroSight IIR can be driven using subroutines supplied.

MICROSCALE IIR

An image analysis package which enables a microcomputer to derive information from a 512 x 512 video frame. Facilities such as enhancing, subtracting and averaging are included with optional pseudo colour output.

Systems available for IBM PC/AT, Victor 9000/Sirius, Apricot, Hewlett Packard 9816, BBC Apple, Etc.

DIGITHURST

Digiturst Ltd.,

Leaden Hill, Orwell, Royston, Herts., SG8 5QH

TEL: CAMBRIDGE (0223) 208926

● Circle No. 139

Atari-6, Commodore-2

ATARI launched six new micros at the Consumer Electronics show, which was staged at Las Vegas in January.

The two show stoppers were the 130ST and 520ST. Both use the Motorola 68000 chip and run CP/M-68K and the Gem graphics environment manager from Digital Research. This is a system similar to the Apple Macintosh which will also be available on the Apricot and Acorn ABC micros.

The 130ST has 128K of RAM and costs \$399. The 520ST has 512K of RAM and costs \$699. Both have 198K of ROM. Among the peripherals are 3.5in. microfloppy- and hard-disc drives and a range of printers.

A range of four new machines was also introduced to replace the 800XL, with which they are claimed to be software compatible. These are

the 65XE, 65XEM, 65XEP and 130XE.

The 65XE has 64K of RAM and costs about \$120. The 65XEM is a music version with eight sound channels instead of four. The 65XEP is a transportable version — rather like the Commodore SX-64 — with 3.5in. microfloppy-disc drive and 5in. monitor, and costs about \$400. Top of the XE range is the 130XE with 128K of RAM and a target price of \$200.

Commodore launched two new micros at the same show, the C-128 and the LCD Portable. The C-128 is a dual 6502/Z-80 machine with 128K of RAM and a price of about \$300. It offers both compatibility with the Commodore 64 and a CP/M-compatible mode.

The LCD Portable is also 6502-based. It features a

16-line by 80-character liquid crystal display. While it has only 32K of RAM, it has 96K of ROM including the usual suite of software provided with lap portables plus a spreadsheet. No price was quoted for this machine.

If the eight new models arrive at the promised times and prices, life is going to become even tougher for the surviving British small micro manufacturers. The XE Ataris could wipe out the Electron, while the Commodore C-128 looks very competitive against the BBC model B. Though they are obviously pitched against the Macintosh, Atari's 68000 models could make the Sinclair QL virtually unsaleable in the U.S.

Meanwhile, Commodore's Amiga and Atari's 32-bit graphics work station are yet to come.

HP Integral PC

HEWLETT-PACKARD has launched the ultimate portable computer, which boasts a 9in. electroluminescent display, built-in 710K floppy and Thinkjet printer, and runs under Unix. However, the cost is £5,450.

The HP-UX operating system is derived from Unix system III, and provides such facilities as graphics and windowing. The languages available under it are HP-UX Technical Basic and C. The Integral uses the Personal Applications Manager found on the HP 150 and HP 110 as a front end. Application software already available includes Multiplan, Memomaker and dBase III.

The new micro has a 68000 chip and comes with 512K RAM as standard, expandable to 1.5Mbyte internally and 5.5Mbyte externally. There is 256K of ROM which includes the Unix implementation.

The 9in. amber display has 31 lines and 80 characters, and allows multiple adjustable windows. The keyboard is detachable, and the whole unit weighs 25lb. Details on (0344) 773100.



Epson's QX-16 is a dual 8088 and Z-80 processor machine running under MS-DOS and CP/M. There is also an optional IBMulator board. Standard features include 156K RAM expandable to 512K, and dual 5.25in. floppies offering 360K or 720K per disc. The cost has yet to be announced. More on 01-902 8892.

The Goupils are coming

SMT GOUPIL, France's largest micro manufacturer, is launching its range of home-grown machines in Britain. The machine is rather less exciting than the name: 8088-based, with 128K or 256K RAM, and one or two 360K floppies.

There is also a hard-disc version.

Goupil was founded in 1979 and claims to command 14 percent of the French micro market; about 20,000 machines have been installed.

(continued on next page)

Hardware shorts

● Prism has cut the price of its VTX-5000 viewdata communications system from £99.95 to £69.95. More on 01-253 2277.

● Comart's new CP-2545Y micro offers an 80286 with 512K RAM, and a 40Mbyte Winchester. Up to four users can be accommodated. The cost is from £7,995. Details on (0480) 215005.

● Titan III plus II allows Apple III owners to run Apple II programs. It emulates a 64K Apple II, and allows Prodos programs to be run. More on (0706) 217744.

● Tandata's BT-approved TM-200 multi-baud-rate modem has been reduced in price from £217 to £173, both prices excluding VAT. More on (06845) 68421.

● Telecom Gold is available for the NEC lap portable for a bundled price of about £600. For more information, ring 01-267 7000.

● ACT and Tandy are to form a jointly owned distribution company with 70 retail computer stores throughout Europe. The new stores will trade under the name TA Computerworld.

● Husky has produced a rugged portable cassette recorder to go with its rugged Husky range of computers. The cost is £595 plus VAT. Details on (0203) 668181.

● Rair has introduced a colour-graphics board for its Supermicro, providing a 16-colour high-resolution pixel-mapped display. The price is £1,250. More on 01-836 6921.

● Etherprint allows Ethernet computers to share up to four serial and one parallel printers. It costs £5,400. More information on (0734) 751087.

● Protek offers an ultra-tough Winchester for harsh environments. It is able to withstand accelerations of up to 15G in any direction. The price is a hefty £10,000 for a 10Mbyte disc. More on 01-245 6844.

ZENITH PC!



Zenith Z-150 Desktop computer – from

£1695

+ Vat

(including green or amber monitor)

"The Zenith Z-150 PC could be the best deal around for someone who needs an IBM PC-compatible desktop computer. It costs a great deal less than a similarly configured IBM PC, it takes up less space, and it has more room for expansion."

— BYTE magazine December 1984.

- * IBM PC COMPATIBLE (software [except ROM Basic] and most cards), INCLUDING graphics. Runs latest IBM PC software, PC-DOS, MSDOS, CPM, Lotus 1-2-3 Symphony, Microsoft Flight Simulator, etc.
- * 8088 standard processor at IBM PC clock rate. 8087 arithmetic co-processor optional extra.
- * 128K User RAM standard, expandable to 640K.
- * Improved keyboard layout with enlarged shift and return keytops; capitals and numeric lock keys lit when locked.
- * RGB Colour video output standard (16 colours), including colour graphics.
- * Monochrome output standard with grey scale corresponding to colours.
- * Zenith green, amber or colour monitors available.
- * FOUR spare card slots standard.
- * IBM PC compatible floppy disk formats, one or two 360K disk drives (optionally 320K).
- * Optional built-in HARD DISK: 10.6MB formatted.
- * Multi-user and networking available.
- * Parallel printer port standard.
- * Serial RS-232 port standard, second optional.
- * Excellent documentation.
- * SOFTWARE: runs standard IBM PC software.

And a portable version to the same specification as the above desktop, except:—

- * 9 inch Amber screen built in (+ colour output).
- * No Hard Disk option.



Zenith Z-160 Portable computer – from

£1895

+ Vat

Brighton Computer Centre

130 Lewes Road, Brighton BN2 3LG
(0273) 673114 Mon-Sat 10am-6pm

Please send me further details of the Z-150 DESKTOP
Z-160 PORTABLE

Name.....

Company.....

Address.....

Tel.....

Application.....PC 3/85

● Circle No. 170

(continued from previous page)

In addition to MS-DOS and Microsoft Basic, the system also comes bundled with a French Basic, called S-Basic. The price for the systems varies from around £1,900 to £4,000 for the 10Mbyte Winchester version.

MSX music

YAMAHA has finally released details and prices of its MSX-compatible music computer, previewed by *Practical Computing* in April 1984. The CS-5M offers the usual MSX features plus an FM synthesiser



and piano-type keyboard. the cost is £534. A full-scale keyboard version costs £614. Eight octaves and eight voices are available.

Additional software allows you to edit and create FM sounds visually, and there is a music notation package that lets you build up an eight-part musical score on the screen, which the machine will then play back to you. There is also a Midi interfacing facility. Details from Yamaha on (0908) 71771.

Telesoftware exam entries

SECONDARY SCHOOLS can enter their pupils for the 1985 G.C.E. Oxford Local Examinations Board using a computer program transmitted via the BBC telesoftware service. Schools using this method of entry will receive a refund of 25 pence per candidate.

Hitherto, schools have been able to enter pupils' exam entries on floppy discs which were sent to them by the examinations board. Now the necessary software will be available free on suitably adapted televisions.

The programs will be broadcast on Ceefax page 710 until 25 February, and entries must be received by 1 March. There

is no copyright on the programs, which can be copied from other sources.

Price cuts

WITH ominous rumblings on the horizon from Atari and others, Sinclair has reduced the unduly high price of the Spectrum Plus to £129.95. The bundled software has been dropped, as has the 48K version in the U.K.

Less expected is the action of Acorn: the Electron now costs £129, neatly matching the new price of the Spectrum. Even more interesting is Acorn's "trade in your used micro" deal. It is prepared to offer a £50 discount on a new BBC model B in return for your old computer; apparently anything from a ZX-80 to an IBM 370 will count.

Beebop

THE BEEBOP INTERFACE allows a BBC Micro to be hooked up to STE-bus systems. The interface is a single Eurocard which sits in an STE card frame, connecting to the BBC Micro's



1MHz bus. A filing system EPROM is also supplied which adds a set of STE-orientated commands to the Basic interpreter. Beebop costs around £120, and is available from Arcom Control Systems on (0223) 242224.

Cheetah pieces

CHEETAH MARKETING is launching a range of products for the Commodore 64 and Spectrum. For the Commodore there is a plug-in speech synthesis module, costing less than £30. For the Spectrum there is a joystick interface, a 56-way extension cable costing less than £10 and a two-way aerial adaptor for computer/TV input for less than £2. Details on 01-833 4909. □

THE FIRST 64K COMPUTER FOR ONLY £129!

ATARI XL

**THE NEW ATARI
64K
800XL** **£129**

EVERYTHING YOU WANT FROM A HOME COMPUTER

- ATARI 64K 800XL - £129:** The Atari 800XL has many facilities and includes such advanced specifications that you will be amazed by its performance. At the new reduced price of only £129 inc VAT for a full specification 64K computer with a proper full stroke keyboard, we believe that the 800XL cannot be beaten. Compare Atari with the competition, just look at these specifications:-
COLOUR CAPABILITIES: 16 colours and 16 intensities giving 256 different colours (all of the 256 colours can be displayed at the same time).
OPERATING SYSTEM: 24K ROM including Atari Basic programming language and a self diagnostic test program.
KEYBOARD: Full stroke design with 62 keys including help key and 4 special function keys, international character set and 29 graphics keys.
SOUND: 4 independent sound synthesizers each capable of producing music across a 3½ octave range or a wide variety of special sound effects. (Additional programming can achieve an octave range of up to nine octaves!)
DISPLAY: 11 graphic modes and 5 text modes. Up to 320x192 resolution. Maximum text display 24 lines by 40 columns.
SPECIAL ATARI INTEGRATED CIRCUITS: GTIA for graphics display, Pokey for sound and controller ports, Antic for screen control and I/O (Input/Output), CPU: 6502C microprocessor - 0.50 microsecond cycle and a clock speed of 1.79 MHz.
EXTENDED GRAPHICS FUNCTIONS: High resolution graphics. Multi-coloured character set. Software screen switching. Multiple redefined character sets. Player missile (sprite) graphics. Fine screen scrolling. Changeable colour registers. Smooth character movement. Simple colour animation facilities.
PROGRAMMING FEATURES: Built In Atari Basic programming language supporting peek, poke and USR plus at least 8 other languages available. The help key will provide additional information and menu screens with certain software. Full on-screen editing is available as well as syntax checking on entry.
INPUT/OUTPUT: External processor bus for expansion with memory and peripherals. Composite video monitor output. Peripheral port for direct connection to Atari standard peripherals. Software cartridge slot is included as well as 2 joystick controller ports.
SOFTWARE: Over 1,500 items of software are available including self teaching programs with unique voice over. The range of programs includes Education, Home Management & Programming aids. There is also APX (Atari Program Exchange) and of course Atari's famous entertainment software now at only £9.95. In addition there is a host of support and help available from specialist Atari magazines like Antic and Analog and from over 75 Atari books/manuals.
- ATARI 400 16K GAMES MACHINE - £29:** We have several Atari 400 games consoles/computers with 16K RAM. The price is £29 (for a reconditioned model) or £39 for a new machine. Both come with 12 months guarantee. The Atari 400 can play all 800XL ROM cartridge games and is expandable up to 48K RAM. Computer upgrade with Basic Programming Kit (£30) optional extra.
- ATARI 1010 PROGRAM RECORDER - £34:** For low cost storage and retrieval capability. Data transmission 600 baud. Storage capability 100K bytes on a sixty minute cassette. Track configuration four track, two channels (digital and audio). Auto record/playback/pause control/unique soundthrough facility. Built in accidental erasure prevention, automatic shutoff and 3 digit tape counter.
- ATARI 1050 DUAL DENSITY DISK DRIVE - £199:** 5¼" disks holding 127K randomly accessible bytes provide both expansion and flexibility for your 400/800 or XL system with new 'helpful' DOS 3. All customers who purchase a Disk Drive from Silica Shop will be automatically given a FREE set of 100 programs on 3 Disks recorded on both sides.
- ATARI 1020 COLOUR PRINTER - £99:** Printer and Plotter with four colour graphic print capability. 40 column width printing at 10 characters per second. Can print 5, 10 and 20 characters per inch. 64 character sizes. Prints text in 4 directions. Choice of line types.
- ATARI 1027 LETTER QUALITY PRINTER - £249:** For word processing letters in professional type. Print speed of 20 chars per second.
- ATARI TOUCH TABLET - £49:** Enables you to draw and paint pictures on your T.V. screen, with the touch of a stylus.
- ATARI TRAK BALL CONTROLLER - £19.95:** Enables cursor movement in any direction and adds arcade realism to your games.
- ATARI SUPER CONTROLLER - £9.95:** The ultimate joystick with double fire button to give you a greater competitive edge in your games.

SILICA SHOP ARE THE No1 ATARI SPECIALIST

Silica Shop are now firmly established as the No 1 Atari retail/mail order and wholesale specialist in the U.K. We already offer our service to over 120,000 customers, 10,000 of whom have purchased Atari Home Computers. Because we specialise (and with a turnover of £1.5 million), we are able to keep prices low by bulk purchases. Ring one of our 45 staff and we will be glad to be of service to you. Complete the coupon below and we will send you our Atari pack with our 16 page price list and XL colour catalogue.

EXTENDED TWO YEAR GUARANTEE: We are an Atari Service Centre, able to service and repair Atari equipment and have added a 12 month guarantee to the year offered by Atari, giving you a full 2 year guarantee on your new XL computer.

SPECIALIST SUPPORT: Our technical staff are always available on the telephone to help and advise you. We endeavour to hold stocks of every Atari compatible item available in the U.K. and we stock over 75 Atari books and manuals.

AFTER SALES SERVICE: When you purchase your equipment from Silica, your name will be automatically added to our mailing list. You will then receive price lists, newsletters and details of new releases and developments, as well as special offers which are exclusive to Silica Atari Computer Owners.

FREE COMPUTER OWNERS CLUB: This is open to all Atari computer owners irrespective of where you purchased your equipment. Membership is FREE and entitles you to receive bulletins giving details of new releases and developments. Send now for your FREE information pack, price list & colour catalogue.

PAYMENT: We accept cash, cheques, postal orders and all Credit Cards. We also offer credit facilities over 1, 2 or 3 years, please write for a written quotation.

NEXT DAY DELIVERY - FREE: All goods despatched from Silica Shop are normally sent by first class post or parcel post FREE OF CHARGE. As a special introductory offer for a limited period only we will be sending all Computers and Disk Drives by a next day Securicor delivery service at our own expense.

So fill in the coupon below with a literature enquiry or order and begin to experience a specialist Atari service that is second to none.

SILICA SHOP LTD, 1-4 The Mews, Hatherley Road, Sidcup, Kent, DA14 4DX Tel: 01-309 1111
ORDER NOW-OR SEND FOR A FREE COLOUR BROCHURE



1 800XL 64K COMPUTER £129



2 400 16K GAMES MACHINE £29



3 1010 PROGRAM RECORDER £34



4 1050 127K DISK DRIVE £199



5 1020 4 COLOUR PRINTER £99



6 LETTER QUALITY PRINTER £249



7 TOUCH TABLET PEN + CAR £49



8 TRAK BALL £19.95



9 SUPER CONTROLLER £9.95

To: **SILICA SHOP LTD, Dept PC0385, 1-4 The Mews, Hatherley Road, Sidcup, Kent, DA14 4DX Telephone: 01-309 1111**

LITERATURE REQUEST:

Please send me your FREE colour brochures and 16 page price list on Atari Computers.

I own a Videogame I own a Computer

Mr/Mrs/Ms: Initials: Surname:

Address:

Postcode:

ORDER REQUEST:

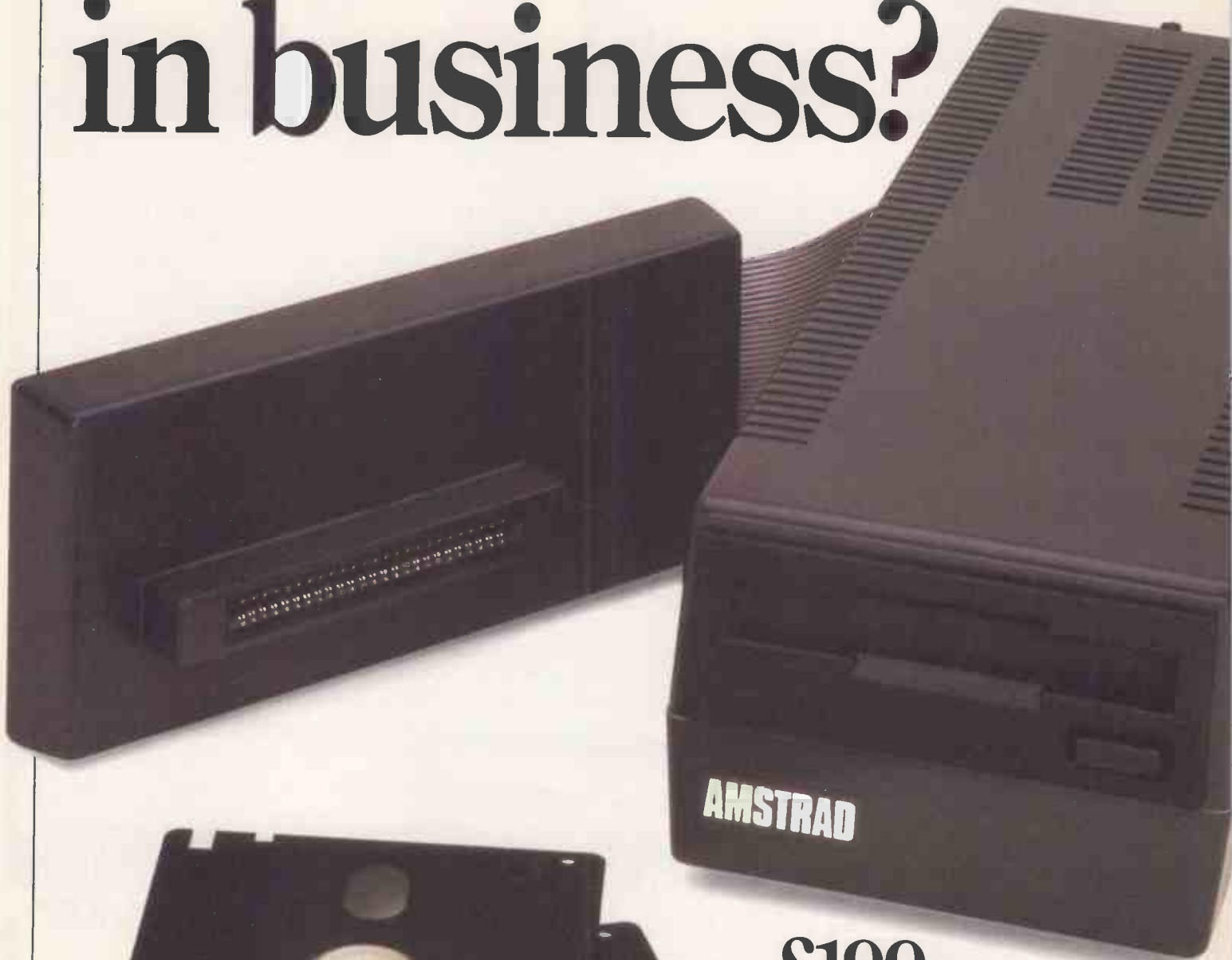
<input type="checkbox"/> 800XL 64K Computer	£129	<input type="checkbox"/> 1020 4 Colour Printer	£99
<input type="checkbox"/> 400 16K Games Machine	£29/£39	<input type="checkbox"/> Letter Quality Printer	£249
<input type="checkbox"/> 1010 Program Recorder	£34	<input type="checkbox"/> Touch Tablet + Cartridge	£49
<input type="checkbox"/> 1050 127K Disk Drive	£199	<input type="checkbox"/> Trak Ball	£19.95
		<input type="checkbox"/> Super Controller	£9.95

ALL PRICES QUOTED ARE INCLUSIVE OF VAT - POSTAGE & PACKING IS FREE OF CHARGE

I enclose Cheque/P.O. payable to Silica Shop Limited for the following amount £

CREDIT CARD - Please debit my:
 Access/Barclaycard/Visa/American Express/Diners Club Card Number

Have you got the drive to succeed in business?



£199

DD1-1 disc drive (with CP/M* and DR. LOGO*) and interface.

£159

FD-1 additional disc drive.

Running any business successfully means first running it efficiently.

And no matter how business-like you think you are, you can't beat the power and convenience of a random access CP/M* disc system.

Now, with Amstrad's CPC 464 computer, you can enjoy all the advantages of a 3" disc drive complete with an integral power supply and plug-in interface controller.

Naturally, you can add a second drive (FD-1) to double the on-line storage capacity, speed up copying files and producing back-up discs.

But of course, simply plugging a disc drive into a computer won't get you very far.

That's why Amsoft have produced a disc based software range of over 30 programs with many more on the way.

AMSDOS and CP/M*

CP/M* is the standard disc operating system for 8-bit microcomputers.

We also supply a special version of DR. LOGO* for CPC 464 users.

Our disc drive system includes a number of extensions to BASIC in the AMSDOS operating system that allow the disc to use files originally created for cassette, and vice versa.

Software also takes care of the necessary file management so that CP/M* files can exist alongside these AMSDOS files.

Data files may even be shared between AMSDOS and CP/M*.

Word processing, data management, accounting, ledgers - you'll

£239

complete with green screen VDU (GT64) and FREE software pack worth over £100.

£349

complete with colour monitor (CTM640) and FREE software pack worth over £100.

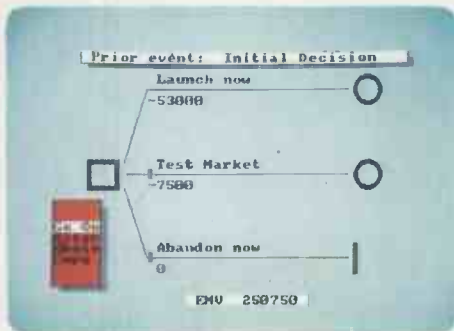


CPC 464
complete
with
monitor
and
datacorder

find an AMSOFT program to suit whatever kind of business you want to do on your CPC 464.

There's even a range of programs that teach you professional business practice.

Incidentally, you can exchange your Amsoft cassettes for identical Amsoft disc software for a mere £4.95 per cassette (the cost of a blank disc).



Decision Maker

CPC 464.

Really gets down to business.

At the heart of it all, of course, is the incredible Amstrad CPC 464 computer.

The CPC 464 has a typewriter-style keyboard, large ENTRY key, sensibly positioned cursor keys, numeric keypad for fast data entry and a full 8-bit character set.

It provides high resolution graphics, 80 column text display, up to 8 text windows plus a graphics window and a palette of 27 colours.

There's also a built-in Centronics standard 7-bit parallel printer interface. So you can enjoy high performance word processing with the printer of your choice.

The CPC 464.

It does whatever you want it to do. But that, of course, is your business.



Optional 80 column dot matrix printer DMP-1. Operates at up to 50 characters per second.

AMSTRAD

ONE GREAT IDEA AFTER ANOTHER

BOOTS COMET Currys Dixons
Greens John Menzies RUMBELOWS spectrum
WHSMITH WIGFALLS AND OTHER COMPUTER STORES

*CP/M and DR. LOGO are Trade Marks of Digital Research

I'd like to know more about the businesslike CPC 464 complete computer system. Please send me literature right away.

NAME _____

ADDRESS _____

POSTCODE _____

To: Amstrad Consumer Electronics PLC, Brentwood House, 169 King's Road, Brentwood, Essex CM14 4EF.

PRICES CORRECT AT TIME OF GOING TO PRESS. NOT ALL STORES STOCK ALL PRODUCTS.



Microscript

● Circle No. 107

With software prices like this Microware's hardware must be hard to pass up!

MULTI-USER PEGASUS £295.00

- Sales Ledger
- Purchase Ledger
- Nominal Ledger
- Invoicing
- Order Processing
- Stock Control
- Payroll
- Job Costing

PROJECT MANAGEMENT

- Hornet - £2750.00
- Harvard - £395.00

NEW LOTUS SYMPHONY £495.00

- New Lotus 123 Upgrade
- Spreadsheet
- Graphics
- Database
- Communications
- Word Processing

LOTUS 123 - £375.00

FRAMEWORK £475.00

VARIOUS SELECTION

- PC Tutor 2.0 - £41.00
- CBasic - £140.00
- Pascal/MT+ - £420.00
- Microsoft 'C' - £384.00
- Chess - £61.00
- Norton Utilities - £59.00
- Backgammon - £35.00
- Electronic Disk - £50.00
- Copy II pc - £29.00



BASIC SYSTEM

- IBM Personal Computer
64K RAM, Single sided Disk Drive
Keyboard, Screen - £1567.00
- IBM Personal Computer
128K RAM, Twin 360K Drives
Keyboard, Screen - £2087.00

BUSINESS SYSTEM

- IBM Personal Computer
256K RAM, Twin 360K Drives,
Keyboard, Screen - £2299.00

Call for our full price list.

HARD DISK SYSTEM

- IBM Personal Computer
128K RAM, 10Mbyte Hard Disk,
Single 360K Floppy Drive
Keyboard, Screen - £3395.00

HERCULES GRAPHICS CARD

- Additional Cost only £215.00

COLOUR SYSTEMS

- Additional Cost only £405.00

DATABASE PACKAGES

- dBASE III - £475.00
- DMS - £195.00
- Delta - £495.00
- Everyman - £475.00
- Knowledge Man - £350.00

WORD PROCESSORS

- WordStar - £245.00
- Microsoft Word/Mouse - £340.00
- Multimate - £340.00
- Wordcraft - £340.00
- Word Perfect - £425.00
- Display writer II - £245.00

TELEX LINK

- Send telexes from IBM PC -
£1350.00

ARABIC IBM PC

- Conversion to Arabic - £590.00
- Arab Word Processor - £595.00

PRINTERS FROM £250.00

- Epson FX-80/FX-100/LQ1500
- Brother HR15/HR25
- NEC Spinwriter
- Sheet Feeders Available
- Typeface Catalogue Available
- Acoustic Hoods from £295.00

THE PROFESSIONALS

- Full training provided
- Free warranty Available
- Leasing deals arranged
- Highly competitive quotations
- Long and short term rentals



Apricot



IBM Portable



Compaq



Rainbow



637, Holloway Road
London N19 5SS 01-281 2431

14, Charles Street · Hanley
Stoke-on-Trent (0782) 269 883

*67, Westow St. · Upper Norwood
London SE19 · 01-771 6373

*2/4 Paul Street London EC2
01-247 8577

*Not IBM Authorized

MICROWARE

Superproject

TODAY'S MANAGERS produce immaculate memos thanks to their word processors, and are in instant communication thanks to electronic mail. They have complete financial control thanks to their spreadsheets and, using Lotus 1-2-3 or Supercalc 3, they convert their figures to diagrams that even the directors can understand.

Unfortunately, they are still planning their projects on the backs of old envelopes. But now the software houses are out to persuade every manager that they also need a project-planning package, and the race is on to produce the dBase II or WordStar of the field.

The latest entry is called Superproject, from Sorcim/IUS, which comes from the same stable as the Supercalc spreadsheet. Where most planners only use one or two of the three main techniques for project management, Superproject actually applies all three.

Superproject provides a Pert chart — project evaluation and review technique — to show relationships between one task and another. It provides a Gantt chart — named after Henry Gantt — to show tasks on a time schedule. It also offers CPM, the critical path method, to show what effect delays to a single task will have

on the completion of the project.

The program aims to be easy to use and offers a Beginner mode, though you can switch to Expert mode with one key-stroke. It makes full use of colour and graphics, and provides on-line help screens. It can also generate reports and can take data from Supercalc if required.

Superproject requires an IBM PC or compatible with 256K of RAM and two disc drives. It costs £395. Contact Sorcim/IUS, St. Mary's House, 16-20 High Street, Maidenhead, Berkshire SL6 1QH. Telephone: (0628) 70911.

Top Class

TOP CLASS is an authoring and presentation package for the IBM PC from a new British company, Format PC.

It enables non-programmers to write tutorial packages that include colour graphics and sound, using a menu-driven system that insulates the programmer from DOS. Answers can be controlled and checked by a number of methods.

Top Class requires 128K of RAM, a colour graphics card and a colour monitor. It will run on a monochrome system, but of course without the colour and graphics. It costs £290 plus VAT.

Contact Format PC at Goods Wharf, Goods Road, Belper, Derbyshire DE5 1UU. Telephone: (0773) 820011.



PC SIG

THE IBM PC Special Interest Group in California is a user group that collects and distributes almost-free software: library discs containing up to 40 programs cost only \$6 each. Since we first gave details in our January issue SIG has grown and moved. The library now contains 265 discs. You can buy the top five for \$34, the top 10 for \$59, or the whole lot for \$1,590.

Contact PC SIG at its new address 1125 Stewart Court,

Suite G, Sunnyvale, California 94086. The telephone number is unchanged at (U.S. area code 408) 730-9291

IBM's results

IBM'S CHAIRMAN John Opel has announced preliminary results for the 12 months ending on 31 December 1984. Sales were just short of \$46 billion, up 14.3 percent over 1983. Net earnings were \$6.6 billion, an increase of 20 percent.

Income from operations outside the U.S. was only \$18.6 billion: a nine percent increase. The main reason for this is the strength of the American dollar. The company estimates that gross income would have been \$690 million higher in the fourth quarter alone, had it not been for these adverse movements in the exchange rate.

With similar growth in 1985, IBM's worldwide sales should hit an average of a billion dollars a week, which is \$25 million per hour, assuming a 40-hour week.

Shorts

● Mem/DOS, the award-winning French Apple package, is now available in a new version for the IBM PC/XT from International Computer Consultants. ICC has also launched vertical market packages for the hotel trade and insurance brokers. Ring: (0481) 20155.

● The Desq multi-windowing software integrator from Quarterdeck

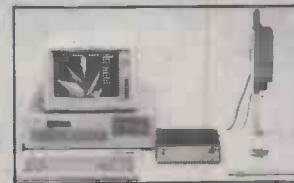


is now available from Softsel. It allows up to nine packages to be run at the same time. Telephone: 01-844 2040.

● Page-based word processing is now possible with the IBM PC, using Workwriter from Data Applications Ltd. It requires 128K of RAM and costs £185 plus VAT. Telephone: (0285) 61828.

● The Venture Development Corporation of Wellesley, Massachusetts has launched a study of 3,000 software packages which run on the IBM PC and compatibles. It costs \$795. Telephone: (U.S. area code 617) 237-3000.

● Digithurst's well-known image-processing system is



now available in a new version for the IBM PC/AT. Telephone: (0223) 208926.

● Convertabuffer II is a clever piece of firmware that enables the graphics output from programs such as Lotus 1-2-3 to be printed using almost any daisywheel printer. It comes on a card that includes a 32K print buffer and a parallel printer port. The price is £349 plus VAT. Information from Yorkshire Microcomputers. Telephone: (0904) 642941.



Micro Computer Disks LTD

FOR ALL COMPUTER SUPPLIES

Lowest prices for highest quality products!



Floppy disks:

maxell. £2.09

Dysan. £1.89 each

3M £1.72

Ribbons: Diablo Multistrike £1.72

Daisywheels: Diablo/Qume only £3.95

(0990) 23002/3



NO MIDDLE MEN! NO FRILLS! STRAIGHT FROM THE WAREHOUSE!

MICRO COMPUTER DISKS LIMITED Wilburn House, London Road, Sunningdale, Berks. SL5 0ER

● Circle No. 126

THE ONLY S100 WORTH NOTING.



Over 100 different S100 cards, crates and systems.

HIGH TECHNOLOGY ELECTRONICS LTD. 303/305 PORTSWOOD ROAD, SOUTHAMPTON. TEL: 0703 581555 TELEX: 477465 HTELG.

● Circle No. 138

ULTRACALC 2

Upgraded version now available!

Ultracalc, the successful spreadsheet program from BBC Publications, has now been upgraded to increase its power and flexibility.

New features include:

- Operation in any screen mode
- Greater printer flexibility including control codes and £ sign definition
- Runs as 'HICALC' on a 6502 second processor to allow 44k of workspace in any screen mode
- Spooling of ASCII text files for subsequent use with any word processor
- Several additional layout options
- Supplementary manual containing a wealth of information on how to use Ultracalc.

£79.50 (inc. VAT)



If you already have a copy of the original Ultracalc, you can exchange it for the new version for just £6.25 inclusive of VAT, postage and packing.

Write for an application form to Software Editor, BBC Publications, 35 Marylebone High Street, London W1M 4AA, enclosing a stamped addressed envelope.

● Circle No. 160

68000 assemblers slug it out

QL 68000 ASSEMBLER fans now have two programs to choose from: Adder has just released QL Assembler costing £29.95 plus VAT to join Metacomco's established QL Assembler, which has dropped in price to £39.95 with VAT. Both

products claim to be full macro assemblers. Details from Adder Publishing Ltd, PO Box 148, Cambridge CB1 2EQ, and from Metacomco, 26 Portland Square, Bristol BS2 8RZ, telephone (0272) 428781.

Professional software dev-

elopers may also be interested in the RTS QL development package, which runs on Vax, PDP-11 and 68000 Unix systems. Costing just under £4,000 it allows Pascal and C programs to be cross compiled and massaged so that they

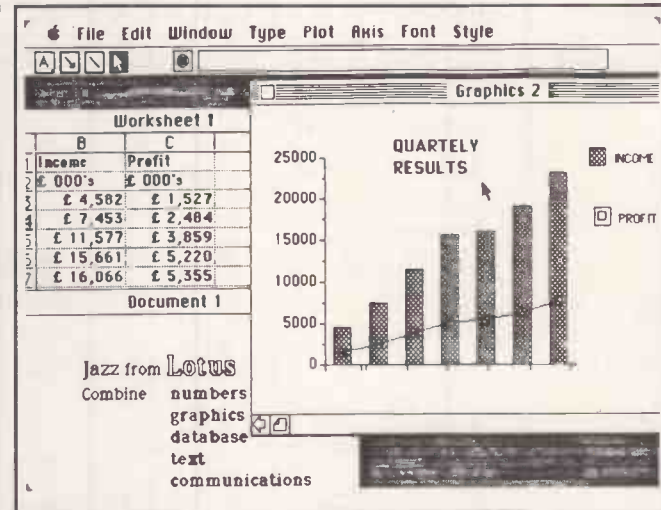
will run under QDOS or CP/M-68K. This should increase the number of established business programs available to run on the QL. Further details available from Real Time Systems on 091-273 3131.

Flood of programs for the Macintosh

APPLE has released the Macintosh Buyers' Guide, a catalogue of over 200 programs and hardware add-ons for the machine. Available from any Apple dealer, price £5.95, it makes interesting reading even though many of the products in it are not easily obtainable outside the U.S.

Among the latest batch of packages that have made it over to the U.K. are a terminal-emulation package and two new databases. Macterminal, £99, emulates VT-100, VT-52, IBM 327X and ICL C-03 terminals. Factfinder, £139 plus VAT from P&P, is a free-form database which lets you search for keywords in relatively unstructured data. 1st Base, £175, is a multi-file relational database. All the packages are available from P&P. Telephone: (0706) 217744.

Micro Planner, price £295, is a British-written project-planning package. It is available from Apple dealers and can be



Jazz: spreadsheet, WP, database, graphics and comms.

borrowed along with a Mac under Apple's "Test drive a Mac" campaign.

Meanwhile, Lotus has announced that Jazz, the Macintosh equivalent of Symphony, will be on sale in the U.K. in April. Jazz integrates

spreadsheet, word processing, database, graphics and communications. The package will cost £495 plus VAT, requires 512K to run and a second disc drive — so only richer Mac users are likely to be able to run it.

BBC cassette to disc ROM

TD ROM transfers cassette-based BBC software to disc. This task is more difficult on the BBC Micro than on most other machines as Acorn does not publish the information necessary to enable you to do it for yourself.

To stop anyone using the system to pirate software, TD Rom encrypts each disc created in a way that is unique to a small batch of ROMs. Since a disc file can only be loaded through the TD Rom which created it, this should prevent all but legitimate personal use. Because it resides in ROM the utility can get at all of RAM from &400 to &7FFF, copying programs complete with any

protection that stops you listing it.

TD Rom costs £18 including VAT and will work on most 40-track drives. Details from Vine Micros, Marshborough, Sandwich, Kent CT13 0PG.

Expressbase II

EXPRESSBASE II is intended to reduce the time it takes experienced dBase II and dBase III users to write applications, and so is best described as a kind of shorthand utility.

Version 2.0 has just been released and we will be reviewing it, along with other dBase products, in our April issue. Expressbase II costs £125 and is available for MS-DOS, PC-DOS and CP/M-80

machines. Contact Salamanca Software Ltd, 64 More Close, St. Paul's Court, London W14 9BN. Telephone: 01-741 8632

Toe-tapping tutors

PIANO AND GUITAR chord shapes are taught by two programs released for the BBC, Spectrum and Electron. Keyboard Chord Tutor and Guitar Chord Teacher show chord shapes, progressions and inversions. Each program costs £14.95 including VAT, and an optional foot-switch is available for £10. Contact P R Adby Associates Ltd, 40 Broad Street, Seaford, Sussex BN25 1NF. Telephone: (0323) 899202.

Software shorts

- PFS:File, the popular Apple and IBM database, is now available for the Commodore 64. Price £104 plus VAT, it requires one disc drive. Details from P&P. Tel: (0706) 217744.
- Mini-office, well known on the BBC and Spectrum, is available for the Amstrad and Commodore 64. Linking word processing, spreadsheet, database and graphics-like integrated software, it costs £5.95 and is supplied on cassette. If not in the shops contact Database Software. Telephone: 061-456 8383.

- The Print Shop lets Apple II users exploit to the full the capacities of their dot-matrix printers. It offers



eight typefaces in a variety of sizes, nine border designs and a graphics editor to let you create your own designs. The Print Shop comes on disc and costs £42.75 from P&P.

- Memsoft is offering a £15 version of its Memdos software development tool. Memdos Junior gives disc-based Apple IIs an index sequential filing system and a screen form generator. Fuller versions of Memsoft run on the Apple and also the IBM PC. Contact Memsoft Ltd, 30 Mincing Lane, London EC3R 7DP.

After we sell you a system we store you in our memory.

At Oryx we offer the most comprehensive and competitively priced range of micro computer hardware, software and accessories to business and the businessman.

We also offer expert advice, which is both free and plentiful.

And, perhaps most importantly, you can buy from us with complete confidence. Any system or package you purchase from us, you've the assurance of our unrivalled, full after-sales support and our technical hot-line.

Because even after we sell you a system we won't forget to look after you.



It's our business
to help yours.

CP/M SOFTWARE

ABTEX SOFTWARE	
Pertmaster*	£625
ASHTON TATE	
DBase II*	£265
Friday*	£165
COMPSOFT	
Compsoft DMS*	£175
DMS Delta*	£450
DIGITAL RESEARCH	
Access Manager	£195
Access Manager-86*	£260
Display Manager	£260
Display Manager-86*	£320
Pascal MT+	£235
Pascal MT+86	£425
DERWENT DATA	
Retrieve 11*	£465
FOX & GELLER	
dGraph*	£165
dUtil*	£60
MICROPRO	
Calcstar*	£95
Infostar*	£338
Mailmerge*	£120
Wordstar*	£205
Wordstar Professional*	£295
MICROSOFT	
Basic Compiler*	£250
Basic Interpreter*	£259
Fortran Compiler	£369
Macro Assembler	£140
Multiplan*	£150
SORCIM	
Supercalc*	£105
Supercalc 2*	£165
SAGESOFT	
Sage Accounting*	£325
Sage Executive*	£645

Most machine formats available.

SOFTWARE FOR IBM/PC

Please see CP/M listing. All product with an * will also run on MS-DOS and PC-DOS and are priced the same

ALPHA SOFTWARE	
Database Manager II	£185
ASHTON TATE	
dBase III	£345
Framework	£345
BORLAND INTERNATIONAL	
Sidekick	£49
DIGITAL RESEARCH	
Concurrent CP/M-86	£225
CP/M-86+GSX	£47
DR Draw	£195
DR Graph	£125
Pascal MT+	£395
IMSI	
4-Point Graphics	£155
IUS	
Easy Writer II System	£260
INNOVATIVE SOFTWARE	
Smart Integrated System	£625
LIFETREE	
VolsWriter Deluxe	£235
LOTUS	
Lotus 123	£325
Symphony	£495
MICRORIM	
R:Base 4000	£325

MICROSOFT

Fortran Compiler	£235
Flight Simulator	£40
Word	£280
Macro Assembler	£70
Word+ Mouse	£349

PROFESSIONAL SOFTWARE INC

Word Plus-PC	£375
--------------	------

SPI

Open Access	£400
-------------	------

SOFTWARE PUBLISHING

PFS: File	£99
PFS: Graph	£99
PFS: Report	£95
PFS: Write	£99

SOFTWARE SYSTEMS

Multimate	£300
-----------	------

SORCIM

Supercalc 3	£255
-------------	------

BOARDS FOR IBM/PC

AST RESEARCH

Mega Plus 64K	£295
Mega Pack 256K	£355
Six Pack Plus 64K	£305
Six Pack Plus 384K	£645
64K Chip Kit	£78

HERCULES

Graphic Card	£375
--------------	------

QUADRAM

Quadboard II 64K	£295
Quadboard II 256K	£495
Expanded Quadboard 384K	£565

MONITORS

KAGA RGB Vision III 12"	£369
KAGA 12" HRGreen/Amber	£145
MICROVITEC CUB 653 14"	£375
SANYO SCM 14" VHR	£425
SANYO 12"HR Green	£105

PRINTERS

BROTHER HR15	£425
BROTHER HR25	£725
CANON 1080A	£319
DATA PRODUCTS 8020	£565
DATA PRODUCTS 8050	£1445
EPSON FX-80	£379
EPSON FX-100	£529
JUKI 6100	£359
MT 80	£200
SMITH-CORONA D200	£420
TEC 1550	£525

HOW TO ORDER

Simply telephone 01-636 0476 to discuss your purchasing requirements. Visitors at our London office - just off Oxford Street - are very welcome.

Orders will be acknowledged and goods are normally despatched within 10 days. All major credit cards accepted. Prices exclude VAT and are subject to change without notice.

TECHNICAL HOTLINE

Or ring 01-631 4341 without obligation for advice.

ORYX SYSTEMS (UK) LIMITED. Mappin House, 4 Winsley Street, London W1N 7AR.

Tel: 01-636 0476 Telex: 28290 ORYXUKG. ● Circle No. 162

(B)PC/3/85

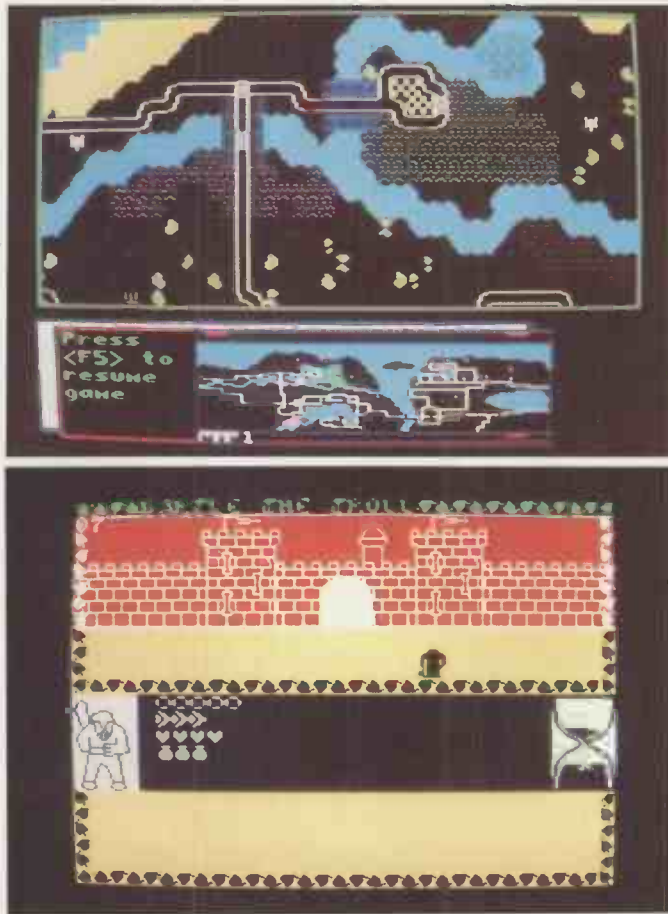
Games Workshop

SO FAR most of the programs launched for the QL have been operating systems and languages, while games have been thin on the ground. Now there is D-Day, a war game of the Eastern Front type with scrolling maps. It has previously been available on the Spectrum, and now Games Workshop has launched versions for the QL and the Commodore 64.

The QL version is claimed to be "massively upgraded" and has over 200K of code, providing four separate scenarios, each with a playing area of 127 by 52 units. The game is for one or two players, and comes with a 40-page manual. The QL version costs £24.95, and the Commodore 64 version £8.95.

Games Workshop has also converted its fantasy board game Talisman to run on the Spectrum, and claims it is the first interactive multi-player arcade adventure on a micro and is "the true successor to Valhalla". It has over 50 graphics screens and costs £7.95.

Contact Games Workshop, 27/29 Sunbeam Road, London NW10 6JP. Tel: 01-965 3713.



Top: D-Day on the QL. Bottom: Talisman on the Spectrum.

Screenplay for Las Vegas

SOFTSEL is now importing the Screenplay range of games from the U.S., and is promoting them with a free trip to Las Vegas. To enter, just ask your dealer for a ticket; you do not have to buy a game.

The six Screenplay offerings are Trivia Arcade, Asylum, Institute, Pogo Joe, Dunzhin and Professional Black Jack.

Trivia Arcade includes 3,000 obscure general-knowledge questions and costs £30.20. Asylum and Institute are graphics adventures and cost £25.90. Pogo Joe is a version of Q-Bert and costs £21.55. Dunzhin is a role-playing adventure and costs £25.90.

Professional Black Jack is the pontoon game, and has been written by Ken Uston "who made millions himself in the casinos", says Softsel. It includes an interactive tutorial

with practice sessions, and scenarios for over 70 of the most popular American casinos. It costs £60.45.

All six games are available for the Atari micros, and all but Institute for the Commodore 64. Four are available for the Apple II and IBM PC. Trivia Arcade is available for the Macintosh for £34.50.

Contact Softsel, Softsel House, Central Way, Feltham, Middlesex TW14 0XQ. Telephone: 01-844 2040.

Mac-Poker and Mac-Jack

DATAPAK SOFTWARE'S two card games for the Apple Macintosh are now being imported by Pete & Pam.

Mac-Poker is a game of five-card stud where the player plays the computer. Mac-Jack II is a game of blackjack, or

pontoon, played with graphics cards using the mouse. Both games cost £44.95 plus VAT.

Contact P&P Micro Distributors, Todd Hall Road, Carrs Industrial Estate, Haslingden, Rossendale, Lancashire BB4 5HU. Telephone: (0706) 217744.



Blackjack for the Macintosh.

Ghostbusters

ACTIVISION'S smash-hit game of the film is now available for the Sinclair Spectrum. Unfortunately the thing that made the original Commodore 64 version so good was the catchy sound, and the Spectrum is not

one of the 1,000 best micros around from that point of view. The Spectrum Ghostbusters does have sound, but nothing like the song. Without it, the game seems somehow thin and feeble.

Reports from the U.S. suggest an Atari version is available. Activision says it should arrive on disc only in March. It will cost £14.99.

Art of War

A NEW STRATEGY GAME has been launched by a Californian software house not living up to its name, Brotherhood. The Ancient Art of War is a real-time game with a scrolling map, which also allows you to zoom in on the battle action. It includes 11 built-in campaigns which pit barbarians, archers and knights against one another.

You have a choice of eight opponents, which means you can, for example, refight Custer's last stand against Genghis Khan. The package also includes a strategy guide based on the teachings of the Chinese philosopher Sun Tzu, after whose 2,500-year old treatise the game is named.

To play it you need an IBM PC or compatible with colour graphics, a double-sided disc drive and PC-DOS 2. It costs \$44.95.

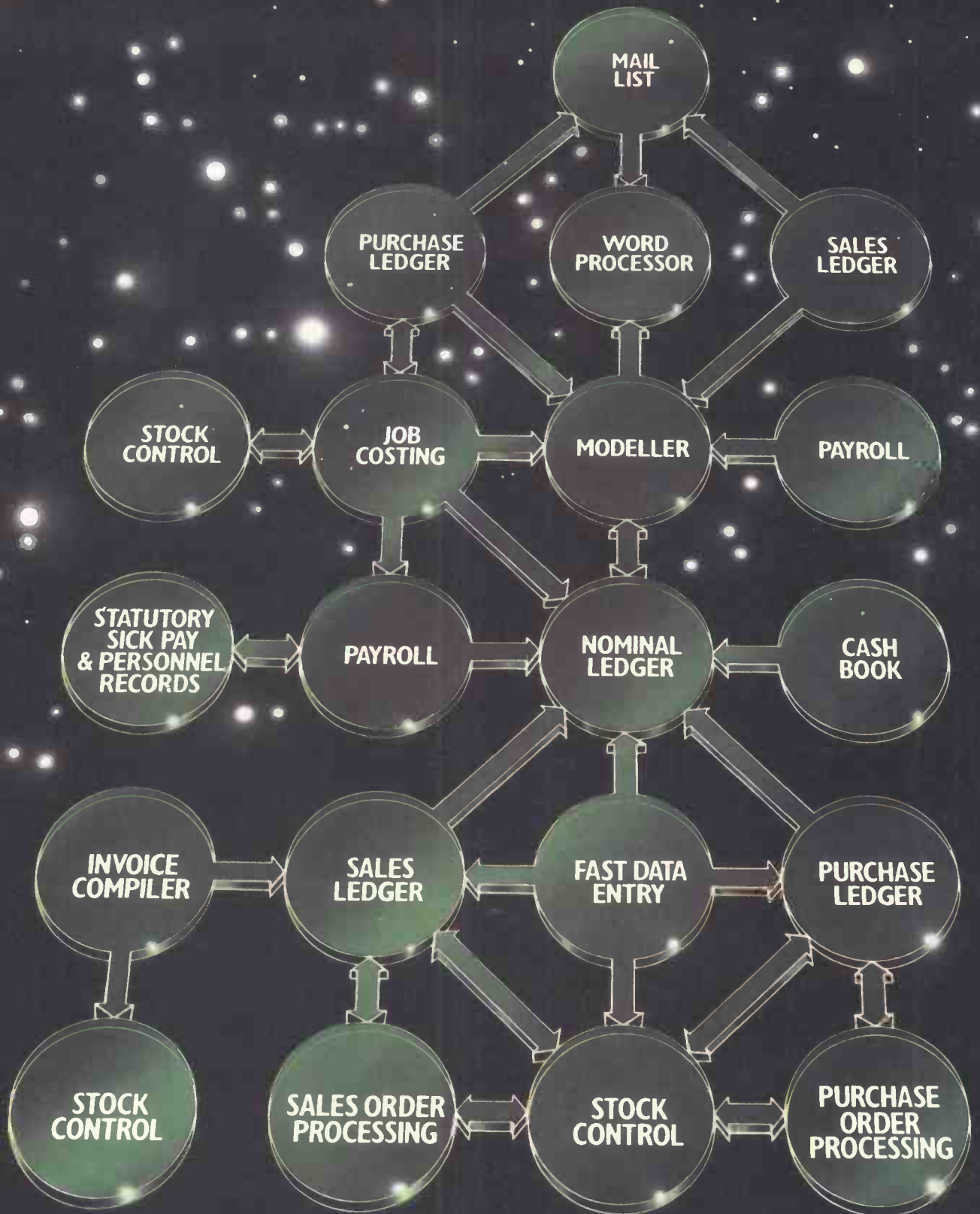
Contact Broderbund, 17 Paul Drive, San Rafael, California 9403-2101. Telephone: (U.S. area code 415) 479-1170.

Grand Slam

COMMODORE 64 owners who enjoy bridge but cannot find people to play can now play the computer with Serin Software's Grand Slam. Bidding is the standard Acol system with Stayman and Blackwood conventions recognised. The micro will play either declarer or defender, and can also play rubber bridge.

The program costs £8.95 from Boots and other stores, or contact Serin at PO Box 163, Slough SL2 3YY. Telephone: Farnham Common 3180.

Serin also markets an excellent Spectrum chess tutor written with British Grandmaster Tony Miles.



...quite simply, none better.

At a TABS Business Centre you'll get free advice, the best hardware and software, expert training and a professional installation service – all in one place.

For your nearest one stop Business Centre
phone Salisbury

0722-338668



PICK A DISK ... ANY DISK



First came the computer... then came the floppy disk... then came floppy disk incompatibility... THEN CAME THE M-F-B SYSTEM.

Has your company seen a growing number of microcomputers appearing throughout the company, and hence a growing problem of disk size and format incompatibility?

Are the times gone when a disk could be taken from one machine and put into another machine for it to work immediately?

If so, then your company is a prime candidate for one of the Gemini M-F-B series of microcomputers - NOT just 'another' microcomputer!

When we created these machines it was our aim to provide the link between man, his preferred machine, and the other computer users in a business.

The M-F-B system provides the ability to format and transfer data between any of the microcomputer formats currently available within its library - over 400 machine type and format combinations. Sophisticated software allows the user to add new formats at any time.

This system will copy files from one CP/M type to another such as CP/M-80, CP/M-86, Concurrent Dos, MP/M, MP/M 86 or Turbo Dos. Additional software is also available to allow the copying to and from IBM PC-DOS disks and MSDOS disks, and also a number of mini-computer and mainframe interchange formats.

The M-F-B, made available at prices that 'drives' the opposition away, comes supplied with a six-month free format update service.

So, if you are the head of a Data Processing department seeking a solution to ever increasing incompatibility amongst departmental computers, or the M.D. of a software house looking for a way to prevent further loss of sales due to the fact that you cannot supply software on the required disk format, then look no further...

The next microcomputer purchase that your company will make is that of a Gemini Multi-Format-BIOS system.

MFB Configurations range from a system with 3 x 5.25" Floppies at approximately £3,000 + VAT through to a version with Winchester drive, 2 x 5.25", 8" and 3.5" Floppies at £4,850 + VAT.

Transfer with Gemini by contacting us at the address below.



Gemini Microcomputers

PROVIDING THE LINK

Gemini Microcomputers Ltd., 18 Woodside Road, Amersham, Bucks, England HP6 0BH. Tel: (02403) 28321. Telex: 837788



THE D200

Near Letter Quality Printer

from the New Force in Computer Printers



An exciting new range of high quality printers has been created to bring speed, reliability and flexibility to both the office and home user. The D200 is a high-specification dot matrix model for outstanding results in the most demanding of applications.

Compatible to all business micros, PCs and home computers, the D200 has a dual Centronics parallel/RS232C serial interface plus **IBM** PC compatibility and **Epson** emulation. The buffer has a 2K bytes capacity and can accept a 96 downloadable character ASC II set.

Performing at a speed of 160 cps with 80 column width (at 10 cpi), throughput is maximised by bi-directional text printing, logic-seeking and a choice of stationery handling (friction and tractor feed are standard – a roll holder is available as an optional extra).

The 6-pitch D200 offers a wide variety of print

style, size and resolution – including Near Letter Quality – and boasts bit image, dot addressable and block graphics. Vertical and horizontal tabs, proportional spacing, superscript and subscript features ensure superior presentation.

Fill in the coupon now and find out how you can make the most of your computer with a printer from Smith-Corona Data Products.

To: Smith-Corona Data Products, Unit 23, Northfield Industrial Estate, Beresford Avenue, Wembley, Middlesex HA0 1XP.

Please send me:

- A free copy of the full colour printer brochure.
- A free list of my local dealers.

● Circle No. 184

Name _____

Company (if appropriate) _____

Address _____

Post code _____ Tel. No. _____

Make and model of computer used _____

PC 6

Those IBMulators keep on coming

FIVE MORE IBM-compatible micros were launched at the Which Computer? Show in January, to join the 64 or so currently on the market.

The new IBMulators were shown by Commodore, NCR, Tandy, Toshiba and Wyse, with the Tandy 1000 looking the model most likely to succeed.

In addition, two more full-function lap computers were launched to compete with Data General's The One. These were Texas Instruments' Pro-Lite and Toshiba's T-1100.

Tandy 1000

The Tandy 1000 looks like the existing model 2000, but as it uses an 8088 chip it is, of course, much less powerful. Although it is claimed to be fully IBM-compatible, Tandy has introduced a few extras,



Tandy 1000.

such as the facility to use more colours, with the built-in graphics, and three sound channels instead of one.

The hardware includes colour graphics, a printer interface, joystick and light-pen ports, all of which cost extra with the IBM PC itself.

The Tandy 1000 comes complete with MS-DOS, GWBasic and an integrated software package, Deskmate, which provides a word processor, spreadsheet and filing together with communications facilities.

It is aggressively priced at only £1,099 plus VAT, for a system with a single disc drive. This does not include a monitor, which costs £139 for monochrome or £399 for colour. A second disc drive can be added for £249, so a 128K

green-screen system costs only £1,487 plus VAT, which is very competitive.

For further details, contact your local Tandy store or phone (0922) 648181.

Portables

New portables were launched by Toshiba and Hewlett-Packard, though TI also showed its new Pro-Life. Grid contented itself with a wide-screen version of the wonderful Compass micro. The electroluminescent display now runs up to 128 characters wide.

The Toshiba T-1100 is an IBM-compatible portable with an 80-column by 25-line LCD display and built-in 3.5in. microfloppy-disc drive. The system includes 256K of RAM and a parallel printer port, and weighs about 3kg. It should be competitive with models like the TI Pro-Lite and Sharp PC-5000.

Hewlett-Packard's The Integral is perhaps the oddest portable of all time. It packs a Unix micro, flat screen, 3.5in. microfloppy disc drive and Thinkjet printer into a 25lb. box measuring only 16in. by 13in. by 8in.

HP says the machine is aimed at the scientific and engineering markets, and also provides an entry-level option for its Unix line-up. However, just how many people want to tote around a Unix engine and are willing to pay £5,450 plus VAT for the privilege, remains to be seen.

Also-rans

Of all the new designs the Wyse PC looked about the most interesting, partly because its low, sleek styling made it look the most original of the bunch.

The Wyse PC has 256K of RAM and two floppy-disc drives. The main board includes two serial ports and a parallel port, and there are two free expansion slots where IBM cards can be fitted horizon-

tally. The system comes complete with MS-DOS 2.11 and GWBasic for £1,995. Both hard-disc and colour versions are also available.

The Wyse PC is made by the famous terminal manufacturer and is imported by both Logitek and RTS Technology.

The Commodore PC was shown running Silicon Office in colour. However, apart from the fact that the keyboard plugs into the front rather than the rear of the system box, there appears to be nothing unusual about it.

Commodore U.K. had only taken delivery of a couple of sample machines just before the show, and had no comment to make on either availability or price.

The NCR PC-4i looks just the same as the current



NCR PC-4i.

Decision Mate V, but of course is IBM compatible. It uses the 8088 chip and comes complete with the 256K of RAM, one parallel port, one serial port, MS-DOS, GWBasic, and three tutorial programs NCR Pal, NCR Help and NCR Tutor. A basic system with a 12in. monochrome screen and a single disc costs £1,799 plus VAT.

The Toshiba T-1500 is a compact system which uses the 8088 and 128K of RAM. Expansion is limited to a further 128K in 64Kbit RAM chips, or to 512K in 256Kbit chips. The main board includes the colour graphics, and a parallel printer port.

Victor announced its PC Plus IBM-compatible upgrade — or should that be downgrade? — for the Victor 9000/Sirius 1, but did not have one on the stand. □

Shorts

● Apple showed the amazing Jazz integrated package — an enhanced version of Lotus Symphony — running on the Macintosh.

● British Telecom showed its badge-engineered version of the ICL One Per Desk, called Tonto.

● Brother launched the TC-600, as a kind of big brother to the EP-44. The TC-600 is a portable typewriter, 80-column printer with a 24-character LCD



display and 14K of memory, which makes it very usable for telex and electronic mail. Brother's FB-100 100K battery-powered 3.5in. microfloppy disc can be used for extra storage.

● Corvus showed its networking system with Microsoft's Networks software running on the IBM. The ACT Apricot network naturally uses the Corvus hardware with Microsoft software too.

● Digital Research showed Logo running on the Amstrad and the Tatung Einstein, plus Gem running on the IBM PC and Acorn ABC 32016.

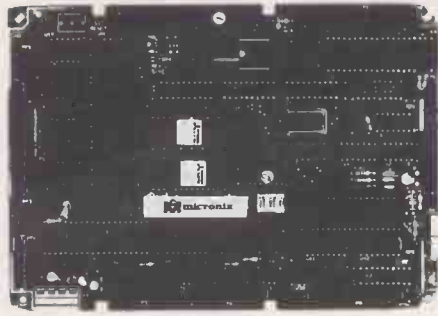
● Epson showed the HI-80 colour plotter which, at around £400, is claimed to be the cheapest of its type.

● Fujitsu showed the FM-16S multi-user version of its IBM-compatible micro, plus the FM-16SX with built-in 11Mbyte or 22Mbyte hard disc.

● Sharp showed its new MZ-800 home/business micro running Personal CP/M. It sports a Z-80A and high-resolution graphics, and is claimed to be data compatible with the IBM PC.

PLEASE NOTE OUR NEW ADDRESS
VISIT OUR NEW SHOW ROOM

MICRONIX ESB-1 16/32 BIT SINGLE BOARD MICRO



★ 68008 8 MHz CPU ★ 128 RAM (expandable to 256K) ★ Up to 64K EPROM
1 Floppy disk controller for 5¼", 3", 3½" drives ★ 2 RS232 serial ports
★ Mounts directly on 5¼" drive ★ 2 × 8 bit parallel ports ★ Full debug monitor
with single line assembler and disk loader ★ Expansion bus ★ Power
requirement: +5V/1.5A, +12V/100mA, -12V/100mA.
Available as a Bareboard with Monitor ROM and IFL Chip Set £199 + VAT =
£228.85 or completely assembled £499 + VAT = £573.85 128K Expansion
Board (required for OS9/68000) £199 + VAT = £228.85 — OS9/68000 real time,
multitasking, multiuser Operating System (similar to UNIX) £300 + VAT =
£345 C Compiler, BASIC 09, PASCAL and FORTRAN available. Single User
CP/M68K £375 + VAT = £431.25.

THE ERICSSON PC

OFFICIAL
ERICSSON
DEALER

Fully compatible with IBM PC/XT
From £1,934 + VAT

- ★ 8088 CPU ★ Optional 8087 processor
- ★ 128K RAM ★ Built in hi res graphics
- ★ Twin half height drives (360K each)
- ★ Amber monitor with tilt & swivel
- ★ MS DOS 2.11 and GW BASIC
- ★ 1 Serial port ★ Parallel port (centronics)
- ★ 12 Month on site warranty



SOFTWARE FOR IBM PC/COMPATIBLES

LOTUS 1-2-3	£375 + VAT = £431.25
SYMPHONY	£550 + VAT = £632.50
PFS: FILE	£120 + VAT = £138.00
PFS: REPORT	£120 + VAT = £138.00
PFS: WRITE	£120 + VAT = £138.00
dBASE II	£365 + VAT = £419.75
dBASE III	£495 + VAT = £569.25
FRAMEWORK	£495 + VAT = £569.25
WORDSTAR V.3.4	£295 + VAT = £339.25
MULTIPLAN	£179 + VAT = £205.85
OPEN ACCESS	£450 + VAT = £517.50

PERIPHERALS FOR IBM PC/COMPATIBLES

64K RAM Upgrade	£ 40 + VAT = £ 46
256K RAM Board	£ 260 + VAT = £ 299
Six Pak Plus with 384K RAM	£ 500 + VAT = £ 575
Hercules Graphic Card	£ 380 + VAT = £ 437
108 key low profile UK Keyboard	£ 160 + VAT = £ 184
NDR 5 + 55MB fixed + 5MB removable hard disk	£2,700 + VAT = £3,105
PC-BACKUP 17.7MB Cartridge backup	£1,760 + VAT = £2,024
I/F for above	£ 560 + VAT = £ 644
PC-STOR/20 16MB Hard disk and 17.7MB Cartridge backup	£3,480 + VAT = £4,002
320/360K Disk Drive for IBM PC half height, bare drive	£ 120 + VAT = £ 138

MONITORS

SINCLAIR Vision QL RGB (H) X 440 (V)	£ 260 + VAT = £ 299
PHILLIPS 12" green	£ 80 + VAT = £ 92
KAGA (TAXAN) K12R2 12" RGB Hi Res	£ 260 + VAT = £ 299
K12R3 12" RGB Super Hi Res	£ 360 + VAT = £ 414
KX1213PC 12" 20MHz Hi Res amber monitor IBM PC compatible	£ 160 + VAT = £ 184
K12R3 12" RGB Hi Res for IBM PC	£ 400 + VAT = £ 460

● Circle No. 137

DOT MATRIX PRINTERS

SMITH CRONA Fastext 80 80 column, 80 CPS	£ 200 + VAT = £ 230
EPSON RX80 F/T 80 column, 100 CPS	£ 240 + VAT = £ 276
EPSON FX80 80 column, 160 CPS	£ 380 + VAT = £ 437

NEAR LETTER QUALITY (NLQ) PRINTERS

PANASONIC P1091 80 column, switch selectable 120 CPS draft/22 CPS NLQ — switch selectable for IBM PC or other Computers	£ 260 + VAT = £ 299
KAGA 810 80 column, 160 CPS draft/27 CPS NLQ	£ 260 + VAT = £ 299
SMITH CORONA D200 80 column, 160 CPS draft 40 CPS NLQ, dual interface, IBM PC compatible	£ 420 + VAT = £ 483
SMITH CORONA D300 same as above but 136 column	£ 560 + VAT = £ 644
FUJITSU DPL24 24 wire head, 288 CPS draft/96 CPS NLQ	£1,480 + VAT = £1,702

DAISY WHEEL PRINTERS

SMITH CORONA L1000 12 CPS, Bidirectional, 3 pitch, dual interface	£ 260 + VAT = £ 299
JUKI 6100 20 CPS, 2K buffer	£ 340 + VAT = £ 391
FUJITSU SP320 48 CPS, Diablo, 4K buffer	£ 980 + VAT = £1,127
RICOH Flowriter RP1600 60 CPS, 46K buffer, universal interface, Qume and Diablo	£1,720 + VAT = £1,978

Tractors and Sheet Feeders also available!

DISK DRIVES FOR BBC

Quality half height Japanese drives boxed and supplied with all cables,
formatter disk and DFS manual

MX150 — 100K Single 40 track, single sided (while stocks last!)	£ 80 + VAT = £ 92
MX152A — 400K Single 80 track, double sided, 40/80 track switch	£140 + VAT = £161
MX252A — 800K Twin 80 track, double sided, switched mode PSU, 40/80 track switch	£340 + VAT = £391



DISK DRIVE FOR APPLE II & IIe

- ONLY £100 + VAT = £115 "NEW LOW PRICE!"
- ★ Not a modified but a dedicated APPLE drive
 - ★ Half height, direct drive CHINON
 - ★ 143K capacity ★ Supplied boxed with cable

VISA, ACCESS WELCOME



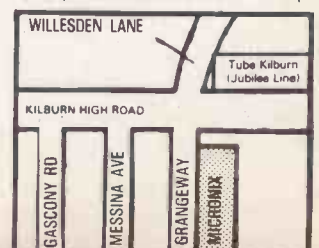
Ordering Information:

Prices are exclusive of VAT unless stated otherwise. Unless otherwise stated,
Postage/Carriage free within UK for advertised prices only — special or
discounted prices will attract postage/delivery charges at cost. All goods are
subject to availability and prior sale. Prices are subject to change without notice.
We accept VISA and ACCESS.

* Visit our brand new Showroom — off-street parking, nearest tube Kilburn
(Jubilee Line) OPEN MON-FRI: 9.30am — 5.30pm SAT 10.30am — 1.30pm

micronix
computers Ltd

1 Grangeway,
Kilburn,
London N.W.6
Tel: 01-625 0295 (5 lines)
Telex: 295173 MICROX G



Under the hammer

Chris Bidmead has been to the computer auctions with a sharp eye open for the bargains to be snapped up there.

AUCTIONS are exciting, and can be a good way to snap up a bargain. But the usual rules of "merchandisable quality" and "fitness for the purpose" that cover your ordinary purchases from a dealer do not necessarily apply. In sale at auction you buy on sight, and there is nobody to complain to if the item purchased is faulty.

The first computer auction I attended in the autumn of last year was a new experience for the auctioneers too, and the affair was not sparkingly successful. The prices below which the seller refuses to part with the lot, known as the reserve, were set very high. The buyers were justifiably cautious, particularly as the auctioneer kept reminding us that he knew very little about the products he was selling.

Will it sell?

Lot 10 was an Epson QX-10 computer complete with printer and a selection of software. "Can I sell it at £700?" the man with the raised hammer asked himself, as if in consultation with his conscience — but still loud enough to be overheard by the 100 or so would-be purchasers who fill the auction room, a hired hall in a backwater London hotel.

"Do I hear £750?" asked the auctioneer. He did, and then he heard £800. But then the halting bidding dried up altogether. "No, gentlemen, I will not sell it for £800." Like five of the other lots offered so far, the Epson had failed to reach its reserve. Instead of falling with a definitive bang to mark the sale, the gavel is laid gently to rest on the podium.

In spite of the sale by auction rules that make the evidence of the seller's eyes practically the sole guarantee, during the viewing the lots had been kept away from our hands-on experience. The "new and

boxed" lots had remained firmly boxed and new, and the second-hand goods were swathed in polythene. As compensation for not being allowed to prod the products, many of the lots were accompanied by a technician's report that gave a cursory description of the condition and workability. But you would be in a tenuous position legally if you insisted on your money back on the basis of misdescription.

Dealers

Many of the potential bidders at such auctions are dealers who have put in lots themselves. They have come to buy too, but because they already know the problems of selling outdated hardware they will only buy at silly prices. Private individuals are chary of chasing the bidding ever upwards because so much of what you buy in a computer is service and support from the dealer.

Perhaps this was why at one auction an Apple Macintosh failed to sell. Launched only months earlier in a flurry of publicity, the Macintosh took its chances as Lot 214, "Brand new in box inc. software". It received not a single bid, although I subsequently learned that the reserve had been set quite low at £800. A used IBM PC, new retail price around £2,500, was pursued across the £1,000 line by a small posse of bidders, but narrowly failed to make its reserve.

Spares only

Several Sinclair Spectrums, "not working but suitable for spares" fell under the hammer at around £35 each; another in good working order failed to reach its £70-odd reserve. A neat little Hyperion portable, IBM compatible in a leather-look carrying case, changed hands at £1,000 after a short burst of brisk bidding. Lotus 1-2-3, the best-selling software package that costs around £350 from dealers, started at a tenth of that price and was hotly contested until the gavel fell on £100.

It's worth keeping your eye on the faces and trying to sort out the professional


dealers from the amateurs since a bid is not always what it seems. At one auction a vendor, eager to inject some electricity into a flagging sale, enthusiastically entered into a duel for what must have been his own lot. There is no other explanation for the fact that although he failed to secure the lot, the same bidder made no bid at all for the identical lot that followed.

Last November, in a return match from the same auction house, vendors seemed to have lowered their expectations and their reserves, and more lots were sold with no reserve at all. Paradoxically, the result in some cases was a higher return. Sundry Apple IIs sold for around £500 and a Macintosh fetched £1,100.

But beware the temptation of the weird and wonderful old bangers with obscure trademarks. In the heat of the auction £30 may seem a snip for a machine with dual disc drives and a screen. But unless you can lay your hands on the documentation and software all you will be lugging home is an oversized paperweight.

Hacking needed

However, if you are prepared to do some post-sale chasing or hacking sometimes you can pick up a serious machine for a song. Typical is the Rair Black Box, which had a price tag of around £2,000 in 1982, that one auctioneer knocked down for £150. It needed a system disc, which would mean cajoling Rair for the CP/M software or getting hold of the software documentation and writing the BIOS yourself. Eight-bit machines complete with system and applications software can sometimes be had for little more. I saw a dual-floppy Panasonic 8in. CP/M machine with some business software sell for £200. At the same auction a Superbrain complete with system went for £250.

The best bargains are often in the side-shows. Poke through that box of oddments described as "Lot 23: sundry connectors". Half the cables will be no use to you, but there will be several you might need. Buy them through a dealer and they could cost you £20 each, but you may be able to pick up a lot like this for £10. 

Crocker Computer Auctions of 154 Tottenham Court Road, London W1, hope to hold monthly auctions of office equipment together with computer software and peripherals. For details ring 01-387 5838.

Modem WS 2000: why it's the experts' choice.

You don't need to be told about the information revolution – you already know that without efficient data communications, you and your business may not survive it.

And you know that a modem will be a vital part of your survival kit.

This is why you should choose Modem WS2000 from Miracle Technology.

✦ **Quality** – In concept and construction Miracle Technology sets the standards other modem manufacturers aim for.

Quite simply, WS2000 is one of the best designed, best made modems you can buy.

It is approved for PTT use in the UK and Holland, with approval pending in other European countries.

✦ **Flexibility** – As a multi-speed, multi-standard modem, WS2000 enables data transfer between almost any two computers – world-wide.

WS2000 gives instant access to the vital information sources of Prestel, Micronet, Telecom Gold and a vast range of public and private databases.

WS2000 can also convert your computer to a telex terminal, giving you inexpensive 2-way international telex facilities.

WS2000 is suitable for use with a wider range of computers than virtually any other modem, and we can offer software packages for most makes.

✦ **Versatility** – No other modem offers all the facilities available with WS2000.

Its unique versatility means it can be expanded by the addition of autodial and autoanswer options (presently undergoing approval testing with BAPT), plus direct computer software control of the modem and much more.

✦ **Service** – A large dealer/distributor network both in the UK and abroad means you're never far from a WS2000 stockist.

And our Customer Service and Technical Departments are happy to give help and advice.

✦ **The Experts** – Thousands of users depend on WS2000 – local authorities, government departments, multi-nationals, private companies and individuals.

WS2000 is the modem chosen by the BBC to demonstrate a UK-USA datalink live on TV; selected by Cable & Wireless/Western Union for their Easylink Telex Service; taken

round the world on Operation Raleigh; in action for CBS News, sending front-line war reports around the world.

WS2000 is the modem used by people who need reliable data communications today – and every day.

WS2000, with BT telephone lead, mains power supply and comprehensive operating manual costs only **£129.95 exc.** (£154.73 inc. VAT & UK delivery) – you may also need a computer lead (£10.35 inc.) – specify computer when ordering.

A small price to pay for survival.

Order by cheque/Visa/Access/Trade or official order to:

✦ Miracle Technology (UK) Ltd,
St Peters Street, Ipswich IP1 1XB.
☎ 0473 50304 ☐ 946240 CWEASY G 19002985



MIRACLE TECHNOLOGY
we thought of tomorrow, yesterday.

Everyone's saying it's a Great Little Printer!

Now you can afford high quality printing on plain paper, even with the simplest microcomputer system.

- * Full IBM-PC compatibility
- * Nine-pin print head * Original plus two copies * 80-132 columns at 10-17 cpi
- * Optional NLQ printing with 18 x 23 matrix * 50 cps draft speed
- * 48 international characters
- * Optional tractors * High-resolution pin-addressable graphics
- * Light and compact

The New Centronics GLP



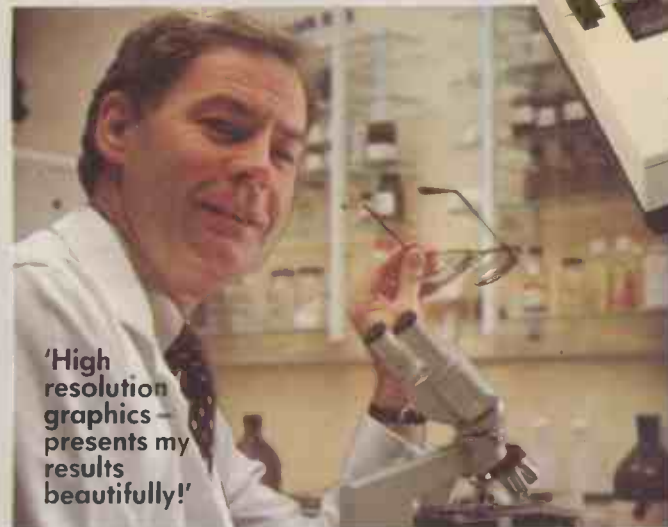
'Fantastic value – even my students can afford it!'



'Near letter quality on plain paper – ideal for correspondence!'



'Weighs only 3 kg – I can take it anywhere!'



'High resolution graphics – presents my results beautifully!'

Please send full details on the GLP and the address of my nearest distributor

● Circle No. 130

Name

Position

Organisation

Address

PC 3

CENTRONICS
MORE THAN JUST AN INTERFACE

Centronics Data Computer (UK) Ltd Petersham House
Harrington Road London SW7 3HA Tel: 01-581-1011

JUKI 6300 - Unbeatable at the price

How many times have you heard that? We thought so.

Manufacturers' opinions are all too often, shall we say, a trifle optimistic? Not this time.

The brand-new Juki 6300 is simply the most powerful and versatile daisywheel printer at the price. Take a look at the features.

[6300 features]

- standard DIABLO* 96-character daisywheel ■ standard DIABLO* hytype II ribbon
- 40 characters per second ■ 3k buffer memory (expandable to 15k) ■ fully compatible escape sequence codes with DIABLO*630 API ■ proportional spacing, 15, 12, 10 pitch ■ operational noise level of less than 60 dB ■ comprehensive, easy-to-read User's Manual

Now look at the price. Just £ 799. It must be the best value on the market.

(Except, perhaps, for our model 6100, which uses the standard IBM* Selectric II ribbon and costs precisely £ 399).

We may be the latest name in information technology, but our philosophy is as old as the hills.

Roughly translated, it means outstanding value for money.

Or, to put it another way, Juki means business.

* DIABLO is a trade mark of Diablo Systems Inc.

* IBM is a trade mark of IBM Corporation.

JUKI

Technology true to type

JUKI (EUROPE) GMBH · Eiffestr. 74 · 2000 Hamburg 26 · F.R. Germany

Tel.: (040) 25 20 76 · Telex: 2163 061 (JKI D) · Fax.: (040) 25 20 79

Sole distributor:

Micro Peripherals Ltd

Intec Unit 3, Hassocks Wood, Wade Road, Basingstoke,
Hants, RG 24 ONE. Tel.: (0256) 47 3232 (32 lines)
Telex: 859669 MICRO PG, Facsimile: (0256) 46 1570

● Circle No. 181



JUKI 6300
(Daisywheel Printer)

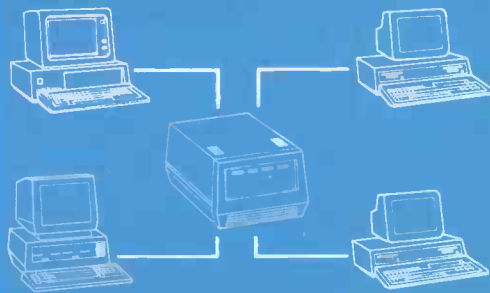
● Circle No. 111 ►

frazzled with floppies?

- Hard disc capacity 5-200Mb
- Removable disc cartridge 5, 10 or 21Mb additional on-line storage or back-up.
- PlusNet... allows shared access to hard disc.
- Supports Sirius PC, SX; Apricot, IBM, Sirius, Epson, Sanyo, and most other micros.
- Maintenance by ACT (Computer) Maintenance Ltd.*

Prices start at £1195

eg. 10Mb Hard disc
Subsystem **£1295**
20Mb Fixed with
5Mb Removable
Subsystem **£2645**



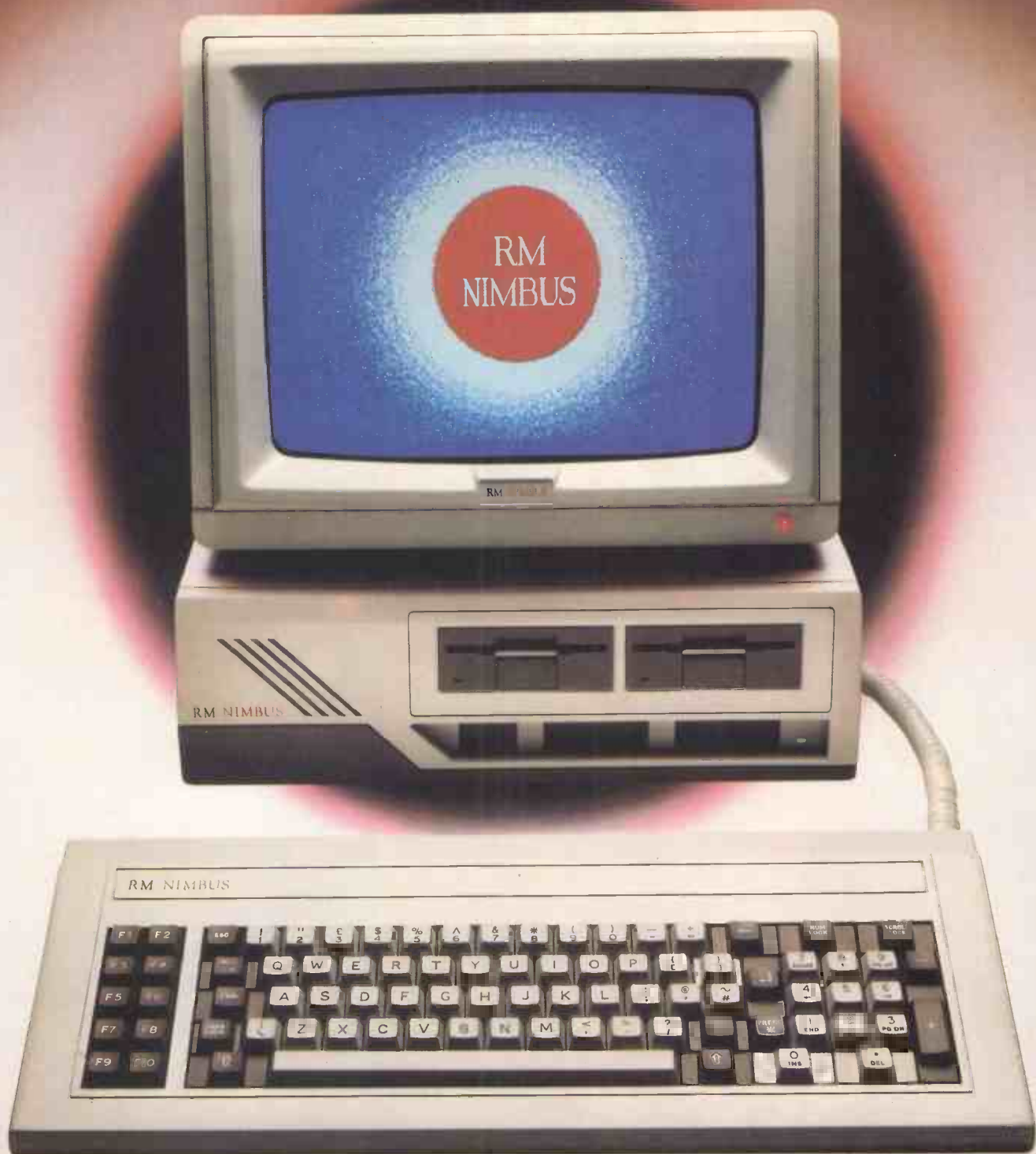
fit a Plus5 hard disc.

*Sirius & Apricot only



Plus 5 Engineering Limited Crowborough Hill, Crowborough, East Sussex, England TN6 2EG Telephone (08926) 63211 Telex 95538 PLUS G

The UK's leading subsystem manufacturer



RM NIMBUS

A NEW BREED OF MICROCOMPUTER

POWERFUL. FLEXIBLE. AFFORDABLE.

RM Nimbus. New from Research Machines, British manufacturer of high-quality microcomputers and networks.

RM Nimbus. An entirely new 16-bit machine with remarkable power, versatility and speed. And with built-in capacity to expand its memory, storage, networking and interfacing.

FAST, POWERFUL, VERSATILE

Nimbus is probably the most advanced 16-bit machine for its price.

It evolves from a completely original design concept, based on an 80186 8MHz processor, VLSI gate array technology, dual-bus architecture, and a separate graphics processor.

It shows an amazing turn of speed and an insatiable capacity for work, whether as a professional business machine, a research and instrumentation tool, or a local network station.

ORIGINAL FEATURES

Among the many totally new ideas incorporated in Nimbus is Piconet, a unique input/output system which enables the

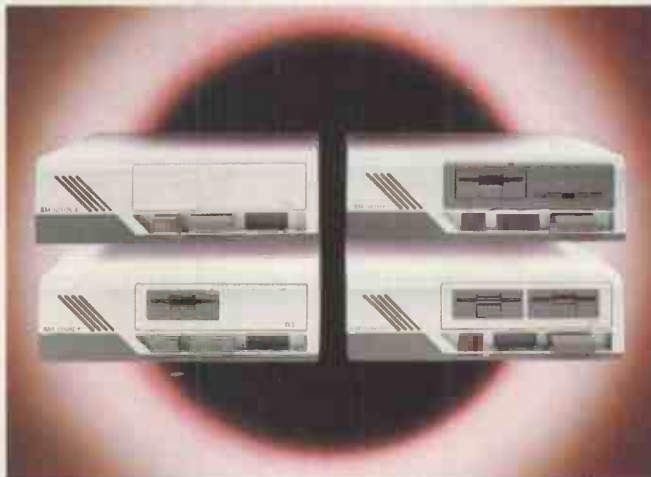


computer to drive up to thirty peripherals, instruments or devices from a single I/O port. In fact there are more interface options with Nimbus than you may ever need.



MODULAR, UPGRADEABLE

Within the same neat unit, you can specify Nimbus with single or twin 3½" disc drives. With a built-in Winchester. Or without discs as a network station. And talking of networks, Nimbus uses the MS-NET* operating system, which will allow up to 64 stations



to share software and network facilities at high speeds.

MORE SOFTWARE THAN EVER

With its MS-DOS* operating system, Nimbus will have access to the world's largest library of professional 16-bit software. And the power to handle the most sophisticated languages and



applications, now and for years to come.



UNBEATABLE VALUE

As a stand-alone computer, Nimbus competes on price terms with any other comparable micro. As a network system, it leaves the others far behind.

For example, Nimbus PC 2 (192K RAM, two 720K 3½" disk drives) costs £1695.**

There is much about Nimbus that cannot be conveyed in words. Its superfast graphics, for instance, or its elegant, user-friendly design. To find out more about Nimbus, use the coupon below, or phone Research Machines on Oxford (0865) 249866.

*MS-DOS and MS-NET are trade marks of Microsoft Corporation.
**Prices do not include VAT.

To Caroline Rawle,
Research Machines Ltd,
Mill St., Oxford.
Tel: Oxford (0865) 249866.

Please send me full details of the new RM Nimbus

I should like to attend a Research Machines Open Day

Name _____

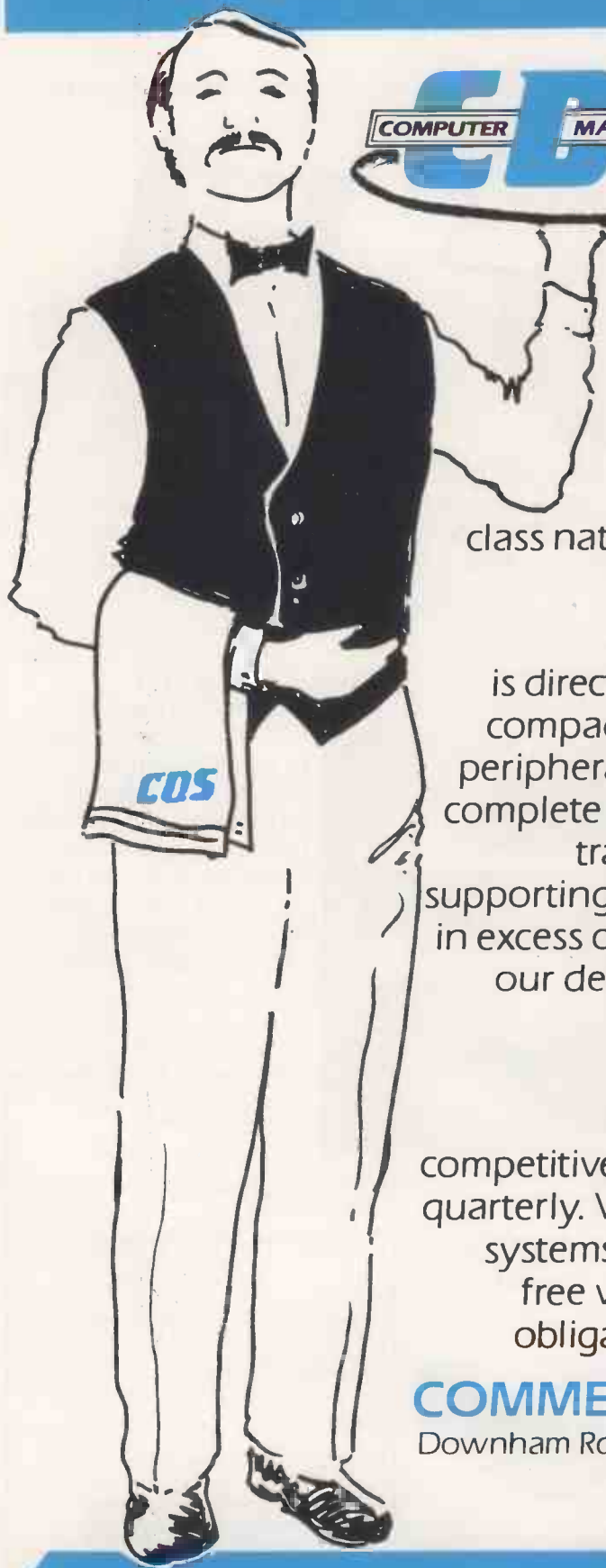
Position _____

Address _____

Tel: _____

RESEARCH MACHINES
MICROCOMPUTER SYSTEMS

WHEN IT COMES TO SERVICE ...



YOU DON'T HAVE TO HAND IT TO US!

For Starters!
we come to you, our fully trained engineers are strategically based throughout the UK providing a first class nationwide on site maintenance service for your micro computer equipment.

Our Main Course
is directed to Apple, IBM, Sirius, Apricot and compaq micros and most importantly "their peripherals." In fact we provide cover for your complete system. With over 50 engineers fully trained on each of the above products, supporting a customer base of micro computers in excess of £12,000,000, you can be assured of our dedication and commitment to support your hardware.

Our Sweetener
is simply the best service for the most competitive rates, there's even the option to pay quarterly. Whether for just one or one hundred systems ring our national sales division for a free written quotation with absolutely no obligation — **we don't even ask for a tip.**

COMMERCIAL DATA SYSTEMS LTD

Downham Rd., Ramsden Heath, Billericay, Essex CM11 1PU

☎ 0268 710292

News from the world of
Sinclair QL computing.

QL

NEWS



One year old... and look how we've grown!

When we launched the QL last year, we knew we were starting a revolution.

For the first time, the serious computer hobbyist could afford the same power and performance as the professional computer user.

A year later, and the QL is more than a unique computer, it's the heart of a unique system.

And the next 12 months promise even more for QL owners... new software options, extra storage devices, printers, monitors...

Read on, and see how far we've come, and how much further we're going!

N°1



NIGEL SEARLE

Now it's the quantum leap for QL software and peripherals

Without doubt, the QL was the computer innovation of 1984. Launched to outstanding reviews, it soon gathered thousands of happy owners, and recognition from people like ICL, who have incorporated QL technology and its Microdrives into the new One Per Desk.

The quickest glance at the QL's specification shows what the fuss was all about...128K RAM, 32-bit processor architecture, 200K built-in mass storage, bundled software, They're features that would normally cost you three or four times as much!

But that's only half the story, because the QL is now the heart of a computer system, with a growing library of software...

As you'll see from these pages, 1985 is the year of the quantum leap for software and peripherals. Already there are no less than five QL languages together with special programs for software developers, a world-beating chess game... and much more on the way!

On the hardware side, there's a special QL monitor to make the most of that high-resolution 512 x 256 pixel display. There

are memory expansion boards, Winchester disk drives, printers, and low-cost Microdrive cartridges.

In fact, there's so much going on, we'll be running these regular Newsletters just to keep you in touch!

If you already own a QL, the next few pages will give you a taste of the exciting year ahead.

And if you don't... take a look at what you're missing. It should be all the persuasion you need!

Now read on...the quantum leap into serious computing starts here.

Nigel Searle, Managing Director, Sinclair Research Limited.



From sophisticated business packages to superb animated games... QL software makes the most of the computer's extraordinary specification.

New QL Software

Utilities, languages, games and business packages...with more on the way!

Two things are now certain about QL software. First, there's going to be plenty of it. And second, it's going to set completely new standards for microcomputers...

At the moment, there are well over 100 software programs in development. And the first

software releases, shown here, demonstrate how exceptional the best QL software will be.

The QL already has five languages, superb programs for software developers, a top quality accounting package and in QL Chess it has its first game.

QLUB: 10,000 members and growing!

QLUB is the special Users Bureau for Sinclair QL owners. There are now well over 10,000 QLUB members, and membership is growing all the time.

For their annual subscription of £35, QLUB members are enjoying a whole range of information and advisory services, exclusive offers and special discounts.

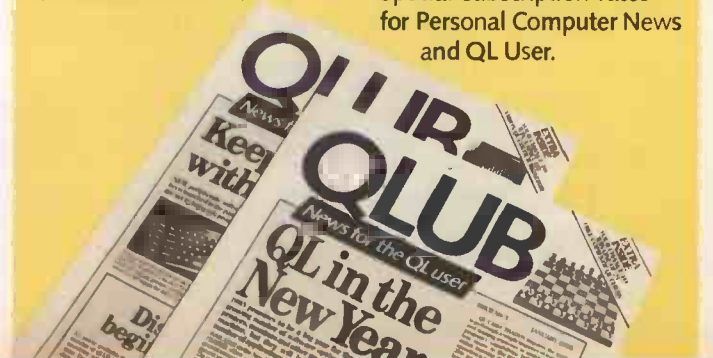
One of the most important QLUB benefits is the special news magazine, appearing six

times a year. The magazine provides a forum for QL owners to exchange views and keep in touch with all the latest developments.

Each issue is packed with updates on QL hardware and software, tips on applying the four QL Programs, and news of how other people are using the QL. QLUB members also receive a range of special discounts, with savings of at least 20% on selected software products.

Current special offers include:
 QL Chess for £14.95
 QL Toolkit for £19.95

QL Assembler for £31.95
 QL Cash Trader for £54.95
 Special subscription rates for Personal Computer News and QL User.





The multilingual Sinclair QL

BCPL – a forerunner of C, BCPL has been described as a systems programmer's delight. In the words of QL User, this compiler is a 'brilliant compromise between a high-level language and a low-level systems language'. Whilst not for beginners, this is an essential buy for anyone with a good knowledge of systems programming. Complete with manual.

Available from
Metacomco – £59.95.
Tel: 0272 428781.

LISP – already well-known for its artificial intelligence appli-

cations, LISP is a powerful and versatile language. This is a sophisticated implementation of LISP, by one of its leading exponents, Dr Arthur Norman. This package features full QL graphics, and a full manual is supplied.

Available from
Metacomco – £59.95.
Tel: 0272 428781.



Pascal – probably the most popular high-level language of all. Pascal is particularly well-suited to structured programming sophisticated data manipulation and algorithmic problems. Pascal interpreter complete with 87-page manual.

Available from
Computer One – £39.95.
Tel: 0223 862616.



Forth – this 'new generation' language is proving both popular and easy to learn. The program provides a full implementation of the latest Forth 83 standard with graphics and sound extension.

Available from
Computer One – £29.95.
Tel: 0223 862616.

APL – the compact mathematics-based interpreted language designed for scientists and mathematicians.

APL keyword interpreter complete with manual.

Available from
MicroAPL – £99.95.
Tel: 01-622 0395.

Programmer's packs

QL Assembler – two programs operating in tandem. The first is a full-screen editor for creating and altering program files. The second, a Motorola-format compatible 68000 assembler which converts source files written in M68000 assembly language into machine code files which can run on the QL.

Both assembler and editor are written in machine code and can be multi-tasked with SuperBASIC, so you can switch

between editor, assembler and SuperBASIC instantly.

Written by GST Computer Systems – £39.95.*

QL Toolkit – a programmer's toolkit with over 70 programs and extensions to SuperBASIC. Most are linked to SuperBASIC initially and can then be used from commands or from within a program. Enhancements include printer spooling (print a file while running a SuperBASIC program); improved file access (with full random input/output command); job control (allows management of multi-tasking programs including the ability to display, alter priorities, and delete jobs from the QL); and SuperBASIC screen editor.

Written by Q Jump – £24.95.*

World-beating chess!

QL Chess – fresh from its victory at the World Microcomputer Chess Championship. This program sets a completely new standard for games software.

There's a high resolution display, animated 3-D graphics, and 28 levels of play from novice to champion. Features include an openings book of nearly 4000 moves, HINT and TAKEBACK functions that help you learn from your mistakes, and the option to play a human opponent or the computer.

Written by Psion – £19.95.*

Software at work

QL Touch 'n' Go – a unique approach to learning touch-typing skills. The program is designed to give you mastery of the standard QWERTY keyboard in just 24 hours. With practice, you should soon reach 40 words per minute, with over 95% accuracy.

Written by Harcourt – £24.95.*

QL Cash Trader – a unique computerised book-keeping system for small businesses. The program provides a complete course in the principles of accountancy, and goes on to become an essential aid in the day-to-day running of a business. Complete with comprehensive manual.

Written by Accountancy Software of Torquay – £69.95.*

*This title is available from
Sinclair Research on
0276 686100, and selected
Sinclair stockists nationwide.

Psion troubleshooting service

All QLUB members can obtain special assistance from Psion on using the QL Quill, Abacus, Archive and Easel programs supplied with the computer. Psion will normally answer any queries within 48 hours.

Free updates

QLUB members will also receive one free update of each of the four QL Programs – incorporating many new developments.

New QL Hardware

An industry is born

From the moment of its launch, the revolutionary QL attracted massive interest from all quarters.

In one area, the interest quickly turned to action, as high-tech hardware manufacturers realised the immense potential of the QL for vast expansion, for system development and for

widespread networking. Already the list of peripherals for the QL is very exciting – and lengthening by the day!

Here, we've covered many of the latest, most important developments.

As more appear, be sure to keep in touch with QL News!



The dedicated Sinclair Vision QL monitor

Once you see the incredible graphics capabilities of the QL you may decide an ordinary TV just can't do them justice.

If that's the case, a high-resolution monitor is needed. (And if you're creating presentation-quality charts, for example, it's quite essential.)

The new Vision QL monitor is specially designed for the computer by Kaga Electronics, with full support from Sinclair Research.

So it exploits the QL's maxi-

mum 512 x 256 pixel resolution to the full, with a pin-sharp 85 column display.

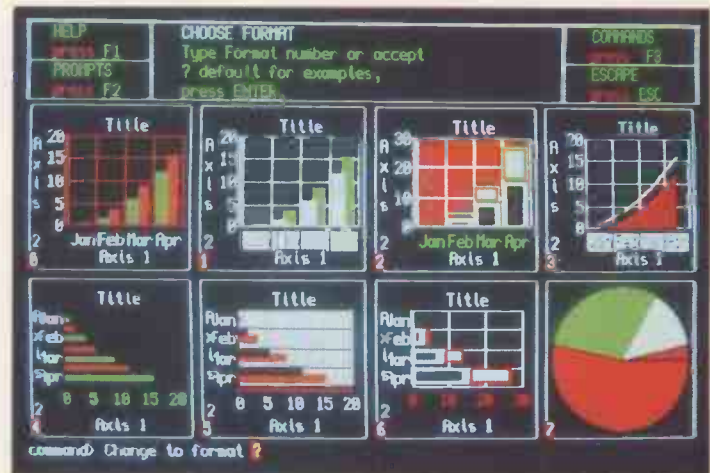
It's also specially styled to suit the QL – in looks, and in use. There's a 12" non-glare tube, and etched screen to diffuse reflections.

So the display is bright, sharp, *much* easier to look at... and invaluable for those late-night programming sessions!

And like the QL, the Vision monitor is designed with space in mind: it has a compact foot-

print of just 12½" by 15" – no more than a typical portable typewriter.

It's available from MBS Data Efficiency on 0442 60155 and selected Sinclair stockists.



Microdrive cartridges. Another Sinclair first!

Microdrive cartridges are the QL's own unique storage media. Each stores up to 100K of information, on a cartridge no

bigger than a matchbox!

Access is within seconds. And in tests, Microdrive cartridges have made over 50,000 passes

without loss of data.

Over 500,000 cartridges are now being used throughout Britain. And QL Microdrives themselves are standard equipment on the new ICL One Per Desk.



Sinclair Microdrive cartridges—up to 100K of programs and data on a medium so compact you can pop it into your pocket.

Powerful hard-disk system

For the QL business user, the new Firefly QL Winchester disk will boost the QL's power in one huge leap.

Designed by Quest, it uses CP/M and offers all the benefits of Winchester technology: fast access, reliability, compact size and quiet operation.

With 7.5 Mb storage, the Quest Firefly is ideal for large databases such as stock or cus-

tomers lists. And at under £1,200, it represents exceptional value for money.

The Firefly will be available very shortly from Quest on 04215 66488.



Winchester hard disk drives supplement your QL's built-in mass storage.

Interface options

The QL comes complete with two built-in RS-232C interfaces.

In addition, interfaces for Centronics printers are widely available from manufacturers such as CST, Miracle Systems and Sigma Research... with

prices from only £35.

And that's just the beginning. For attaching scientific and laboratory instruments to the QL, CST even offer an IEEE-488 interface, which can handle up to 16 connected devices simultaneously!



A Centronics interface slips discreetly into place.

Expansion boards for up to 4 times more memory!

Also from Quest, a simple and inexpensive way to expand the QL's RAM: with memory expansion boards.

These compact units connect to the standard QL expansion port, using the QL's internal power source or, for larger boards, an external power source.

The units range from 64K and 128K RAM boards to massively powerful 256K and 512K RAM boards, so there's something for every user.



Compact expansion boards.

Prices start at £117, and the 512K board is a very cost-effective investment at just £587.

With affordable memory like this, the QL is more than a match for any other micro under £2,000!

The spec behind the spectacle

CPU—Central Processing Unit
Fast, powerful Motorola 68008 chip. A second processor, an Intel 8049, controls the keyboard, generates the sound, and acts as an RS-232C receiver.

RAM
128K. Now expandable to 640K.

ROM
48K.

Operating system
Qdos—revolutionary single-user, multi-tasking, windowing operating system.

Storage
Twin built-in QL Microdrives. Up to 100K storage each—transfer rate, up to 15K per second.

Keyboard
Full moving 65-key QWERTY, five function keys, four cursor keys.

Language
Sinclair structured SuperBASIC.

Application software
QL Quill—word processor
QL Abacus—spreadsheet
QL Easel—graphics
QL Archive—database
All four packages supplied with the QL.

Interfaces
Two serial RS-232C interfaces, Microdrive expansion port (up to 6 may be added), ROM cartridge port, local area network, 2 joystick ports, RGB monitor and TV output.

Text screen
Various modes—up to 85 columns by 25 rows on monitor. On TV, up to 60 columns.

Graphics resolution
512 x 256 pixels (four colour),
256 x 256 pixels (eight colour).

Sinclair Research Ltd
Camberley, Surrey, GU15 3BR.
Tel: Camberley (0276) 686100.

sinclair

Where to find the QL. The Sinclair QL is available at selected branches of Dixons, W H Smith, John Lewis Partnership, Currys, Greens in Debenhams and Ultimate, and larger branches of Boots, John Menzies and specialist computer stores nationwide.

sinclair, QL, QLUB, and Qdos, are trademarks of Sinclair Research Ltd. Quill, Easel, Archive and Abacus are trademarks of Psion Ltd. Due to our policy of continual product improvement, Sinclair Research Ltd reserve the right to alter specifications at any time.

● Circle No. 135

Any colour you want...



and black.



Anadex DP-9725B
four-colour printers

ANY colour you want – and black of course. That's the Anadex DP-9725B new full colour printer.

Dreary diagrams are revitalised and words and figures are highlighted to emphasise important points. These are what most offices need today. And Anadex designed the machine to give good print quality and high speeds at low cost, using a 4-colour ribbon and dual-pass capability. The advanced technical features offered are: – a brisk 240 cps., operating modes that include data processing, draft and correspondence quality and high resolution graphics at 144 dots/in.

VDU colour displays from the IBM PC colour system are effortlessly transferred to hard copy by means of a free diskette supplied with the DP-9725B.

And a printhead life of more than 500 million characters – that adds up to a lot of colour . . . and a touch of class.

For further details of your nearest supplier, contact Anadex at the address below:

Anadex Ltd., Weaver House,
Station Road, Hook, Basingstoke,
Hants. RG27 9JY
Tel: (025672) 3401 Tlx: 858762



>NEXT MONTH

>NEW AND IMPROVED!

Look carefully for your copy of *Practical Computing* next month: you should find us hiding behind a new front-cover logo. Having reached the ripe old age of seven – well nearly – we are due for a facelift

And the changes won't just be cosmetic. We are planning a new series of features for the next financial year which will make the magazine even more valuable to the serious user. Naturally there is a price to be paid for all this, but in your case it's just 10p a month more – a measly £1 will still get you an issue of *Practical Computing*.

>WORD PROCESSING

In the April issue special section *Practical Computing* takes its annual look at the field of word processing. We will be surveying the latest developments in the field, from the cheapest to the most sophisticated systems.

>REVIEWS

Two of the most important programs in all of microcomputing – WordStar and dBase II – have recently appeared in new guises. But it is by no means certain that the new ones are going to replace the old. We'll be taking a first look at the new WordStar 2000 and reconsidering dBase II to find out. Robert Piper will also be reviewing an important new IBMulator, the Wyse PC, from the famous terminal manufacturer.

>AND MUCH MORE..

In next month's programming section we'll be looking at multi-tasking on the BBC Micro, while Roger Cullis continues his step-by-step analysis of the BBC's ROM. Our regular CP/M spot will provide an improved screen listing function.

Plus there will be all the latest news and regular columns to keep you in touch with what's really going on in the wide world of microcomputing.

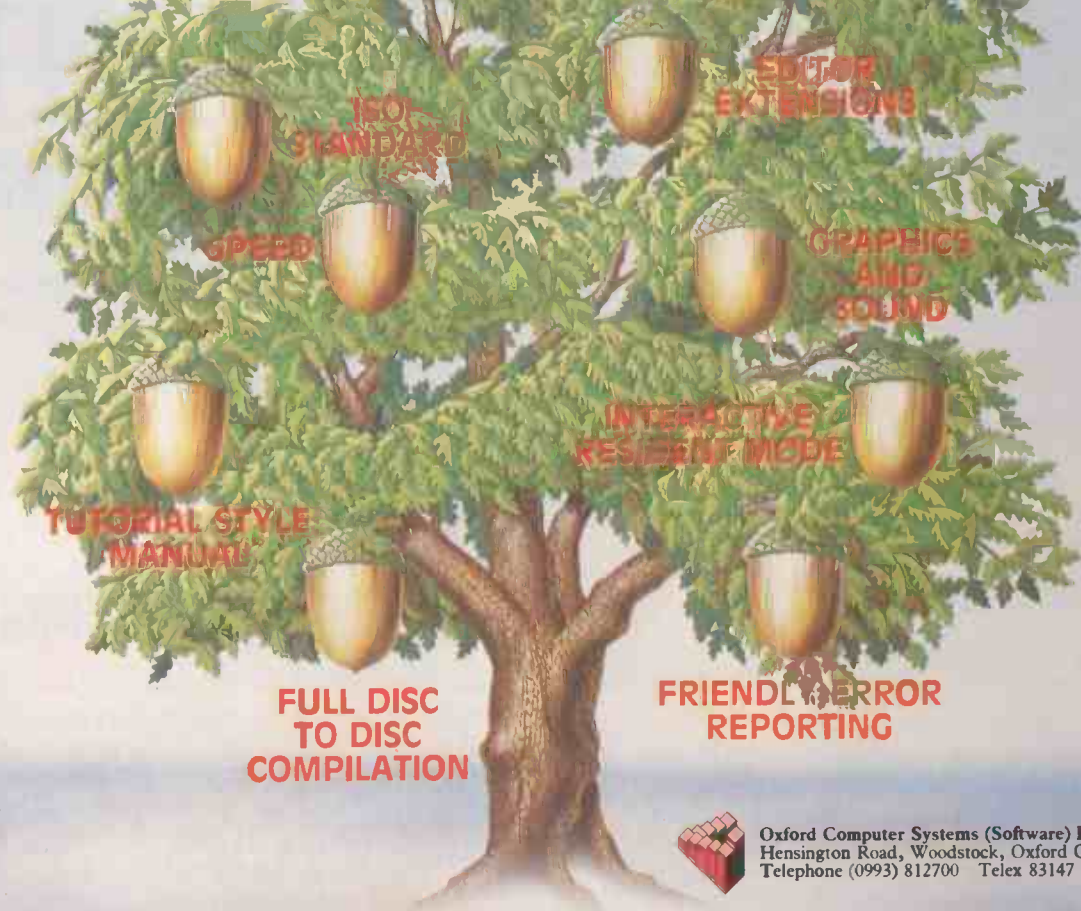
Don't miss the April issue of

Practical Computing

On sale at WH Smith and all good newsagents after March 14.

Contents may vary due to circumstances beyond our control and are subject to change without notice.

OXFORD PASCAL



Oxford Computer Systems (Software) Ltd.
Hensington Road, Woodstock, Oxford OX7 1JR, England
Telephone (0993) 812700 Telex 83147 Ref. OCSL

Compilers like these don't grow on trees

Oxford Pascal is Fast

Oxford Pascal compiles down to FAST COMPACT P-code, giving you the real speed and power of Pascal, together with the ability to compile very large programs.

Oxford Pascal is Standard

Oxford Pascal is a full extended implementation of Standard ISO Pascal. This means that you can compile any Pascal program (subject to size), written on any computer, anywhere.

Oxford Pascal is Compact

Because it compiles into P-code, Oxford Pascal reduces programs into the most compact form possible. In fact it allows you to pack more code into your BEEB than any other language, and should your programs become too large, you can still use the CHAIN command to overlay limitless additional programs without losing data.

Graphics & Sound Extensions

In addition to the entire Pascal language, Oxford Pascal features a whole range of Graphics (all modes) and sound extensions designed to make maximum use of the BBC Computer. Oxford Pascal also provides numerous extensions such as hexadecimal arithmetic and bit manipulation instructions.

Oxford Pascal in Education

In Education, Oxford Pascal is fast becoming a *de facto* standard. It is already the most popular Pascal on the Commodore 64, and will soon be released for the Spectrum and the Amstrad. In fact, Oxford Pascal will soon be available for 90% of the computers installed in the U.K., and is already available in German, French, Swedish, and American versions. Students and teachers alike find that it makes sense to use a standard implementation of Pascal across the whole range of educational micros. Call us for details of our generous educational discounts.

Manual

Both these compilers come with a manual which has been carefully designed, not only as a quick reference guide, but also as a full

tutorial for those new to Pascal.

Resident and Disc Compiler

Oxford Pascal comes in two forms:

For Tape Users...Oxford Resident Pascal.

A compiler located largely in ROM which is available at any time. Programs can be written and compiled on the spot without disc or tape access, and compilation is fast enough to make using the compiler much like using the BASIC interpreter. Thus, learning Pascal is a simple interactive process. Some 15K of memory is available for user programs, the remainder being reserved for compiled object code.

For Disc Users...Oxford Disc Pascal offers all the above PLUS...

a full disc compiler which is capable of using the WHOLE memory for Pascal object code, it is supplied with a powerful LINKER, allowing you to break large programming tasks down into separately compilable, easily-manageable files.

Friendly Error Messages

Many compilers produce little more than an error and line number to help correct mistakes in Pascal programs. Oxford Pascal however, gives you one of 49 friendly and informative error messages. Messages which not only indicate the reason for an error, but also print out the line in question with a pointer to the exact position where the error was detected. Run-time errors are reported using line-numbers from the original source-program, with a full explanation of how the error occurred.

Powerful Editor

With Oxford Pascal there is no need for you to learn how to use a new Editor. Pascal programs can be entered in exactly the same way as BASIC programs, without the need to learn any new commands. When you are used to using Pascal, you will find our extensions to the Standard

Editor even more useful. What is more, Oxford Pascal allows you to mix BASIC and Pascal together, in much the same way that you can mix BASIC and assembler. In fact you can, if required, mix all three together...BASIC, Pascal and assembler...in one program.

Stand Alone Code

Unlike other compilers, Oxford Disc Pascal allows you to compile on the BBC and then relocate your program so that it will run on the BBC and on the Electron. The relocated program will run without a Pascal ROM and can be loaded and run from tape or disc just like any other program.

This means that you can distribute or sell your software freely and without the need for ROMs, to run either of the above machines.

Price/availability matrix

	BBC 'B'	ELECTRON	C64	SPECTRUM
DISC	£49.95	Not yet!	£49.95	Available April 1st 1985
CASSETTE	£39.95	£59.95 Inc. Cartridge	£22.95	

All prices are inclusive of VAT
Please add £2.00 for postage and packing.

Oxford Compilers — The Future

During the next year, we at Oxford will be releasing a series of language implementations such as C, and Modular 2, for the BBC, and other popular micros.

These compilers are being built, using the most modern techniques in automated compiler construction, and will bring to the micro-user, a level of robustness and efficiency, only now becoming available to mini and mainframe users.

Oxford...
the Compiler
Compilers.

● Circle No. 136

Oxford Pascal Order Form. Please make cheques payable to OCSL Ltd.
Please rush me my copy of Oxford Pascal. I enclose £
including £2 postage and packing.
I would like my compiler supplied on DISC CASSETTE

My computer is BBC 'B' ELECTRON C64 Please tick as appropriate

Name _____
Address _____
Postcode _____
Telephone _____

REM DI



Control where you want it

The Remodi Manufacturing Control System can direct your company to more efficient inventory and programme control,

The following integrated modules are now available.

- **Bill of Material**
- **Materials Requirements Planning**
- **Purchasing**
- **Goods Receiving**
- **Inventory Management**
- **Inventory Accounting**
- **Stores Control**

The Remodi Manufacturing Control System will run on microcomputers operating under MS-DOS, TURBOdos, CP/M, CP/M86, MP/M and MP/M86. S100 BUS or Local Area Networks are suitable for installation.

For more information on Remodi, please return the coupon.
Dealer and Agent enquiries are welcome.

Remodi Manufacturing Software
Please send me further details
of the Remodi Manufacturing Control System.

Name _____

Position _____

Company _____

Address _____

Telephone _____ PC3/85

Remodi Ltd., Rothesay House, Rothesay Place, Glenrothes, Fife, KY7 6PW. Tel. 0592 759317.
Telex: 728239. FAX: 751196.

● Circle No. 123



Extra Compatibility The A-200 is fully compatible with the IBM PC, giving access to the world's widest range of software and peripherals. It uses MS-DOS, the industry-standard operating system, and GW-BASIC, the most popular language. So it's totally in step.

Extra Speed Unlike many other PC's, the A-200 has the 8086 processor and uses a 16-bit data bus. So it's quicker thinking.

Extra Memory The A-200 has a basic memory of 256 K, expandable to 512 K, plus twin 360 K disk drives. So it's harder working.

Extra Expandability The A-200 has built-in Centronics and RS 232C interfaces, leaving 4 expansion slots for optional extras such as Winchester disks up to 140 MB and local area

networking. So it grows with your business.

Extra Desk space The A-200 has a tilt and swivel, high resolution screen and an IBM compatible keyboard layout. It's not only quieter and better looking than most PC's, but smaller and lighter too. So it won't cramp your style.

Extra Quality Canon's unrivalled expertise in optics and micro-electronics, plus a world-wide reputation for excellence in business machines, is the ultimate guarantee of quality in the A-200. So you know it won't let you down.

Extra Value At £1,875 for the A-200 monochrome package, all these extras are standard. So you do get more for your money.

IBM is a trade mark of International Business Machines Corporation
MS-DOS and GW-BASIC are trademarks of Microsoft Corporation
Centronics is a trade mark of Centronics Data Computer Corporation.

A-200

PERSONAL COMPUTER

As sure as the sun rises
in the East,
this is a better value
personal computer.
Because so many extras
are standard.



POST TODAY

To: Canon (UK) Ltd., Computer Systems Division, Canon House, 2 Manor Road, Wallington, Surrey SM6 0AJ. Tel: 01-773 3173. Facsimile: 01-773 2156.

Please send me extra information about the A-200 Personal Computer.

I'd also like to know more about other Canon Computer products.

TX-50 Counter terminal

HT-5000 Handy terminal

LBP-8 Laser printer

Tick boxes

Name _____

Company _____

Position _____

Address _____

Telephone _____



Canon COMPUTER SYSTEMS



● Circle No. 159

Official Business Machines
of The Football League

DON'T DEAL WITH THE REST, DEAL WITH THE BEST

ATA The market leaders!...

PARTICIPATE IN OUR SUCCESS!
 Become an ATA franchise
 Ring (0727) 34361 NOW
 and speak to Charmian Rowley!

apricot

Apricot F1e 128k RAM single 315k Disk Drive.....	848.00
Apricot F1 256k RAM single 720k Disk Drive.....	985.00
Apricot PC 256k RAM single 315k Disk Drive.....	1150.00
Apricot X15 256k RAM 5mb S/S Drive.....	1999.00
Apricot X110 256k RAM 10mb D/S Drive.....	2299.00
Apricot Monitor.....	170.00

The complete range of Apricot computers and Apricot software is available. Please phone for details.

PRINTERS AND PLOTTERS

Epson RX80.....	249.00
Epson RX80F/T.....	289.00
Epson RX100.....	415.00
Epson FX80.....	360.00
Epson FX100.....	499.00
Epson H180 Plotter.....	349.00
Centronics Horizon H80.....	375.00
HP ThinkJet Printer.....	375.00
HP LaserJet Printer.....	3195.00
HP 7470A RS232 or HP 1B A4 Plotter.....	985.00
HP 7475A RS232 or HP 1B A4 Plotter.....	1549.00

HEWLETT PACKARD PERSONAL COMPUTERS

We have a selection of Hewlett Packard demonstration hardware and software for sale at enormous discounts. Please ring for details.

Macintosh

Macintosh 128k computer.....	1499.00
Macintosh 512k computer.....	2149.00
External Drive.....	299.00
10" Imagewriter with accs. kit.....	355.00

Macintosh

FileVision.....	134.00
Multiplan.....	141.00
Chart.....	110.00
Word.....	119.00
File.....	119.00

Full range of Macintosh Software available.

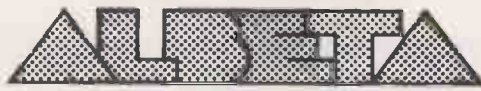


Apple IIC 128k RAM 80 col.....	765.00
Apple IIe 64k Computer.....	449.00
Apple III 256k Computer.....	1690.00

IBM ACCESSORIES

Hercules Graphics Card.....	355.00
Hercules Colour Card.....	178.00
Sigma Maximiser Multifunction Card.....	266.00
The NEW Quadboard.....	295.00
PC Express Accelerator Card.....	626.00
64k memory upgrade (9 chips).....	49.00
E/Buffer Printer Buffer.....	from 58.00
Torus Icon Local Area Network.....	POA

BUYING AN IBM PC THEN FIRST CONSULT



IBM PC AUTHORISED DEALER*



FOLLOWING ALBETA'S SUCCESSFUL TAKEOVER OF ATA WE WILL CONTINUE TO OFFER THE BEST VALUE FOR MONEY COMPUTER PRODUCTS, INCLUDING THE IBM PC AND ALL IBM SOFTWARE

IBM PC SYSTEMS

IBM PC Business Starter System:	
IBM PC 128k RAM, 2 disk, monitor, keyboard.....	1675.00
IBM wordprocessor, spreadsheet, filing s/ware.....	270.00
IBM PC Office System:	
IBM PC 128k RAM, internal 10mb hard disk, 360k disk, DOS 2.1, monitor, keyboard.....	2295.00
Wordstar, Multiplan, DMS+.....	549.00

IBM PC XT Executive System:	
IBM PC XT 256k RAM, 10mb hard disk, 360k disk, DOS 2.1, monitor, keyboard.....	2895.00
Multimate, dBase III, Lotus 1-2-3.....	1049.00
Accounting System:	
Pegasus. (Sales, Purchase, Nominal, Invoicing Stock, etc.).....	per module 180.00

Terms and Conditions upon application.
 30 days credit available for official orders from plc's and public sector organisations subject to 5% credit charge. Please phone for details.



PRICES EXCLUSIVE OF VAT AND CURRENT AT TIME OF PRINTING.



ATA IS A DIVISION OF ALBETA

LONDON 4 Albion House, 1 Back Hill, EC1	01-833 0044
* ST. ALBANS 9 Adelaide Street, St, Albans	(0727) 34361
SHEFFIELD 72 Eldon St, Sheffield S1 4GT	(0742) 700802
POTTERS BAR 197 High St, Potters Bar	(0707) 57113
SOUTH WEST Cwrt-y-Gaer, Wolvesnewton	(02915) 700
NORTH WEST 32 Greenfield Ave, Parbold, Wigan, Lancs	(02576) 3113
TELEX 946240 CWEASY G (Please quote REF: 19003030)	

Please telephone for the latest price list

TurboDOS power for multi-user networking



It's not easy to build an effective multi-user system. It takes experience, confidence and, above all, a superior operating system.

HM Systems possess all three qualities in large supply, and we've put them into Minstrel 2, our latest model.

Experience has shown that multiple workstations and resource-sharing call for multi processor architecture. That way, every user gets their own computer and performance doesn't suffer.

Confidence comes from using proven S100 technology. We've seen too many systems fail by being based on "next year's industry standard". We'd rather settle with this year's working solution. Wouldn't you?

Which is not to say that we're behind the times.

Our state of the art HTS 86 dual processor card was developed to provide two 16 bit computers on a single board.

This means 16 bit computing power at 8 bit prices for you.

We simply prefer evolutionary to revolutionary development.

Make no mistake, any multi user system is only as good as its operating system. Minstrel 2 uses TurboDOS® We've not come across a more flexible and powerful tool.

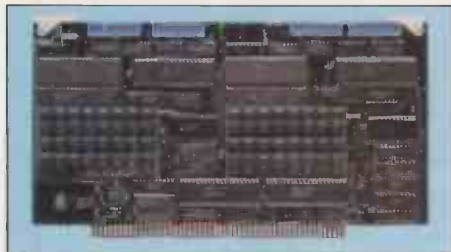
TurboDOS reads programs written for CP/M II,† CP/M 86, MP/M II, MP/M 86, has PC DOS emulation, and allows IBM PCs or lookalikes to share the resources of a Minstrel 2 system.

Networking is integral.

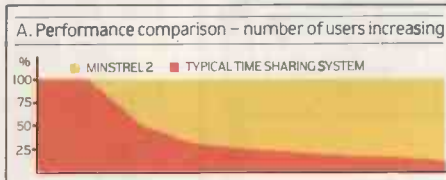
Minstrel 2 can communicate with all leading mainframes. And we can prove it.

Entry cost for a two-user system with 20Mb hard disk capacity is £6250.00. Additional workstations cost £1110.00 inclusive.

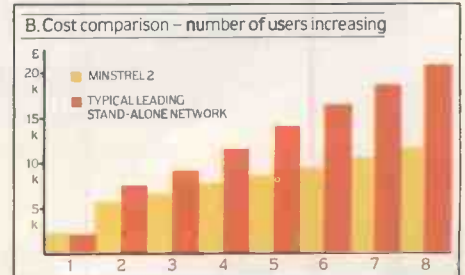
Write or call for a full colour brochure. You won't get a hard sell. With experience, confidence and the best operating system, we find the facts speak for themselves.



HM Systems HTS 86. 16 bit performance at 8 bit prices.



Costs rise and performance suffers when a number of terminals share a common processor. Graph B shows a network of leading stand-alone computers when compared with Minstrel 2. Graph A shows the effect on performance of timesharing compared with Minstrel 2.



TurboDOS™ TurboDos is the registered trademark of Software 2000 Inc.

†CP/M and MP/M are registered trademarks of Digital Research Inc.

HM Systems Limited,
220 The Vale,
London NW11 8HZ
Telephone: 01-209 0911
Telex: 266828-HMS G
Easylink: 19001060

● Circle No. 155

HM Systems

TOP VALUE from **NEC**...



the **ADVANCED Personal Computer (APC)**
from only **£1,735 + vat**
including free **NEC dot printer + MSDOS or CPM**
or free **MSDOS + WORDSTAR + MULTIPLAN**

STANDARD FEATURES

- **SPEED:** full 5 MHz 8086 16 bit processor (true 16 bit data).
- **CAPACITY:** One or two ONE MEGABYTE 8" disks (1.2 Mb each under MSDOS)
- **MEMORY:** 129K user RAM + screen RAM + system ROM + battery-backed CMOS non-volatile RAM & clock/calendar.
- **OPERATING SYSTEMS:** MSDOS 2.11 or CPM-86 or CONCURRENT DOS (CPM).
- **HIGH RESOLUTION:** 8 x 19 dot character screen definition, (25 lines of 80 characters + 26th system status line), 12 inch green screen.
- **AWARD WINNING NEC 7220 graphic chip** in character mode, 256 standard character set includes maths/greek & graphic symbols. **ADDITIONAL 256 USER-PROGRAMMABLE shape character set(s).**
- **DETACHABLE KEYBOARD:** Fast buffered 61 key + 25 key numeric/cursor pad + 22 dual mode function keys with labelling facility (16 of which will each hold two 15 character user-defined strings).
- **SERIAL RS-232:** Up to 19,200 baud synch/asynch. **PARALLEL printer.**
- **SUPERB MANUALS:** operating level to full technical spec (US written).
- **COMPACTNESS:** 19 inches wide, 24 inches deep, 14 inches high.
- **PRICE:** unbelievable for the quality of this product from the mini-computer division of NEC (world's 3rd largest micro manufacturer).

OPTIONAL EXTRA FEATURES

- **EXPANDABLE USER MEMORY:** in 128k units to 640k RAM.
- **HARD DISKS:** one/two (10-20 MB formatted), floppies ideal for backup.
- **8 COLOUR SCREEN:** (standard software uses colour optionally).
- **VERY HIGH RESOLUTION GRAPHICS:** 640 x 475 x 8 colour screen from 1024 x 1024 x 3 bit mapped array (384k extra RAM!). Hardware draw, pan & zoom using 2nd NEC 7220 controller. Fast! Macro shape generation etc.
- **32 BIT HARDWARE ARITHMETIC PROCESSOR:** 8087.
- **CONCURRENT CPM NOW AVAILABLE.**
- **8 BIT Z80 CARD NOW AVAILABLE** for dual standard 8 & 16 bit, 64k RAM, RAM DISK facility within user memory.

SOFTWARE

ALL GENERAL CPM-86 AND MSDOS SOFTWARE
CUSTOMISED software packages to your requirements for less than the price of a typical inflexible standard package — details on request.
ACCOUNTS: Own bespoke packages at two levels, SYSTEMATICS, PEACHTREE.
WORD PROCESSING: NEC Benchmark, Spellbinder, Wordstar, etc.
DATABASE: DBASE II, Rescue, Datastar, Friday! etc.
LANGUAGES: C, CB-86, CBASIC-86, Microsoft BASIC, COBOL, FORTRAN, PASCAL, PL/1.
COMMUNICATIONS: Asynch, IBM: Bisync 3780, 3270, HASP.

Brighton Computer Centre

130 Lewes Road, Brighton BN2 3LG
(0273) 673114 Mon-Sat 10am-6pm

Please send me further details of the NEC APC.

Name

Company

Address

Tel

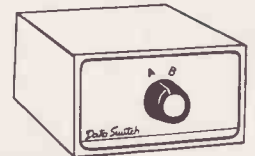
Application PC3/85

• Circle No. 117

PRINTER SWITCHES FROM HOMESTEAD ELECTRONICS

LINK TWO OR MORE MICROS TO ONE PRINTER, PLOTTER, MODEM ETC. OR VICE VERSA

- ★ ROBUST CONSTRUCTION
- ★ SCREENED, METAL HOUSING
- ★ FULLY TESTED
- ★ BI-DIRECTIONAL
- ★ NO POWER REQUIRED
- ★ 12 MONTHS GUARANTEE
- ★ OFFICIAL ORDERS ACCEPTED
- ★ 24 HOUR DESPATCH



SERIAL DATA SWITCHES

RS 232/V24. 25 way 'D' sockets

LINES 1 to 8 & 20	
Model R2 2 way switch	£49
Model R3 3 way switch	£57
Model R4 4 way switch	£65
Model R5 5 way switch	£73
Model R6 8 way switch	£110
Model RX 2 way cross-over	£65

ALL 25 LINES

Model V2 2 way switch	£65
Model V3 3 way switch	£77
Model V4 4 way switch	£89
Model V5 5 way switch	£101
Model VX 2 way cross-over	£89

PARALLEL DATA SWITCHES

CENTRONICS. 36 way sockets

Model C2 2 way switch	£79
Model C3 3 way switch	£99
Model C4 4 way switch	£119
Model C5 5 way switch	£139
Model CX 2 way cross-over	£119

IBM PC. 25 way 'D' sockets

Model P2 2 way switch	£65
Model P3 3 way switch	£77
Model PX 2 way cross-over	£89

IEEE-488. 24 way sockets

Model E2 2 way switch	£89
Model E3 3 way switch	£109
Model EX 2 way cross-over	£129

PLEASE ADD VAT AT 15%. ALL ITEMS CARRIAGE PAID
TRADE, EDUCATIONAL & EXPORT ENQUIRY WELCOME
CABLES ALSO AVAILABLE. EX STOCK & CUSTOM BUILT



HOMESTEAD ELECTRONICS

Trelawney Industrial Court
Trelawney Avenue, Langley
Slough, Berks. SL3 7UJ.
Telephone: (0753) 44269

• Circle No. 145

The Northern Amateur Radio Societies
Association will be holding their 23rd
Annual Radio & Electronics Exhibition
and Mobile Rally in the
CENTRAL HALL, BELLE VUE,
Redgate Lane, Longsight, Manchester
on Sunday, 10th March 1985
commencing at 11 a.m.

Admission will be £1 to the
exhibition.

OAPs and children 50p
Car Park facilities (80p) are available
as will be restaurant and bar.
Contests and a raffle will take place.
There will be a play area for children.
Talk in will be on S22, SU8 or any
other clear frequency

• Circle No. 104



I SPEND so much time writing about the technological jam promised for tomorrow, about 256K memory chips, 32-bit microprocessors and virtual memory, for example, that it is sometimes easy to forget that here and now for most people still comprises an eight-bit Z-80 based machine running CP/M and Microsoft Basic. Some readers may even feel that all this talk of Unix, 120Mbyte Winchester and high-speed arithmetic co-processors is the technological equivalent of having sand kicked in your face.

So this month I take great pleasure in introducing an advanced new product which is so old-fashioned that even owners of ZX-80s will be able to relate to it without flinching. It is a chip which relies for its success on eight-bit technology and the Basic language, and to which 2K of RAM is usually more than enough: in short, an immediate tonic for all readers who are suffering from a bad dose of future shock.

Strange

One of the strangest features of this ancient new device, to the uninitiated at least, is the manufacturer. It is not made, as you might expect, by the Luton Semiconductor Co-operative, but by the mighty state-of-the-art Intel Corporation. No, Intel has not abandoned its 32-bit plans and switched to alternative technology like wood-burning fires, windmills and eight-bit microprocessors. Its new 8052AH-Basic microprocessor is very much part of tomorrow's world, it just looks old-fashioned.

The new device is actually a member of Intel's growing family of single-chip microprocessors, which all squeeze processor, RAM, ROM, and I/O into single packages for use in embedded controller-type applications. The main difference with the 8052AH-Basic chip is that it has a built-in 8K ROM-based Basic interpreter which allows control programs to be written directly in a high-level language instead of the assembly code used by all other members of the Intel family.

Intel is not the first to introduce single-chip microprocessors with an on-board Basic interpreter. Zilog was first with its Z-8671 — one of the Z-8 family — closely followed by National with its 8073. Unfortunately both of these earlier devices had only a limited on-chip ROM area available, and so only a Tiny Basic was possible in the 2K Z-8 and the 2.5K 8073. Tiny Basics can be useful for simple control tasks, but anyone used to the facilities of the 8K Basics to be found on even the simplest personal computers would soon be put off. This is because of their restriction to integer arithmetic in the range -32768 to +32767, and their lack of any mathematical functions or string handling.

The 8052AH-Basic is just a pre-programmed version of the 8052AH, which itself has one of the largest ROM

Back to Basics

Intel's new CPU chip with built-in Basic joins the rest of the family.

arrays available, and so a full 8K Basic complete with floating-point arithmetic, string handling and transcendental functions was possible. However, despite the power of the Basic, the Intel chip is really intended for use in controller-type applications, not personal computers. As a result the Basic has many special control features not normally found on those machines.

To counter the usual criticisms that Basic is a messy, unstructured language, Intel has included the highly desirable Do-While and Do-Until statements in addition to the standard For-Next and If-Then-Else. Another major criticism of interpreted Basic in control applications is that it is very slow and cannot keep pace with many real-time control tasks. To overcome this limitation Intel has designed a fast, token-based interpreter and included a Call statement for fast access to assembly language subroutines. Combined with a 12MHz clock rate these features ensure that the 8052AH-Basic can keep up with most applications.

Clone

A complete system can be built by adding an eight-bit latch, a byte-wide static RAM chip, a crystal and a few discrete components to the 8052 itself. However, an RS-232 terminal of some kind is necessary to enter and debug programs. Using this basic three-chip computer for everyday tasks such as a heating controller or a burglar alarm is simply a matter of hooking up with appropriate I/O connections, plugging in a terminal — most home computers would serve adequately — and then entering and checking the required program. Once the system operates satisfactorily the terminal can be unplugged and, hey presto, you have cloned your home computer!

The standard 8052AH provides up to four eight-bit I/O ports. On the Basic version the two eight-bit ports, P0.0 to P0.7 and P2.0 to P2.7, are used together to form a multiplexed data/address bus capable of addressing up to 64K of external memory or other peripheral chips. Port 3 is dedicated to functions such

as console serial I/O and interrupts, leaving only port 1 available for custom I/O functions. If lots of extra I/O lines are required then external parallel peripheral interfaces such as the Intel 8255 can be used. Also available on the 8052AH and on the Basic version are three 16-bit timer/counters, a serial Usart interface used for the console device on the Basic device, and 256 bytes of RAM.

Volatile RAM

The simple three-chip system had to rely on external and volatile RAM to hold programs, and this is obviously undesirable for the more permanent applications where programs held in ROM or some other form of non-volatile memory would be preferable. To cater for this, Intel has built in a software-controlled PROM programmer facility which is capable of programming most varieties of EPROM and EEPROM device.

To use the programmer, you plug an EPROM into a socket mapped on to location 8000H and enter a program into RAM beginning at location 0200H. You then type Prog or FProg to specify whether an older 50ms. device, such as the 2716 or 2732, or one of the newer 1ms. devices, such as the 27128, is installed. The rest of the process is automatic, the RAM program being copied into the EPROM at the appropriate location ready for execution.

Up to 255 different programs can be copied into a single EPROM provided there is enough room, and each time the Prog command is used the system returns a new file number. EPROM programs can be executed by typing

```
ROM <file number>
```

which locates the correct program, followed by the Run command. A transfer command XFer is also available to copy EPROM programs back into RAM for editing when required. A complete self-contained EPROM system of this type could be built on a small pcb and used for a wide variety of dedicated control applications. □

With Quest the QL really means business



Executive Series



QL Expansion Console



Memory Expansion Board



Business Accounts Software



CP/M 68K



Disk Drive

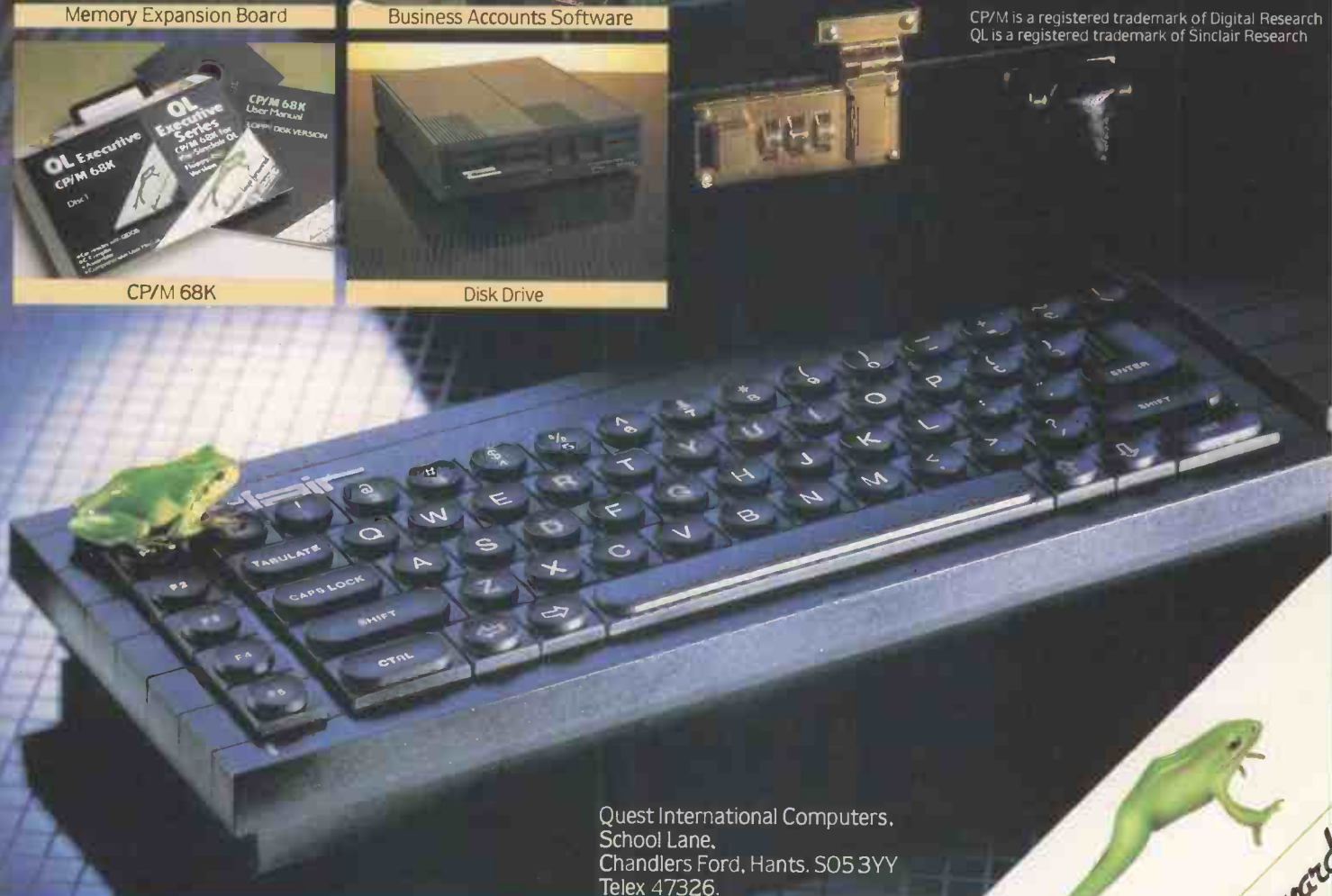
Quest's Executive series of quality peripherals and software for the Sinclair QL allows the business and serious home user to fully realise the full potential of the most exciting computer of the 80's.

Post the coupon below to obtain details of a wide range of Quest Executive products including:

- CP/M 68K
- Business Accounting Software
- Floppy and Winchester Disk Drives
- Memory Expansion Boards
- Monitors
- Printers
- Consumables

Telephone Sales Desk 04215 66488

CP/M is a registered trademark of Digital Research
QL is a registered trademark of Sinclair Research



Quest International Computers,
School Lane,
Chandlers Ford, Hants. SO5 3YY
Telex 47326.

Please send me details of the Quest Executive Series

PC3/85

Name _____ Tel. No. _____

Address _____ My QL Serial Number _____

Position _____ is _____

● Circle No. 124



Another leap forward
QUEST



International packet deal

BT's Packet Switch Stream can cut the cost of long-distance communication.

PERHAPS the most exciting aspect of computer communications is the possibility of linking up to systems in other countries. A modem meeting the correct standards is all that is needed, but this method is expensive and transmission quality is low.

Both these problems are overcome by the use of a digital network to relay transmissions. British Telecom provides a network known as Packet Switch Stream, PSS, and there are similar systems in many other countries. Each PSS user has a PSS number, and to link to users abroad you need only add a few numbers, the international code, to its number. The majority of computers linked to PSS are commercial, such as The Source, CompuServe, People Link, Dialog and so on.

A typical call to one of these systems, if dialled direct, would cost about £36 per hour, not including the connect time charges of the system being called. A call to the same system on PSS would cost only £6 per hour.

Cheaper

PSS is so much cheaper because it uses special techniques to send data. When you ring someone on your telephone, you use one whole line for the duration of the call. PSS splits up all data being transferred between two computers into blocks of 64 characters which have information about their source and destination added. The blocks are then sent one by one down the line, intermingled with blocks from other users. The block assembling, disassembling and intermingled transmission is all handled by the PSS exchange and is carried out so quickly that it is almost totally invisible to the user.

A typical session on PSS goes as follows:

- Dial the number of local PSS exchange and switch modem on-line.
- Wait five seconds to allow the carrier signals to stabilise.
- Press Return twice, followed by A2 and Return to initialise the PSS exchange. The PSS exchange then sends its identification code.
- Type in your 10-character PSS ID, called your Network User Identity or

1,200/75 baud BBSs

Name	Number	Password	User ID
Aberdeen Itec Abertel	(0224) 641585		
Club 403 on Vltal	(0203) 474645		403403403
C-View	(0702) 546373		
Estel	(0279) 441188		
Hackney Bulletin Board	01-985 3322	Public	
Northampton Bulletin Board Service	(0604) 20441		
Optel	01-794 0655		
System Aid	01-571 0026	Public	
Viewdata	(0752) 661866		

NUI, preceded by the letter N. PSS now replies

ADD?

- Type in the address of the computer system to which you want to connect: for example, CompuServe is on A93132 and People Link is on A9311031200070. The second character is always 9 for systems outside Britain, and 2 for systems in Britain; the game Multi User Dungeon is on A2206411411.
- Now follow the log-on instruction for the system you have called.

It costs £25 to join PSS, and on-line charges are £6 per hour to the U.S. plus £3.50 for every 64K sent or received. Inland charges are £1 per hour and £0.25 per 64K.

Further details are available from PSS Customer Service Group, G07 Lutyens House, 1-6 Finsbury Circus, London EC2M 7LY. Telephone: 01-920 0661.


Bulletin board update

WHAT IS probably the first specialised bulletin board in Britain has recently opened. Clinical Notes On Line is dedicated to holding news and messages of interest to members of the medical profession. It is described by its Sysop Mike Buckingham as a trailer for a full commercial system. CNOL is available 24 hours a day at 300 baud on (0524) 60399.

The British Apple Systems User Group has opened two Bulletin Boards. BABBS1, British Apple Bulletin Board, is

on (0394) 276306 and is run by Tony Game. BABBS2 is on (0268) 776956 and is run by Mike Jones. Both systems are on-line for 24 hours per day and work at 300 baud. They have a variety of special interest groups, some only of interest to Apple users. Among those of more general interest are groups covering Adventure, CP/M, Graffiti and Jokes.

The original Basug BBS has now become a commercial system. Pip BBS is run by Quentin Reidford and is on (0742) 667983. It runs for 24 hours per day at 300 baud and still has a number of files available which would be of interest to Apple users.

Metro BBS, run by Paul Beaumont, works 24 hours per day at 1,200/75 baud. It currently has some on-line adventure games, an art gallery and an adventure help section. Metro is on 01-341 7840. Another new BBS, OSI/Technical, is run by Frank Leonhardt 24 hours per day on ring-back at 300 baud. The system runs on a micro made by the now defunct Ohio Scientific and the homebrew software is constantly under development. If you have any problems while using the system please be patient, and leave a message to the Sysop. OSI BBS is on 01-429 3047. 

If you have discovered a new bulletin board or information system which you think would interest other readers, write to me with the details either here at *Practical Computing*, or via Electronic Mail on TBBS London, Telecom Gold 84:TCC051, or Prestel Mailbox 919993567. *Practical Computing* is on Telecom Gold 81:JET727.

Things are looking up

Two more ways to speed up the process of searching a table.

IF YOU are a regular reader of this column, by now you should be an expert in the techniques of table searching. Over the months, we have perused all the popular algorithms for table look-up, ranging from the classic binary search to the use of tree structures. This month we are going to continue our Cook's tour by taking a look at two further methods.

The first allows you to search a table before the searched-for value is fully known. It is often used where an operator is entering a value from the keyboard. The program can do a lot of its work during the short delays that occur between key-strokes, so by the time the final character has been entered, the required item has nearly been found.

Suppose you are developing software for a travel information service and you have a database of train times and fares to every railway station in the U.K. You want

the user to be able to type a place name, after which the program will respond with a screenful of helpful data.

Ideally, the searching should proceed as fast as the user can type. As an added bonus, you can arrange to stop the search the moment the user has entered as many characters as are needed to make the name unique. For example, Ipswich, Overton and Uttoxeter are among the dozen or so British railway stations that can be completely identified by their first two letters. By contrast, Chesterfield needs at least five letters to distinguish it from Chesham, Chessington etc., and a further three to avoid confusion with Chester.

The basic technique is fairly straightforward. You need a list in RAM of all the station names in alphabetical order. The timetable data will be held on disc. As each letter is typed, you move a pointer further up the table so that it always points to the

first entry which matches the portion of the target value entered so far. You then look at the following entry. If this is equal to the target you wait for more characters. Otherwise you know that the value pointed at is the required one and you process it accordingly.

First pass

Unfortunately, it takes a disproportionate amount of time for the first pass of this loop compared with subsequent one. This is because there are some 2,600 stations in the U.K. so an average of about 1,300 comparisons would be needed to locate the first letter. Even on a fast micro like the Olivetti M-24, this takes about five seconds in interpreted Basic, and most people type a lot faster.

To get round this, you can set up a second RAM table holding just 26 entries

Listing 1.

```
1200 'Skeleton of a program to demonstrate a method of searching a table
      at the same time as the target key is being built.
1210 'BIGTABLE$() is the table to be searched. Each entry is a key, of
      variable length, ending with a terminator char. (such as CR). Keys
      are in alphabetical order. The final entry contains all Zs.
1220 'INDEXTABLE(26) contains pointers to entries in BIGTABLE$(). Each
      value points to the first BIGTABLE$() entry that starts with one
      of the letters, A-Z.
1230 DEF FNFIRSTPART$(P,T$)=LEFT$(BIGTABLE$(P),LEN(T$))
      'This function returns a string consisting
      of the first few chars. of the Pth entry in
      BIGTABLE$(), of length equal to that of T$

1240 'Some other definitions:
1250   NO=0: YES=NOT NO      'Note all numeric variables are integers
1260 '
1300 'Now begin the processing
1310 WHILE YES              'Loop indefinitely
1320   OK=NO:
      WHILE NOT OK:
        ... get next char. in THISCHAR$ ...
        ... discard it if not A-Z ...
1330   POINTER=INDEXTABLE(ASC(THISCHAR$)-64))
      'Point to first entry in main table that
      starts with this letter
1340   IF POINTER>0 THEN
      PRINT THISCHAR$; : TARGET$=THISCHAR$: OK=YES
      'Echo char; TARGET will contain the key
      being built
1350   WEND                'If no entry starting with this letter,
      start again
1360   WHILE OK
1370     WHILE TARGET$<FNFIRSTPART$(POINTER,TARGET$):
      POINTER=POINTER+1:
    WEND                  'Advance pointer past all entries that come
```




corresponding to the letters of the alphabet. Each entry in the smaller array is a pointer to the first name in the main table that starts with the corresponding letter. It is like the thumb index that you sometimes see cut out of the edge of a large dictionary, and it enables you to go straight to the relevant section of the list. Although this arrangement will speed up the first iteration of the search, there is little point in extending it to subsequent characters since on average you only need 50 comparisons to locate the second letter, and just two for the third.

Another small problem is that the user must have some way of signalling when an entry has been completed. In most cases, this will not be needed because a unique match will be found before the name is completed. But you cannot always rely on this; if someone wants to go to Chester, how does the program know not to wait for the f in Chesterfield?

You need to define a terminating character — Carriage-Return is an obvious choice — and test for it each time a keystroke is processed. You can simplify this by storing the terminator at the end of each table entry, thus avoiding the need to test for it and to take special action when it is detected. By definition, a name plus the terminator will never be a sub-string of the following name, so the Chester/Chesterfield conflict will not arise.

By the same token, you can define a further character string to terminate the entire table. This will save you from having to test for table overflow each time you advance the pointer. A string of Zs will suffice.

To bring the whole thing together, listing 1 shows a skeleton program to illustrate these techniques. To keep it simple, details not strictly relevant to the table searching, such as accessing the database and displaying the results, are omitted. As far as trapping keystrokes is concerned, you can use a method that does not cause the program to suspend while it is waiting for the user. This can be achieved by `Inkey$` or `Constat%` in some Basics. For more about this, see "Two at a time", *Practical Computing*, April 1984.

Refinement

Some further refinements to the skeleton program are necessary. If the program fails to find a match it ignores the whole of the user's entry. In a real system, something more elegant would be needed. You would also require some form of error correction to allow the operator to backspace over a typing mistake, with the program adjusting the pointer as necessary. Finally, there should be a mechanism for ending the entire process when it is time to go home, rather than looping indefinitely.

The second table look-up method is a variation of the binary search, known as interpolation searching. Many books on programming wrongly describe the binary search by analogy with a telephone directory. To look up a name in the phone book, they say, you open it in the middle, decide whether the name falls before or after the open page, then open that half of the book in the middle, and so on until the name is found.

This might be an accurate description of a binary search, but it bears no resemblance to the way you use a phone book. In real life, you start by making a rough estimate of where in the book the name is likely to appear. You would expect to find a name starting in D roughly one-sixth of the way into the book, while a name beginning with T would be about three-quarters of the way through. Having opened the book according to your initial guess, you might well repeat the process for a second try. If you were looking for D but found E, you would probably go back a distance of about one-fifth of the portion of the book before the open page, and so on.

Such is the principle of the interpolation search. With a conventional binary search, the program works by considering progressively smaller sub-lists, each sub-list being one-half of the previous one. With interpolation searching, the program estimates the size of each sub-list according to the actual value being sought. It assumes that the values are evenly distributed and estimates the likely position of the target value by reference to the two boundary elements. This is shown in listing 2. The routine is identical to a normal binary search except for the calculation of the variable `Current` in line 2020. With a binary search, this pointer would be half the sum of `Low` and `High`.

Given a reasonably even spread of values, using interpolation will nearly always reduce the number of iterations needed to conduct the search. Whether or not it is faster will depend on the relative speeds of calculation and comparison in your system. □

```

                                before the target, as entered so far
1380  IF TARGET$=FNFIRSTPART$(POINTER,TARGET$) THEN
      IF TARGET$<>FNFIRSTPART$(POINTER+1,TARGET$) THEN
          ... BIGTABLE$(POINTER) is ...
          ... the required entry ...
      ELSE
          PRINT THISCHAR$; : TARGET$=TARGET$+THISCHAR$
          ... then get next char; discard it if not ...
          ... A-Z or terminating character ...
      ELSE
          OK=NO: ... execute procedure for rejecting the key ...
1390  'If current entry is the last one that matches,
      this is a hit; if no further matches exist,
      echo char and get next; if no matching
      entries, reject entire key

1400  WEND
1410 WEND
    
```

Listing 2.

```

2000 'To find ITEM in ARRAY() of SIZE elements, using binary search with
      interpolation. (All variables are defined as integers.)
2010 LOW=0: HIGH=SIZE
2020 WHILE LOW<HIGH:
      CURRENT=LOW+INT((ITEM-ARRAY(LOW))*(HIGH-LOW)/(ARRAY(HIGH)-ARRAY(LOW)))
2030 IF ITEM<ARRAY(CURRENT) THEN
      HIGH=CURRENT-1
      ELSE
      IF ITEM>ARRAY(CURRENT) THEN
          LOW=CURRENT+1
      ELSE
          .... item found ...
2040 WEND
2050 ... item not found ...
    
```


Q Can the Advance 86A be connected either to the disc drives on an Apricot or to a 5.25in. drive?

P J Newcombe

A It is theoretically possible to hook up the discs from any computer on to any other, but this almost always requires special hardware to be built, making the project expensive. Alternatively you can often loosely couple two machine by wiring together the RS-232 ports on both machines. The Sirius has an RS-232 but the Advance 86A does not, so this technique cannot be used. Somewhat harder, but still feasible, you could connect the Advance 86A parallel port to the Sirius parallel port.

To connect your own 5.25in. drive to the 86 you need the following hardware: an extra power supply, a disc controller board, the drive itself and a cable to connect to the motherboard on the 86. In addition you need MS-DOS software to make it all work. Not a job I would start!

Q My problem is that I have recently bought the latest WordStar version 3.3. The installation program with this version is very much easier to use than earlier versions, but they have removed the patching facility which allowed you to alter specific bytes in the earlier versions. I would still like to be able to do this.

D C J B Bookless

A The Install program with versions of WordStar up to 3.0 offers the user in turn a choice of terminals, printers, communication protocols and drivers. Merely by saying that modifications are not complete you are then given easy access to a patcher routine which you may use to alter any other areas in the program. WordStar 3.3 has a much improved installation program called WInstall, which is easier to understand and more straightforward. It allows you to choose the terminal and the printer, and you may set a number of WordStar features, such as the default help level, page length or right margin. Finally it incorporates some features concerning the operating

ASK IPC

system. It does not allow direct access to the patcher subroutine, but it seemed improbable that Micropro would really throw away a useful feature like the patcher subroutine, so we explored further.

A special unpublished command will allow you to access the patching subroutine. Run the WInstall program as usual. When the menu appears type + to go to the patcher subroutine, and you can then modify bytes in the user area in much the same way as was possible with earlier versions of WordStar.

So far as we know the mnemonics of WordStar symbols used are the same as in

earlier versions, and you may read and display the contents of any byte by typing a : followed by the name of the symbol. So :SCRISZ, for example, will display the hex value corresponding to the number of columns that WordStar moves the screen during horizontal scrolling, when editing long lines. You could either leave this unchanged, by pressing Return, or change the value by typing the equivalent hex value.

Other bytes may be examined or changed in the same way. It is easier to use the WordStar menu than the patcher if the features you require are in the menu, but by

WordStar on an Apple II

Q I have an Apple IIe with dual disc drives, an 80-column extension card, a Z-80 card and CP/M, and an Ensign 1650 printer. My copy of WordStar has been configured for a Diablo printer, and it seems to work. Unfortunately when I print a document, the second and fourth lines appear with the letters in the wrong order:

```
Twinkle, twinkle, little star,  
;era uoy erehw rednow l woH  
Up above the world so high,  
.yks eht ni dnomaid a ekiL
```

Please can you explain what is wrong?

B Wilbraham

A The inverted order of the letters on the second and fourth rows is easy to understand. Your copy of WordStar was configured for a Diablo printer, and the installing procedure altered WordStar itself so that it sent the appropriate control code to the printer to make it do bi-directional printing. This avoids wasting time for the print head to fly back, but WordStar must transmit the characters for the second line in the reverse order.

I suggest that you try using a dot command at the beginning of your data file to switch bi-directional printing off: put .BP 0 starting with the dot in column 1 on the first line of your data file. I expect that this will cure your problem, but you may encounter other snags with WordStar configured for the wrong printer. Try it and see.

The best and permanent solution is to run the Install program to alter WordStar to drive a different printer. If your printer is not on the menu of printers you can install any printer to run as a Teletype, with no special features. After referring to the printer manual you may be able to install some of the special features as well.

using the patcher you can alter other features, including the proportional-spacing routines which are present in WordStar but not supported by Micropro.

Q Having recently retired it has occurred to me that a home computer might be of value as an adjunct to other interests. I have looked at various machines and read reviews and buyers' guides, but none of them makes a reference to using the machine for actual computation. The problems I have in mind are calculation using complex numbers, matrix manipulation, linear regression, curve fitting, smoothing and interpolation, reduction of statistical data, and the calculation of statistics.

P G Redgment

A Most home computers come complete with some form of the Basic language though they vary significantly in both syntax and capabilities. We do not know of any version of Basic running on a micro that has adequate matrix manipulation statements built in. To implement matrix functions in Basic on a micro you have to write a set of subroutines for addition, subtraction, multiplication and inverse. Great care must be taken with the inverse subroutine to preserve numerical accuracy or the elements in the resultant matrix may be left with few, if any, significant figures. It would seem wise to use double precision: this means you need more than six-figure accuracy, and usually means 12 or more figures. The BBC carries nine figures, CBasic carries 12 and Microsoft Basic double precision carries 16 figures.

To use complex numbers you will have to use a pair of variables to represent the real and imaginary parts of a quantity. You will then need to write for yourself either subroutines or user-defined functions to perform complex addition, subtraction, multiplication and inversion. If you need any other functions such as complex sine or complex cosine then you will also need to write subroutines for these too, based on the real Sin and real Cos functions provided. P

G. W. COMPUTERS LTD

London's West End — Nationwide overnite service — More product ranges —
Probably the widest selection of networks/micros/and printers

WE OFFER ONE OF THE BEST 'SYSTEM DEALS' IN THE U.K. (save 1500.00 +)
THE NEW DBMS III.7 (series III of the world's first 'task-robot-programs')

G.W. COMPUTERS LTD — Tel: 01-631-4818

.....FEATURES.....
 Mbasic & word-star compatible
 1400 character record sizes
 mathematical scratchpad,
 record relational indexes,
 translatable to any language
 User-definable reporting
 field protection/classification,
 either-or, same as, greater, smaller
 sorts alphanumeric, any window
 12 online file architectures.
 240 fields using cross-referencing
 cross-record calculations,
 'Jump-to' any record in 12 files.
 User-define files/field words/sizes.
 "purchase/sales-analysis", "personnel-file"

DBMS III.7 new switch mode facility enables you to cross up to 12 different files (32000 records per file) pre-selecting any of up to 20 fields per record/file for display/print output (240 fields) in all. One massive enquiry can pass through 384,000 records

You might have two files whose records are directly related to each other, so that the first file (say containing names and addresses) refers to the second file (say financial and other information relating to the same record numbers in the first file) directly. Then you can simply choose that in file 1 you are interested in just the name and telephone numbers, whereas in file two, you are interested in the income, trading period and number of branches, information. Your enquiry can then pass through both files highlighting that information only. Actually there doesn't need to be a strict correlation between the same record numbers in different files, and you can also just on JUMP command go to any record in any of the 32000 records in any one of the twelve files and carry on cross-referencing from there onwards

DBMS'S MACROS WORK FROM THE MOMENT YOU INSERT THE 'TASK DISK' IN THE COMPUTER

Simply design your file, give its fields your words, set up your report mask, and then enter your records. Switch to 'automatic drive' and formulate any task you wish the program to fulfil, the task is stored as a macro. Take a copy of the program on another 'task disk' and from then on, the task disc will function without a single key-stroke. Think of a number of such 'task disks' such as "stock-re-order reports", "stock-valuation reports", analysis, "patient history analysis", "research-analysis", "budgeting", "plus more?"

Not only does this program surpass most of its kind that you might buy elsewhere, but if you buy the hardware from us, then you get it — FREE DBMS II (WITHOUT MACROS) AND DBMS III ARE FULLY IMPLEMENTED UNDER CPM.86 (tm) AND MS-DOS (tm) i.e. < SIRIUS/VICTOR/IBM > DBMS II IS 395.00 (or 250.00 by mail order ex. training). DBMS II is 575.00 (or 295.00 by mail order ex. training).

Contains the highest state of the art software available today

FORMS/TEXT/CALC/DBMS IV — ALL IN ONE PROGRAM THE — "KEY" — @ 575.00.

When you budget for a complete system of software you eventually end up with a host of packages like. Sales, Purchases, Nominal Data, Text, Calc, Mailshot, invoice, Order, Workflow, Personnel, and so on. The list is endless and the outlay several thousands of pounds.

Text. Write a letter as you see it on the screen, edit it then simply enter P to print. Set into the form, your data fields, "#####" and specific file-related activities, formulae and validation checks. Enter values and see the spreadsheet calculate itself.

Database. Search files for data to be inserted to fields specified. All the features of DBMS III, explained elsewhere in our ad.

Here's an example of an invoice you might design for your stationery You could design your own spreadsheet, order form, statement, wage docket, or any other kind of form that is required to fit your existing stationery.

INVOICE					
To <1>#####	From: G. W. Ltd 55 Bedford Court Mans. Bedford Avenue London W.C.1. Tel: 01-636-8210				
<2>#####					
<3>#####					
<4>#####					
<5>#####					
Date<6>###	Tax point<7>###		Agent<8>###		
Quantity	Description	Cost	Tax	Total	
<9>###	<10>#####	<11>###	<12>###	<13>###	
<14>###	<15>#####	<16>###	<17>###	<18>###	
Total . . . <19>#####		Tax . . . <20>###			

<??> items <1> to <5> internal command to request name, input, and then search an address file for details.
 <??> items <6> to <7> request date input and validate.
 <??> item <8> request agent number and validate range.
 <??> item <9> request quantity, validate range.
 <??> item <10> request description, search file, accept, and calculate fields <11> <12> <13>. If finished invoice then calculate fields <19> and <20>

Now comes the more valuable facility. You can provide the 'FORM' with file-related instructions, not only to request a 'console' input for file search against names, and stock, but after the invoice is finished, the fields you have selected may be passed to related files.

EG: Send fields <0>, <1>, <06>, <07>, <11>, <12>, <13>, <19>, <20>, to a sales ledger.
 Then send fields <9>, <10>, <11> to product analysis file.
 Then send fields <0>, <1>, <7>, <19>, <20> to V.A.T. file.
 Then send fields <10>, <11>, <12>, <13> to Nominal ledger. Do you see?

G. W. COMPUTERS LTD — Tel: 01-631 4818

SYSTEM DEAL (our speciality) SAVES YOU 1500.00 +

Buy any computer, any printer and 150.00 value diskettes add 85.00 for cables and testing. Add 10% for return to base warranty for 1 year (optional) add 110.00 for delivery & installation (optional) training optional extra 120.00

and get completely ***** FREE *****

cpm handbook.....50 basic exercises.....2000 sheets paper
 DBMS III.7.....wordprocessing.....spreadsheet
 mbasic.....diagnostics.....msort/dsort
 recover.....autoload.....instant basic
 library boxes.....disk/games.....DT/AS/NS sorts

***** total value 1400 + + + *****

Here's a typical example of a complete system deal

1 — TEXAS instruments pc w/256k ram/2 drives	2445.00
2 — Oki B2 or Epson rx80 printer	295.00
3 — Cables & testing	85.00
4 — Diskettes	150.00
software described above	FREE
	2975.00

We specialise in 'STANDARD MICRO-PRINTER SYSTEMS' as well as 'NETWORK SYSTEMS BASED ON A SHARED HARD DISK'.

The range of computer products (mostly ex stock) includes the most popular brands of micro-computers, printers, modems, buffers, spoolers and software.

G. W. COMPUTERS LTD — Tel: 01-636 8210

POPULAR BRANDS OF EQUIPMENT WE SELL

MICROS — Texas/I.B.M./Dec/Superbrain/Compustar
 — Apple/Lisa/Compaq/Corona.
PRINTERS — Nec/Quime/Diablo/Oku/Epson/Olivympia/Ricoh
 — Texas/Dre/Anadex/Brother.
OTHERS — Corvus/Compustar/Sigma.
 — Hard disks networks and multiplexors
 — Spoolers/Modems/Buffers
MAIN AGENTS — — — — — for TEXAS and MOTOROLA

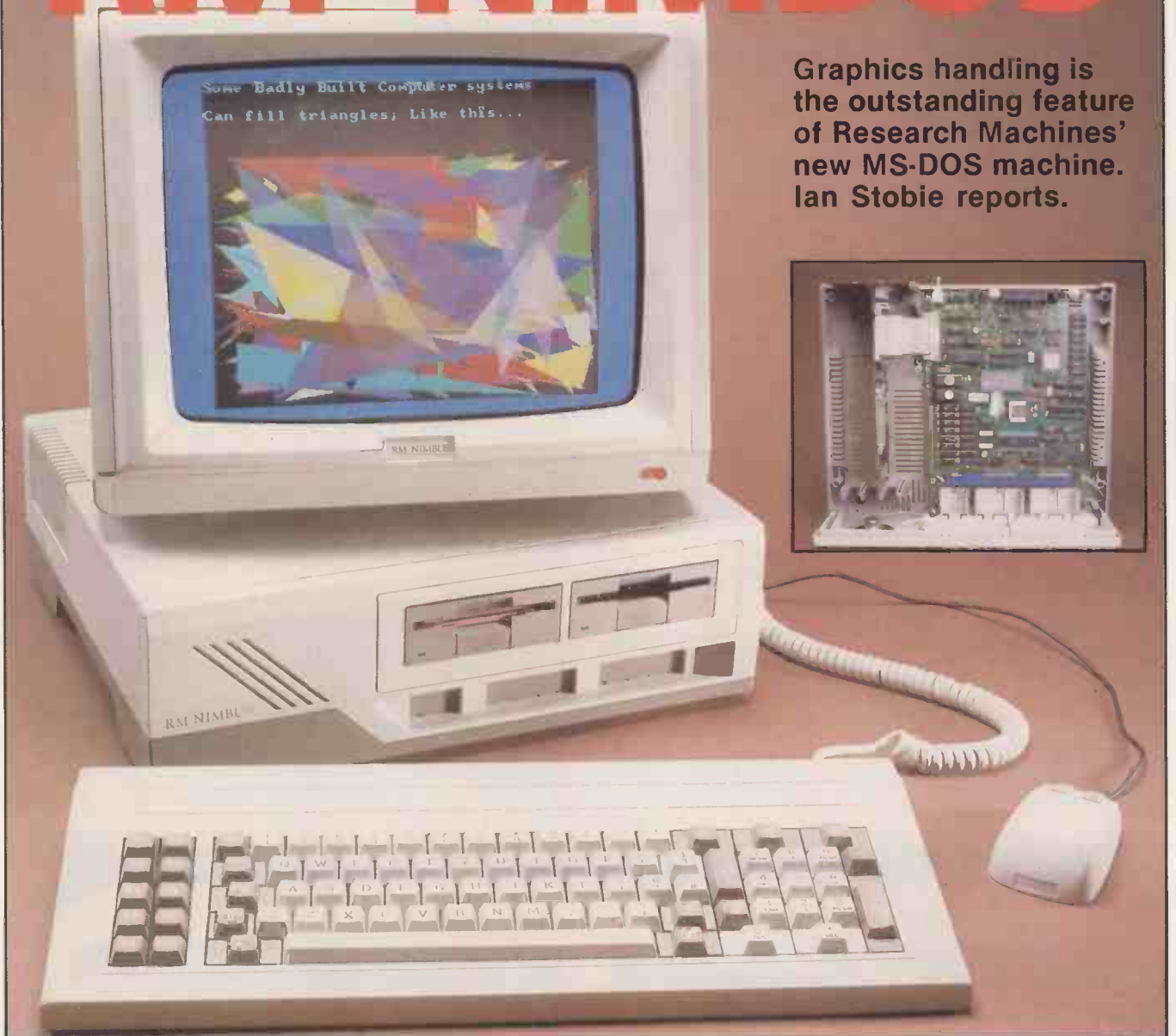
TERMS & ETC

G.W. Computers Ltd [Grama (Winter) Ltd]
 43/55 Bedford Court Mansions
 Bedford Avenue
 London W.C.1 England
 Telex 892031 TWC G

Telephones:
 01-636-8210
 01-631-4818
 Boston office tlx 94-0890

24 hour answerphones; leave address for 'infopacks'. We do not operate a reader's reply card service. Terms: C.W.O. or C.O.D. Prices exclude V.A.T., but include all non-credit discounts available. No dealers! The above lists are not exhaustive. Please call at our showroom only by prior appointment. Unless expressly agreed, all warranties are commercial 90 days return to base for parts and labour. Annual warranties and maintenance facilities available nationwide through closely related third parties.

RM NIMBUS



Graphics handling is the outstanding feature of Research Machines' new MS-DOS machine. Ian Stobie reports.

AS A LATECOMER to the market Research Machines had to give its first 16-bit machine something to make it stand out from the crowd — and it certainly has. The machine is the Nimbus. It is an MS-DOS-running IBM near-compatible like all the rest, it is fast, it links easily into a local area network, and it has breathtaking graphics. The price is competitive too: around £1,220 not including the monitor to the typical user for the twin-drive version described here.

Like other RM computers, the Nimbus is aimed primarily at the educational sector, although with this system Research Machines also hopes to reach other local-authority departments and a broad range of technical and scientific users.

First deliveries of the Nimbus are scheduled for March. We have had a pro-

tototype of the system to look at in our office. Few hardware changes in the finished product are likely, but the system software and packages we had for review were not final versions. All the same, the machine made a strong and favourable impression on us.

Monitor separate

Physically, the Nimbus consists of a system box containing the cpu, memory and disc drives, a separate keyboard with optional mouse, and a monitor. The monitor is priced separately and any standard monochrome or RGB colour monitor will do. We were using a rather bulky 14in. Microvitec colour monitor which costs around £300.

The Nimbus system box itself is quite

compact, with about the same footprint as the Apricot. Like the Apricot it too uses Sony-style 3.5in. microfloppy-disc drives. The Nimbus drives are actually manufactured by Y-Data, but we had no trouble using Sony discs in them. You get 360K of storage per side, giving each drive a capacity of 720K. The Nimbus comes in a variety of disc configurations, ranging from one microfloppy, to a microfloppy plus 40Mbyte hard disc. It is also available in a disc-less version for use as a network station.

Inside the box is an 80186 running at 8MHz and at least 192K of RAM, 64K of which is dedicated to graphics. This turns out to be a very fast combination. We did not have RM Basic with our test system, but we ran our standard set of Benchmark routines using Microsoft's Basic-86

Specification

CPU: Intel 80186 running at 8MHz;
Research Machines custom graphics processor; optional 8087 maths co-processor

Memory: 192K, including 64K dedicated to graphics, expandable to 1Mbyte; 64K ROM containing low-level graphics primitives and other system routines

Display: connects to standard monochrome or RGB colour monitor; shows 25 lines of either 40- or 80-column text, and graphics in resolutions of 250 vertical dots by 320 or 640 horizontal dots; 16 colours in lower-resolution mode, or choice of any four in high resolution; text and graphics can be mixed on the same screen, and text displayed in different sizes, fonts and orientations

Keyboard: detached QWERTY keyboard with same layout as IBM PC, including 10 function keys, a separate cursor/numeric pad and with 83 keys in all; generates either IBM character set or RM 480Z's; optional mouse

Sound: 8910 music chip providing three channels over seven octaves; Oki voice chip for digitised voice output

Discs: available in four different disc configurations and in a disc-less version for network use; the PC-2 has twin Sony-type 3.5in. microfloppy drives, 720K each drive; PC-1 has one microfloppy; XN-10 and XN-20 have a hard disc of 10Mbyte or 20Mbyte respectively and a single microfloppy; hard-disc models and the disc-less version come with an extra 128K of RAM

Interfaces: mouse/joystick port; RS-232 printer port; RS-422 serial port

supporting Piconet, which lets you daisy-chain up to 30 external devices on to the port; two ROM cartridge sockets; 5V and 12V d.c. power-out lines; four slots are provided inside the Nimbus case for fitting expansion cards, one of which is usually occupied by the disc controller

Hardware options: mouse; 8087 maths co-processor; MS-Net network interface allowing up to 64 Nimbus or 480Z Chain stations to link

Software: PC-1 and 2 will come with MS-DOS, RM Logo and RM Basic included in the price; educational purchasers of network systems will get a discounted bundle of software including Microsoft Word, Multiplan, Superfile and Pascal

Size: main unit measures 405mm. (16in.) by 352mm. (14in.) by 122mm. (4.8in.); keyboard 467mm. (18.4in.) by 184mm. (7.2in.)

U.K. prices: Research Machines quotes its prices excluding VAT and with an educational discount, commercial users pay about 20 percent more; the educational prices are available to Individual students and teachers on the PC-1 and PC-2; single-drive, 192K PC-1 £945; the twin-drive, 192K PC-2 £1,221; disc-less 320K TN £898; XN-20 20Mbyte hard disc, 320K £3,376; 14in. badge-engineered Microvitec colour monitor, around £300

Manufacturer: made in the U.K. by Research Machines

Distribution: available from March 1985; Research Machines Ltd, Mill Street, Botley Road, Oxford OX2 0BQ. Telephone: (0865) 249866

interpreter, which is probably a fairer comparative test of the hardware anyway, as it is used on many other machines. The Nimbus was faster than any of the other machines we have tested apart from three 68000-based machines — the Sage, the TDI Pinnacle and the HP 200 — all of which cost much more.

Benchmarks do not test graphics, but RM has gone to great lengths to speed graphics up still further. The Nimbus has a custom-designed graphics co-processor working alongside the 80186. It carries out key sequences of instructions, such as address calculation followed by read-modify-write, at hardware speeds.

RM decided against using a standard display controller as, although it would speed up line drawing, it does not help much with common graphic tasks like area filling and block moving. Instead the company ran performance-monitoring routines with early versions of its own graphics software to find out where time was consumed, and then implemented the crucial loops as a custom gate array.

Memory

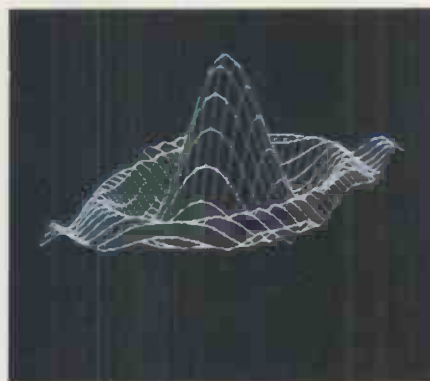
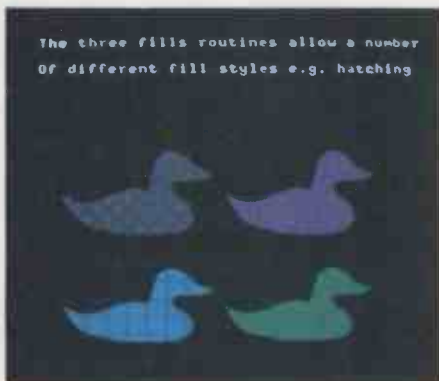
There is 64K of ROM on the Nimbus board, containing various system and I/O routines, with a very large chunk devoted to the graphics display. Four expansion slots are provided for adding cards inside the Nimbus system box; on our system one of them was occupied by the disc controller. RAM memory can be expanded inside the system box to 1Mbyte without using any of the expansion slots, as there is space provided for this purpose on the main board.

The floppy-based Nimbus come with 192K of RAM, while the hard-disc and network models start at 320K — 256K plus 64K of graphics memory. Further memory expansion is possible, but MS-DOS is unable to access more than 640K directly; the same limitation applies to any machine using the operating system, including the PC-DOS variant. You can, however, configure spare memory as a silicon disc, and this is useful even on the smallest Nimbus if the program you are running leaves some spare RAM available.

The keyboard is as IBM-like as they come, with an identical layout to the PC and XT models. I personally prefer the IBM model's more positive feel, but the Nimbus keyboard is well built and far superior to that on the ACT FIE, a likely competitor. Software to support a mouse is contained in the 64K system ROM. The mouse itself will cost extra, probably around £90.

Once you have the Nimbus up and running the first thing you notice is the graphics. Maximum resolution is 640 dots horizontally by 250 dots vertically. This is about the same as on the BBC Micro and for the same reason: any higher resolution

(continued on page 65)



Dedicated hardware is responsible for the Nimbus's fast and flexible graphics.



FLOPPY DICK'S® 'N' RIBBONS

FLOPPY DICK SAYS: "We are a specification and reliability at guarantee".

maxell
new low prices.

House simply because today they are the best for Every disk is certified 100% error free with lifetime

FLOPPY DICK SAYS "Make a good impression with MX ribbons"

maxell. (HITACHI)

For maximum reliability

5.25" Mini disks	1-8 box	9+ box
MD1-DD ss dd 48 tpi	£20.99	£19.99
MD1-D 2-disk twinpack	4.99	post free
MD1-D ss dd 48 tpi	28.99	27.99
MD2-D 2-disk twinpack	6.99	post free
MD1-DD ss quad 96 tpi	28.99	27.99
MD2-DD ds quad 96 tpi	38.99	37.99
MD2-HD ds 96 tpi 1.6 m/byte	49.99	47.99

Postage: 1 box £0.75 plus £0.50 per additional box

3 1/2" MICRODISKS

MF1-DD 80 track 1/2 Mbyte	£36.40	£34.49
MF2-DD 80 track 1 Mbyte	50.49	48.49

3" Compact disks

CF2 100 tpi	£45.99	£44.99
-------------	--------	--------

8" Floppy disks

FD1-128 ss sd 128 bytes	£25.49	£24.49
FD1-XD ss dd soft	27.49	26.49
FD2-128 ds sd 128 bytes	35.49	34.49
FD2-XD/ds dd soft	34.99	33.49
FD2-256D/ds dd soft	34.49	33.49

512D/1024D
Postage: 1 box £1.50 plus £0.50 per additional box.

DAISYWHEELS from £3.55 each

We stock ALL Maxell disks PLUS extensive range of ribbons, printwheels, disk storage and other related products

Call Lawrence or Jenny on 0483 273152 for information or quote: 24-hour answering service

Multistrike Ribbons	Each
Diablo Hy-type II	£1.79
Qume I Sprint 3/5 etc	1.59
Ricoh 1600	1.79
NEC Spinwriter	2.09
Wang A5	1.89
IBM Tech III	2.19
Brother HR15	3.99

Nylon fabric Ribbons	Each
Oki Microline 80,82,83,92,93	1.09
Oki Microline 84, 84A	2.49
Qume I/IBM 6240	2.29
Diablo Hy-Type II	1.79
Walters WM2000 for schools	5.39
NEC Spinwriter	2.49
Olympia ES100	2.89
Epson 80	2.79
Epson 100	5.99
Epson 100 refills	2.49
Centronics 700 Zip-pack	1.69
Centronics 150	3.99
Brother HR15	3.00
Postage: 1-2 ribbons £0.50; 3-12 ribbons £1.00	

Correctable Ribbons	Each
Facit 8000	£2.49
Olivetti ET121 etc	1.79
Olympia ES100 etc	1.99
Brother HR15	2.69
IBM 82C Golfball	1.19
Juki black	1.19
Juki green, brown, blue red	2.19

Lift-Off Tapes	from £0.75
Brother EP44	£2.70
Brother HR5	2.45

DISK library cases and storage boxes from	£3.10
---	-------

REMEMBER — if in any doubt, ask. FLOPPY DICK SAYS: "Asking dumb questions is easier than correcting dumb mistakes".

Prices EXCLUDE VAT

MX COMPUTER SUPPLIES

LOWER BARRIHURST HOUSE, DUNSFOLD ROAD, FREEPOST, CRANLEIGH, SURREY, GU6 8BR

Tel: (0483) 273152 Telex: 859111

● Circle No. 141

LOWEST PRICES IN UK?

MICROS			
BBC B	325.00	Star Gemini 10	217.00
BBC B + DFS	384.00	Star Radix 10	449.00
Electron	165.00	Star Gemini 15	305.00
Electron with Plus 1, View, VSheet, Game	245.00	Star Delta 15	444.00
Commodore 64	175.00	Shinwa CP 80	169.00
Commodore 16 starter pack	109.00	Riteman A1	229.00
Commodore Plus 4	235.00	Canon PW1080A	299.00
Apricot 2 x DS discs + monitor	1395.00	Canon PJ1080A (Colour)	409.00
Apricot 2 x DS discs + monitor	1599.00	Canon PW1156A	375.00
Apricot XI 5 meg + monitor	2170.00	Ricoh 1600 (BK)	1245.00
Apricot XI 10 meg + monitor	2290.00	Toshiba 2100H	1295.00
Apricot F1	899.00	FOR THE BBC SYSTEM	
Epson QX10	1399.00	CUMANA CS100 40tk ss	129.00
Epson QX10 Colour	1595.00	CUMANA CS200 80tk ss	159.00
Epson PX8	P.O.A.	CUMANA CS400 80tk ds	184.00
Epson HX20 + case + cassette	P.O.A.	CUMANA CD200 dual 40tk ss	225.00
Sanyo 550	699.00	CUMANA CD400D dual 40tk ds	305.00
Sanyo 550 dual ss discs	750.00	CUMANA CD400S dual 80tk ss	289.00
Sanyo 550 dual ds discs	925.00	CUMANA CD800S dual 80tk ds	339.00
Sanyo 555	895.00	3.5" Drives — Cumana	
Sanyo 555 double sided	1125.00	CUMANA CS351 40tk ss 100K	139.00
Kaypro 2	935.00	CUMANA CS354 80tk ds 400K	189.00
Kaypro 4	1375.00	CUMANA CD352 dual 40tk ss	245.00
Kaypro 10	1995.00	CUMANA CD358 dual 80tk ds	349.00
Wren Portable	965.00	CUMANA CD358 dual 80tk ds	349.00
PRINTERS		Monitors M" vitec 1431 Normal	177.00
Epson RX80T	189.00	Monitors M" vitec 1451 Med	260.00
Epson RX80FT	205.00	Monitors M" vitec 1441 HiRes	399.00
Epson FX80	315.00	Monitors Saba TV/Mon + lead	199.00
Epson RX100	349.00	Monitors Sanyo 3125N colour	174.00
Epson FX100	429.00	Monitors Sanyo 3117M med col	289.00
Epson LQ1500	895.00	Monitors Sanyo 3115H HiRes	395.00
Epson DX100	369.00	Monitors Sanyo Mono HiRes 18MHz	99.00
Epson P40 thermal (S or P)	75.00	Monitors Zenith Amber/green	69.00
Juki 6100	325.00	6502 2nd processor	169.00
Brother HR5 (Serial or par)	129.00	Z80 2nd processor	256.00
Brother HR15	389.00	Bit Stick	299.00
Brother HR35	799.00	ROMS Disc Doctor	27.50
Brother EP44	199.00	ROMS Termi	27.50
Microline 82A	253.00	ROMS Graphics	27.50
Microline 93S	545.00	ROMS View	45.00
		ROMS Wordwise	32.00
		ROMS Sweettalker	21.75
		ROMS Viewsheet	46.00
		ROMS Caretaker	27.50
		Sidewise RAM Board	36.00

Carriage £10. add 15% VAT to all orders
VISA-ACCESS accepted — cheque clearance 7 days
For best price on ANY Micro Product — 0865-63544
Large SAE (22p) for massive Hard/Software Catalogue

CENTRAL MICRO DISTRIBUTORS

PO BOX 194 — OXFORD — OX3 9AN
TEL OXFORD (0865) 63544 (MAIL ORDER ONLY)

● Circle No. 146

SWAP-SWAP-SWAP-SWAP-SWAP

SWAP

MICRO TO MICRO
FILE TRANSFER
SYSTEM

SWAP-SWAP-SWAP-SWAP-SWAP

"Get your microcomputers talking to each other!"

SWAP allows you to transfer any programs and data between 2 computers of different manufacture. SWAP consists of 2 floppy disks and a cable configured for your 2 chosen computers. Here are some of the formats available:

IBM PC	IBM Compatibles	Sirius
Apricot	Apple (CP/M)	HP150
Televideo	Superbrain	BBC
Sanyo 555	DEC Rainbow	Kaypro

If your format is not in our extensive range we can usually produce it at little or no extra cost.

The price of SWAP is £158 (£135 plus VAT and postage and packing). Please specify your computers when ordering.

MERCATOR COMPUTER SYSTEMS LTD
3 Whiteladies Road, Clifton, Bristol BS8 1NU.
Telephone: (0272) 731079
Telex 44220 Comtel Ref 247

SWAP-SWAP-SWAP-SWAP-SWAP

● Circle No. 144

64

PRACTICAL COMPUTING March 1985

Benchmarks

The Nimbus is undoubtedly a very fast machine. The table shows the time in seconds to run eight standard Basic routines. These routines test out various typical tasks, each repeating an appropriate set of Basic statements 1,000 times. We Benchmarked Microsoft Basic version 5.28 running under MS-DOS.

	BM1	BM2	BM3	BM4	BM5	BM6	BM7	BM8	Av.
RM Nimbus — 80186	0.5	1.8	3.9	4.0	4.6	8.5	13.2	13	6.2
IBM PC/AT — 80286	0.5	1.9	4.6	4.7	5.2	9.1	14.6	14	6.8
Acorn BBC — 6502	1.0	3.1	8.3	8.7	9.2	13.9	21.9	52	14.8
ACT Apricot — 8086	1.5	4.8	10.4	10.8	12.2	22.8	35.5	34	16.5
IBM PC — 8088	1.2	4.8	11.7	12.2	13.4	23.3	37.4	30	16.8
RM 480Z — Z-80	1.1	6.9	13.5	13.0	15.0	23.2	33.1	51	19.6



The I/O ports are situated at the back of the system box. The Piconet interface, sixth from the left, allows you to daisy-chain up to 30 peripherals to the Nimbus.

(continued from page 63)

is getting beyond the capacities of a cheap monitor to display.

At this resolution, which corresponds to its 80-column text mode, the Nimbus lets you have any of four colours active at one time, as against two on the BBC. These four colours can be chosen from a palette of 16. Halving the horizontal resolution to 320 dots gains you use of the full 16 colours. Further shades are obtainable using software contained in the system ROM to set alternate dots in different colours — something Research Machines refers to as “dithering”.

Mixed displays

The Nimbus displays text from the same memory areas as graphics, so there is no restriction on the way you can mix graphics and text. Indeed, text can be in colour, in several different sizes and plotted upside-down or at a 90-degree angle to the normal line.

RM Basic makes use of the graphics ROM routines and graphics co-processor, as probably any implementation of any future graphics-related product will, such as Microsoft Windows. We had several demo programs written in RM Basic but no interpreter. The demos were very impressive: speed and range of colour were beyond what you expect from a micro.

From the RM Basic spec all this power looks quite controllable. Although there are two different resolutions, the user can

specify x and y values independently of mode. Most graphics commands will take either a single x,y co-ordinate, a list of x,y co-ordinates up to the maximum that will fit in a Basic line, or the name of an array which can contain up to 16,000 x,y co-ordinates. For instance.

LINE x,y . . . xn,yn
draws a multi-sided shape; Area followed by a similar list draws a colour-filled shape, while Points with the same set of x,y parameters draws a pattern of dots at the vertices of the shape.

All three commands can be modified by option-setting commands. For instance, Style used with Line redefines the type of line, as you can draw in six different sorts of solid and dotted line; used with Area it redefines the area-fill style — solid, hollow or hatched. With Points it sets the point style: you can have crosses or five other types of point. Other commands let you control colour dithering, select one of the six hatching patterns, and draw arcs, circles and pie-chart segments quickly.

Research Machines has decided to commit itself to MS-DOS as the Nimbus operating system, and at present has no plans to offer CP/M-86. The Nimbus is not fully IBM compatible and does not pretend to be — after all it has 3.5in. discs. The company believes its potential customers are more interested in performance than IBM compatibility, and also acknowledges that trying to achieve greater compatibility would have pushed up the price. The Nimbus has the same keyboard layout as the IBM PC, uses the

same character set, and fully emulates the IBM monochrome screen. Porting well-behaved PC-DOS software across to the Nimbus should be no more difficult than to the ACT Apricot, for example.

We had early versions of Microsoft Word and Multiplan to look at, which illustrate this point. The exact composition of the software bundled in with the system has not been finalised. Stand-alone users will probably get Word, Multiplan, Superfile, Pascal and a version of PC Paintbrush at a reduced price. A school-administration bundle is also being assembled.

Research Machines says it has 1,000 Chain local area networks installed, with an average of 10 stations, usually RM 480Z, to each LAN. The Nimbus is Chain compatible. This means Chain will now allow up to 16 Nimbuses or 480Zs to be mixed on a network. It would cost around £160 to connect either floppy-based Nimbus model to the network; hard-disc models and the disc-less TN model are already appropriately equipped. By the early summer Research Machines hopes to have implemented MS-Net, Microsoft's network for 16-bit machines, which allows up to 64 stations on the LAN.

One other example of network thinking is applied at a lower level in the Nimbus design. Research Machines has devised Piconet, which allows you to connect up to 30 peripherals to one port on the back of the system box. This is a standard feature on all Nimbus models. It works in a similar way to the IEEE-488 and HP-IL interfaces, in that you daisy-chain devices together. Each peripheral is equipped with both a male and female RS-422 connector. The Nimbus is capable of providing power for the first three devices on the net.

Conclusions

● The Nimbus is an impressive system. The graphics are superb, and the whole system well thought-out and appropriate to the educational, technical and scientific markets it is aimed at.

● Research Machines has decided that price and performance matter more than strict IBM compatibility for this type of user. At around £1,500 for a twin-drive MS-DOS system with colour monitor, falling to under £1,000 for the basic network model, pricing is competitive.

● The Nimbus uses the excellent 3.5in. microfloppy discs. Software houses should not have a great deal of difficulty porting MS-DOS and most IBM products across to it, but in the short term the range of software is liable to be restricted.

● Research Machines has a strong track record with local area networks. The option of linking Nimbuses into an MS-Net or Chain network will be attractive to a large number of users, enabling them to reduce unit costs and attempt more ambitious applications. □

MORE CREDIT.



When you're choosing an accounting/book-keeping program, it pays to balance cost against performance.

On the credit side, Sage can offer the only fully integrated one diskette program on the market for £375. Easy-to-learn and easy-to-use, it provides the simple, efficient and inexpensive solution to small business accounting problems.

What's more, Sage Accounts now has even more functions than before • Sales and Purchase Ledgers • Nominal Ledger • Cash Book • Journal Entries • Trial Balance • VAT Return • Monthly and Annual Accounts • Age Analyses • Statements

- Budget Variance Reports • Credit Control Features
- Audit Trail – all together in one compact and comprehensive package.

In addition, Sage Plus provides invoice production linked to stock files and integrated with the sales and nominal ledgers.

Operational problems? Forget them. Sage is suitable for use on most business micros and is fully automatic – which means no shuffling through a pile of disks to find the program you need. It's also complete and self-contained – no expensive modules to buy every time you need a new function.

LESS DEBIT.



All in all, the credit side of Sage is pretty impressive. But more impressive still is the debit side – just £375 for Sage Accounts, £695 for Sage Plus, or £195 for Sage Payroll. That's a fraction of the cost of most of the alternatives. Weigh it up for yourself. Only Sage gives you heavyweight performance at a lightweight price.

MONEY-SAVING PACKAGE DEALS TOO!

Sage Accounts with Payroll £495.
Sage Plus with Payroll £795.

For more details of Sage Accounting Programs, call 01 200 0200 or clip out the coupon.

SAGESOFT

Please send me more details of Sage Accounting Programs and my nearest dealer.

Name: _____

Position: _____

Company: _____

Address: _____

Tel: _____

Sagesoft Limited, NE1 House, Regent Centre, Newcastle upon Tyne NE3 3DS. Tel: 091 284 7077. Telex: 53623 SAGESL G.

BETTER SAGE THAN SORRY pci

● Circle No. 152

SANYO 775

Sanyo's new transportable looks set to challenge the Compaq for its degree of IBM compatibility. Robert Piper sees how it shapes up.

UP TO the launch of the controversial 555 series Sanyo had enjoyed a very unremarkable liaison with business micros, its earlier attempts having been both conventional and fairly expensive. The 555 was a very different story offering a 16-bit computer sold with an entire suite of Micropro software for an almost unbelievably low price.

The 555 range has now been enhanced but its major stumbling block, IBM compatibility, is little better on the new machine than it was on the old. However, Sanyo has a new machine up its sleeve which goes a long way to answering such criticisms: the Sanyo 775. It is a fully IBM-compatible transportable machine supplied as standard with a colour monitor and bundled with WordStar and Calcstar. The £2,150 price tag indicates that Sanyo is aiming at the market stronghold currently dominated by the much-revered Compaq portable, rather than the bargain basement sector epitomised by the 555 series.

In its portable condition the Sanyo 775 bears a remarkable resemblance to the Compaq, although it is larger and at 40lb. considerably heavier — probably due to the inclusion of a colour monitor. Carrying the machine around is possible but not a pleasant experience and should not be considered if the distances involved exceed more than 100 yards or so.

Setting up any transportable is simple and the 775 is no exception. The keyboard which forms the base of the suitcase during transportation is unclipped from the monitor and disc drives, then laid on the desk. Both the keyboard and the main processor can be angled towards the user by extending the flip-out legs on their respective bases. The keyboard plugs into a socket on the front of the machine adjacent to the disc drives.

The rear of the processor where the carrying handle resides has three incredibly vulnerable hinged panels, which open to provide access to the various interfaces. Generally, the standard of construction is far superior to that of the 555 series; but it may be marginally inferior to the Compaq, which gives the impression that it can stand up to rough use somewhat better.

The front of the unit has a panel on the far left which houses an on/off switch, mains pilot and a sliding brightness control. To the right of this is a 9in. colour monitor manufactured for Sanyo by NEC. Next along are two vertically orientated Chinon disc drives of 360K capacity

each. The drives themselves are exceptionally quiet but are somewhat spoilt by the awkward pinch-style locking devices, which can prove fiddly in use. They are also reasonably fast drives, a definite point in their favour.

Colour monitor

The colour monitor produces a stable display with good colour balance. The coarse IBM-style character set composed in 320- by 200-pixel format, coupled to the small screen, does not lend itself to long periods of word processing, so it is advisable to connect a larger auxiliary monitor if this is required. Furthermore, it was not possible on the review machine to obtain enough brilliance from the display to suit bright working environments.

On the far right of the rear panel is a compartment which contains the mains socket and is large enough to stow the lead when not in use. The centre panel below the handle houses the auxiliary display connections for RGB and composite-video monitors.

The panel on the far left conceals the two IBM-compatible expansion slots and the parallel interface port. For some obscure reason Sanyo Japan has connected a socket like that on a serial interface to this port, making it extremely difficult to connect an Epson-style printer. Sanyo U.K. has indicated that this may be changed before the machines reach the dealers in quantity. The expansion slots can only be filled by lifting the top cover. This is surprisingly simple since it only requires the removal of two screws to reveal a well-screened chassis assembly.

It is necessary to remove the screens to gain access to the full-length expansion slots and main printed-circuit boards. The

775 uses an Intel 8088 cpu running at a very respectable 8MHz coupled to 256K of parity-checking RAM. The machine's Basic Benchmarks reveal quite a sprightly performance almost up with some of the true 16-bit 8086-based compatibles like the Compaq Deskpro and Olivetti M-24.

Unlike the 555, the 775 has an enhanced IBM-compatible keyboard. LED status indicators are fitted to the Num Lock and Caps Lock keys. The numeric pad is provided with its own Enter key. The main Return key is, sensibly, larger than that fitted to the IBM. Key action is superior to the Keytronics unit supplied with the Compaq and 70 percent of the other compatibles, but not up to the standard set by IBM.

The 775 is supplied with a standard implementation of MS-DOS version 2.11. There does not appear to be any form of mode command so it is hard to see how users will be able to customise the optional serial interface card which fits into one of the expansion slots. Microsoft's GWBasic interpreter is included with the 775, as opposed to Sanyo's own Basic supplied with the 555. Strangely, it is referred to on-screen as GWBasic but called up from disc by entering

Basica

presumably to ensure compatibility with IBM software that includes calls to Basica.

WordStar and Calcstar are bundled in with the 775 U.K. package. Unfortunately the review machine had only just arrived from Japan and no software was available for test. Sanyo says the packages are the same as supplied with the 550 machines.

One of the advantages of the specific 775 implementation is that both packages can now run in colour. Users can customise WordStar to produce a wide variety of combinations, some of them incredibly



Heavy to carry but simple to set up.

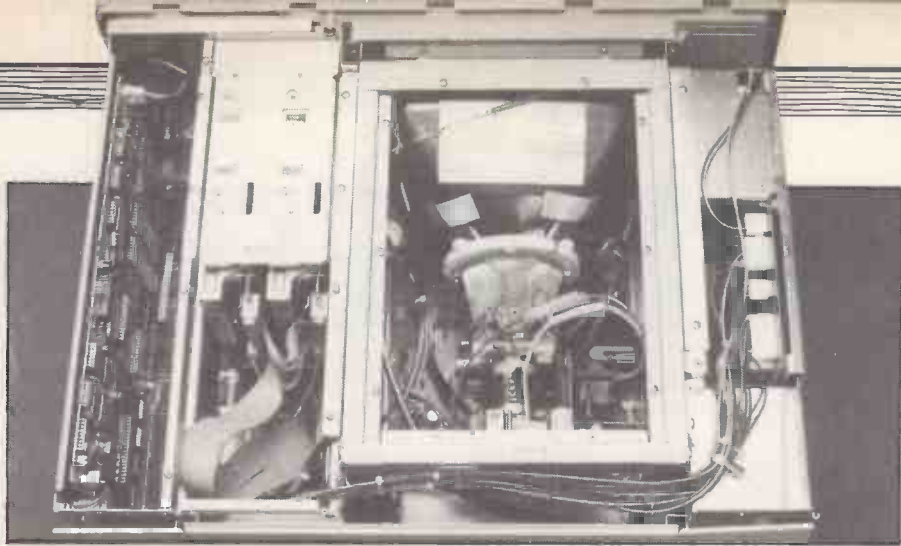
garish, but Calcstar has a pre-defined colour presentation which cannot be altered. However, the 555 series implementation of Calcstar did not support the use of the machine's cursor keys; the archaic practice of moving the cursor around the spreadsheet using Ctrl plus the ? key had to be adopted. Hopefully the necessary enhancements have been made to the 775 implementation.

A good job

The 775 has been designed from the outset as an IBM PC compatible. In certain areas such as the colour display attributes, the 555 specification has actually had to be downgraded to achieve the required result. But Sanyo has done the job well and the new machine displays the highest orders of compatibility. Around 20 different IBM packages, including the new colour Flight Simulator, were tested and run successfully with no apparent problems.

The 775 appears to match the Compaq on compatibility except for one failing. When Microsoft Word was loaded the copyright notice appeared followed by the normal text-entry screen. However, it would not respond correctly to the keyboard: you only had to press any key and the program would exit back to the system. The only possible explanation of this may involve the type of copy protection used by Microsoft, which may be incompatible with the Chinon disc drives or controller.

As with many other portables, the 775's expansion possibilities are rather limited. The two expansion slots will quickly be eaten up by a serial interface card and extra memory. Compaq has recently announced an upgrade for its portable where chips on the motherboard can be exchanged to give 640K without filling any expansion slots. This is not possible on the Sanyo, but it may be feasible to use a third-party manufacturer's multi-function board to make the most of the available space. No guarantees can be given regarding their total compatibility so, as usual, the particular manufacturer should be consulted prior to purchase. In fact,



To reach the expansion slots you have to remove the machine's cover.

Benchmarks

The standard Basic benchmarks were run, to produce the following timings, in seconds:

	BM1	BM2	BM3	BM4	BM5	BM6	BM7	BM8	Av.
Sanyo 775 — 8088-2	0.9	3.0	6.4	6.7	7.2	12.8	20.0	20.7	9.7
IBM PC — 8088	1.2	4.8	11.7	12.2	13.4	23.3	37.4	30.0	16.8
IBM PPC — 8088	1.3	4.8	11.8	12.2	13.4	23.6	37.6	36.9	17.7
Compaq — 8088									
Olivetti M-21 — 8086	0.5	2.0	4.6	4.7	5.2	9.4	14.8	16.1	7.2

when comparing the possibilities for expansion on the 775 to the opposition it does not fare quite so well. The Compaq and the Olivetti M-21 both have three expansion slots, and the Olivetti also has a serial port as standard.

The review machine was only supplied with one manual, which covered setting up, the operating system and GWBasic. Sanyo manuals have improved greatly since their early attempts, and are now well laid-out and comprehensive. However, they are rather brief and users will find the section on Basic handy as a reference guide, though not as a tutorial. If the 775 is anything to go by, WordStar and Calcstar will be supplied in one manual consisting of standard Micropro documentation plus a machine-specific implementation guide written by Sanyo.

As befits the 775's price, Sanyo intends to be selective in choosing the dealers that handle its machine to ensure customers get sufficient support. Maintenance will either be available direct from Sanyo through Systems Reliability Ltd or organised locally by dealers.

Specification

CPU: Intel 8088-2 running at 8MHz
Memory: 256K expandable to 640K
Dimensions: 280mm. (11in.) high by 510mm. (20in.) wide by 400mm. (17in.) deep
Weight: 18kg. (40lb.)
Display: colour 80 by 25 characters or 640 by 200 pixels mono; 320 by 200 pixels colour
Interfaces: RGB and composite video, parallel printer port
Discs: two Chinon 5.25in., 360K each
Operating system: MS-DOS version 2.11
Bundled software: GWBasic, WordStar and Calcstar
U.K. distributor: Sanyo Marubeni (U.K.) Ltd, 8 Greycaine Road, Watford, Hertfordshire. Telephone: (0923) 46363
Price: £2,150 plus VAT

Conclusions

- Although the Sanyo 775 is one of the heaviest transportables around it is undoubtedly far more portable than the average desk-top machine. Weight aside, it still takes less than a minute to pack it or set it up for use and this is probably the most appealing feature of transportables.
- Compatibility with IBM software is excellent and definitely puts the machine among the best available.
- The integral colour monitor works well for graphics but is a little harsh when displaying text.
- At £2,150 including 256K RAM, WordStar and Calcstar, the price is only just competitive when compared to the likes of the Compaq and Olivetti M-21. In reality the bundled software and 256K RAM may well prove more appealing than the colour monitor.
- The 775 has a very creditable speed performance for an 8088-based machine. □



The keyboard perpetuates most of IBM's vices and virtues.

ENTERPRISE

Bill Bennett concludes his review with an assessment of the machine's Basic and graphics capabilities.

IN THE HIERARCHY of eight-bit computers the Enterprise stands at the pinnacle. It is unlikely that there will ever be another eight-bit home micro which packs as big a punch. Enterprise's home-grown IS-Basic represents a similar peak. It would be difficult for a programming language to be more capable or more structured and still be Basic.

The IS-Basic dialect is close to the new ANSI standard, with additional commands to make the most of the Enterprise's hardware features like stereo sound and very high-resolution graphics. There is also a liberal sprinkling of links to the micro's operating system.

IS-Basic is similar in many respects to BBC Basic. It is Pascal-like in its structures and Basic-like in its ease of use. It contains graphics and sound capabilities that Wirth would never have dreamed of when he specified Pascal, yet it retains the Goto statement. Educationalists will love it because of the structures; timid users will delight in the way it holds their hands, with meaningful error messages and clear layout. Programming heavyweights will warm to its ease of use and the comprehensive command set.

Sophisticated

The screen editor is very sophisticated, being based on the built-in word processor described last month. You can move the cursor around the screen to correct faulty lines of code, rather as you can with the Commodore screen editor. However, the Enterprise system is vastly superior, partly because the cursor is moved by the joystick which is built into the keyboard. It may sound peculiar, but with a little practice the joystick soon becomes as simple to use as the Macintosh mouse. The screen scrolls up and down, allowing changes to be made to any of the program lines without the need to relist the relevant block of code.

There are two ways of removing unwanted text from a program line. The Erase key moves the cursor leftwards, devouring all in its wake. Delete leaves the cursor where it is but obliterates the characters immediately to the right. The Insert key adds spaces to the right of the current cursor position.

A very neat and somewhat surprising feature of the Enterprise's word-processor like editor is the way that keywords and variable names are wrapped around on the screen. Another useful feature is the indentation of sections of code to high-

light the logical structure of the program. These two facilities make programs easy to read and even easier to debug. Variable names can be as long as you wish — though only the first 31 characters are significant — so there can be no excuse for not writing readable programs. It is possible to write programs in the 80-column mode, which also makes the code easier to read if your monitor's resolution is up to it.

The blue function keys come in useful during a programming session. Most of them are assigned to programming tool commands such as Auto, Renumber and List. Other such commands include Continue, LList to list to the printer, Type to switch to the word processor, Speaker to toggle the internal speaker on and off, and Text and Graphics to switch the display from one mode to another.

The Click command toggles the click which sounds when a key is hit. Display followed by Text or Graphics defines a window to display the relevant output. The interesting Info command prompts the interpreter to spew forth a number of statistics about the current program, including the amount of RAM it occupies. There is a full trace facility which also comes in useful for debugging recalcitrant software.

IS-Basic's Edit bears no relation to the similarly named command found in other Basics: here it is used to switch between the different programs stored in the computer's memory. Several programs can exist side by side in the memory, each having its own set of program lines and variables. Each program can be referred to by a name or a number, and can be called from another program by using the Chain command. Program 0 can use up to around 42K, other programs up to around 32K. Although the current crop of Enterprises only have 64K of RAM, the machine is capable of addressing a cool 4Mbyte.

The Delete command allows unwanted program lines to be purged efficiently, and it can be used in the form

DELETE <blockname>

to erase all the program lines in a program block. Merge works in the usual way as does New, but New All deletes all the programs currently in the memory.

"Structured programming" is a name to drop in trendy computing circles. All the best languages allow it. Pascal, Forth and Logo are all pretty strong on structure and so enjoy a good reputation with educationalists. However, Pascal can be

painful to learn, and Forth is best described as a write-only language. On the other hand, the cognoscenti tend to sneer at Basic because it encourages poor programming habits.

In this respect IS-Basic is a compromise. It encompasses elements of Pascal and Logo, while retaining the fundamental simplicity of easy-to-grasp Basic. It is comprehensive in that it contains the more sophisticated structures alongside the much-maligned "spaghetti plate" Goto and Gosub control statements of minimal Basic. One might argue that by retaining these commands IS-Basic fails to grasp the nettle of truly structured programming. Yet without them the language would not really be Basic at all and it would be nigh-on impossible to convert programs which have been written for other machines to the IS-Basic format.

Differences

Of all program constructs, the most fundamental is the subroutine or procedure. In Basic they tend to be short diversions of code; in Pascal they take the form of mini-programs with their own sets of parameters. In IS-Basic ordinary Basic-style subroutines are allowed, but a higher form exists in the shape of the function block. It works in a similar manner to ordinary Basic functions, but with a number of important differences.

Like a Pascal procedure, a function block has parameters and is in effect a mini-program. It is given a name, which makes it easy to use and to identify within a program. Like its Pascal cousin, the function block uses local variables. Basic subroutines will tend to run if program control reaches them by accident, and give a Return without Gosub error. Function blocks only run when called using a statement of the form

CALL <function name>

It is defined using the Def statement like normal user-defined functions. The block definition can come before or after the Call. Local variables exist exclusively within the confines of their respective program block. Outside that block they have no valid existence.

IS-Basic also has global variables, which are defined in the main bulk of the program before control has reached a block. Any variable defined prior to the block can be used within it. Normal programming practice is to keep the variables within and outside a block entirely sep-

(continued on page 73)



Above: Compared to those on other low-cost micros the Enterprise keyboard is adequate. It is of membrane construction and offers colour coding: eight function keys in blue, the Stop key in red, special keys in green and the standard character keys in grey. Right: Like many other micros the Enterprise has a separate transformer.

NO COMPUTER? FOR WHAT REASON!

Here at MicroGeneral we don't just sell you a computer system. As Computer Engineers we can, with our computer engineering resources, provide years of support service back up. If you're taking the first step make sure it's in our direction! - We could save you some embarrassing mistakes.

APRICOT F1

a full blown business micro

For the first time business user a genuine business machine with some amazing 'high tech' features. - See the Apricot's mouse execute previously complex tasks at a single key stroke, and the new infra-red device means there's no cable connection to the keyboard, giving desk top planning a new meaning.


- 256K RAM 720 single disk.
- MS-DOS
- Rapid Display manipulation and special effects.
- Expansion and Outport facilities.
- Colour/Mono Monitor or VHF for your TV.
- Extremely light (under 13lbs) - totally portable.
- Price includes SuperWriter, SuperCalc, & SuperPlanner software.
- Well over 1000 software packages now available.



LEASE F1
from **£6** per week
CALL FOR DETAILS
DEMO NOW

NOW IN OUR 5th YEAR OF BUSINESS!

**MICRO
GENERAL**

■ Always call for the best possible price. Access/Visa 
(PC 3) Unit 25, Horseshoe Park, Pangbourne, Reading,
RG8 7JW Tel: 07357 4466

● Circle No. 156

(continued from page 70)

arate, only passing parameters between the two.

Looping can be performed by the For-Next construction, but IS-Basic also offers some more powerful options. Again these structures are Pascal-like and are based on the Do-Loop command pair. It is possible to have an infinite loop started with Do and finishing with Loop, all the code between the two commands being repeated *ad infinitum*. More usefully Do loops should include a get-out clause. The two possibilities are Do-While and Do-Until. The While or Until can be put at the front or rear of the loop, providing the option of a front or back door to the block of code.

Both Do-Loop and For-Next structures can be terminated by the Exit command, which allows the loop to terminate gracefully without executing the commands between the Exit and the end of the loop. It is vastly preferable to the more usual ways of leaving a For-Next loop, which always causes problems for conventional Basic programmers.

Elegant

Another Basic construction which makes programming aesthetes wince is the If-Then-Else structure. IS-Basic treats it in an elegant way by using program blocks. The structure will work in the conventional manner, but by introducing the Endif command a whole new way of working opens up. In IS-Basic it is possible to have a section of code which runs like

```
IF condition THEN
  block of code
ELSE
  another block of code
ENDIF
```

which is much neater than the mess that ordinary Basic can lead to with Goto statements all over the place.

The Select-Case structure is a little like a tidy, readable version of On-Gosub, though it can also be thought of as a way of tidying up a string of If-Then-Else-Endif commands. It enables the control to be sent to a program block chosen by the value of a variable. Should there not be any suitable case, it is possible to use Case Else, which takes care of all values not otherwise mentioned.

As cheap home computers go, the Enterprise is well endowed in its graphics facilities. The commands from Basic are extensive and they seem to be relatively quick, especially when compared to the Sinclair Spectrum or the Commodore 64. Though "high-resolution" is a much over-used phrase in the language of home computers, the screen and colour resolution of the Enterprise are second to none, with a total of 256 possible colours and a screen capable of displaying 640 by 360 pixels. A program is also supplied that uses interlacing to provide a resolution of 640 by 720.



The Enterprise is very flat in shape.

So high is the possible resolution that a normal colour television set is not capable of displaying everything that could appear on-screen. The actual screen resolution is controlled by the Nick chip, and is highly flexible. Unfortunately the manual is vague about the graphics and we will have to wait until further documentation becomes available before the possibilities are fully explored.

No matter what graphics mode is in operation the co-ordinate system assumes a 1,280- by 720-pixel pattern, making it very easy to convert images from one graphics mode to another. There are 256 colours, though they are not all available in all graphics modes. To use all 256 at once the horizontal resolution is reduced to a chunky 80 pixels. It is possible to select a reduced palette of colours when working in a higher-resolution mode.

Colours may be selected by number, or can be mixed by combining the red, green and blue guns using the RGB command. Simple colours can also be selected merely by name. Ink and Paper commands will remind users of the Spectrum, and so will the attribute-style graphics which are also possible.

Maybe the neatest thing about the Enterprise's graphics commands is the way that turtle graphics can be combined with straight graphics when using the Plot command. There is even a choice of working in degrees or radians, and an Ellipse command which can also be used for drawing circles. Naturally there is an adequate Paint command and the ability to define characters.

Although the Enterprise does not have a built-in assembler, it does have some features which will appeal to machine-code programmers. The Allocate command sets aside an area of memory to

store machine code. Code is used to store machine code and Hex\$ converts codes to the correct format.

If there is one feature of the Enterprise which lets the whole show down it is the manual. It is simply not comprehensive enough in the way that the BBC Micro's manual is. Naturally there will be a whole crop of "Make the most of Your Enterprise" books around to help plug this gap, but it is a shame that such a worthy ship could be spoilt for a ha'p'orth of tar.

Clearly the main task of the manual is to provide a tutorial, but it reads very much like a case of the blind leading the blind. Beginners will be hopelessly lost. The key features that make the Enterprise unique are underplayed, as is the structured nature of the Basic. The example programs do not necessarily illustrate whatever point they are supposed to be making.

Worst of all, too many questions are left unanswered after you have completed the book. At no point does it explicitly state what the maximum values for the x and y co-ordinates of the screen are, nor does it mention which values in the sound command correspond to which notes in the musical scale. A few charts would not have gone amiss. A lot of time and care and thought have gone into making everything else about the Enterprise seem right. What a shame that the same cannot be said about the manual.

Conclusions

- The Enterprise is a state-of-the-art, cheap eight-bit home computer.
- At £250 it competes directly with the MSX micros, and beats them hands down on specification. It also provides the BBC Micro with some strong opposition at a much lower cost. Against the Amstrad, the Enterprise looks a touch expensive: even if it does enjoy a higher technical specification, it has no monitor or cassette unit.
- If the promises about expansion and software are kept then the Enterprise micro should have an interesting future.
- IS-Basic points forward to the future development of the Basic language. It is comprehensive, structured and very powerful. The addition of a Logo cartridge would make the Enterprise an incredible graphics tool. □

Benchmarks

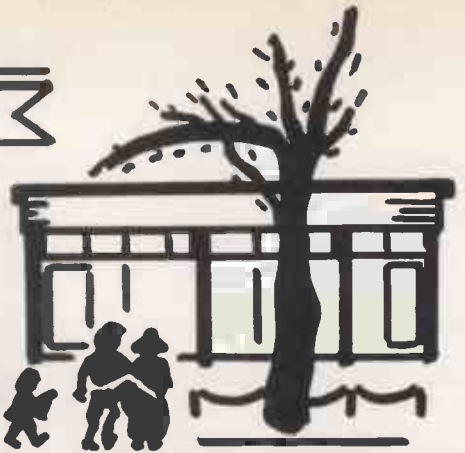
The timings below, in seconds, are for the set of standard Basic Benchmarks routines given in the January 1984 issue of *Practical Computing*. The Enterprise emerges as slow compared to other eight-bit home micros. There appeared to be a bug in IS-Basic's sine function, which was unable to return a value for sin (59) in BM8. The extra line Option Angle Degrees corrected this.

	BM1	BM2	BM3	BM4	BM5	BM6	BM7	BM8	Av.
Enterprise — Z-80	24.0	19.0	21.0	32.0	33.0	49.0	94.0	308.0	68.5
BBC model B — 6502	1.0	3.1	8.3	8.7	9.2	13.9	21.9	52.0	14.8
Commodore Plus-4 — 7501	1.4	9.4	17.9	18.5	20.9	34.2	54.6	100.6	32.2
Spectrum — Z-80	4.8	8.7	21.1	20.4	24.0	55.3	80.7	25.3	58.5

THE FIRST CHOICE—THE FINAL ANSWER

... its still

FOLLY MICRO



PRINTERS

CANON PW 1080A	£319 + VAT
SHINWA CP80.....	£169 + VAT
THE NEW SHINWA CPA 100CPS.....	£195 + VAT
DAISYSTEP 2000.....	£215 + VAT
MP 165 A new standard for dmp.....	£299 + VAT
80 Col. 165CPS with an INCREDIBLE 75N.L.Q.	

BEST EVER PRICES

SEIKOSHA GP50A	£95 + VAT
SEIKOSHA GP100P or S.....	£143 + VAT
SEIKOSHA GP100VIC.....	£175 + VAT
SEIKOSHA GP500A.....	£175 + VAT
SEIKOSHA GP250X.....	£199 + VAT
SEIKOSHA GP700A.....	£347 + VAT

STOP PRESS

JUKI 6100

JUKI 6300

BARGAIN PRICES

The NEW JUKI 6300 ultimate daisywheel £760 + VAT
 Bestseller JUKI 6100 still available for just £326 + VAT
 JUKI prices include Cable, Paper and FREE delivery

THE NEW HONEYWELL HEAVY DUTY DOT MATRIX PRINTER

132 Column, 150cps. HONEYWELL L32..... £610 + VAT
 Designed for High Throughput Without Duty-Cycle Limitations
 IBM PC Compatible inc. Line Graphics, Mosaic, 3 Grey tones, Math set and
 9 Nationals. Paper up to 12" wide and 4 carbon copies.

DISC DRIVES

5¼" Single 400K	£185 + VAT
5¼" Dual 800K.....	£350 + VAT

BUSINESS SOFTWARE

Lotus 123.....	£295 + VAT
Symphony	£425 + VAT
Compsort Delta.....	£495 + VAT

MODEMS BT APPROVED

Minimo 300 baud.....	£96 + VAT
Minimo 300/1200/75 baud.....	£145 + VAT

EVEN MORE PRINTER BARGAINS

STAR GEMINI 10X.....	£185 + VAT
STAR GEMINI 15X.....	£270 + VAT
STAR DELTA 10.....	£298 + VAT
STAR DELTA 15.....	£380 + VAT
STAR RADIX 10.....	£390 + VAT
STAR RADIX 15.....	£477 + VAT

MANNESMANN TALLY

MT 80.....	£173 + VAT
MT 160.....	£449 + VAT
MT 180.....	£579 + VAT
PIXY PLOTTER.....	£495 + VAT
With FREE IBM, BBC or APPLE SOFTWARE	

PRIORITY ORDER

Please send me:

Name _____

Address _____

I enclose cheque/PO for £ _____

Please add VAT + £9.50 DLY PER ITEM

PC3/85

FOLLY MICRO



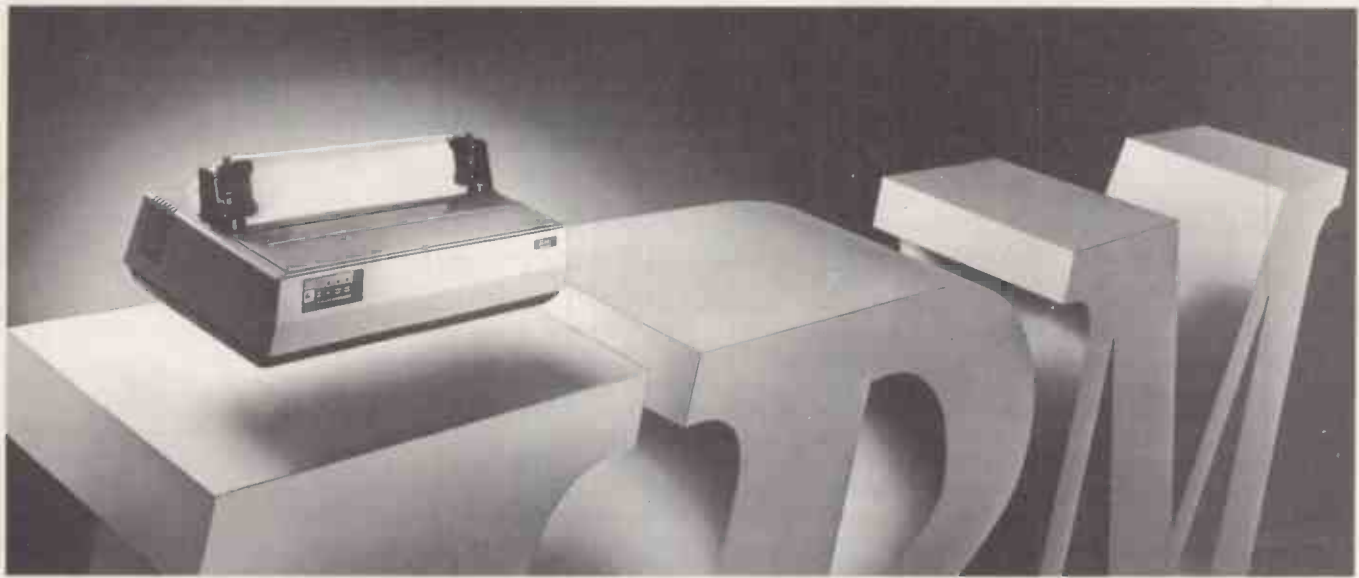
0730 894078

0730 67057

10 College Street, Petersfield, Hampshire
9am-9pm every day or send SAE for full range

We have no connection with any other retailer

SHOWROOM NOW OPEN



DOTTING THE I'S' FOR EVEN THE BEST COMPUTER.

OKI IS O.K.

When you're talking about the best, why buy anything but the best to complement your choice – and when it comes to printers for the best computer, there is only one real choice – OKI.

Why OKI? – What other printer could offer you a printhead guaranteed for over 200 million characters – each one as clear and precise as the last? What other printer could offer you all the features that an OKI can? What other printer comes with a full .12 months warranty, your guarantee of OKI's undisputed quality and reliability?



X-DATA Ltd. 750/751 Deal Avenue
Slough Trading Estate Berks SL1 4SH
Tel. Slough, (0753) 72331 · Tlx. 847728

These are the features that make OKI printers stand out from the crowd, in the same way that the best computer is head and shoulders above the rest.

If you want to know more about OKI printers, drop into the dealer who sold you your computer and insist on the best complement to your computer. Insist on OKI.

BBC Logos

The wait is over, and now BBC Micro users have several Logo packages to choose from. Susan Curran appraises their strengths and weaknesses.

I AM NOT an entirely enthusiastic convert to Logo. Though the experimental work on Logo in education has been interesting and impressive, within limits, I sometimes feel the language is more publicised than used.

For the unfamiliar, Logo has two main elements: turtle graphics and list processing. The turtle graphics themselves are handled through list processing. The point is that in any version of the language worthy of the name there is graphic list processing and non-graphic list processing.

Logo is entirely procedural. User-defined procedures are added to the in-built primitive procedures to build up programming power. Procedures when run can call other procedures, or recursively call themselves; there are no separate elements called programs. It is not particularly mathematics-orientated, and though all the versions stretch to non-integer arithmetic, only the perverse would select Logo for heavy number crunching.

One obvious problem with Logo is the gulf between simple turtle graphics and the complex demands of non-graphic list processing. Turtle graphics are easy to teach to even very young children and are also a useful tool for the more advanced. List processing is not easy, and attempts to introduce it to young children have not been an unqualified success. All too often, the programs simply build up very elementary databases that could better have been handled using a database application program.

Logo does, of course, face heavy competition from other list-processing languages such as Lisp and Prolog. Logo list processing is, in fact, normally more or less a subset of Lisp facilities. It is not a competition which Logo will always and inevitably lose, and this side of Logo is perhaps best seen as a serious tool for data structures, rather than as an educational language for young children.

Logo is remarkably unstandardised, though the versions covered in this review do show family resemblances to other micro-based versions of the language. Such semi-standardisation is obviously important to those who want to work with Logos on different machines, or to transport programs from one to the other. For the new user, clarity and ease of use may seem more important. All of the versions reviewed make proper use of BBC graphic modes and provide reasonably full

access to operating-system commands, and to this extent they obviously differ from non-BBC Logos.

Curiously, the BBC Micro has only just acquired its first versions of Logo, long after other popular home computers. For a major educational computer this has been an extraordinary omission, but one now repaired with a vengeance. Four rival versions of the language have been launched.

I tested three versions: Acornsoft Logo, LSL Logo from Logo Software Limited, and LCSI Logo from Logotron Limited. The fourth version is from the Open University, and it is not covered in detail here. There appears to be remarkable unanimity about the cash value of a good Logo. All three packages reviewed cost just under £70, though schools and colleges may be offered special deals by some software suppliers.

All four versions are in ROM form, but while the LSL and LCSI versions are crammed on to a single 16K chip, the Acornsoft and Open University implementations take up two chips each. Though this results in more expensive instruction sets, it could pose problems for

those who have only one spare ROM socket and are reluctant to invest in an expansion board.

LSL Logo

LSL Logo was once expected to become Acorn's official version. The fact that it didn't delayed its development, and clearly caused considerable ill feeling: there is a viciously negative acknowledgement to Acorn at the start of the LSL manual. It has gone through several versions, and there has been an unflattering review from the British Logo User Group of version 0.6. The final release version is 1.0, which is markedly improved in both speed and reliability.

This one-chip Logo is written in assembler. The manual is spiral-bound, has 234 pages and is nicely produced on thick paper with plenty of colour. It contains a beginners' guide aimed at children, some brief but competent teachers' notes, a full and clear technical specification, and some quick references including a very full bibliography. It lacks a single comprehensive index, but I found it adequate for general reference.

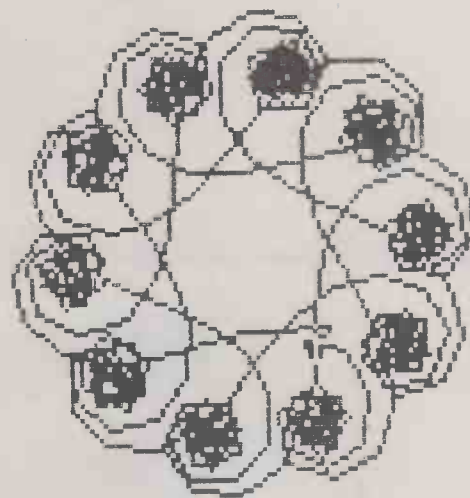


Figure 1. LCSI listing of Inspiral routine and screen dump.

```
?FD "INSPIRAL
TO INSPIRAL :SIZE :ANGLE
FD :SIZE
RT :ANGLE
INSPIRAL :SIZE :ANGLE + 10
END
```


The beginners' guide tries hard to be entertaining — too hard for some tastes. Its profusion of styles of illustration and type comes across as a bit of a mess. There are very full explanations of simple commands and of elementary matters like wiring up the system, but there are not many worthwhile programs. Very little space is given over to non-graphic applications.

A few more short sample procedures are incorporated into the technical section — again, nothing serious. It is a definite shortcoming of this package that it does not have in-depth program support. The technical section of the first edition of the manual was also riddled with printing

errors but LSL has done a thorough job in identifying them and they should be corrected in the next edition.

In use LSL Logo defaults to a graphic screen with a square, white-bordered graphic window at the top and a text area at the bottom. Mode 4 is the default. The square window leaves a lot of screen space unused, but it is pleasant to work with, and easy to redefine. The bordered window works in fence style only accepting plots within it. Window plotting is available as an alternative, with off-screen points nominally plotted as usual in BBC graphics. One real drawback is the lack of a wrapping option, as on the other Logos.

LSL has altered the flexible but exas-

perating BBC co-ordinate system, and the graphics window has Cartesian scaling, with 220 plotting points on either axis and a centre origin. This made it rather difficult to benchmark graphics applications against the different scales used by the other programs. The scale can easily be altered. The SetX and SetY commands will not draw lines, making it impossible to simulate co-ordinate graphic commands. Otherwise, the graphic primitives are very good.

All editing is in mode 7. Though immediate commands can be given in other modes, procedures can only be defined in the editor. The package claims a full-screen editor, but what is provided is not what you, I or the writers of other Logos would recognise as one. The procedure is reproduced in a top window, and amendments are made by using the copy cursor and building up a new line in the bottom window.

The method is vaguely reminiscent of editing programs on the Spectrum. You have to use the function keys to open up a new line, delete a line or store the definition. Only one procedure can be edited at a time, and the length is limited to 90 screen lines or 50 Logo lines. The size of the lower window sets a practical limit of two lines to each Logo line, which is a considerable restriction in a list-processing language.

The obvious disadvantage of mode 7 is the different character set, in particular the absence of the square brackets that normally enclose Logo lists. LSL has worked around this problem by making square and round brackets functionally identical; the same is done with single and double quotes, too. This was possible only because of the restricted format of arithmetic functions, which means that they do not use round brackets. It is quite a neat arrangement.

LSL procedures can only be saved individually, under their procedure names. There is no option to produce a file consisting of several procedures with a name of its own, and this makes it unnecessarily awkward to load and run a program consisting — as any serious program will — of a set of procedures. It also means that it is unwise to give any procedure a name more than seven characters long.

There are a good selection of error messages and of debugging commands, including two Trace commands — one for variables, one for procedure names — and a Walk command to single-step through program execution.

Though LSL's primitives are reasonably comprehensive, one failing is in the arithmetic commands. There is no support for infix arithmetic of the usual 2+3 type. All arithmetic is handled in prefix form

ADD 2 3

which will be unfamiliar to small children.

(continued on next page)

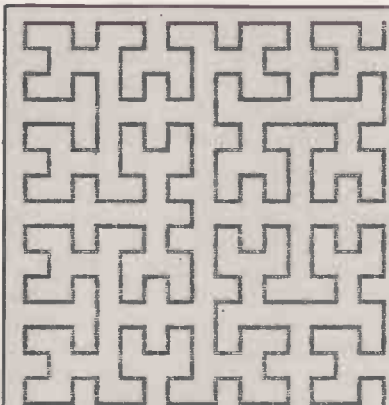


Figure 2. Listings of Hilbert routine and screen dump from LCSi.

```
TO HILBERT :SIZE :LEVEL :PARITY
IF :LEVEL = 0 [STOP]
LEFT :PARITY * 90
HILBERT :SIZE :LEVEL-1 -:PARITY
FORWARD :SIZE
RIGHT :PARITY * 90
HILBERT :SIZE :LEVEL-1 :PARITY
FORWARD :SIZE
HILBERT :SIZE :LEVEL-1 :PARITY
RIGHT :PARITY * 90
FORWARD :SIZE
HILBERT :SIZE :LEVEL-1 -:PARITY
LEFT :PARITY * 90
END
```

Acornsoft

```
?PO "HILBERT
TO HILBERT :SIZE :LEVEL :PARITY
IF :LEVEL = 0 [STOP]
LEFT :PARITY * 90
HILBERT :SIZE ( :LEVEL - 1 ) ( 0 - :PARITY )
FD :SIZE
RT :PARITY * 90
HILBERT :SIZE ( :LEVEL - 1 ) :PARITY
FD :SIZE
HILBERT :SIZE ( :LEVEL - 1 ) :PARITY
RT :PARITY * 90
FD :SIZE
HILBERT :SIZE ( :LEVEL - 1 ) ( 0 - :PARITY )
LEFT :PARITY * 90
END
```

LCSi

```
?INSPECT "HILBERT
TO HILBERT SIZE LEVEL PARITY
IF EQ :LEVEL 0 ( RETURN )
LEFT MLT :PARITY 90
HILBERT :SIZE SUB :LEVEL 1 SUB 0 :PARITY
FD :SIZE
RT MLT :PARITY 90
HILBERT :SIZE SUB :LEVEL 1 :PARITY
FD :SIZE
HILBERT :SIZE SUB :LEVEL 1 :PARITY
RT MLT :PARITY 90
FD :SIZE
HILBERT :SIZE SUB :LEVEL 1 SUB 0 :PARITY
LEFT MLT :PARITY 90
?EDIT "BM4
```

LSL

```
?PO "BM4
TO BM4
PRINT "S
MAKE "K 0
REPEAT 1000 [MAKE "K :K + 1 MAKE "A :K / 2 * 3 + 4 - 5]
PRINT "E
END
```

LCSi

```
?INSPECT "BM4
TO BM4
PRINT "S
MAKE "K 0
REPEAT 1000 [ MAKE "K ADD 1 :K , MAKE "A DIV :K 2 ,
MAKE "A MLT :A 3 , MAKE "A ADD :A 4 , MAKE "A SUB :A 5 ]
PRINT "E
LSL
```

```
TO BM4
PRINT "S
MAKE "K 0
REPEAT 1000 [MAKE "K :K + 1 MAKE "A :K / 2 * 3 + 4 - 5]
PRINT "E
END
Acornsoft
```

Arith benchmark listings in LCSi, LSL and Acornsoft Logos.

(continued from previous page)

Round brackets are not specific to arithmetic, and it takes some care to combine a number of prefix arithmetic operations correctly. Another serious omission is the list-processing Sentence primitive.

Some Logo purists have been upset by the need to separate commands on the same line by commas, no punctuation being the Logo norm. Personally, I found this feature quite helpful. The package works fast, particularly when the turtle is hidden.

LCSI Logo

The French Soli company developed this Logo along the lines of Apple, Atari, Spectrum and other popular versions. It too is written in machine code and it works fast.

The chip comes with a loose ring-bound manual in a fancy IBM-style library case. There are 183 pages, including the index, neatly and plainly written with no pictures. I found the manual style a little patronising, but the contents are solid enough. There is little difference between the sections aimed at pupils and teacher, and young children would find it heavy going. There are several programs in the manual, and two useful sets of utilities for list processing: Mike Sharples' Phrasebook and Boxes.

LCSI starts up in mode 4. As soon as a graphics-orientated command is given the initial text screen switches to a graphics screen with a text window at the bottom. The manual provides full information on memory management. The editor too will work in any mode, if sufficient memory is available. There is no visible fence as on other packages, but the screen arrangement is neat and versatile.

There is a good full-screen editor, with a buffer that holds 1,500 characters. Editing commands include screen scrolls and page switches, Find and Replace. Sets of procedures can be switched in and out of the buffer as required and as space permits. Procedures can be saved individually or collectively.

The set of primitives is sensible, though short forms only are given of some standard primitives, like SE for Sentence and BF for ButFirst. A good feature of the syntax is the ability to include BBC * commands anywhere within a program line: the rest of the line is not automatically passed to the operating system as in BBC Basic. A less good one is the lack of specific local variables, except for those passed direct to procedures.

The set of graphics primitives is not extensive. For instance, you have to use operating-system commands to change default colours, alter the default windows, write text in the graphics window or fill shapes. The graphics window cannot be redefined in Wrap or Fence mode, when it always takes up most of the screen, leaving only the text window at the bottom. It can

Benchmarks

Logo benchmarks are not fully standardised. We ran five reasonably common ones: Hilbert (see figure 2), Inspiral (see figure 1), and Circle to cover the graphics, a list-reverse procedure for non-graphic list processing, and a simple arithmetic benchmark. Timings are in seconds. Graphics timings are given with turtle displayed and (in brackets) with it hidden, which make quite a difference on some packages.

	Hilbert	Inspirale	Circle	Arith	RevList
Acornsoft	77 (58)	63 (54)	40 (20)	115	110
LCSI	49 (29)	50 (26)	44 (25)	88	28
LSL	55 (13)	88 (36)	90 (37)	38	26

Suppliers and prices

Acornsoft Logo, £69 including VAT from Acornsoft. Telephone: (0223) 316039
 LCSI Logo, £69.95 including VAT from Tecmedia. Telephone: (0509) 230248
 LSL Logo, £67.85 including VAT from Logo Software Ltd. Telephone: 01-891 0989. Schools should place orders via E J Arnold.

be redefined in Window mode, but you have to correct the origin by hand using VDU 29.

Acornsoft Logo

Acornsoft's Logo package is comprehensive to the point of going over the top: two chips, a disc, a cassette, three manuals, a reference card and sundry extra bits of paper, posters and so on. I almost expected badges and balloons to emerge from the bottom of the box. It is all elegantly put together, and though the manuals are not as inherently strong as the loose-bound volumes of the other packages they appeared reasonably robust.

Of the manuals, *Introduction to Logo* is an 89-page beginners' book, beautifully written and simply illustrated. *Logo* stretches to 163 pages, and is intended for those familiar with the computer and with Basic programming; it too is well done and well indexed. Neither contains much in the way of usable programs, but the package provides the luxury of 16 example programs and 11 extensions on both 40/80-track disc and cassette. Though the programs are not all major works, they do add up to an excellent illustration of the package's potential.

Among the extensions are screen dumps to Epson and Olivetti-type printers, as well as driver software for the BBC Buggy, Valiant and Jessop floor turtles only available as an optional extra for LSL and LCSI Logos. Also on disc/cassette are some mathematical functions not in-built, some property list functions, and machine-code interface primitives like Call. The example programs include a simple natural-language system, a mini-

Prolog interpreter, a character definer, and various educational game outlines.

The list of primitives in the manual has over 200 entries, enough to tax the memory of anyone and more than twice as many as in LSL Logo. However, this difference is not a very accurate way of measuring the power of the two packages. Acornsoft Logo was written in BCPL and is not especially fast, particularly in list processing. In the graphics routines, too, it seemed frequently to stop in its tracks, presumably for garbage processing.

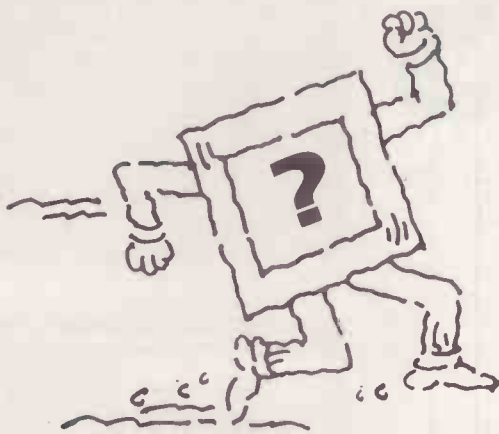
Acornsoft Logo is the only version to provide multiple turtles and redefinable turtles as standard. They are a real plus, making it possible to develop graphics microworlds quickly and simply. However, they do slow down the action markedly, and I found it quite difficult to program co-ordinated multi-turtle sequences using Logo's limited control primitives.

Similar facilities will be provided in LSL and LCSI Logo only through hardware sprite boards. Sprite boards should be faster and more powerful than software-generated sprites can be, but they are likely to cost around £100 to £150, putting them out of the reach of many users.

The Acornsoft Logo's text/graphics window arrangement is not easily adapted. There is a text window at the bottom, and a rectangular fenced graphics area above. The graphics window stays the same size, and does not default to whole-screen, in the Wrap and Window modes.

Conclusions

- All three packages are above average in presentation and content, and all seemed reliable in use.
- LSL offers less than the other packages, with its poor editor, shorter list of primitives and lack of program support. It has several non-standard features, but it is speedy and easy to use.
- LCSI Logo is a well-rounded package which has fast and full list-processing capabilities.
- Acornsoft Logo is generally competent, though slower than LCSI. Its multiple redefinable turtles and good program support make it the winner in my opinion, as long as you have two ROM slots to spare.



The fastest spreadsheet is understandably better.

SuperCalc® 3, Release 2

SuperCalc 3 with FastMath™ is faster than any other competitive spreadsheet. A lot faster. This means while you're waiting for others to calculate, you could be off and running with SuperCalc 3, Release 2. And on top of its astonishing speed, it's all on one disc to simplify usage. We've simplified the price, too. It's about **£80** lower than its best known rival.

SuperCalc 3, Release 2 provides the broadest range of functional capabilities. You get a better data manager, and the

most sophisticated graphics of any integrated program. Your spreadsheets will be more meaningful, more understandable.

Yet it's surprisingly easy to learn and use. From easy startup, to extensive tutorials, to deeper, more efficient modelling, the more you get into SuperCalc 3, Release 2, the better it treats you.

Speed, flexibility, depth... no wonder it takes you further, faster.



Easy Software working harder.

Sorcim/IUS Products: EasyWriter 1 System, EasyWriter II System, SuperWriter, SuperCalc 3 Rel.2, and other SuperCalc Software, EasyFiler, and EasySales Pro.

Special offer: Free demo diskette

Please send me a Free Demo Diskette* so I can preview the features and effectiveness of SuperCalc® 3, Release 2.

Name _____

Address _____

Tel: _____

Post this coupon to:
Sorcim/IUS, 10 Station Road, Watford,
Herts WD1 1EG. Tel: (0923) 46255.

*Diskette is designed for use with IBM-PC® or fully compatible hardware systems. IBM-PC is a registered trademark of International Business Machines Corporation.

● Circle No. 149

is no longer available by default. You can still get to it by giving its full path name of
 <logical device>:<filename>
 in this case

ROM: ADAM

Alternatively you can change the default program directory to ROM:, access Adam, then reset the default directory to what it was before, giving its logical name. This happens quickly because Adam keeps the full directory of each mounted logical device. You can, of course, reset the directory by giving the physical name, but this will evoke an implied mount, re-reading the directory from the tape.

Adam has a third screen area, which is used to log session activity. Here the names of the various programs used during the session are allowed to accumulate, together with a note of what became of them.

At this stage we noticed that the TV set was incapable of displaying the row of tiny dots in the left-hand corner that are supposed to give an indication of processor activity. We didn't miss that very much until we came to run the time and data utility, which replaces these dots with a rather more useful digital clock.

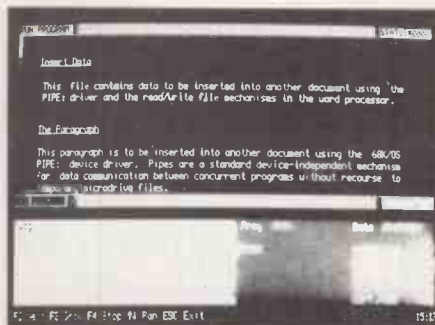
No doubt the television could have been adjusted to bring this into view, but on the Hitachi the internal control was hard to get at, and we were in no mood to fool with high voltages. As luck would have it, at this point a very handsome black monitor specially designed for the QL arrived from Microvitec. Now we were able to switch to 85 characters per line, and see a full screen of crisp, easily readable characters.

There is one crucial difference between 68K/OS and a single-tasking system like CP/M. All the components of CP/M are synchronous. 68K/OS, on the other hand, also supports asynchronous processes that take place in their own time, almost as if they were running on separate processors. One practical implication of this to the user is the way 68K/OS appears to be able to read and write to the Microdrives without pausing in its service of an application program.

Aside from these asynchronous processes, the interface between the operating system and applications running under it divides into four categories of functions, each category having its own entry point. Specific functions within the categories are differentiated in the conventional way by loading a different function number into the D0 register.

One entry point, called the SP vector, is reserved for direct assaults on the hardware-dependent system primitives, notably the graphics routines. Software is provided to draw points, lines, blocks and conic sections, but these functions are strictly specific to the QL and so should be avoided by applications that aspire to be portable.

Another entry point, the input/output subsystem or IOSS, creates a connection



The word processor sandwiched between two copies of Adam.



Running multiple copies of Adam.

to device drivers, which are either standard to the operating system or supplied by the user. Device drivers can be interrupt driven, polled or run as asynchronous programs, but the interface with the IOSS ensures that whatever the level of complexity of the device driver, it simply appears as a subroutine to the rest of the operating system.

Limitations

Unfortunately hardware limitations mean that it still has not been possible to make the resident driver for the two RS-232 devices work entirely sensibly. You still have to put up with not being able to set separate baud rates for send and receive, so Prestel-type comms requires expensive additional hardware. If you want different baud rates on each line you have to confine communication to transmitting, and give up any idea of receiving; there can be no soft handshaking, for example. These hardware shortcomings are, frankly, tatty but QL users should console themselves with the thought that they could spend over twice as much on a Tandy 1000 and get no RS-232 at all.

A third entry point, the DFM vector, takes care of all the display-file manager calls. Display files are sets of linked lists retained in RAM that maintain the contents of windows, allowing them to scroll or be overlaid without loss of data.

The snag with windowing under SuperBasic is that if one window overlaps another the contents of the earlier window are destroyed. This can only be avoided by writing additional code that takes responsibility for checking for any damage done by overlapping windows and repairing it as necessary. Separate tasks therefore have to know what the others are

Utilities on Microdrive

Format.PRg — A program to format a new Microdrive cartridge or wipe an existing cartridge.

Copy.Prog — Copies program and data files one by one between cartridges.

Time.Prog — Sets system date and time.

Dump.Prog — Dumps a screen image to an Epson FX-80.

Edit.Prog — An easy-to-use screen editor with a help screen; a real joy compared with Quill, and a lot faster.

Draw.Prog — Lets you create drawings on the screen using a menu and two sets of hair-line cursors used for positioning rectangles, circles, ellipses, squares, lines, pixels. Text can be added and areas can be filled with various colours. Your keystrokes can be saved to a file which can be called up later. Not a serious utility — it is intended as a demonstration of how application programs can tap into the OS facilities.

Slides.Prog — Allows you to display serially a set of pictures created by Draw.Prog. Fun for demos.

Print.Prog — A program to print out a file. This is where you begin to miss the simplicity of CP/M, with its built-in Type command.

Rename.Prog — Renames files. Here again, you need a separate program to do what other operating systems take charge of themselves.

IOSSMenu.Prog — Lets you experiment with the input/output sub-system and also serves as a demonstration of the menu-handling abilities of the system.

Fount.Prog — An under-documented teaser for use with Edit and some pre-defined founts. There are no details about how to create your own founts.

up to. Display files, on the other hand, result in windows that can coexist, and even occupy the same physical location, without being mutually destructive. And you can actually scroll text through the windows without losing any of it.

The final entry point, the OS vector, is used to access the remainder of the hardware-independent functions like memory management, heap allocation and multi-process handling. Of these the most novel is the menu manager, a collection of functions designed to make it easy for applications programs to provide a consistent user interface. It draws heavily on the window functions to create two kinds of special window: the menu window and the list-selection window.

The menu window writes a set of indestructible prompts and reads data keyed into input fields, which it also provides. Variable messages can be displayed, to provide context-sensitive help, for instance. The second kind of window displays a scrollable list of items, from

(continued on next page)

(continued from previous page)

which the user can make selections for transfer to the menu window.

Functions like memory management are, of course, crucial to an operating system. But you might be forgiven for asking whether the more exotic functions of windowing and menu management should not rather be supplied as library routines, to be appended to application programs as needed. Why have them permanently taking up precious operating-system space? The ability to delete and rename files is conventionally a resident part of the operating system, yet CP/M and MS-DOS users coming to 68K/OS will be surprised to find they have to be loaded from the Microdrives as transient programs.

On the QL there may be some argument for this inversion. Because scrollable text-window routines are already part of the operating system and reside in ROM, an application package like a word processor does not have to pull all that code into RAM every time you load it.

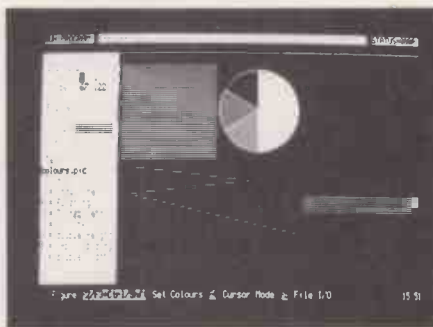
The advantage of an operating system that takes care of things like windowing becomes clear when you power up WP.Prog, the pre-release copy of the word processor GST plans to release to run under 68K/OS. It loads far faster than the Psion equivalent, as it only contains about 16K of code — though it is only fair to point out that the GST offering has fewer functions than Psion's Quill. This is partly because the tricky business of displaying and scrolling text through a window, which forms a large part of any word processor, is taken care of by the operating system. When it comes, the full word processor is destined to occupy a 16K EPROM for mounting on one of the spare slots on the 68K/OS plug-in board.

Out of hand

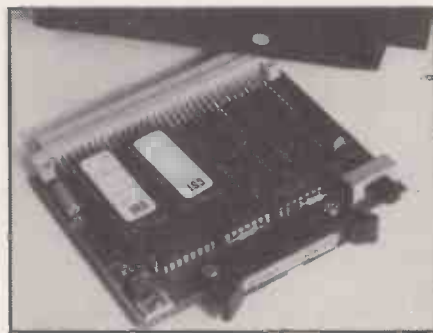
The windowing can get out of hand, as we discovered when trying to save text to a full microcassette from inside the GST word processor. An error window opens towards the top of the screen, inviting you to make more disc space. Thanks to multi-tasking you can do this by returning to Adam, expanding the Adam screen until you can see all the data directory, and then evoking Delete.Prog.

This utility also opens a window of its own to ask you to confirm the delete, and rather unnecessarily takes half the screen to do it. When this window closes again you expect to see the lower half of the screen restored. But in fact half the word processor screen popped up here. More curiously still, if you try to repeat the save and have not deleted enough files, the Disk Full warning pops up underneath the top half of the Adam screen, so you do not see it until you hop across to shrink the remains of the Adam screen.

The word processor is still in its pre-release stage, so it is not fair to judge



Graphics drawing.



The GST hardware.

it. But it does seem to indicate that the operating-system window manager — presumably now a mature part of the product — rather curiously allows an application package to think it is showing you a window, while another process of a lower priority is blocking the view.

This serves as a reminder that, as it stands, the operating system is not designed for fools and is not foolproof. I found, for example, that it is possible to corrupt the directory relatively easily. Log a cartridge called, say, Progsa on to mdl: and load a program from it into memory. Swap the cartridge in mdl: for a second cartridge — let's call it Progsb — and try setting it as the default program device.

The operating system will tell you that you cannot do this, as the directory — of Progsa — is already in use, signposting the activity of the process we have loaded. You might be inclined, by using Alt-F1, to kill the process that is causing the trouble. Don't! If you do, the system will write the directory back to drive mdl:, assuming that Progsa is still there. As it isn't Progsb will receive the Progsa directory, lose its own directory and consequently all hope of finding its own files again.

Attention to the details of true multi-tasking makes the addition of 68K/OS a great improvement on the standard QL. But it leaves you without any applications software, or even high-level languages to develop your own. An assembler is supplied as an extra, but one of the attractions of the 68000 generation of chips is supposed to be that we can say goodbye to assembler writing forever.

Even regarded as an assembler system, there is one very important utility missing — a debugger. Like the high-level languages, this is promised for the future. But until it arrives the system will require a lot

Function-key assignments

- F1 — Selects the Run mode. The program directory can be scanned using the cursor keys, and a program selected by pressing the Escape key when the cursor is against the correct directory entry. This copies the name into the command-line window. Alternatively the name of the program to run can be typed in the normal way.
- F2 — Selects the function mode. This is used for setting up the default program and data drives or devices, or explicitly mounting or dismounting them.
- F3 — Swaps the directory selection between program and data.
- F4 — Updates the log and directory screens, something which is not done automatically at the termination of each program.
- Alt-F1 — Takes you straight out of whatever you are doing and into the System mode. From here you can skip about between the various jobs currently running, expand or contract the window area on a particular display, suspend that job, restart it, kill it, or bring a completely new task to life. You can also perform a warm boot into Adam.

of patience from its users. Significantly, GST has been developing what utilities there are under the Motorola Exormacs system and not under 68K/OS.

What we missed most in the new environment was SuperBasic, one of the best things about the QL as bought in the shops. GST hopes to offer a Basic of its own soon, and Fortran and Pascal are rumoured to be on the way.

Swapping programs and data with QDOS is also not a solution. The two operating systems use quite different formatting, and cannot read each other's cartridges.

Conclusions

- 68K/OS is an ambitious, fully fledged multi-tasking operating system for the QL and other 68000-based machines. It comes with excellent documentation on an easy-to-fit expansion board that allows you to revert to QDOS at the touch of a switch.
- The dearth of languages makes 68K/OS something of an anomaly — a development system for what is supposed to be a high-level language chip, with the only language being ASM.
- 68K/OS costs £99.95, which includes a brief Users' Manual. Purchasers of the system are going to want to go into it all a lot more deeply, and won't mind forking out £4.95 for the highly detailed and well-written System Programmers' Manual.
- Unlike CP/M, 68K/OS does not include the assembler as a standard operating-system utility, and it will cost you another £39.95.

A SELECTION FROM OUR PRODUCT RANGE

High Level Languages

Product	CP/M	CP/M-86	MS-DOS	PC-DOS
BASIC INTERPRETER	•	•	•	•
BASIC COMPILER V5.3	•	•	•	•
BUSINESS BASIC COMPILER	•	•	•	•
C COMPILER	•	•	•	•
CBASIC	•	•	•	•
CBASIC COMPILER	•	•	•	•
CIS COBOL	•	•	•	•
COBOL COMPILER	•	•	•	•
FORTRAN COMPILER	•	•	•	•
LEVEL-2 COBOL	•	•	•	•
muLISP	•	•	•	•
muMATH/muSIMP	•	•	•	•
PASCAL COMPILER	•	•	•	•
PASCAL MT+	•	•	•	•
PL/I	•	•	•	•
PRODFORTRAN	•	•	•	•
PRODPASCAL	•	•	•	•

Low Level Languages

Product	CP/M	CP/M-86	MS-DOS	PC-DOS
MACRO-80	•	•	•	•
PROGRAMMERS UTILS (RASM)	•	•	•	•

Program Development Tools

Product	CP/M	CP/M-86	MS-DOS	PC-DOS
ANIMATOR	•	•	•	•
BUG	•	•	•	•
DISPLAY MANAGER	•	•	•	•
FTNUMB	•	•	•	•
LEVEL II ANIMATOR	•	•	•	•
PASM	•	•	•	•
PDEVELOP	•	•	•	•
PLINK	•	•	•	•
PLINK II	•	•	•	•
PLINK-86	•	•	•	•
SID	•	•	•	•
SPEED PROGRAMMING PACKAGE	•	•	•	•
XLT-86	•	•	•	•
ZSID	•	•	•	•

Utilities/System Tools

Product	CP/M	CP/M-86	MS-DOS	PC-DOS
CLIP	•	•	•	•
DESPool	•	•	•	•
DISKED-2	•	•	•	•
DISKMAN	•	•	•	•
DISKORG	•	•	•	•
DISKTTOOLS-1 (DISKMAN & DISKORG)	•	•	•	•
DISKTTOOLS 2 (DISKTTOOLS 1 & DISKED-2)	•	•	•	•
DUTIL (FOR DBASE-II)	•	•	•	•
FILESHARE	•	•	•	•
DEC RAINBOW SERVICE S/W: (1) Format/Verify Service (2) Autorun Service (3) Function Key Service SERVICE S/W VOL. 1 (1, 2 & 3)	•	•	•	•
THE OPERATING GUIDE	•	•	•	•

Sorting

Product	CP/M	CP/M-86	MS-DOS	PC-DOS
MSORT	•	•	•	•
SUPERSORT	•	•	•	•

Code Generators

Product	CP/M	CP/M-86	MS-DOS	PC-DOS
AUTOCODE	•	•	•	•
FORMS-2	•	•	•	•
QUICKCODE	•	•	•	•
SOURCEWRITER	•	•	•	•
THE LAST ONE	•	•	•	•
THE LAST ONE—COMPACT	•	•	•	•

Telecommunications/Conversions

Product	CP/M	CP/M-86	MS-DOS	PC-DOS
BACDEBIT	•	•	•	•
BACSCOPY	•	•	•	•
BSTAM	•	•	•	•
BSTMS	•	•	•	•
ICL CO3 EMULATION (Bulk)	•	•	•	•
ICL CO3 EMULATION (Interactive)	•	•	•	•
ICL CO3 EMULATION (Interactive & Bulk)	•	•	•	•
REFORMATTER CP/M ↔ DEC	•	•	•	•
REFORMATTER CP/M ↔ IBM	•	•	•	•

Word Processing/ Text Editing/Editors

Product	CP/M	CP/M-86	MS-DOS	PC-DOS
EDIT-80 V2.02	•	•	•	•
MAILMERGE	•	•	•	•
MEMOPLAN	•	•	•	•
WORD	•	•	•	•
WORD WITH MOUSE	•	•	•	•
PARAGRAB	•	•	•	•
PEdit	•	•	•	•
PLANSTAR	•	•	•	•
P.MATE	•	•	•	•
SPELLSTAR	•	•	•	•
STARBURST	•	•	•	•
STARINDEX	•	•	•	•
WORDMASTER	•	•	•	•
WORDSTAR	•	•	•	•
WORDSTAR PROFESSIONAL (WS+MM+SS+STAR INDEX)	•	•	•	•

Databases/Data Management Systems

Product	CP/M	CP/M-86	MS-DOS	PC-DOS
DATASTAR	•	•	•	•
dbASE-II	•	•	•	•
dbASE III	•	•	•	•
FRIDAY	•	•	•	•
FRAMEWORK	•	•	•	•
INFOSTAR	•	•	•	•
REPORTSTAR	•	•	•	•

Financial Accounting

Product	CP/M	CP/M-86	MS-DOS	PC-DOS
INCOMPLETE RECORDS SYSTEM	•	•	•	•
NOMINAL LEDGER	•	•	•	•
OPEN ITEM PURCHASE LEDGER	•	•	•	•
OPEN ITEM SALES LEDGER	•	•	•	•
PADMEDE BUSINESS CONTROL SYSTEM	•	•	•	•
PAYROLL	•	•	•	•
PURCHASE LEDGER	•	•	•	•
SALES INVOICING	•	•	•	•
SALES LEDGER	•	•	•	•
TIME & COST RECORDING	•	•	•	•

Financial Modelling/Problem Solving

Product	CP/M	CP/M-86	MS-DOS	PC-DOS
CALCSTAR	•	•	•	•
DECISION ANALYST	•	•	•	•
LINEAR & GOAL PROGRAMMING	•	•	•	•
MATHSPACK	•	•	•	•
MICROPLAN	•	•	•	•
MULTIPLAN	•	•	•	•
PLANTRAC 1	•	•	•	•
PLANTRAC 1+	•	•	•	•
PROFIT PLAN	•	•	•	•
QSTAT	•	•	•	•
STATSPACK	•	•	•	•
TKI SOLVER	•	•	•	•
TKI SOLVER PACKS	•	•	•	•
FINANCIAL MANAGEMENT	•	•	•	•
MECH ENGINEERING	•	•	•	•

Business Applications

Product	CP/M	CP/M-86	MS-DOS	PC-DOS
JOB COSTING	•	•	•	•
POLICY MASTER	•	•	•	•
PRINT ESTIMATION	•	•	•	•
STOCK CONTROL	•	•	•	•

Training Aids

Product	CP/M	CP/M-86	MS-DOS	PC-DOS
CP/M TUTOR	•	•	•	•
KEYBOARD MASTER	•	•	•	•
TYPING MASTER	•	•	•	•

Graphics

Product	CP/M	CP/M-86	MS-DOS	PC-DOS
dGRAPH	•	•	•	•

The key to a Superior



Spreadsheet

Who wants equality?
Your spreadsheet must be better than the rest.

Supercalc combines the columns and rows of an accountants worksheet with the data storage and processing power of your microcomputer. The result is a powerful decision making tool that helps the user to solve the most complex "What if" financial modelling and forecasting questions.

It is ideal for the professional manager or engineer who has to deal with complex financial or numerical analysis.

There are three different Supercalcs.

Supercalc is the first version which has proved to be so popular with its many, many 8 bit micro users.

Supercalc 2 is an upgraded version, which can run on all the 16 bit micros as well. It also has new features including extra consolidation, use of colours and sorting. Supercalc 3 can only run on the IBM PC, but has a sophisticated graphics facility making use of up to 99 colours.

- Simple Commands
- Consolidation
- Calendar & Date Calculations
- Colour Display
- Variable Column Widths
- Many Formatting Options
- Sorting
- Row and Column Ranges
- Advanced Memory Manager
- Can Write Canned Applications
- Text Value Referencing
- Data Protections
- On-Screen-Help
- Full Documentation
- Separate Windows if required
- Graphic Options (3)
- Convert/Share or Transport Data Between Programs (3)
- Extract Data Based On Criteria (3)

For more information on how to unlock the power of your microcomputer contact MPI now on 01-591 6511

MPI & SORCIM:
The Right Combination

*Retailer and OEM Terms Available

*Access And Visa Cards Accepted

*Free Catalogue Available

*PLEASE TELEPHONE FOR LATEST PRICES



MICROCOMPUTER
PRODUCTS
INTERNATIONAL
LIMITED

Room PC1284,
Central House,
Cambridge Road,
Barking,
Essex IG11 8NT.
Tel: 01-591 6511
Telex: 892395

THE HOME OF
MICROCOMPUTER
SOFTWARE

BBC utility ROMs

David Osborne looks at what you can do with Toolkit and Caretaker plugged into your BBC Micro.

ALL SORTS of programs and functions can now be purchased that sit in the ROM sockets of the BBC Micro. Their great value is that there is no need to load the programs from tape and disc, and normally they do not take any appreciable computer memory from the user. As well as application programs such as word processing, databases and spreadsheets, ROMs can contain any utility software to help programmers in their task. Graphics ROMs, alternative programming languages and Basic and machine-code utilities can now all be bought for a few pounds.

In my machine I have two Basic utility ROMs which have increased my Basic programming productivity. The Toolkit ROM comes from Beebug Software, and Caretaker is supplied by Computer Concepts. Some facilities are common to both packages, but when they are used together they offer a full range of helpful utilities. Both packages arrive with supporting documentation, which is easy to read and understand, and with full instructions on how to insert the ROM into the micro.

No problems

I found no problems with either ROM. As with most ROM-based software, all of the functions from the two ROMs are accessed using * commands.

As soon as you insert Caretaker, you are provided with two useful facilities. Whenever you make a mistake in the syntax of any Caretaker command, the correct syntax is automatically given. Caretaker gives single-key entry for most Basic keywords: holding down Tab and another key will enter the Basic command word for you. For example, pressing Tab and M writes the command Mode to the screen. Pressing Tab and A produces Auto, and so on.

The single-key entry system can be turned off with a *Normalkey command so that you can use the *Tabstops command, which makes the BBC Micro's Tab key work like a typewriter-style Tab key with tab positions that can be defined by the user.

Both ROMs offer a couple of facilities which really have only limited usefulness. From Toolkit, *Old and *New do what the Basic versions of these commands do, with the difference that you can use them from within a program. Similarly, *Report gives a report of the last error message plus the line number. This saves you having to type Report and Erl. The *Clear command clears all variables, including the integer variables A% to Z%. Caretaker's *Cursor toggles to turn the cursor off or on, though the appropriate VDU commands work just as well and have the advantage that you can play around with the cursor in programs for other machine that don't have Caretaker installed.

More accurate

The main value of the two ROMs lies in helping Basic programmers to enter and check programs faster and more accurately. For example, both offer the facility to search for and replace a string. On the whole I prefer the way in which Toolkit does this, which is menu driven from the *Util command. Option 1 allows you to search for any string, including Basic keywords. Option 2 does the same but replaces the string with another. Another major plus for Toolkit is that the *Util command lets you restrict operations to any range of program lines that you want.

The only problem with the *Util options is that the strings which are searched for or replaced are highlighted in colour, as are the instructions, so they may be difficult to read on monochrome monitors. You can turn off the colour facility with a *Off command, but it is one more thing you have to remember to do. Both Toolkit and Caretaker commands can also be preceded by a unique letter in case the command conflicts with another ROM. So Toolkit's letter is B giving, for example, *BUtil, *BOn, *BOff, and Caretaker's is C.

Caretaker's way of doing all this is through one command, *Exchange, which has a lot of possible parameters. However, you cannot simply search, you can only

search and replace. So to find all occurrences of the string "Caretaker", for example, you need to *Exchange "Caretaker" with "Caretaker", which is rather laborious. Also, Caretaker only reports the line numbers at which a replacement has been made and you cannot see the actual line as you are able to with Toolkit.

A further annoying feature of Caretaker is that you have to tell it to search for Basic keywords. It is easy with Toolkit: all you have to do is to put a £ sign in front of the appropriate word. However, with Caretaker you have to tell it to search for the keyword token number which is put between two vertical brackets. So instead of looking for £Input, for example, you have to search for [232]. Although Computer Concepts provides a Basic token table in its manual, it is not as easy as just having to type in the word with £ in front.

However, Caretaker does allow the facility to replace strings only on command. You may not want to replace all occurrences of variable A with B, so you can arrange for Caretaker to ask each time, in which case it does give you the full line. Also, whereas both Toolkit and Caretaker have wild card facilities, Toolkit only searches for single wild card characters. Caretaker has the additional facility of searching for and replacing groups of characters. For example, searching for Jenk* would find Jenkins, Jenkinson, Jenkinson, etc.

Menu operation

In Caretaker list procedures, functions, variables, arrays and the like are done using the *LVar command with a series of optional parameters. Toolkit does it from the more user-friendly menu within *Util.

The Basic programmer often has to strike a balance between two conflicting needs of clarity and memory. The program has to be easy to read so that debugging can be done with the minimum of searching. This means leaving spaces, including Rem statements, and not having too many statements on one line. However, this wastes memory, and a

Summary of commands

	Toolkit	Caretaker
Supplementary commands		
NEW	NEW	—
OLD	OLD	—
CLEAR	CLEAR	—
CURSORS	—	CURSORS
ON/OFF		
Commands common to both ROMs		
String search	UTIL1	EXCHANGE
String replace	UTIL2	EXCHANGE
Basic word search/replace	£	Token number
List procedures, functions	UTIL1	LVAR
List Variables, Arrays	UTIL4-8	LVAR
Remove spaces, etc.	PACK [S,R]	SQUASH [S,R,M]
Renumber whole or parts of prog	RENUMBER	RENUMBER
Recover bad program	RECOVER	RETRIEVE
Move program in memory	MOVE	MOVE
Merge two programs together	MERGE	MERGE
Memory Information	FREE	STATUS
Machine-specific commands		
Screen edit	EDIT	—
Basic lines		
Error trap and Edit	ON	—
Hex and ASCII dump of memory	MEMORY	—
Screen dump to file	SCREEN	—
Verify memory with file	CHECK	—
Produce a program listing	—	EXPAND
Save part of program	—	PARTSAVE
Insert program into one in memory	—	INSERT
Save/Load function keys	—	KEYSAVE/KEYLOAD
Set Tab function	—	TABSTOPS

useful feature of any Basic utility ROM allows you to avoid such waste.

Both ROMs have facilities for stripping out spaces and Rem lines, and will strip out spaces where you would not otherwise be able to do so. For example, if you had the statement

```
IF A = B THEN C
```

there must be a space between B and Then. Otherwise, the Basic interpreter, which works in a left-to-right direction, would read the statement as if it were looking for a variable BThen. Because the packing utilities are able to know that B, Then and C are separate entities, they can tokenise Then first to produce a meaningful

```
IFA = BTHENC
```

to make a saving of five bytes. Toolkit tells you how many bytes it has saved.

Caretaker scores

Caretaker scores over Toolkit in so far as it has the facility for combining statements to make large, multiple statements separated by colons. Because each time you enter a new line number you use four bytes, this can be quite a significant saving of three bytes per line. Because it can tokenise the keywords first, the statement lines that you end up with are often longer than you could put in yourself. Having such large statements makes it very difficult to read a listing of the program, so Caretaker includes a function, *Expand, that lists the program with one statement per line. It separates lines at a colon and makes it easier to read a program.

Both ROMs allows you to moves lines around in the program. So you could take a section of the program — say some procedures — from the end and put them in the middle of the program. This is very useful for untidy programmers who like to end up with a neat program in which common procedures and functions are grouped together.

Toolkit easy

Toolkit does this through its list of *Util options. You type in the first and last line number of the segment to be moved, and the line number after which the segment is to be moved to. If the line numbers are all out, Caretaker's solves the problem by doing it all in one go using the *Renum command. For example, *Renum 42,2,168,180 will renumber and reposition lines 160 to 180, in steps of two starting at line 42. The only problem occurs if there are more lines to be inserted than there are available line numbers: then *Renum does not work, returning an error message. First you have to create the right amount of space using *Renum with a large enough gap size between lines, and then renumber the appropriate section. But all in all, Toolkit is easier for moving program lines around.

The other common facilities work in the

same way in each ROM and often they have the same name. To recover a bad program with Toolkit you use *Recover; with Caretaker you use *Retrieve. To merge a program from disc/tape to the current program, overlaying common lines, you use *Merge. To renumber the program or part of the program you use *Renum. Caretaker's does not use any extra memory. To move the program up or down in memory you use *Move. Finally, to report on the memory status with Toolkit you use *Free, while with Caretaker you use *Status.

In the areas where the two ROMs differ, Toolkit's strength is in editing Basic programs while Caretaker is best at playing around with program segments and using disc or tape to store them.

The main facility of Toolkit is the *Edit command, which allows quite sophisticated screen editing of Basic programs. With the Up and Down cursor-control keys, it enables the user to move forwards or backwards through the program. Unfortunately, it only prints lines down the screen; consequently when moving backwards through a program it is only the line numbers that tell you where you are.

Irritations

In Edit mode you can use the left and right cursor keys to move along the line to the point that needs changing, and make the alteration without having to use the Copy key. Any changes made to the program line will be stored when you pass to the next line. With very long, multi-statement lines this can be a great time saver. If you suddenly find you need another statement in the program, pressing Ctrl and Tab together will cause an additional line to be added to the program, providing there is room to insert the line without overwriting an existing line.

There are two minor irritations associated with *Edit. First, mode 7 is automatically selected, which is annoying if you program in mode 3 to be able to see whole lines on a screen. Secondly, as soon as *Edit is entered, all variables except the integers A% to Z% are cleared. This can

(continued on next page)

Suppliers and prices

Caretaker costs £33.35 including VAT from Computer Concepts, Gaddesden Place, Hemel Hempstead, Hertfordshire HP2 6EX. Telephone: (0442) 63933.

Toolkit costs £27 including VAT plus 50p post and packing from Beebugsoft, PO Box 109, High Wycombe, Buckinghamshire HP10 8HQ. Telephone mail-order service: St. Albans (0727) 60263.

Utility ROMs

(continued from previous page)

be annoying if you want to check the value of a variable before making a change to a program.

Another command associated with *Edit is *On, which is convenient for debugging. If a program encounters an error when running, the *Edit facility is automatically entered at the line which was in error, and the cursor is moved either to or near the point in the line which was in error. The only problem with this facility is that all values are cleared, which is annoying for all users, and all error reporting is done in colour, which is annoying for those with monochrome monitors.

The final three facilities in Toolkit deal with the computer memory itself, rather than the program. The *Memory command provides hexadecimal and ASCII dump of the memory between two addresses, and is useful for seeing where information is stored in the computer. The *Screen command saves a screenful of

information to a file, which is very useful for instant screen displays. Finally, *Check checks that the contents of the computer's memory between two addresses is the same as that in a disc or cassette file. Essentially it is a Verify feature that saves you from losing information through it not having been stored correctly. Since discs are usually reliable, its main value is for tape users.

Play around

The main individual features of Caretaker allow you to play around with parts of programs. For example, you can save parts of programs on to disc or cassette using the *Partsave feature. So if you have developed a properly structured program which is composed of a number of procedures and functions you can use *Partsave to create a new disc or cassette of the program parts, which can be used later. When you start a new program you can *Merge the small program segments that are stored as separate programs into your new program using either Toolkit or Caretaker, or with Caretaker you can *Insert them.

The *Insert command enables you to insert the program segments that are stored on disc or cassette into the program in memory without overlaying existing program lines. It does not matter if the line numbers are all out, as *Renum will

see to that. Along with *Partsave, this is an invaluable facility since you can develop new programs from old ones without having to type in the program segments again.

While Toolkit allows you to save the screen to a file, Caretaker saves another important memory area, the function keys. Using *Keysave or *Keyload you can tailor the BBC Micro keyboard to the task in hand. For example, you may want to set up the function keys differently when producing an assembly-language program than when writing one in Basic. Caretaker allows you to do this without having to go to the bother of typing in the key definitions each time.

Conclusions

● Both Toolkit and Caretaker provide an invaluable aid to the programmer in use each one complements the other.

● Priority in the ROM sockets is immaterial since both use difference command words for the main features. When the command words are the same, such as *Merge or *Move, they do the same thing anyway.

● The BBC Micro, is an extremely powerful machine. With Toolkit and Caretaker inside it, the ability of the programmer to make it work efficiently is given a substantial leap forward.

ON-SITE DEMONSTRATIONS

Available for many software packages in the Manchester/Sheffield/Nottingham/Derby area. For other areas please call.

PEGASUS ACCOUNTING

Regarded by many accountants as the very best accounting software available. Pegasus comprises eight modules, most of which will operate alone or will work together in a totally integrated system. We have professional staff, in London and the Midlands, fully trained to install and support Pegasus. Prices and details on request.

FRAMEWORK/D/BASE III

The new generation of software from Ashton-Tate. Each program is available at £325

COMPUTER-AIDED DESIGN

As specialist consultants in this field we can supply either software only or a total system configuration with full support. We are supplier of AUTOCAD, DOODLE and a number of other CAD packages. The productivity benefits of CAD are enormous — the cost of a system is almost certainly much less than you would expect. In most cases our clients have found a system pays for itself within 3 to 12 months!

COMPUTER BOOKS

We sell a range of over 200 books. Included in the titles we sell are: "Getting to know your Apricot" £12.95. "Framework: Programmer's Reference" £18.50. "MSDOS User's Guide" £11.05. Please ask for a copy of our booklist.

BEST UK SOFTWARE PRICES?

Buy from TriSoft Ltd., the specialist software company, formed by microcomputer consultants.

- * Over 400 leading software packages (inc. Apple)
- * Independent advice in making your choice
- * Professional staff + network of consultants
- * Most formats. All programs latest versions

SPECIAL OFFERS

DBASE II £229
WORDSTAR PROFESSIONAL £265

	List Price	Our Price		List Price	Our Price
SAGE PLUS	695	495	SAGE PAYROLL	195	139
SYMPHONY	550	415	DMS DELTA 2	495	375
OPEN ACCESS	450	310	DR C COMPILER	275	218
QUICKCODE	200	149	DR ASSEM. + TOOLS	155	119
SUPERCALC III	295	199	DISPLAY MANAGER	375	299
DATAPLOT +	195	155	MS PASCAL	250	199
INFOSTAR	285	218	VISICALC	207	175
MULTIPLAN	179	135	STATPACK	345	299
MS WORD	300	239	DGRAPH	200	145
WORDCRAFT	425	359	DR DRAW	232	179
VOLKSWR DEL.	295	199	GRAPH PLAN	220	175
MULTIMATE	350	229	BSTAM	145	110
SPELLBINDER	320	220	CROSSTALK XVI	140	119
FASTPLAN II	525	395	MOVE IT	90	79
PLANSTAR	495	375	THE LAST ONE	330	245
CARDBOX	195	169	OMNIS 2	295	235
RESCUE	295	229	SUPERSORT	145	108
MILESTONE	250	179	FILE TRANSFER	95	79

SAGE ACCOUNTS £259

The new updated version (1.5) featuring many of the enhancements at only £259 (reduced from £375). Please telephone or write for details of all other Sage Accounting products and our Sage training programme.

All prices exclude V.A.T. POST FREE on orders over £150. If you see any of these products advertised at a lower price we will improve upon that offer in most cases. Please phone or write for our comprehensive price list.

DEALER AND CONSULTANT ENQUIRIES WELCOME

TRISOFT LTD

INDEPENDENT MAIL ORDER DISTRIBUTORS OF QUALITY SOFTWARE
Castle House, Lea, Matlock, Derbyshire DE4 5GL. Telephone: 062 984 383/719

APRICOT/SIRIUS/COMPAQ

range of computers sold: please telephone.

NORTH STAR DIMENSION

The only 100% PC-compatible multi-user, multi-processing system currently available. Will accept up to 12 work stations and runs all IBM "off-the-shelf" software. Tremendously cost-effective as compared to IBM PC networks; up to 60MB central storage. Entry-level, 2 screen configuration with 15MB central storage — only £5875.

SUPERCALC II £195 £145

PSION XCHANGE

Now, for the first time, you can buy a modular suite of programs that individually represent the latest state of development in word processing, data management, financial planning and graphics. Linked together they form an integrated software system that allows you to switch instantly between various tasks and to exchange information between programs. This exciting new software development from the British company Psion is priced at:

£495 £399

Individual module prices are available on request. Psion Xchange is currently available on IBM, Apricot and Sirius.

LOTUS 1-2-3 £279

The famous package combining spreadsheet, graphics and information management. Originally only available on IBM/DEC. Now also available on the

APRICOT and SIRIUS

**We start carrying
your workload
the very first day.**



EasyWriter II™ System

EasyWriter II System is word processing that's easy to learn and easy to use. Memos, reports, correspondence, even statistical documents are letter perfect from day one. If you can type, you can use it to lighten your workload.

EasyWriter II System gives you everything you need. It has an 88,000 word spell checker and convenient mail-merge for reports and form

letters. They're built right in, not sold separately. And unlike some other programs you may see, what you look at on the screen is exactly what is printed.

So no matter what your office word processing needs, EasyWriter II System can make the days more productive, by carrying the load right from the start.



**SORCIM/IUS
MICRO SOFTWARE**

A Division of Computer Associates International, Inc.

Easy Software working harder.

Special offer: Free demo diskette

Please send me a Free Demo Diskette* so I can preview the features and effectiveness of EasyWriter II™ System.

Name _____

Address _____

Tel: _____

Post this coupon to:
Sorcim/IUS, 10 Station Road, Watford,
Herts WD1 1EG. Tel: (0923) 46255.

*Diskette is designed for use with IBM-PC® or fully compatible hardware systems. IBM-PC is a registered trademark of International Business Machines Corporation.

Sorcim/IUS Products: EasyWriter 1 System, EasyWriter II System, SuperWriter, SuperCalc 3 Rel.2, and other SuperCalc Software, EasyFiler, and EasySales Pro.

● Circle No. 150

Dropping bricks

Some tips for programming the game of Pferdeäppel, suggested by David Levy.

THE SCATOLOGICALLY NAMED Pferdeäppel is marketed in Germany with the subtitle "The Funny Jumping Knights Game". It is the brainchild of the brilliant games designer Alex Randolph, an American who for some years now has lived in Venice. Pferdeäppel is simple to learn and great fun to play, but for some inexplicable reason it appears not to be on sale in the U.K.

Pferdeäppel is played on an eight-by-eight board by two players, each of whom has one horse. White, who moves first, has a white horse and is the defender. The other player has a brown horse and is the attacker. The players move alternately, and the horses move in exactly the same way that a knight moves in chess: two squares in horizontal or vertical direction and then one square at right angles to the first part of the move. From the initial position White may therefore move from h1 to either g3 or f2, while Brown may respond by moving from a8 to either c7 or b6.

40 bricks

At the start of the game there are 40 bricks, 28 of them brown and the other 12 golden. When making a move with his horse, a player must put one brown brick on the square from which his horse moves. When a horse has been moved a player may, as part of the same move, put another brown brick on any vacant square, although neither player is permitted to put a brick on the last remaining flight square of his opponent's horse. If and when all the brown bricks have been dropped the golden ones are used, and an extra golden brick may be added after moving his horse if a player so wishes.

A player's horse may move to almost any square which is not already covered by either a brown or a golden brick. The only restriction is that a player may not move to a square one move away from the square currently occupied by the opponent's horse.

The object of the game is slightly different for each of the players, although there is the common aim of running the opponent out of legal moves. White tries to stave off being trapped for as long as

possible, and if White is trapped while there is still at least one brown brick unused he loses the game. Brown then scores one point for each brown brick unused.

White wins if he is trapped when there is at least one golden brick on the board, and then scores one point for each golden brick on the board. If he survives until all the golden bricks have been used White scores 24 points rather than 12. If White is trapped at exactly the moment when the last brown brick has been put on the board, the game is a draw and neither player scores any points. If Brown runs out of legal moves at any stage, White wins the game and scores 24 points.

The differing aims of the two sides mean that the strategy for each of them is also different. One preliminary observation, which is rather obvious, is that Brown should not place any bricks on the board unless in doing so he can force a win. In other words, if the tree search spots a forced win for Brown, it is perfectly acceptable for Brown to put one or more bricks on the board voluntarily, provided that they form an essential part of the winning variation. Otherwise Brown should never add a brick of his own volition.

It is not difficult to appreciate that mobility — usually defined as the number of legal moves a player can make — is the key to success. White should always try to maximise his own mobility, since with a wider choice of moves White is more likely to be able to stave off being trapped.

It is well known from chess that those pieces with maximum mobility are usually those situated near the centre of the board, while those near edges and corner squares are normally far more restricted. But in Pferdeäppel it is quite possible for most of the central squares to be covered in bricks, in which case it is less obvious which squares offer the greatest mobility.

There is another factor affecting mobility which makes matters even more complicated. A horse which can legally move to any one of, say, four different squares will normally be considered to be more mobile than a horse which has only two legal moves. But if each of those four squares was, in itself, only good for one

legal move, while each of the two squares would allow the horse to move to three further squares, a move to the 2 square might well be better than a move to the 4 square. In other words, you must not only take into account the immediate mobility from a square, you must also consider the potential mobility from that square. With this in mind, the program's evaluation function can be of the form:

```
If position is a win Then score (1,000 × winning score) Else
If position is a loss Then score (- 1,000 × losing score) Else score (White's mobility - Brown's mobility)
```

The tree search can perform a full-width analysis of the game tree to a fixed depth. If it encounters any drawn positions at the terminal depth the program should, if it is playing White, score a draw as -500, while if it is playing Brown it should score the draw as +500. This will encourage it to take a draw as Brown if it cannot see a forced win by the time that the brown bricks have been used up, and to avoid a draw as White if it cannot see a forced loss before the golden bricks begin to drop.

Proximity

How should the mobility measures be quantified? The fact that you need to consider potential mobility as well as immediate mobility has already been established, but there is one further factor worthy of inclusion: the proximity between the two horses. If the horses are near to each other, moves by the brown horse will of themselves create problems for the defender, since the brown horse will drop a brick in the vicinity of the defender. If the two horses are far away from each other, Brown may, if he wishes, drop his extra brown brick near the white horse, but he does not have the luxury of putting two bricks near to White.

The measure of White's mobility may therefore be

$$\text{White's immediate mobility} + \text{White's potential mobility} + D$$

where D is a multiple of the number of legal moves required for Brown's horse to reach the square currently occupied by White's horse. White's immediate

mobility is simply the number of legal moves that White's horse can make from its current square.

So White's potential mobility may be expressed as a multiple of

$$\begin{aligned} & (1/2 \times \text{number of squares White's horse} \\ & \text{can reach in two moves}) \\ & + (1/4 \times \text{number of squares White's} \\ & \text{horse can reach in three moves}) \\ & + (1/8 \times \text{number of squares White's} \\ & \text{horse can reach in four moves}) + \dots \end{aligned}$$

although your program may take rather a long time to compute these numbers. The two multipliers that I have indicated — one for the distance D and the other for potential mobility — should both be determined by one of the learning methods described in my earlier articles. From my limited experience with the game I suspect that D will turn out to be more important than potential mobility, so try starting with a relatively high value for the D multiplier.

Brown's mobility is less important, but not insignificant. First, Brown may not run out of moves without suffering the indignity of a 24-point loss, so the question of potential mobility is significant there. Also, if Brown's mobility is severely

limited he will find it more difficult to move near to White's horse, and White will find it easier to increase the value of D. For Brown's mobility I would suggest employing the similar measure

$$\text{Brown's immediate mobility} + \text{Brown's potential mobility}$$

and that this value be subjected to another multiplier, also determined by an iterative learning process.

End of game

I have already mentioned that the search should be full width to some fixed depth, but there is also one exceptional case to consider. This is a test for an end-of-game condition in the terminal position. If during the course of calculating the terminal score for a position the program finds that one side has zero immediate mobility, but the other side has at least one legal move, the program knows that the side with zero mobility must lose the game on its next move — apart from the drawn situation. This might be the side to move next in the terminal position, or its opponent. The program should therefore score

such terminal positions as wins, with the number of bricks multiplied by 1,000 or -1,000 as appropriate.

Sorting the moves in order to speed up the alpha-beta search is not difficult. When generating a group of moves the program should first examine those which offer the player concerned the greatest immediate mobility. The search should proceed iteratively: it should first perform a one-ply search and sort the moves; it then does a two-ply search, reordering root moves when necessary, and so on.

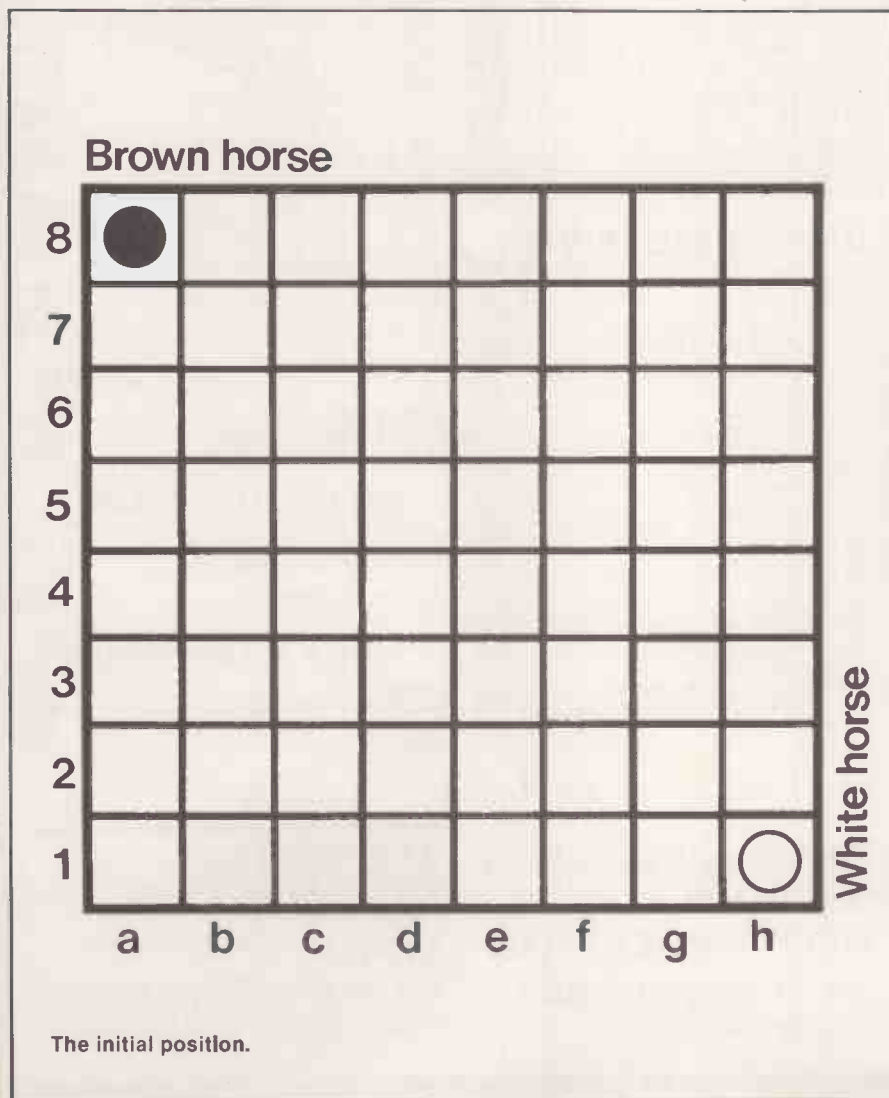
Since mobility is often very low, particularly late in the game, your program might well be able to perform searches of up to 20 ply if you write in assembler, but this will depend on whether you are able to restrict the branching factor of the tree by omitting many of the inferior drops that can be made. Even programs written in Basic could, with the right multipliers in the evaluation function, play quite a good game with only a six- or eight-ply search.

Branching factor

I have already explained that Brown should only put extra bricks on the board if a forced win can be detected in the tree search. Obviously it is to White's advantage to drop extra bricks at every possible moment, but if your program were to examine every possible drop in combination with each legal White move the branching factor would become very high. I would suggest that the program consider White putting an extra brick on the board only on the square furthest away from the White horse, and on those squares to which Brown may move on his next turn.

Pferdeäppel is one of those games where it may, from some point, be possible for your program to analyse exhaustively up to the end of the game, as there are a finite number of bricks to be dropped before the game ends. How far from the end of the game such an analysis is possible will depend largely on how efficiently your program is written, and which programming language you use. I would suggest that you carry out a number of experiments on positions where only eight, 10, 12, 14 ply or more remain to the end of the game, in order to determine roughly how long it will take your own program to play perfectly from such positions. You can then decide, for each playing level, at what stage the program should switch to the end-of-game search.

If you have a program level which normally responds in an average of, say, 10 seconds, you might consider it worthwhile allowing 20 or 30 seconds for an end-of-game search, or even longer. You then have the option of making the program think in its opponent's time, so that if the user makes a predicted move the program can reply more quickly. Then, any time saved earlier in the game can be used for a deep endgame search, while still keeping to the target average time per move. \square





MORE MASSIVE SAVINGS



MATRIX PRINTERS

	Ex Vat.
ANADEX DP-6500 500cps	£2234
ANADEX WP-6000	£1961
BROTHER HR5	£125
BROTHER M1009 50cps	£154
CANON PW1080A 160cps (NLQ)	£299
CANON PW1156A 160cps (NLQ)	£379
EPSON RX 80T 100cps	£190
EPSON RX80FT 100cps	£214
EPSON FX 80 160cps	£319
EPSON FX 100 F/T 160cps	£424
EPSON LQ 1500 200cps (NLQ)	£894
HONEYWELL From	£375
MANNESMANN MT80 80cps	£177
MANNESMANN MT180 160cps (NLQ)	£539
NEC PINWRITER P2(P)(NLQ)	£535
NEC PINWRITER P3(P)(NLQ)	£595
NEWBURY DRE 8850 300lpm	£2065
NEWBURY DRE 8925 240cps	£1385
OKI 84A 200cps	£625
OKI 92P 160cps	£360
OKI 2410P 350cps	£1535
OLI 2350 (P)	£1435
OLIVETTI DM4100E 120cps	£520
OLIVETTI DM5300E (P) 220cps	£985
PANASONIC KP1091 120cps + (NLQ)	£249
SHINWA CP80 Model II FT	£165
STAR DELTA 10 160cps	£299
STAR DELTA 15 160cps	£399
STAR GEMINI 15X 120cps	£269
STAR RADIX 15 200cps (NLQ)	£525
TOSHIBA TH2100H 192cps	£1275
TREND 930 200cps (NLQ) 80cps	£1350

SOFTWARE

	Ex Vat.
CAXTON BRAINSTORM	£245
CAXTON CARDBOX	£165
DBASE II	£235
DBASE III	£325
DMS DELTA	£375
DMS +	£155
DR FORTRAN 77	£199
DR PASCAL	£280
DR ASSEMBLER Plus Tools	£125
FRAMEWORK	£325
FRIDAY	£135
KNOWLEDGEMAN	£380
LOTUS 1 2 3	£285
MICROSOFT WORD	£210
MULTIMATE V 3.2	£225
MULTIPLAN	£135
MULTIUSER ACCOUNTS per Module	£295
OPEN ACCESS	£315
PEACHTREE 5 Ledger pack	£499
PEGASUS LEDGER MODULE	£200
PERFECT WRITER	£199
PULSTAR LEDGER MODULE	£135
SAGE ACCOUNTS	£250
SAPPHIRE DATAMASTER	£395
SELECT WORDPROCESSING	£175
SPELLSTAR FOR WORD STAR	£95
SYMPHONY	£425
TK SOLVER	£245
VOLKSWRITER DELUXE	£155
WORDSTAR	£195
WORDSTAR MAILMERGE	£95
WORDSTAR PROFESSIONAL	£275

Ex Vat.

DAISYWHEEL PRINTER

	Ex Vat.
BROTHER HR1	£254
BROTHER HR15	£329
BROTHER HR15 Keyboard	£135
BROTHER HR15 Sheetfeeder	£185
BROTHER HR25	£565
DAISYSTEP 2000 20cps	£219
DIABLO 630 API	£1295
DIABLO Sheetfeeder	£490
FUJITSU SP320 48cps	£795
JUKI 6100 18cps	£319
NEC 2030 Parallel 120cps	£545
NEC 3530 Parallel 35cps	£1049
NEC 7730 Parallel 55cps	£1440
OLIVETTI DY450 45cps	£880
QUME 11/40 RO	£1210
QUME 9/45 RO	£1550
QUME LETTERPRO 12/20	£449
RICOH RP1300S	£795
RICOH RP1600S	£1150
RICOH RP1600S FLOWWRITER 8K IBM PC	£1299
RICOH RP1600S Sheetfeeder	£459
RICOH RP1600S Tractor	£138
TEC STARWRITER F1040 40cps	£840
TEC STARWRITER F1055 55cps	£1195
TEC Sheetfeeder	£459
TEC Tractor	£138

Ex Vat.

COMMODORE
SALE
MANY ITEMS
AT TRADE
PRICES: Including
C16 PLUS 4
Cassettes
Disk Drives
Printers

FULL MANUFACTURERS
WARRANTY
MOST ITEMS EX STOCK

NEXT DAY INSURED COURIER
DELIVERY AVAILABLE

COMPUTERS

	Ex Vat.
APRICOT F1 256K	£895
APRICOT F1 MONITOR	£175
APRICOT PORTABLE 256K 1x720K Drive	£1375
APRICOT 256K 2x720K Drives & Monitor	£1545
APRICOT Xi 256K 10MB & Monitor	£2195
CIFER 9000 Multi User 21MB	£5095
COMPAQ 2 2x360K drives	£1795
COMPAQ PLUS 10MB	£3195
IBM PC 256K 2x360K Mono	£1865
IBM PORTABLE 256K	£1902
IBM XT 256K Colour	£3217
IBM XT 256K Mono	£2952
MACINTOSH	£1495
OLIVETTI M24 256KB 2x360KB Drives	£1690
OLIVETTI M24 256KB 10MB	£2810
OLIVETTI M21 256KB 2x360KB Drives	£1590
OLIVETTI M21 256KB 2x720KB Drives	£1810
SANYO MBC 555 128K 2x160K Drives	£795
SIRIUS/VICTOR 256K 10MB	£2850
SIRIUS/VICTOR 256K 2.4MB	£2095
SIRIUS/VICTOR 128K 1.2MB	£1645

EXTERNAL HARD DRIVES

	Ex Vat.
PLUS 5 20MB + 5MB CARTRIDGE	£2325
PLUS 5 30MB + 5MB CARTRIDGE	£2845
PLUS 5 40MB + 5MB CARTRIDGE	£3059

IBM MEMORY BOARDS

	Ex Vat.
128K MEMORY EXPANSION	£190
256K MEMORY EXPANSION	£249

PC NET STARTER KIT	£795
--------------------	------

VDU's & TERMINALS

	Ex Vat.
CIFER T4	£760
HAZELTINE ESPRIT Fixed Keyboard	£395
QUME QVT 103 (VT100 VT131)	£695
TELEVIDEO 910	£489

MAYFAIR MICROS

BLENHEIM HOUSE, PODMORE ROAD,
LONDON SW18 1AJ

TEL: 01-870 3255 / 871 2555

We accept official orders from UK Government and Educational Establishments. Mail Order and Export Enquiries welcome. Callers by appointment.

Public knowledge

Glyn Moody introduces this month's special section detailing the possibilities that public networks and databases hold in store for micros users.

THE MICRO REVOLUTION represented a triumph of the individual over the institution. Gone were the days when computing meant DP departments graciously allowing the uninitiated to use the jealously-guarded mainframes. Micros meant real, personalised processing power that not only sat on your desk, but was completely at your disposal.

However, this tended to encourage isolation. Replacing the hollow-eyed, polo-neck sweater wearing computer junky that used to wander about computer installations late at night, came the personal-computer addict. Sufferers from this vice would retreat to their rooms with a micro and never be seen again.

Turning tide

But the tide is turning. Gradually it is being realised that perhaps more important than the narrow personalised power which micros offer is the possibility of using them as windows on an almost limitless world of information. In fact, micros have turned out to be just the thing to tap all the promised power of the information revolution.

The first and simplest example of a public network that allows you to access large databases of information was Prestel. Initially telephone lines and modified TVs with special keyboards were used to call up some of the thousands of pages stored on the central Prestel computers. But like many other brilliant British ideas, Prestel was badly marketed for many years and until recently has been a failure in terms of the size of its user base.

If the situation is now changing it is largely because micros can be easily adapted to function as Prestel terminals. In this way, for very little extra cost, you can now access some 350,000 pages currently on offer. They range from financial information and updates on the weather, sport and consumer prices, to more specialised sections. One of these is specifically aimed at micros, Micronet 800. It requires an extra subscription and currently boasts about 30,000 subscribers. It also accounts for more accesses

to Prestel than any other single section.

Although Prestel possesses a wide range of information, it is hampered by the fact that its technology is old. Information transmission is slow, and there are no advanced search techniques. If you want to find out about, say, IBM you just have to look everywhere that is likely to have information on it.

But the large, specialised databases that are appearing in increasing numbers present you with a simple range of commands that can be used to search out particular spheres of knowledge. For example, you could specify IBM as a search topic and the host machine would scan through all its data. The result would most likely be useless, because the search topic specified was too broad. Instead, you could narrow your research by including limiting contexts, such as IBM and micros and the U.K. and 1984. The combination of all these factors would then produce a usable, though not necessarily useful list of information.

Developments in the public database world are proceeding in two main directions. First, there is a mad rush to acquire on-line rights to just about everything printed. The general philosophy is that knowledge is power, and that even if they are not viable now, the information sources could one day prove profitable. To give an idea of the scale of things, the American service Dialog has about 75 million items currently and is still growing.

Improvement

Secondly, as databases grow the search techniques used to access them are improving. This is partly a question of computing power — how quickly the host mainframes can sort through the information they hold. The way in which the information is stored is also crucial. From using limited searches on keywords only, which act as limited indexes, databases have progressed to full-text siftings.

Also related is the way in which the search is carried out. The commands available are gradually being refined and made more powerful, and you can expect to see forms of artificial intelligence

beginning to play a role in the years to come. In other words, the database will try and understand what we are looking for and help us, rather than blindly stumbling through its huge information banks.

Many databases are now starting to add electronic-mail facilities to their services, so allowing users of a particular system to exchange information and requests. Otherwise there are the dedicated electronic-mail systems, of which the best known in the U.K. is Telecom Gold. In a sense, an electronic-mail system is like a very specialised database. Mail sent is stored in the host machine and then accessed or searched for by the recipient. In both cases the idea of a central mainframe or mini acting as a mediator of subsidiary micro communications is present.

Integrity

The whole development of electronic mail and databases raises questions regarding data privacy and integrity. Last year's Data Protection Act was at least nominally designed to prevent abuses of database information held on individuals. In particular, it aims to regulate the transfer of information, which in turn impedes cross-referencing. But as databases and search techniques become more extensive and sophisticated, so it will become easy for anyone — including governments — to build up detailed composite files on individuals, companies and so on.

Correspondingly, electronic mail presents the perfect surveillance medium, where data is presented in a convenient computer-readable form. Searching for keywords and phrases would merely require computers with the necessary raw processing power. The recent flurries of excitement over the possible breaches of Prestel's security emphasise the importance attached to data integrity.

Public networks, both as sources and as channels of information, represent one of the most significant steps beyond the circumscribed world of the stand-alone computer. They enlarge the private domain of the micro to include the outside world. □

Keep in touch

Electronic mail is not just for commercial users but for the individual with a single micro too. Chris Bidmead explains the various systems available.

SURVEYS confirm what we all suspect: the postal service is in decline. Luckily, information technology is providing a new approach to correspondence, and one that is often faster and cheaper than the postman's sack.

The answer lies in the telephone. In the U.K. the telephone network operates well below capacity for most of the time. Apart from the peak between 11a.m. and 11.30a.m. during workday mornings, its daytime use has been estimated at around 60 percent of capacity. In the small hours between midnight and 6a.m. the system is hardly used at all.

Hence the recent promotion of electronic mail. You may be thinking that the new heavyweight technology that suits big company budgets is not for you. For them it is a natural development of existing commercial services like telex and fax, and like these two conventional communications systems, electronic mail is out of reach to the individual user.

However, the micro has brought word processing down to earth, and is about to do the same for electronic mail. The chances are that if you are reading this you already have access to the capital equipment that represents most of the expense: the computer. A modem need set you back no more than an additional £50 to £60 unless you want to be fancy. The subscription to the electronic mail service comes cheaply at, say, £12 per month, or even free if you confine yourself to correspondence via one of the many public bulletin boards — see *Practical Computing* December 1984. The only other expense is the cost of telephone calls, but if your early enthusiasm carries you away the phone bill can come as a terrible shock.

Although it is quite possible to set up a simple two-way electronic-messaging system by connecting a pair of micros together via modems and the public telephone line, true electronic mailing comprises a network of addresses. Like the conventional telephone system, it allows you to contact anyone on the

network provided you know their identity code. It is a sophisticated system that requires at least one intermediate computer, usually a mainframe, which provides software to take care of house-keeping such as password protection, temporary storage space and message routing.

Normally the mainframe remains in the background and the user is given the illusion of a straightforward two-way connection that presents the recipient's mailbox as a pigeonhole where messages can be safely left for minutes, hours or days to await collection, technically known as store-and-forward. This way electronic mail avoids the "he's in a meeting . . ." syndrome; you can get ungarbled messages to people even if they are not available at the same time as you are. Correspondence is almost as quick and casual as the telephone, but can also be informally documented if you save your messages and replies on disc.

Some systems also allow the users direct access to the power of the mainframe. You can run remote maths programs, play games or even cross-compile down the telephone line. Few such activities come under the heading of electronic mail, but

there is a cluster of programs, roughly classified as electronic office software, that behaves like an extension of the communications facilities.

There are a surprising number of companies that handle very large volumes of private electronic mail on worldwide mainframe links, chief among these being ADP and Geisco. But their clients tend to be exclusively large companies with annual bills running into four or five figures. The three chief rivals for your custom as an individual electronic communicator are Prestel, Telecom Gold and Easylink. Gold was hived off from British Telecom before it went public; Prestel remains in the fold as part of British Telecom's Value Added System Services department, VASS, and Easylink is the outside contender, being an arm of the U.S. Cable and Wireless company.

PSS

All the services at some time or another prevail upon another important sub-department of BT VASS, an outfit called PSS — another club the individual electronic mailer can join. PSS stands for packet switch stream and is a simple and cheap way of maintaining a real-time data connection between computers over long distances. If one of the computers is, say, a lap portable and the other a mainframe carrying the electronic mail service, the subscriber can tap into PSS or one of its local variants from any part of the world. The call charge will be at the local rate, and even with the additional PSS charge the total cost could compare very favourably with standard long-distance charges.

PSS is cheaper because it does not monopolise the line for the whole duration of the call. Unlike an ordinary modem connection, where the data is carried on an analogue signal that mimics the normal voice use of the telephone line, PSS data is carried as a series of digital pulses. But before being transmitted over the PSS circuit the data is first electronically

PSS charges

Fixing yourself up with an NUI requires a down payment of £25, with an additional quarterly rent of £6.25. Three other costs are simultaneously chargeable. First there is the regular local charge call to the computer, which will appear on the phone bill in the usual way. The two other charges are for volume and duration, in much the same way as a taxi charges for time and distance.

For example, on a call to the Source in the United States you would pay a volume charge of £3.50 for each kilosegment — 64K to you — of data that is transferred in either direction, and a duration charge of £6 for each hour of connection. The charges in Europe are considerably less: £1.20 for each kilosegment transferred, and £1.32 per hour. In the U.K. the costs are £0.90 to £1 per hour duration charge and £0.15 to £0.20 per kilosegment.

Like Prestel, PSS is part of British Telecom's VASS department. To find out more ask the operator for a Freefone connection to the PSS Customer Service Department, or dial 01-920 0661 and talk to David Harper direct.

Telecom Gold Network: For assistance type 'HELP LOGIN' at the prompt 'PAD>'
This is Dial-up Pad 0 line 1 speed 300

```
PAD>call 83
*** Call connected
Welcome to Telecom Gold's System 83
Please Sign On
>ID JNLO20
Password:
TELECOM GOLD Automated Office Services 18.4K(83)
On At 0:49 17/01/85 GMT
Last On At 0:42 17/01/85 GMT
```

Those wishing to access Telecom Gold on Sat. 19th January, please type AOSNEWS

Mail call (1 Read, 1 Unread, 2 Read express, Total 4)

>mail

Send, Read or Scan: re unread

```
To: JNLO20 (83:JNLO20)
From: MKD429      Posted: Thu 17-Jan-85 0:39 GMT UK GMT Sys 81 (13)
Subject: Using Telecom Gold
```

--More--

Dear Reader,
This printout shows the sequence of logging on and reading a letter using the Telecom Gold electronic mail system.

83:JNLO20 is the mailbox used by the editor. Practical Computing uses a separate box, 81:JET727, accessed mainly with the office Apricot. Chris Bidmead and Ben Knox are among the other writers with their own boxes.

We are always pleased to receive comments and queries via Telecom Gold.

Yours faithfully,
Jack Schofield

Action Required: del

End of Mail.

Send, Read or Scan: .q

```
>off
Off At 0:50 17/01/85 GMT
Connect Mins = 2
Compute Secs = 1/1
```

Mail call (1 Read, 2 Read express, Total 3)
*** Cleared

=0JW=y_0

A session reading the messages in a Telecom Gold mailbox. A welter of information is provided automatically, such as the time you last used the system and how many messages are being held in your mailbox. The user only has to respond to the > prompts, and to answer the queries "Action required" and "Send, read or scan".

Prestel charges

There is no initial charge to join Prestel, and the quarterly Mailbox rental is a very modest £5. The various closed user groups will add their subscription fees to this.

Contacting the system during peak time — that is 8a.m. to 6p.m. weekdays, 8a.m. to 1p.m. Saturdays — costs five pence per minute in addition to the normal phone-call charge. Out of peak hours there is no extra charge. Most of the pages you are likely to need for the purposes of electronic mail are free, but many Prestel pages are priced and you will be billed accordingly.

Contact Stephen Rogers, Prestel's Mailbox Manager, on 01-583 7130.

divided up into packets of a few kilobytes. Each packet is wrapped in additional digital data, including a packet number, a value used for error checking and a destination identity.

The point at which this takes place is called a PAD, or packet assembler-disassembler. Once the wrapping has been done, each individual packet makes its own way to the destination, signposted on the way by a series of PADs which read the address and direct the packet accordingly, storing it if necessarily until the required line becomes free. At the final destination another PAD disassembles the packets in sequential order, restoring the data stream.

Each PSS user has a network user identity, or NUI. Renting your own NUI allows you to make direct connection at baud rates up to 1,200 in both directions simultaneously with other computers on the network, provided you know their NUA, or network user address.

Prestel

Boxes on Prestel are provided by some micro manufacturers and it may therefore be the first system that springs to mind as a carrier for electronic mail. Although it is being used for that purpose there are factors that make it less than ideal. Prestel

(continued on next page)

(continued from previous page)

is a graphics and text system based around the technology of the television screen. Most electronic mail does not require graphics, but does need to convey the maximum sense in the fewest bytes.

Also Prestel is conceived primarily as a one-way communication system, with a few information providers creating pages of information to be read by the masses. The communication protocol reflects this: data comes in to the user at a healthy 1,200 baud, but anything the user wants to transmit is sluggish to 75 baud.

Further, because it does not use ASCII coding, text received over Prestel cannot easily be gathered into or transmitted from a conventional micro word-processing system. Most Prestel communication software running on micros allows you to store downloaded pages, but if you are tempted to pull those pages into your word processor for reformatting or to search through them for occurrences of a phrase you are in for a disappointment. Instead of a text file, all the word processor will find is a collection of escape codes.

Such problems are not insuperable. Prestel is probably the cheapest of the commercial systems for the small user, and if you are tapped into it already to make use of its other facilities, you will find it perfectly usable for sending electronic mail. You have a choice of the main Prestel mailbox or the equivalent on one of the closed user groups within Prestel.

A simple way to get an ASCII text file from Prestel is to access it over its dedicated 300-baud line, which provides an automatic translation for Teletype terminals. This mode also gives you faster transmission, but reception is slower than usual on 300 baud, because as well as the asterisks that replace all the fancy graphics and colour, a great many spaces are also transmitted.

Easylink

Easylink has been recruiting customers by way of the micro dealers, as it sees its service as being particularly geared to the single-micro user and small business. The main selling point is the modest initial cost, lower access charge and the two-way telex facility, which until recently was a

Easylink charges

The initial charge is £25 for any one subscriber, with an additional £5 for each mailbox being rented. The monthly subscription also depends on the number of mailboxes rented. For one to three mailboxes the charge is £12 per mailbox per month, dropping to £9 for four to eight mailboxes, and £8 thereafter. Easylink puts a ceiling on the charge of £98 per month.

On top of this there is a connect time fee of five pence per minute, as well as a traffic rate which varies with destination. Within the U.K. the charge is 12.5 pence per 200 characters; for Europe it is 22.5 pence per 200 characters; and for the U.S. and Canada, 65 pence per 400 characters. Charges for the rest of the world are considerably higher, at £1.10 for 400 characters. There is no charge for receiving mail.

Telecom Gold charges

Telecom Gold officially charges an initial £100 plus VAT to join the system, but a number of existing users have spare boxes available for a lot less, or in some cases for no charge at all. Once you are on the system the two main charges, in addition to the standard charge for the line that will appear on your normal telephone bill, are

Connect time

Standard rate: 08.00-19.00 Monday to Friday excluding public holidays	
First 250 hours charged on any bill	10.5p per minute
Next 250 hours charged on same bill	8.5p per minute
Thereafter	7.5p per minute
Cheap rate all other times	3.5p per minute

Filling

First 2,500 units	20p per 2,048 characters per month
Next 2,500 units	15p per 2,048 characters per month
Any further units	10p per 2,048 characters per month

International mail to the United States, Canada, Australia and Hong Kong costs 15 pence per 1K of data, with a minimum charge of 30 pence.

The difference between the cheap rate and the standard rate is very striking, and means that provided you tread carefully it should be possible to get away with quite small bills.

feature notably missing from its biggest rival, Telecom Gold.

During a short trial I found the system to be swift and efficient, with plenty of courteous help waiting at the end of a voice line. However, if you are looking for action and excitement you will not find it. Unlike Telecom Gold it has no games to play or baroque software byways to explore. What I missed most was a directory to tell me who is on the system and where. Prestel and Telecom Gold have on-line directories you can scan through to see if there is anyone you want to talk to, but if you do not know any numbers on Easylink you will probably find yourself alone.


Telecom Gold

The infrastructure of Telecom Gold grew up around British Telecom's need to keep its staff in touch with one another. But even before the recent privatisation of the main company, Telecom Gold had already set up a separate existence. BT is still one of its main customers, but the system has now been thrown open to other users from large institutions to private individuals.

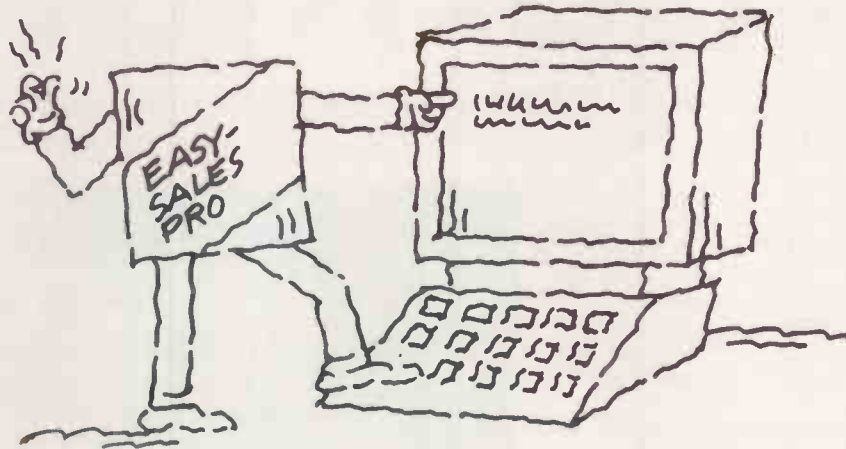
In contrast to the simple, clean lines

of Easylink, Telecom Gold computers present a rich stew of software to the subscriber who is prepared to spend a little money to delve beneath the surface. Like Easylink, during normal messaging the central computer is more or less invisible to the user, but it is capable of a lot more. Database software called Infox allows you to build a personalised information storage and retrieval system, a forms package formalises the business of entering data, and WPMail lets you prepare your messages on a word processor and send them all out in a batch. If you are working with a dumb terminal rather than a micro you might be tempted to use Telecom Gold's own built-in word processor, though it is inevitably somewhat slow and cumbersome in comparison with software running on a micro.

One area where the electronic office comes into its own is the shared diary. The one on Telecom Gold is called Tickler, and as well as reminding you about appointments it can also be used by selected colleagues to find out when you will be available. To ensure your schedule is not open for everybody to inspect, Tickler allows a hierarchy of password protection to allocate the privilege of reading and writing entries. Also, like Easylink, Telecom Gold now has full telex facilities. So that lap portable in your briefcase is not just a letterbox, it's a complete office.

For the individual who does not need the elaborate extras, Easylink's low initial charge probably makes it a more economic way into electronic mail. Unfortunately there is no direct link between these two main rivals or Prestel. The gateway is bound to come but as yet there is a battle of wills between the two companies so the choice is more likely to depend on which system the people you want to communicate with are using. The fact that neither publishes a full directory of users does not make the choice any easier. 

EasySales Pro™ picks your best prospects instantly.



EasySales Pro™

The more accurately you pick your best sales prospects, the more time you save. Your sales force spends more time selling, less time figuring out who to sell to.

EasySales Pro is a personal computer program that can dramatically increase the efficiency of your sales efforts. In one easy-to-learn program, EasySales Pro sets up sales call priorities by ranking the importance of your prospects. It shows you how much time should be spent with them, and how often to call.

Just tell EasySales Pro about your customers and prospects. The pro-

gram guides you to better sales decisions.

EasySales Pro is designed to be adaptable to a wide variety of sales management systems, so you can easily customize it to your product line. And EasySales Pro can generate timely reports on territory activity, as well as in-depth records of prospects. This makes it a snap to update your sales and prospect information.

Pick your best prospects... before your competitors do. Pick up EasySales Pro at any Sorcim/IUS dealer.



SORCIM/IUS
MICRO SOFTWARE

A Division of Computer Associates International, Inc.

Easy Software working harder.

Sorcim/IUS Products: EasyWriter 1 System, EasyWriter II System, SuperWriter, Super Calc 3 Rel.2, and other Super Calc Software, EasyFiler, and EasySales Pro.

Special offer: Free demo diskette

Please send me a Free Demo Diskette* so I can preview the features and effectiveness of EasySales Pro.™

Name _____

Address _____

Tel: _____

Post this coupon to:
Sorcim/IUS, 10 Station Road, Watford,
Herts WD1 1EG. Tel: (0923) 46255.

*Diskette is designed for use with IBM-PC® or fully compatible hardware systems. IBM-PC is a registered trademark of International Business Machines Corporation.

A view to information

Despite their potential, phone-based viewdata systems have proved to be a worldwide flop. Jack Schofield examines why and speculates on their future.

THE POST OFFICE launched Prestel in September 1979, predicting 100,000 users by the end of 1980, and exponential growth after that. One of the earliest users, and keenest supporters, was *Practical Computing*, and in fact this magazine put the first computer programs on Prestel in 1980 before eventually pulling out.

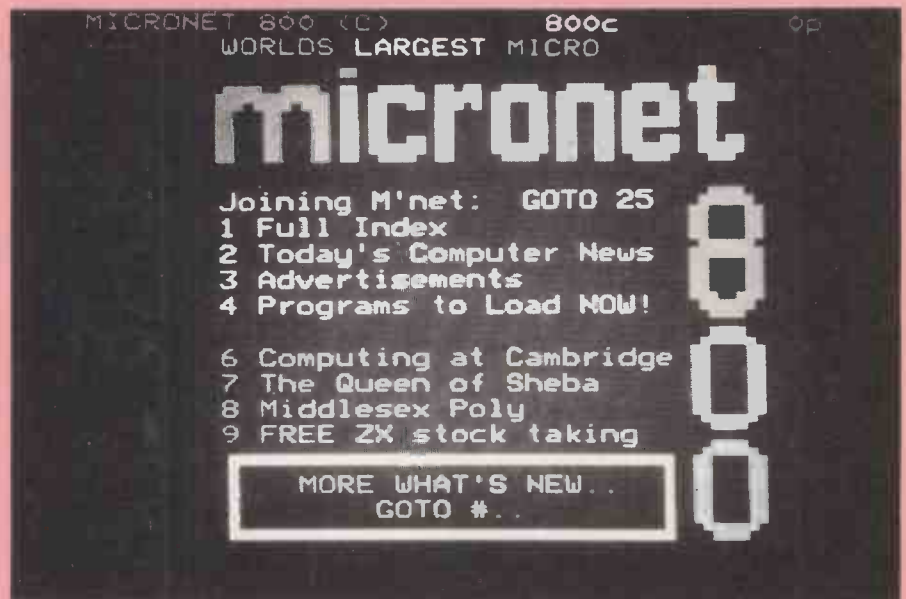
Prestel was a dismal and expensive flop. By June 1982 there were just 16,350 terminals. Even by the end of 1984 there were only about 45,000. However, the system is worth looking at because it provides a great deal of information and has a special section devoted to microcomputing — which includes Micronet 800.

Electronic mag

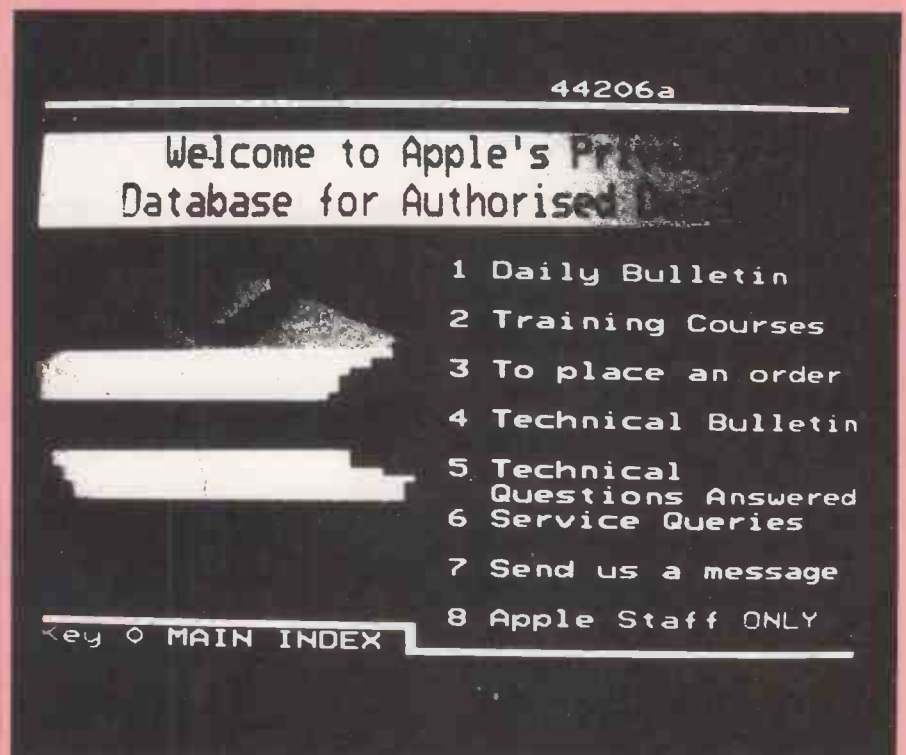
Micronet is a sort of electronic computer magazine, complete with news pages, readers' letters, advertisements, games and chat. There are programs that can be downloaded for a few selected micros, too. The most interesting section of Micronet is the news, which is updated daily. Coverage is mainly of the Sinclair and Acorn micros, but sometimes contains some interesting industry gossip. Micronet's main problems are, however, created by the limitations of Prestel itself.

Prestel is a videotex service like the text transmission you often see on television sets: Ceefax, Oracle and 4-Tel. These broadcast videotex services are called teletext. Prestel comes down the telephone line, in which form videotex is known as viewdata.

Because the frames are stored on a computer, there can be millions of them. The frames are arranged in a tree structure. At the top, Prestel has pages 1 to 9 and each of these can have another 10 pages attached to it. Page 1, for example, "owns" pages 10 to 19. Therefore the second level has 90 pages, from 10 to 99. Each of these can, in turn, have its own sub-pages, and so on until the end of the line is reached with nine-digit numbers. Pages can be extended by the use of frames. A frame is a screenful of information, and it has a page number followed by a letter from a to z.



The Welcome frame for Micronet 800, Prestel's most popular information provider.



Apple dealers receive information and place orders via a Prestel closed user group.

Suppliers of viewdata services

Air Call Videotex. Turnkey systems, training, bureau services. Telephone: (0582) 603123

Aregon International. Turnkey systems and consultancy. Telephone: 01-831 7536

AVS Intext. Electronic publishing and consultancy. Telephone: 01-434 2034

Baric Computing Services. Consultancy and systems. A Prestel IP with a gateway and national network, which runs Holidaymaster. Telephone: (04862) 27241

CAP (Reading). Turnkey systems and consultancy. A Prestel IP offering umbrella facilities. Telephone: (0734) 55900

Datasolve. Umbrella IP services, gateway systems for book and travel trades, etc. Turnkey systems and consultancy. Telephone: (09327) 81266

Disc International. Viewbase interactive viewdata and Envoy electronic mail via gateways for a wide range of industries; also consultancy. Telephone: (0823) 85292

D M England. Turnkey packages and training. Telephone: (0734) 342666

Eosys. Consultancy and project management. Telephone: Farnham Common 5123

FB Computer Services. FB Dataview package, plus bureau facilities. Telephone: (0372) 66891

GEC Computers. Supplies computer equipment for Prestel, and software and computers for many other public and private systems. Telephone: 01-953 2030

GEC Viewdata. Software for GEC computers, plus bureau services. Telephone: 01-836 8000

Herts 288. Consortium of local authorities in Hertfordshire providing local service via Prestel. Telephone: (0707) 268100 x 321

Honeywell. Themis private viewdata system, plus training and consultancy. Telephone: 01-568 9191

IBM U.K. Turnkey systems and IBM gateway facilities. Telephone: 01-995 1441

ITM. Rotovision and low-cost private viewdata systems using the BBC Micro. Telephone: 01-708 9066

ICL. Bulletin private viewdata system. Also works with its Baric subsidiary company. Telephone: Freefone ICL

Istel. Bureau services, training and consultancy, own packet-switch network. Telephone: (0527) 64274

Jasmin Electronics. Turnkey systems. Telephone: (0533) 58128

Mars Group Services. PVS-990 viewdata system and complete turnkey systems. Telephone: (0753) 30721

Prestel. World's largest viewdata system. Telephone: 01-583 9811

Systems Designers. Turnkey systems and consultancy. Telephone: (02514) 22171

Systeme. Computext software and turnkey systems. Telephone: (05327) 702277

Tandata Marketing. Viewdata terminals and peripherals. Telephone: (06845) 68421

Torch Computers. Communicating micros with Metrotel software suitable for Prestel IP editing. Telephone: (0223) 841000

Viewtel Services. Claims to be leading IP on Prestel. Telephone: 021-236 3366

Viewtext Ltd. Turnkey systems and consultancy. Telephone: (0892) 45178



Prestel's service for GPs transmits information provided by the DHSS, among others.

Thus Prestel can handle a vast amount of information. It is in presenting and accessing it that problems arise, as follows.

- The tree structure means a large proportion of the frames contain no useful information, but just direct you on the long route to where that information is held. It is possible to go straight to a particular frame, but that only helps if you know the number of the frame you want.
- Frames contain only pre-packaged information. Prestel is not a true database, it is a form of publishing. It offers little or no true computing power. As yet you cannot search on keywords or make your own selection of data.
- The frame was designed for domestic television sets, and holds very little text. The limit is 24 rows of 40 characters, that is 960 characters or about 150 words. With their fancy borders, most Prestel frames carry less than half that.
- Prestel is not a live service. Once a frame has been downloaded it cannot be updated without downloading it again — and, if it is a charged frame, paying the fee again. With fast-moving information like stock-market prices this is a drawback.
- The graphics are crude. Prestel uses an alphamosaic pattern of three- by two-square characters to draw pictures. This is economical as a page can be stored in about 1K of memory. However, the limitation is less relevant today than it was in the early 70s, when the system was specified.
- Prestel is slow. At its 1,200/75 baud rate it takes about six seconds to receive a frame. The system cannot cope with smaller units than one frame, even where a one-word answer would do.
- Prestel is relatively expensive for the home user, though the cost is far less than serious databases like World Reporter, etc. But even if it were cheap, the way you pay for it still makes it confusing. You pay for the equipment, you pay to join and there is a continuous charge for Prestel computer time during business hours. The time you spend on the system adds to your phone bill. Also there are sometimes charges for reading individual frames. So it is hard to keep track of what the real costs are, especially as you get billed much later.
- Prestel lacks excitement. It has no sound, no pictures, almost no movement, no emotion and no drama. Prestel is actually a file-card system. Even pretty coloured graphics do not disguise that.

Many of these problems were pointed out in *Prestel in Use — A consumer view* by E Scott Maynes, published by the National Consumer Council in April 1982. This booklet records the appalling difficulties faced by people trying to get real information out of the system. It con-

(continued on next page)

(continued from previous page)

cludes that all the indexes are unsatisfactory, but "the tree index is highly unsatisfactory and should be discarded or drastically revised". Multiple keyword search should be used instead, as with most on-line databases. Unfortunately this sensible advice has never been taken up, and Prestel remains a fundamentally crippled system as a result.

However, there are some areas where the benefits outweigh the disadvantages. Examples include stock-market prices, airline and hotel bookings, and details of cars and houses for dealers and estate agents. In these cases up-to-date information can be worth tens or even thousands of pounds.

Prestel can also handle simple transactions. Home banking is already available through the Bank of Scotland's service and Nottingham Building Society's Homelink. Teleshopping is another possibility, especially useful for the disabled. Club 403 in the Midlands is an example, albeit not a very successful one.

Prestel can provide information to selected groups of users, instead of to every subscriber. A closed user group, CUG, enables large companies to make stockholdings and prices available to their dealers, for example. Micronet 800 is a CUG. Many other CUGs have been a great success.

A limited electronic mail system is available, and through Telex Link users can also send telexes. Both facilities are very useful, though the system cannot be compared to, say, Telecom Gold in power and flexibility.

Finally, Prestel can provide a gateway into the information providers' computer systems. Examples include Skytrack for airline reservations, Homelink for home banking, Homeview for estate agents and Viewtrade for used cars. The possibilities are exciting.

Disparate aims

However, such developments mean Prestel is no longer simply an information service. Instead there are many different companies pursuing different aims under its umbrella. Most have nothing in common except the limitations of the Prestel tree structure, frame size, limited processing power and slow delivery speed.

Internationally Prestel has two major rivals: Teletel in France and Telidon in Canada. Teletel is like Prestel. It has enjoyed extravagant government support. In two current experiments terminals are being given to households to replace telephone directories, and used by government to communicate with businesses, replacing form filling for example. Free terminals are being installed at the rate of about 10,000 per week. People can also buy them cheaply or rent them for 70 francs per month.

The French government's aim is to

The Burgess view

Frank Burgess was Head of Services and Head of Marketing, before becoming General Manager of Prestel in December 1981 — a post he relinquishes on March 1 this year. In November he presented a paper at The International Forum for the Videotex and Teletext Industry in Amsterdam, making the following major points.

Videotex will not sell itself. Newcomers falsely assume that because Prestel is so easy to use, it must be easy to sell. This has not proved to be the case.

Common carrier does not work. "Common carrier" meant Prestel would not own information but that anyone could publish information on a first-come, first-served basis. This led to disparate services, poor databases, unco-ordinated marketing and pricing policy confusion. It also meant IPs could take their data off Prestel and set up competing services.

"All things to all men" does not work. The famous 1980 slogan "A world of information at your fingertips" has to be discarded because profitability could not be foreseen, it was almost impossible to index, and there was no USP (unique selling proposition).

The technology is not the product. The Prestel industry fell into the trap of concentrating on the technology and not on the applications.

There is little market for basic information retrieval. Prestel was invented and launched on the assumption that there was.

The dedicated dumb terminal has a limited life. Prestel assumed the mass market would use TV sets with modems and Prestel decoders, whereas most now use personal computers.

Price is important but not the biggest problem. Media analysts originally thought that customers were not buying because of price. Research within Prestel demonstrated that customers did not want the service at the time *at any price* because it did not make enough useful contributions to customers' needs.

Instead, Prestel marketing now concentrates on what it calls trigger services. The aim is to provide a specific service to a clearly identified group of people. Examples include Micronet 800 for computer users, and Homelink, the building society. If the trigger service is good enough to justify the cost of subscribing to Prestel, the rest of the database is essentially free and therefore does not attract as much hostility for any failings.



Linked to the Brailink terminal, Prestel can display information in Braille.

install viewdata to streamline government and reduce the flow of paper. It also helps the French information industry, which now has a bigger share of the world market than the British one. Electronic mail and other uses will grow as the system becomes widely installed.

Canada's Telidon has two advantages: better graphics and hardware independence. Telidon's superb display comes

from drawing pictures geometrically, instead of building up mosaics. This requires terminals with more memory — 32K instead of the 3K for Prestel and Teletel terminals. Also it needs accurate transmission, since if data is lost the entire frame may be scrambled. However, Telidon is clearly more suited to current and future computer and telephone technology than Prestel is.

The Prestel computers

There are six Prestel computers for subscribers. They are all powerful GEC 4080 minis with software written in Babbage and Coral. They work in pairs: Dickens and Keats in Birmingham, plus Dryden and Kipling, and Derwent and Enterprise in London. The network is star-shaped with each computer holding the same data. A seventh central computer, Duke, is used by IPs to enter and update material. Gateways to 18 other computers are provided by two GEC 4082s.

GEC/Prestel systems are operating in Australia, Austria, Hong Kong, Italy, the Netherlands, Malaysia and West Germany, as well as the U.K.

Prestel can be accessed via a special terminal, TV set or business micro or by using a popular home micro such as the Sinclair Spectrum, Acorn BBC, Apple II or Commodore Pet, etc. Unfortunately it uses the 1,200/75 baud system, where most microcomputer users have 300/300 baud modems.

The French scene

In the 70s France planned a national electronic telephone directory service using its Transpac packet-switch network to replace printed telephone directories. Unfortunately when the Socialist government came to power in 1981 it made acceptance of a Minitel home terminal voluntary. With only half of those offered accepting a terminal, directories still have to be printed, which destroys the cost savings offered by the electronic system.

Nevertheless, around 500,000 terminals were installed by the end of 1984. The targets are 1.3 to 1.7 million terminals by the end of 1985, 2.4 to 3 million by the end of 1986, and 8 million by 1992. So far most terminals have been installed in Brittany, Paris, Picardy, Provence and the Côte d'Azur. Minitel sets can also be purchased separately or rented. A model similar to ICL's One Per Desk costs about £14 per month.

As well as telephone numbers, the service provides information — like Prestel — and games. In some areas, businesses are using sets to fill in and submit government forms, while government departments are also using the system for internal communications. Electronic mail is available to business users. In the future, mail, banking and shopping services will be offered to everyone.

The million-plus Minitel terminals ordered has provided a massive boost to the French information technology industry, which now has a larger share of the world market than the British one.

D.I.Y videotex

A Liverpool company, ITM, has launched a videotex system called Rotoview, which allows anyone with a BBC Micro, disc drive and modem to set up a videotex service.

The system is intended for public display, much like a slide carousel. Companies could use it as a 24-hour sales and service system. Enthusiasts could open their own Prestel-type bulletin boards with message areas and telesoftware that can be downloaded. Educational establishments and libraries could find many uses for the system, which was used to provide information for visitors to the International Garden Festival in Liverpool last year. Other possible users include conference centres, hotels, airports, shopping precincts and railway or bus stations.

The Rotoview software costs £75, and Host software for the BBC Micro costs £20, both plus postage and VAT. Contact Information Technology and Marketing Ltd, E3, New Enterprises, S.W. Brunswick Dock, Liverpool L3 4AR. Telephone: 051-708 9066.

More important is hardware independence. Telidon keeps the information storage separate from the communications and display terminals used. The aim is to avoid rapid technical developments making data unusable. At the moment North America is a hotchpotch of systems, but a new Telidon-based standard looks likely to prevail. This standard is NAPLPS — pronounced "naplips" — the North American Presentation Level Protocol Syntax. Micros

are already being built to comply, just as the Acorn BBC model B and Rediffusion Teletyper have Prestel graphics built in.

However, it must be admitted that so far viewdata has been a failure everywhere in the world. Prestel is not unique, just the most spectacular example. If viewdata is to succeed it will do so by abandoning futile attempts to imitate magazines and newspapers. Instead it must concentrate on simplifying and speeding up the really boring transactions like looking up phone

BANK OF SCOTLAND Account Details	
As at close of business 14 Jan 85	
Account No	00428407
Balance	125.84
Today's items	-75.43
Fund transfers pending	65.00
Keycard withdr pending	-30.00
Interest accrued	-1.12
Charges accrued	-0.50
Overdraft limit	200.00
Cash available from Keycard	70.00

Account information

Bank of Scotland Standing Order Mandates Held			
To	Next Due	Until	Amount
Upland Electricity Monthly	30Jan85	30Nov85	32.40
British Gas Monthly	06Feb85	06Sep85	31.15
Midshires Council Monthly	01Feb85	01Mar85	57.81
General Life Ass Monthly	31Jan85	N.A.	22.45
United Auto Ins Quarterly	15Mar85	15Jun85	26.95

Standing orders

BANK OF SCOTLAND Inter-account transfers	
Details	
From	Current Account No 00428407
	Grant J A Pers Acc
	Home Banking Centre
To	Investment Account No 02037184
	Grant J A
	Home Banking Centre
Amount	£100.00


Transfers between accounts

BANK OF SCOTLAND Cash Management			
148 High St Southampton			
Account No 00101000000000000000			
Ledger position on first lines			
Debit position on second lines			
	Debits	Credits	Balance
14Jan1985	1,456	504	1,733
			2,526
15Jan1985	-389	750	2,094
		1,048	1,117
16Jan1985	0	0	2,094
		2,884	1,767
17Jan1985	0	0	2,094
		327	2,094

Cash management

Home banking is one of Prestel's newest features.

numbers, sending electronic mail, paying bills and looking up facts.

These are things that, in the last five years, Prestel has learned the hard way, at enormous cost. With its recent change of emphasis on to marketing "trigger" services like the successful Micronet 800 — see "The Burgess view" box — there are now signs that Prestel could, in the future, be a success. At the moment, however, it remains what it was: a wonderful idea with enormous, but unrealised, potential. 

If you want it tomorrow . . .
call us today
01-455 9823

COMPUTERS/CALCULATORS/PLOTTERS

HEWLETT PACKARD			
HP 4 1CV (SCI Computer)	£164.95	CE 158 RS232 and Cent IF	£120.00
HP 4 1CX (Computer)	£215.00	CE 150 printer cassette IF	£125.00
HP 4 1C (Card Reader)	£139.95	CE 159 8K Add on mem with BATE	£79.00
HP 4 1C Printer 82143A	£230.00	CE 152 Cassette	£36.00
HP 4 1C Cassette drive	£290.00	PC 1251 (Computer)	£66.50
HP 16C (Hex Con)	£84.00	CE 125 (I/F for above)	£86.50
HP 15C (Adv Sci)	£84.00	Casio PB 700 (h/held Computer exp to 16K)	£127.00
HP 71 Printer 82162A	£295.00	Casio PB 750 New Computer	£89.50
PLOTTERS		Epson QX-10 (desk top comp)	£1599.00
HP 7470A (A4 2 Pen Plotter)	£799.00	EPSON HX20 Briefcase computer, 16K expandable, Serial and RS232 interface.	£375
HP 7475 (A3 6 Pen Plotter)	£1399.00	EPSON PX-8 (portable 64K Computer/Word Processor)	£775.00
Pixy Plotter (A4 3 Pen 8 Colour)	£399.00	Epson Modem CX21 (300 Baud)	160.00
SHARP			
PC 1500A (PI/Computer with 8K ex to 24K)	£147.50		
PL 5000 Portable Computer	£1190.00		

WORD PROCESSING PRINTERS/MONITORS

NEC 7710 RS232/7730 Cent	£1725.00	BROTHER* *Highly recommended*	
NEC 2000 (20 CPS)	£615.00	HR1 (16CPS)	£284.00
NEC 3530 (33 CPS)	£1300	Serial or Centronics —	
SILVER REED		HR15 (3K Buffer 18CPS)	£399.00
EXP 500 (12CPS)	£299.00	HR25 (3K Buffer 25CPS)	£699.00
EXP 770 (31CPS-2K Buffer)	£850.00	HR35 (35CPS)	£825.00
Sheet feeder for above	£199.00		
MT EXP 500 (14 CPS)	£329.00		
SMITH CORONA		DIABLO	
S/C TPI (12CPS)	£199.00	620 (RO)	£650.00
S/C L100 (12 CPS-cmulats Diablo 630 Protocols)	£260.00	630 (ECS/IBM)	£1650.00
QUME 9/45 RO-FFP	£1900.00	630 (API) (IBM COM)	£1400.00
9/55 RO-FFP	£2375.00	630 (KSR)	£1840.00
11/40 RO (Also IBM-PC)	£1185.00	Tractor (8)	£1195.00
TEC STARWRITER*		FUJITSU	
F10-55 CPS (serial/parallel)	£1399.00	EPSON DX 100 (13CPS)	£399.00
Tractor (Bi-Di)		Sheet Feeder	
Sheet Feeder		RUTISHAUSER	
Mechanical Sheet F		Sheet Feeders and Tractors for:	
OLYMPIA*		Qume, Diablo, NEC, Ricoh, TEC	
ESW 103	£800.00	Starwriter, Olivetti, etc.	From £99.00
TOSHIBA		RICOH*	
The all speed — Word Processing, Draft, Data Processing printer		Model RP 1300 (S) (4K Buffer)	£895.00
JUKI 6100 (18CPS)	£325	Flowriter (8K) PR 1600	£1244.00
TEC Starwriter from	£890	IBM-PC Version	£1500.00
COLOUR MONITORS from £220		Mechanical Sheet Feeder	£459.00
Monochrome Monitors from	£54.00	RP1200 (20CPS)	£555.00

PHONE US FOR BEST DEAL

DOT MATRIX PRINTERS

OKI*		SMITH CORONA	
M82A (120 CPS)	£240.00	Fastext 80 (80CPS)	£195.00
M92P (160 CPS)	£379.00	D100 (120CPS)	£249.00
Tractor	£50.00	D300 (160CPS 2K Buffer IBM/Epson Comp)	£550.00
M83A (12 CPS)	£420	MANNESMAN TALLY	
M84P (200CPS)	£750.00	MT80 (80CPS)	£177.00
ANADIX*		MT160 (F/T) (160CPS)	£495.00
DP-9000 B/(180 CPS)	£850.00	MT180 (160CPS 132 Col)	£699.00
DP-9500 B/(180 CPS)	£893.00	EPSON	
DP-9625 B/(240 CPS)	£1155.00	Epson RX80T (100cps)	£195.00
BROTHER		Epson FX80 (160cps)	£324.00
EP44 (16 CPS)	£189.00	Epson RX80FT	£220.00
HR 5 (30 CPS)	£129.00	Epson FX 100FT 160cps	£430.00
STAR range from	£156.00	Epson RX100FT (100cps)	£399.00
CANNON PW1080A (160CPS)	£274.00	Epson LQ1500 (200cps)	£895.00
NEC Pinwriter (132 cols)	£599.00		
MODEMS from	£79.00		

TECHNICAL ADVICE

If you require help in selecting correct PRINTER/SHEETFEEDER/MONITOR/SOFTWARE PROGRAMME or even I/F CABLE for your existing computer Tel our HOT LINE 01-455 9824

SOFTWARE

This is only a selection of programmes available — telephone us for your specific requirements.

APPLE II/e		IBM/COMPAQ	
Mailmerge V.3.3	£125.00	Wordstar V.3.35	£270.00
Wordstar V.3.31	£270.00	Mailmerge V.3.24	£125.00
Wordstar/Mailmerge/Spellstar	£406.00	Lotus 1-2-3	£325.00
ACT — APRICOT		Symphony	£450.00
Pulsar-Wordstar	£250.00	dBase II (CP/M86)	£295.00
Mail Merge	£75.00		
Superwriter	£250.00		

EXPORT ORDERS WELCOMED

GOODS FULLY GUARANTEED PRICES EXCLUDING VAT AND P + P.

Company and Government orders accepted by phone. Barclaycard Access Visa accepted by phone.

Tel.: 01-455 9823

MOUNTAINDENE

22 Cowper Street London EC2

● Circle No. 157



COMPUTER SYSTEMS AND SUPPLIES

Official Government/Educational/Local Authority orders welcomed

COMPUTERS

SANYO and APRICOT, complete systems including WP, spreadsheet, database, SAGE accounts, printer, cables, disks & paper from: £1395

MONITORS

Philips CT2000 TV/Monitor	£199
Kaga Taxan K12R1X colour	£179
Sanyo CD3125 colour	£159
Microwlic 1431 colour	£179

DAISYWHEEL PRINTERS

Daisy Junior 14 CPS	£199
Daisystep 2000 18 CPS	£215
Juki 2200 16 CPS	£239
Juki 6300 40 CPS	£879
NEC Spinwriter 3500	£1039

MATRIX PRINTERS

Smith Corona Fastext 80	£159
Shinwa CP80 100cps	£179
Panasonic KXP1091 NLO	£269
Kaga Taxan K810 NLO	£269
Canon PW100A NLO	£289
Smith Corona D200 NLO	£339
NEC P1 180 CPS	£349
HP Thinkjet 150 CPS	£369
NEC Pinwriter P2 NLO	£519

PLOTTERS

SCP 80-A4 NEW	£169
Roland DXY 01 A3	£275
Hewlett Packard 7470	£789
Houston EDM42 A1	£2995

These represent only a small sample of our full range of computers and peripherals. Please telephone or write for full list.

PRINTER BUFFERS

8K-£75	16K-£85	32K-£95	64K-£119	128K-249
--------	---------	---------	----------	----------

DISK DRIVES

Cumana, Opus & Pace from £95.

FLOPPY DISKS — LOWEST PRICES YET! — POST FREE

Per box of 10 — all double density	DYSAN 5.25" 100% guaranteed				3M 5.25" Lifetime guarantee			
	1	2-4	5-9	10+	1	2-4	5-9	10+
SS 48 TPI	17.00	16.50	16.00	15.50	14.50	14.00	13.50	13.00
OS 48 TPI	24.50	24.00	23.50	23.00	18.00	17.50	17.00	16.75
SS 96 TPI	24.50	24.00	23.50	23.00	21.00	20.50	20.00	19.50
OS 96 TPI	29.50	29.00	28.50	28.00	23.50	23.00	22.50	22.00

NASHUA 5.25" 5 year guarantee

SS 96 TPI	17.45	17.05	16.65	16.25	34.50	34.00	33.50	32.50
OS 96 TPI	18.95	18.55	18.15	17.75	45.50	45.00	44.00	42.50

Please add £2.00 to the above prices if required in 'SEE 10' Library Case
*DYSAN branded disks — SPECIAL OFFER deduct £1.50 from these prices
FANFOLD PAPER Low prices across the range, e.g. 11" x 8 1/2" — £9.35, 11" x 9 1/2" — £9.75, A4 Clean Edge £11.69
Prices per box of 2000. Quantity discounts. All sizes available.
RIBBONS All types available at low prices, plus quantity discounts e.g. Smith-Corona TPI — £2.39, Brother EP44 — £1.69, Juki 6100 — 99p, Shinwa CP80 — £3.79, Epson FX/MX/RX — £2.49.
Please send cheque with order. Carriage: Disks POST FREE. Computers/Printers/Monitors/Disk Drives £7.50. Paper £2.25 + £1 per box. Ribbons & Pinwheels 95p (any quantity). Please add 15% VAT to all prices (inc. carriage). Limited space precludes listing of our full range of products. Please telephone if you do not see the item you require, or write for full list.

A.M.A. COMPUTER SYSTEMS & SUPPLIES
Dept. B, 8 Glebe St., Beeston
NOTTINGHAM NG9 1BZ. Tel. 0602 255415

● Circle No. 182

VIZASTAR 64

PACKAGE... AT AN AMAZINGLY AFFORDABLE PRICE! THE LATEST DESIGN TECHNIQUES COMBINE ULTIMATE EASE-OF-USE, WITH ALL THE SOPHISTICATION OF AN INTEGRATED PRODUCT... ADVANCED SPREADSHEET FEATURES INCLUDE HIGH-SPEED MATHS FUNCTIONS, 1000 BY 64 WORKSHEET, PROGRAMMABILITY, WINDOWS, CELL PROTECTION, SEARCH AND SORT, TEXT EDITING, WORDPROCESSOR COMPATIBILITY, SIMULTANEOUS GRAPHICS... INTEGRATED WITH A 1000-CHARACTER PER RECORD DATABASE, UP TO 250 CHARACTERS PER ITEM... THE ONLY PRODUCT OF ITS KIND FOR THE COMMODORE 64! SUITS MOST PRINTERS, SUPPLIED WITH EXCELLENT HANDBOOK. OUR PRICE £99.95 £89.00



YOUR PROGRAMS WILL REALLY TAKE OFF WITH DTL JETPACK 64! 100% COMPATIBLE WITH IBM BASIC, JETPACK COMPILES BASIC PROGRAMS INTO MACHINE CODE, RUNNING UP TO 25 TIMES FASTER... AND USING UP TO HALF AS MUCH MEMORY, TO GIVE FASTER LOADING, OR BIGGER PROGRAMS! AND IT EVEN ACCEPTS BASIC EXTENSIONS AND MACHINE CODE ROUTINES AS WELL!

Master 64

HAS EVERYTHING YOU NEED FOR PROGRAMMING TO TOP PROFESSIONAL STANDARDS! BASIC IV, MACHINE CODE MONITOR, AND 85 POWERFUL NEW COMMANDS... INCLUDING TOOLKIT, BUSINESS BASIC, KEYED ACCESS FILES, DISK DATA COMPRESSION, FORMATTABLE SCREEN ZONES, MULTIPLE SCREENS, DATE CONTROL, REPORT GENERATOR, 22-PLACE ARITHMETIC, SCREEN PLOT, SCREEN DUMP, AND MORE... ALL FOR ONLY £64.95!

OUR PRICE (DISK) £39.95 £35.95

VIZAWRITE 64

VIZAWRITE 64 IS A HIGH-PERFORMANCE, LOW-COST WORD PROCESSOR WITH ON-SCREEN FORMATTING, THAT TAKES FULL ADVANTAGE OF THE 64'S COLOUR, GRAPHICS AND MEMORY FEATURES... AND SUPPORTS VIRTUALLY ANY PRINTER! WITH A COMPREHENSIVE AND EASY-TO-FOLLOW USER REFERENCE MANUAL, VIZAWRITE IS THE ULTIMATE PERSONAL COMPUTER WORD PROCESSOR! AVAILABLE ON CARTRIDGE (£89.95 £78), DISK (£79.95 £68) OR WITH VIZASPELL (£99.95 £85)

*** WANT IT TOMORROW? *** CALL US TODAY! *** ON 01-546-7256

VIZASTAR (DISK)	£99.95	£89.00	MULTIPLAN (US) (DISK)	£79.95	£67.95
VIZASPELL (DISK)	£59.95	£49.95	PRACTICALC (DISK)	£44.95	£39.95
EASYSRIPT (DISK)	£26.00	£65.00	PRACTICALC (TAPE)	£39.95	£34.95
EASYSPELL (DISK)	£50.00	£41.95	HOMEBASE 1-4 (SUPERBASE)	£17.95	
SIMON'S BASIC (CART)	£50.00	£41.95	STEPPING STONES (SUPERBASE)	£9.95	
FIGARO 64 (DISK)	£86.95	£75.00	PRINTLINK 64 (INTERFACE)	£29.95	

PRICES INCLUDE 15% VAT AND ARE CORRECT ON GOING TO PRESS. ORDER BY POST OR PHONE, USING CHEQUE, ACCESS/BARCLAY CARD OR OFFICIAL ORDER. DESPATCH IS BY SAME-DAY 1ST CLASS POST, PRE-PAY ORDERS FREE. PRODUCT DATA AVAILABLE ON REQUEST. REF A31



LAKESIDE HOUSE, KINGSTON HILL, SURREY, KT2 7QT. TEL 01-546-7256

● Circle No. 185

Data up-to-date

Public databases are becoming increasingly popular as they provide a wealth of current information on a diverse range of subjects. Glyn Moody summarises what can be found on some of those currently on-line.

ONE OF the oldest on-line databases, and still the largest, began as yet another spin-off from the Nasa space programme. Originally called Recon, for Remote Console Information Retrieval Service, it was set up by Lockheed Corporation as a tool for Nasa researchers and initially drew on government and research publications. In 1972, when the service was made available to the public, the name of the database service was changed to Dialog, which was the name of the command language used to search through the files. Today there are over 60,000 users.

Limited field

Dialog is big: it currently holds over 75 million records, and the number is growing steadily. Alongside such mammoth enterprises, smaller databases have sprung up that limit their field of activity to a very narrow sphere. Examples include databases covering areas such as Finnish business periodicals, hydrogen in metals and packaging legislation.

But whether large or small, on-line databases share a number of common features. They are nearly all accessed through the public telephone network. Some private networks still exist for certain very specialised services where the cost includes provision of a separate network. But by and large, on-line systems use the Packet Switched Stream network, which is described in more detail in the article on electronic mail on page 92 of this issue. Essentially it allows you to access distant telephone numbers for the cost of a local telephone call plus annual membership of the PSS scheme.

As a result of the greatly reduced costs, it is quite viable to access databases all around the world. So databases are increasingly international in their appeal and use. Major databases are to be found in the U.K., U.S., France, Germany, Italy and Holland, all of which contain international information likely to be of interest to U.K. users.

The first databases evolved as electronic indexing systems and bibliographic services. Blaise, run by a department of the British Library, is still used predominantly for this purpose. The older systems were used, especially in scientific disciplines, to search through abstracts of papers and conference proceedings. Such databases were easy to set up and had a clearly defined market. Today there are hundreds of such databases, covering most areas of science and technology.

Apart from their usefulness in academic institutions, scientific databases also play an important role in industry. In particular, chemical information is widely accessed using on-line techniques. Patents form another sphere where on-line searches have become quickly accepted.

The biggest growth area today is probably business. As more and more businesses equip themselves with micros, so the possibilities of on-line searching increase. Many of the statistics and forecasts widely used in the business and financial community are now available on-line. These include such services as information from the *Financial Times*, the Bank of England, the IMF and the U.K. Treasury.

Share services

Two areas which obviously lend themselves to interactive searching are shares and company information. There are a number of share services that provide constant updates on various sectors of the world's stock markets. Some even allow you to set up your own portfolio and monitor its progress. Eventually this kind of system will tie in directly with stockbrokers to enable you to place orders from your micro.

Company information is required for a variety of purposes, and often entails costly and time-consuming visits to Companies House. Once again, on-line searching is well suited to provide up-to-date information very quickly and easily. A number of database hosts offer infor-

mation of varying detail on British and foreign companies.

An extension of business applications is the full-text service. Instead of providing abstracts or streams of statistics, the full-text service offers complete documents. For example, Datasolve's World Reporter provides the full text of *The Guardian*, *Washington Post* and *The Economist*, along with the BBC's Summary of World Broadcasts and External Services News.

Specialised

Another specialist full-text service is provided by Lexis for lawyers. Some 200,000,000,000 characters of text make up a file of legal cases from the U.K., U.S. and France, which can be searched in a variety of ways to obtain information on precedents and relevant background.

This kind of service moves beyond providing standard sources in a more convenient form. Instead, you can start looking for facts or connections that may or may not be there, and which certainly could not have been found by any other means. In this way it is possible to start extracting useful information from the deluge of raw data that assaults us daily. In the future this kind of database use will become increasingly important.

Another development likely to gain ground already exists in the U.S. The databases available through CompuServe have 800 subject areas and over 168,000 users. They offer something for nearly everyone, and provide a kind of total environment which places greater emphasis on two-way interaction. CompuServe offers a special interest group which caters for people with a very specific interest. Subjects covered at present include those of interest to users of IBM PCs, Commodore and Apple computers, golfers, doctors, veterinarians and cooks. It also possesses a highly popular CB simulator, which permits users to chat over some 40 channels, using only

(continued on next page)

Using an on-line database

Most major international databases can be accessed via the PSS network. Assuming you are a member of the service, you can dial up an on-line system simply by getting on to the service, and then typing in the database's network user address. You may need to supply passwords to gain entry to the database, which will be provided when you sign up with the host. Normally, signing up with an information host gives you access to several databases. The host may have provided the database itself, or it may buy them in from an outside firm. Some of the databases may be exclusive to one host or common to many.

Once you are in your chosen database or the main command mode, you normally use a small group of simple commands to begin search procedures. For example, Knowledge Index, which is a cheaper subset of Dialog, uses the command Find followed by a word to initiate a search; World Reporter uses Get. In both systems it is possible to narrow the field of enquiry by adding more words in various ways.

For example, searching for micros And mainframes will only find items that have both in their files of identifying words or concepts. There are also Or and Not operators, just as in Basic. Some databases allow you to use wild cards in searches. As in CP/M, they enable you to specify only partially your search topic, leaving an intentional ambiguity. So MOT* would search for

any word beginning with mot, such as moth, mother, motor, motion and so on.

Normally, search procedures produce a statement of the number of files found meeting the criteria. Using additional Ands and Ors, they can be whittled down until a manageable number is obtained. To display the items, you normally select various formats, ranging from complete printouts to short forms.

Most systems have their own specific commands, which may include provision for electronic mail, for example. But the overall structure is usually the same — there is even a Common Command Language that can be found in use across a wide range of European databases. CCL came about largely through the efforts of an agency of the European Commission.

One service available from its Luxembourg offices is a free Help Desk which deals with all queries concerning European databases. Its telephone number is (010-352) 488041. Upon receiving your call, they will phone you back. The same office has information about a free trial use of its own database service. As well as a number of scientific databases, there is a translation database and a training system that helps you learn how to use the CCL.

In the U.K., there is help from the On-line Information Centre, soon to be an independent consultancy firm run under the auspices of Aslib, the Association for Information Management. The address is 26-27 Boswell Street, London WDC1N 3JZ. Telephone: 01-430 2502.

(continued from previous page)

handles, as in CB, instead of names.

Compuserve also has a very wide range of business services, news information and databases which can also be found elsewhere. There are various bulletin board facilities too, as well as electronic shopping services. All in all, Compuserve represents one step beyond the conventional database service, and moves towards an environment in which users can find information, send messages, and order goods and services.

MUD accessible

In the U.K. things have not moved so quickly. But Commodore's Compunet system is the first to offer a wide range of interactive services. As well as a CB simulator, there is a link to Compucard and an on-line shopping service. There is even access to Mud, the multi-user interactive adventure game running at the University of Essex — see page 92 of January's *Practical Computing*. A section called the Jungle allows software to be uploaded and downloaded, and sends electronic messages. At present the scheme is restricted to Commodore 64 owners but there are plans to extend it.

The growth of on-line database provision seems to be accelerating. In the U.S. and Canada, the number of on-line searches went up sixfold from 1975 to 1981. From 1972 to 1982, the number of purely bibliographic references went up from about 3 million to 77 million. The growth in the newer areas of full-text services has been even more dramatic.

Many large companies in the field of in-

?find micro or personal or home

1381 MICRO
4394 PERSONAL
1842 HOME
S1 6519 MICRO OR PERSONAL OR HOME

?find computers or computer

7983 COMPUTERS
14067 COMPUTER
S2 16790 COMPUTERS OR COMPUTER

?find doctor or doctors or physician or physicians or medical

34 DOCTOR
21 DOCTORS
39 PHYSICIAN
52 PHYSICIANS
706 MEDICAL
S3 747 DOCTOR OR DOCTORS OR PHYSICIAN OR PHYSICIANS OR MEDICAL

?display s1

Display 1/L/1
1191020 D84000287
HOW DOCTORS CAN BEAT THE INFORMATION OVERLOAD CRISIS
CLARKSON, D.
COMPUT. WKLY. (GB) NO.892 24 5 JAN. 1984 Coden: COMWAA
ISSN: 0010-4787
Treatment: GENERAL,REVIEW; PRACTICAL
Document Type: JOURNAL PAPER
Languages: ENGLISH
INFORMATION TECHNOLOGY IS ABLE TO ENSURE THAT THE VAST AMOUNT OF DATA AVAILABLE TO DOCTORS IS USED PROPERLY. ANY SUCH PROCESS OF DECISION AIDS MUST SEEK TO EXPRESS, IN TANGIBLE FORM, THE DIAGNOSTIC SKILL OF THE CLINICIAN. IT MAKES SENSE TO EXAMINE A SPECIFIC MEDICAL PROBLEM IN A HOSPITAL ENVIRONMENT. FOR EXAMPLE, WORK HAS BEEN UNDERTAKEN AT ST. JAMES UNIVERSITY HOSPITAL, LEEDS, ON ACUTE ABDOMINAL PAIN AND AT THE SOUTHERN GENERAL HOSPITAL

Searches can be widened or narrowed by using combinations of search topics. Individual items can then be called up with a command such as Display.

On-line databases

ABI/Inform (ESA-IRS, Datastar). Business management and administration.

Acompline (ESA-IRS, Scicon). Urban management aspects.

Alis (Datacentralen). Automated Library information system.

Bank (ADP). Bank of England financial statistics.

BCD (ADP). U.S. business conditions digest.

Business (Datastar, Inka). Worldwide trade

opportunities and business contacts, company data.

Cisdoc (EAS-IRS). Occupational health and safety.

Citibase (SIA). U.S. principal economic indicators.

CNRS Lab (Questel). CNRS current research activities.

Comext (CISI). External trade statistics.

Compendex (ESA-IRS, Inka, Pergamon Infoline, Datastar). All branches of engineering.

Compustat (ADP). Balance-sheet statistics of 6,000 U.S. companies.

Computerpat (Pergamon Infoline). U.S. patents on the subject of digital data processing.

Conference Board (ADP). 750 business-related economic time series.

Conference Papers Index (ESA-IRS). Scientific and technical papers presented at conferences.

Conference Proceedings Index (Blaise). Index of conference proceedings.

Cronos (CISI, Datacentralen). Range of E.E.C. economic indicators and statistics.

Defotel (Questel). Financial information on about 1,500 French and foreign companies.

EDE (Datacentralen). Environmental database and ecological parameters.

EDF-DOC (ESA-IRS, Questel). Scientific and technical database.

EI Engineering Meetings (Datastar). Information on the proceedings of some 2,000 technical conferences.

Electronic Publishing Abstracts (Pergamon Infoline). Literature on electronic publishing and related areas.

Essor (Questel). Management, personnel and field of activity of 65,000 French companies.

Exstat (ADP). Balance-sheet statistics of 2,500 companies.

Fintel/FT (Datastar, SIA). Company and business information abstracts from the *Financial Times*.

FUTU (Datacentralen). Journal articles in all subject areas of forecasts, trends and ideas of the future.

Future (ADP). Commodities database, daily prices on world market.

FX (ADP). Daily exchange and interest rates at New York.

HSEline (EAS-IRS). U.K. health and safety executive aspects.

IRS/FMI (ADP, CISI). Financial data for member countries for the IMF.

International Economic Abstracts (Datastar). Economic information on markets, trends and investments worldwide.

Key British Enterprises (Pergamon Infoline). Profiles of the top 20,000 companies in Britain by turnover.

LCMarc (Blaise). Books and serials catalogued by the U.S. Library of Congress.

Math (Inka). Mathematics and related subjects.

Meeting Agenda (Questel). Advance notices about congresses, conferences and exhibitions throughout the world.

MEI (ADP). OECD main economic indicators.

MMA (Pergamon Infoline). Worldwide management and marketing practices.

Newsline (EAS-IRS, Finsbury). News from British, French and German daily papers.

New York Times (Datastar). *New York Times*, bibliographic file.

Pascal (EAS-IRS, Questel). General coverage of science, technology and medicine.

Phys (Inka). Physics and related areas.

PINCCA (SIA). Price index numbers for current-cost accounting.

Predictcasts (Datastar). Business and technology.

Robomatrix (ESA-IRS). The applications and impact of robots on society.

Routes (SIA). Data on the U.K. road network.

SB-I (Questel). Computer science abstracts.

Scicopath (Scicon). Information on motorways and roads in U.K.

Share Price Data (Scicon). Daily prices for the U.K. market on equities, commodities and overseas stocks.

Standards and Specs (ESA-IRS). U.S. standards and specifications.

Statis-Bund (CISI). German economic data.

STP (ADP). Short-term forecasts of main U.S. indicators.

Teledoc (Questel). Information on telecommunications and electronics.

UKCSO (SIA, Scicon). Macroeconomic indicators for U.K.

UK Treasury (SIA). Major economic time series.

USflow (ADP). Financial statistics on about 1,000 U.S. companies.


formation provision probably entered the field with an eye to long-term profits and a need to stake out a claim in the world of information, rather than any strong belief that easy money was there to be made now. Correspondingly, there has been a pell-mell rush to buy up on-line rights to suitable material, particularly in the business field.

The table at the top of this page gives a flavour of some of the main databases currently operating, with the name of the host and a brief description of their contents. Obviously it is impossible to do anything like justice in this space to a database containing a million records. Again, you should contact the relevant host for details.

A useful guide in this context is the directory of databases and databanks published by the European Commission in

Luxembourg. The address is 177 Route d'Esch, Luxembourg; telephone (010 352) 488041. It is also available on-line as one of the free databases provided by this organisation.

Future prospects

In the immediate future, we can probably expect to see further dramatic growth and a consolidation of public databases. The on-line database represents the coming together of both sides of the computer coin: the mainframe with its raw processing capability, and the desk micro which provides power that is distributed but limited. Together they could provide not just a new way of looking at and using the world of information, but also a way of interacting electronically with the outside world. 

Database hosts

The table on the following page gives some information on the leading database hosts, with a bias towards those that are based in Europe. The telephone number is that for dialling from Britain, as is the NUA number. The cost per connect hour should only be taken as a very rough guide to the range of prices involved; check with hosts for details. The same goes for the costs of the hard-copy service, if any. Some services allow you to take screen dumps directly, others send you copies for a fee. The number of users and type of users gives some indication of the size and scope of each host's end market.

Database hosts

	Address	Telephone	NUA	Comms (baud rate)	Cost per connect hour	Email provision	Hard copy provision
ADP	Poortweg 4, 2612 Delft, The Netherlands	(010 31 15) 569382	—	—	200-400 guilders plus subscription up to 30,000 guilders	—	—
Blaise	Blaise Marketing and Support Group, British Library, Bibliographic Services, 2 Sheraton Street, London W1V 4BH	01-636 1544 ex 242/284	A227900102	300 and 1,200	£27	N	Y
Butterworth Telepublishing	4-5 Bell Yard, Temple Bar, London WC2A 2JR	01-404 4097	—	1,200	£70	N	Y
CISI-Wharton	Ebury Gate, 23 Lower Belgrave Street, London SW1W 0NW	01-730 8171	219200394	300 and 1,200	£50-£100 for European databases; £35-£40 for U.K. databases	Y	Only CSO: £10 per enquiry, £1.60 per series
Compuserve	500 Arlington Center Boulevard, Columbus, Ohio 43220, U.S.A.	(010 1 614) 457-8600	—	300 and 1,200	\$6-\$12.50	N	Y
Datacentralen	Retortvej 6-8, 2500 Valby, Denmark	(010 45 1) 468122	2382415 92400	300 and 1,200	\$36-\$60	Y	—
Datasolve Ltd	Datasolve House, 99 Staines Road West, Sunbury-on-Thames, Middlesex TW16 7AH	(09327) 85566	A275312212	300 and 1,200	£60	N	£0.30 per page
Datastar	Plaza Suite, 114 Jermyn Street, London SW1Y 6HJ	01-930 5503	A9228464 110115	300 and 1,200	£60	Y	N
Dialog Information Services	PO Box 8, Abingdon, Oxfordshire OX13 6EG	(0865) 730969	A212300120	300 and 1,200	£75	soon	\$0.25
Echo Customer Service	177 Route d'Esch, L-1471, Luxembourg	(010 352) 488041	A927 0448112	300 and 1,200	free	Y	N
Finsbury Data Services	68-74 Carter Lane, London EC4V 5EA	01-248 9828	A219200101	300 and 1,200	£70	N	N
Inka	7514 Eggenstein- Leopoldshafen 2, Germany	(010 49 7247) 824566	2624572474 0001	300 and 1,200	DM120-DM300	N	DM0.40
IRS-Dialtech	Room 232, Ashdown House, 123 Victoria Street, London SW1E 6RB	01-212 5638	A92222 620021	300	£27-£67	Y	£4
Pergamon Infoline	12 Vandy Street, London EC2A 2DE	01-377 4650	A219200190	300 and 1,200	£40-£75	N	£0.15
Questel	83-85 Boulevard Vincent Auriol, 75013 Paris, France	(010 33 1) 582 6464	20800604 0010	300 and 1,200	FF500	N	FF2
Scicon	Brick Close, Kiln Farm, Milton Keynes MK11 3EJ	(0908) 565656 ex343	A290840111	300 and 1,200	£55	N	—
SDC Information Services	Bakers Court, Bakers Road, Uxbridge, Middlesex	(0895) 37137 ex235	A931060051	300 and 1,200	\$80	Y	\$0.20
The Source	1616 Anderson Road, McLean, Virginia 22102, U.S.A.	(010 1 703) 734 7500	—	300 and 1,200	\$7.75-\$20.75	N	Y

Networks: databases

Main databases and subject areas	Type of User	Number of users	Date established	Location
business, financial: Disclosure, Compustat, Cronos, OECD	mainly business, some academic	500	early 1970s	London and U.S.
bibliographic: UKMARK, LCMARK, DPB	libraries, academic	800-1,000	1977	London
Nexis for business, finance, energy and high-tech; Lexis for legal cases from U.K., U.S. and France	Nexis: media, stockbrokers, banks Lexis: lawyers only	Nexis 2,000 Lexis 7,200	Nexis 1979 Lexis 1968	Ohio
numeric, economic and financial statistics: CSO, FT currency and share database	large and small companies	80-100	mid-1984	Paris and London
general-interest, communication channels, special interest groups, CB simulator	professionals	168,000	1979	Ohio
chemical and environmental: EEC, Ectin Cronos	industry, research	1,300	1978	Denmark
World Reporter for news and current affairs; World Exporter plans and projects; Eurolex; Wildscape	media, government, industry	400-500	January 1983	Sunbury-on-Thames, Middlesex
business and biomedicine: Predicast, FT Abstracts, Medline	industry, academics	—	November 1981	Switzerland
chemistry, medicine and business: CAsEarch, Medline, Disclosure	industry, business	60,000	1964	California
database use training, translation database, European tenders	business	1,500	late 1970	Luxembourg
Textline business abstracts; Newline headlines	banks, insurance, libraries	—	January 1980	London
science, technology and engineering	academic, business	1,500	1979	West Germany
science and technology: Inspec, NTIS	business, government	1,000	1976	Italy
science and technology: Jordans, Impadoc	industry, business, libraries	—	1981	London
scientific and technical: Pascal, CNRS, Index	academics, industry	5,000	1979	France
Polis parliamentary data, Acompline, Urbaline	government, libraries, industry	160	1981	Milton Keynes
chemistry, energy, engineering and patents: Compendex, Tulsa	pharmaceuticals, oil, industry	1,800 in Europe	1972	California
business, electronic mail and newswire information	mostly business, some home	62,000	June 1979	Virginia

SOFTWARE CENTRE

CP/M

CP/M-86

MSDOS

MICROPRO SOFTWARE SYSTEM

PLANSTAR: Advanced financial planning.....£295
WORDSTAR: Best selling professional Word Processing software; On screen formatting, Block manipulation, File read/write, Simultaneous Editing and Printing.....£295
MAILMERGE: Enhancement for document personalisation and mailing applications.....£145
SPELLSTAR: Enhancement for checking spelling and maintaining spelling dictionaries.....£145
STARINDEX: Useful package for creation of Table of Contents, Index, List of Figures, Interfaces to Wordstar to improve document presentation quickly and easily.....£116
INFOSTAR: Impressive Data Base system combining the power of Datastar with the flexibility of Reportstar.....£295
DATASTAR: Screen based Data Entry, vetting and retrieval system. Screen formats under user control.....£175
REPORTSTAR: Powerful report generator, provides much needed enhancement to Datastar for report production and transaction processing.....£210
CALCSTAR: Electronic spreadsheet with interfaces to all MicroPro

NB: Combination prices — WS/MM
 £390; WS/MM/SP/SI £399

DATABASE MANAGEMENT

FORMULA II: Unique information management system with exceptional capabilities for Application Generation. Multiple files and indexes, transaction processing, interactive, no programming language required.....£450
dBASE II: The most popular of data management systems, very powerful application generator.....£37
QUICKCODE: Add-on facility for dBASE programmers to speed development process by generating dBASE command files.....£200
dGRAPH: Extremely useful program for graphical representation of dBASE and user created data files.....£200
dUTIL: Utility to speed up dBASE execution.....£69
CARDBOX: Highly popular electronic card index system. Easy to use, with powerful retrieval facilities.....£195
FRIDAY: End user file management system from the authors of dBASE II. File definition, input and reporting under user control.....£195
OPEN ACCESS: Multi-function Executives Information System.....£450
RETRIEVE II: Information Management with unique features.....£495
EVERYMAN: Database Systems for the IBM-PC.....£475



Telesystems Ltd

The Geans, 3 Wycombe Road, Prestwood, Bucks., HP16 0N2 Tel: 02406 6365

LANGUAGES

Microsoft	CP/M	MSDOS	Digital Research	CP/M	CP/M-PCDOS	86
BASIC Interpreter	£325	£325	CBASIC Interpreter	£130	£275	
BASIC Compiler	£365	£365	CBASIC Compiler	£425		
FORTRAN Compiler	£465	£325	PASCAL MT +	£300	£325	£325
COBOL Compiler	£645	£645	C Compiler		£295	£295
C Compiler		£465	PERSONAL BASIC Int		£125	
PASCAL		£285	CIS COBOL	£425	£425	
BUSINESS BASIC Comp		£550	FORMS-2	£110	£110	
MACRO ASSEMBLER	£185	£99	FILESHARE	£250	£425	
			FORTRAN77		£295	£295
SUPERSOFT C Comp	£185	£185	SUPERSOFT BASIC		£200	£200
PROFORTRAN		£220	Compiler		£220	£320
			PRO PASCAL		£220	£320

UTILITIES

ASCOD: The most flexible asynchronous communications package available to the micro world. Interactive, batch, menu-driven. Available for CP/M, CP/M-86, MS/PCDOS.....£170
BSTAM: Simple communications program for exchanging files between CP/M systems.....£140
TRANSFER: System for exchanging files between CP/M systems. Provided with full 8080 source code.....£130
CONVMS: Operating system converter. Runs MSDOS programs under CP/M-86.....£70
CONVCP: Operating system converter. Runs CP/M-86 programs under MSDOS.....£70
ASSEMBLER PLUS: Disassembler for 8080 and Z80 programs.....£167
DISKEDIT: Facility for editing disk held data by sector. Invaluable aid.....£70
IBM-CP/M COMPATIBILITY: Set of programs that enable IBM 3740 disks to be used on CP/M, permitting transfer of files to/from IBM mainframes.....£110
SPP: Speed programming Package for use with Pascal/MT+.....£167
XL786: Converts 8080 assembler code to 8086.....£106
EM80/86: Emulator to run CP/M software under CP/M-86.....£70
DISPLAY MANAGER: Screen handling productivity aid for Digital Research compilers.....£333
ACCESS MANAGER: File handling productivity aid for Digital Research compilers.....£333
EXPRESS BASE II: Development aid for dBASE II.....£125

APPLICATIONS

MULTIPLAN: Exceptional electronic worksheet from Microsoft.....£159
MULTI-TOOL WORD: Microsoft's advanced Word Processor with optional Mouse for added flexibility.....£299
SUPERCALC: Fast action spreadsheet and planning aid.....£200
ABSTAT: Powerful statistics package.....£295
GRAPHSTAT: Versatile statistics and graphics package for the Epson QX10, IBM-PC and Sirius.....£195
ALIAS ACCOUNTS: Fully integrated accounts system with inbuilt hooks to dBASE II.....£1200
ALIAS PAYROLL/SSP: Standalone or integrated system with optional links to ALIAS accounts.....each £600
RCS LEDGERS: Sales, Purchase, Nominal ledgers in MBASIC source code.....each £300
RCS PAYROLL: Full function, highly used package.....£500
STATISTICS PACK: Over 25 easily used routines in MBASIC.....£120
MATHS PACKAGE: Interactive routines (40+) in MBASIC.....£120

MISCELLANEOUS

CP/M 2.2: Standard operating system on 8" disk.....£130
CP/M-86: Standard 16-bit operating system.....£225
SUPERSORT: Full function Sort/Merge/Selection package.....£145
MSORT: Standalone and COBOL hosted Sort package...£149
MAGSAM: MBASIC utility to provide multi-key ISAM file facilities.....£150
TOUCH 'N' GO: Teach yourself keyboard skills.....£40
MICROSOFT MOUSE: Mouse, interface card and software.....£149
OPTIMISER: Interactive Linear Programming package.....£325
PROSTAR TRAINING GUIDE: Independent instruction on the use of MicroPro 'STAR' products.....£30

PLEASE CALL FOR FULL LIST

PRICES EXCLUDE VAT

DEALER ENQUIRIES INVITED

Make the most of your micro

Improve your BASIC with

Better BASIC by A J Quillinan

A collection of advanced modern techniques with a strong business flavour, designed to bridge the gap between the keen amateur and the seasoned professional BASIC computer user. Suitable for use on CBM, Pet, Commodore 64, VIC 20, BBC, Apple, ACT, Sirius, Apricot, Tandy TRS 80, Sinclair Spectrum and ZX 81.

176 pages £7.50.

Find out what LOGO is and what it can do with

LOGO for Micros by M Lesser

Intended for the reader with some experience of computing who wants to know what LOGO is and what it can do, not only in education, but also in a more general computing context. LOGO is available on a growing number of micros including BBC, Apple, ZX Spectrum, Commodore 64, Research Machines, Atari, IBM and Texas Instruments.

160 pages £7.95

Open up the hidden profit potential of your Sinclair QL with

Sinclair QL in Business by Arnold Handley

If you were formally trained as a programmer, Sinclair QL in Business breaks all the rules. If you have never handled a computer in your life, this book can make money for your business.

160 pages approx £7.95 approx.

Learn about hardware, languages or programming with

Questions + Answers on Computers by Steve Money

Provides a broad overview of some of the techniques and principles of computer hardware and the languages and techniques and principles of computer programs.

128 pages approx £2.95.

Order now from your bookseller

Newnes Technical Books, Borough Green, Sevenoaks, Kent TN15 8PH.



● Circle No. 108

71 of the Times Top 100 Companies shop at Willis

The Willis catalogue contains everything a computer could ask for - from flexible disks to print wheels, from ribbons to cables.

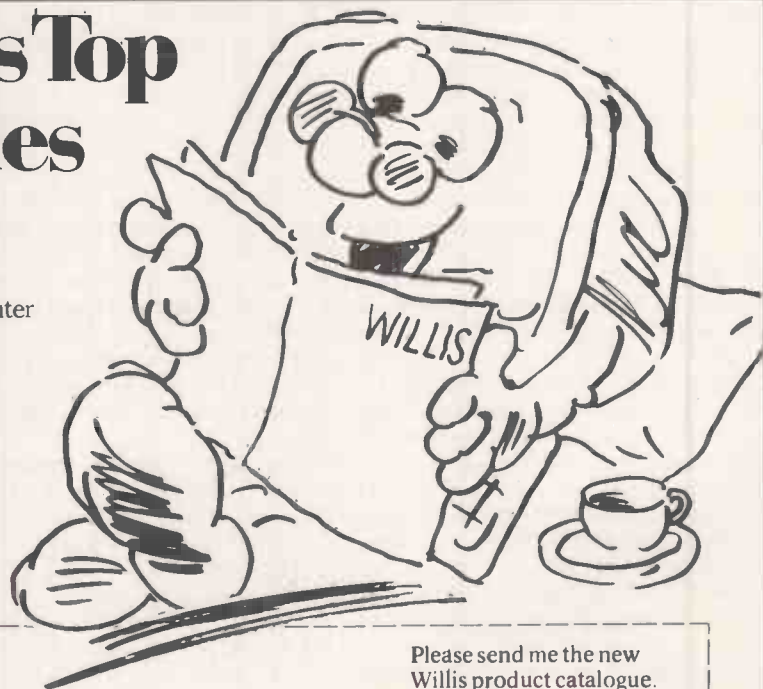
At least 71 of the Times Top 100 Companies are already customers of Willis - either through the catalogue or at our West End Showroom in Dover Street.

Catalogue customers are assured of a 24-hour turnaround of orders - faster if necessary - and reliable attention to detail at all times. Our prices are among the most competitive in the business.

If you haven't yet received a copy of the Willis catalogue, return the coupon or call into our Showroom at 10 Dover Street, London W1.

WILLIS

Where computers do their shopping.



Please send me the new
Willis product catalogue.

Name _____
Company _____
Address _____
Tel. No. _____

Post to: Willis Computer Supplies Ltd., Freepost, Southmill Road,
Bishop's Stortford, Herts. CM23 1BR. Tel: (0279) 506491.

PC3/85

● Circle No. 106

RAM SPACE

The call was never traced. It crept into the Network unbidden, merging in with a million other data streams already in the system. It could have come from any one of 100,000 nodes in the local area, but all traces of its entry point were meticulously removed.

Its original data blocks had been binary coded and transmitted in the normal manner. The local operating system scanned the headers and shifted the message into its packet-switching mode. There was a long pause of some milliseconds as several thousand telephone calls were switched temporarily on to another channel, and then the accumulated data messages were injected rapid-fire into the Network. With imperceptible loss of continuity, the original calls were reinstated on the line.

Somewhere in the Network the call encountered resistance — an impedance mismatched, a slight loss of voltage. Inevitably there was some corruption. A subtle change in address codes here, a not so subtle syntax error there, but just enough to make a difference to the program's operation.

The call was routed via the central area exchange. On the first try the engaged signal was returned and the data stream was dumped into the queuing system buffer. The program now re-formed in the RAM space allocated it. It looped a few times in its self-execution mode until all the check-sum errors had been eliminated. Then, following its own internal instructions, it copied vital parts of its own program structure into available memory.

A few milliseconds later, another incoming call was met with an engaged signal and routinely transferred to the queuing system. The internal housekeeping program checked available RAM, found that none was available and executed a secondary set of instructions. It contacted the nearest exchange, initiated a transfer operation with the control program and dumped the entire contents of its buffer into the secondary exchange. On reformatting in its new location, the program cycled through its instructions and filled all available space with copies of itself.

In the space of time it took to switch the overflowing calls through all the exchanges in the region, the program consumed every last byte in the system.

It took many attempts and much sacrificed code before the program discovered a way to break out of buffer memory. By changing the header on its leading block, it managed to insert itself into the housekeeping program as a non-addressable subroutine. By repeatedly

calling its own subroutine, it found it could control this part of the system.

Under the new command of the program, all the exchanges now released their own copies of the program's peripheral routines held prisoner in buffer memory. The control program set up an exchange of data between itself and the subservient programs it had released, assigning it top priority on the Network. Data-handling facilities for other traffic were now severely overloaded. Calls in progress were cut off or remained

by David Cleden

unconnected and data packages put on indefinite hold. In response to the unusual pressure on the system, an infrequently used circuit was switched into operation and the control of operations transferred to an adjacent region. Simultaneously, a red light began to flash on the Network Controller's board.

A little under three seconds had elapsed since the call had entered the system.

The Network Controller paused, adding emphasis to his words. "Do you realise what will happen if we let this thing get to the Prime Processor?"

The duty operator remained silent.

"We depend on the PP to hold the entire Network together. The environmental control programs for half the major cities are interfaced with the network, to say nothing of the intellnet service and business traffic. Oh sure, we can manage if the PP gets screwed up — for a while. The public may start hollering when they can't tune in to their favourite cable channel, but when the air conditioning starts failing in the hospitals and people start dying, they're really going to scream."

The duty operator swallowed nervously. "I don't think there's anything to worry about, sir. Nothing can get on the Processor unless we want it to."

The Controller scowled. "You know that's a lie. Every system has its weaknesses. It's just a question of knowing where they are and exploiting them. There's some joker out there who thinks he's been smart getting this bug into the Network, and I want to know who he is and how he did it. I don't care what has to be done and who you get to do it. The integrity of the Prime Processor must be maintained at all costs. I want this thing zapped."

With almost unlimited resources available, the Program spent

considerable time exploring and evaluating its environment. It was not sentient, of course, for no computer program with such restricted parameters could be truly sentient. But where necessary, it could modify and refine its own routines to protect itself from attacks and increase its effectiveness within the Network.

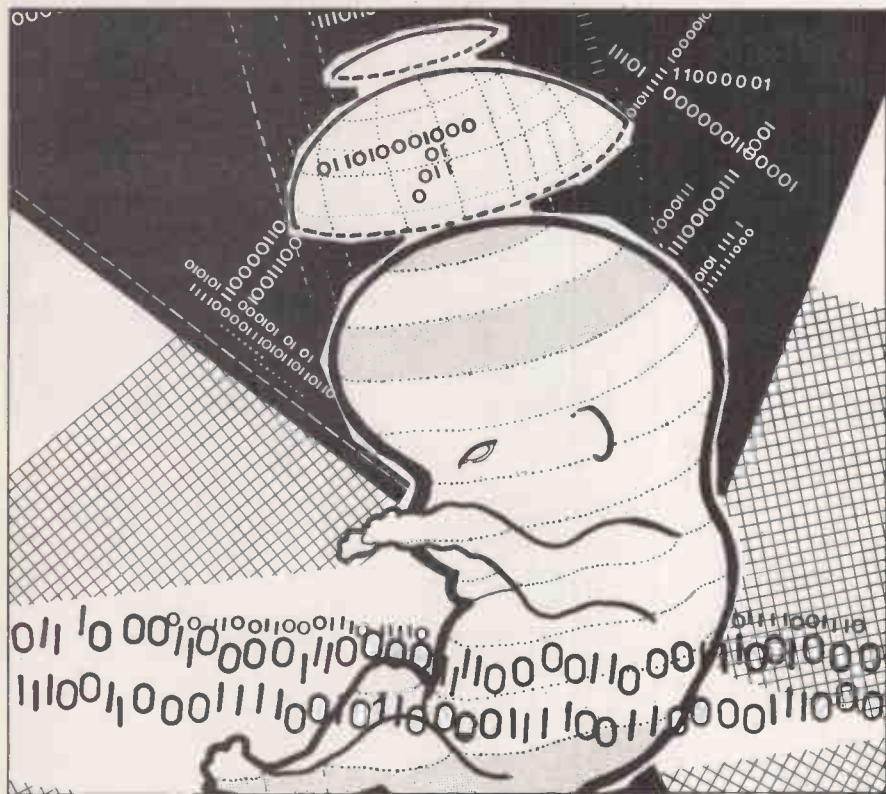
It quickly learned that its original strategy of distributing itself physically throughout the Network was both inefficient and clumsy. The matter was easily remedied. It began at once to sever communication links with many of its more peripheral routines, at the same time centralising its own programming in a more compact form. As the system began to purge the old code, the Program observed with satisfaction as the sea of overloaded data once more swept into the Network. Concealing its existence amongst such a flood of information was simple, and the Program was free to move unrestricted through the Network.

Mostly the Program confined itself to the larger databases where it could maintain its anonymity. There were numerous outlet codes in the Network, but most were too small to contain the Program in its newly condensed form and it was unwilling to compromise its program structure to investigate further. But it continued to search for more suitable RAM space where it would be safe from the prying codes of housekeeping programs. From the data it had recorded in its earlier state, the Program knew that such a place existed.

As the Program moved from level to level, it could sometimes detect the power and sheer presence of vast, dedicated memory arrays, although it was never able to assimilate any more information on its location. It deduced from additional data that the place which it sought possessed a special name, but the name meant nothing to the Program. At every step, it found its way barred by high-security codes that were impossible to bypass. The place that it sought remained just out of reach.

The Program did not, could not, feel any frustration over this inaccessibility. It was content to wait and explore its environment more fully. In time it would master the intricacies of the security codes and then it would not be denied.

It came as a surprise to Kevin when his scout program started chattering the results of a kill on to the screen. The response time of the game had slowed right up in the last few minutes and he had been about to log off, but contact with an opponent changed everything. Quickly, Kevin executed his defence program to



protect the RAM space his own program resided in, and studied the figures returned by his probe on the enemy's program module.

Boy, but that thing was big! Someone must have employed some pretty nifty algorithms simply to keep this thing from falling apart. He wasn't at all sure he ought to take this one on and challenge it for RAM space. Might he not be better off taking the points penalty and cycling upwards through memory while his program was still intact?

The decision was taken out of his hands. He had no time to implement any commands before the display informed him that his RAM space was being challenged for priority.

The Program had not expected to encounter any interference. It had manipulated the housekeeping program into gaining access to this particular branch of the Network and was cycling rapidly up through memory away from its entry point when it sensed the intruding presence of another program. It felt the other program probe its headers for information on program size and address codes and could do nothing to stop it. When the probing ceased, the Program waited patiently for any further action.

The Program considered the situation carefully. Its existence had been detected and this knowledge could be used to jeopardise its continued existence. Retreat would lead only to a temporary escape, for the avenues of retreat were limited and the Program could be followed and lured into a trap. Therefore, its course of action was clear. It must attack and destroy its opponent to protect itself.

It looped a few more times, planning its strategy. Several milliseconds had already passed since first contact, and now the Program dared not wait any longer. It committed itself to the attack.

Much the same thoughts passed Kevin's mind but took considerably longer to be evaluated. His defensive routines held long enough for him to send decoy code spinning out in random directions, while he shifted his RAM space a few bytes downwards in memory.

The other program seemed to sniff cautiously at the correctly headed blocks of random data, but made no attempt to pursue them as they chased off into oblivion. Kevin smiled to himself. Obviously this was no amateur he was dealing with.

Kevin saw his opponent's main weakness in the size of his program. The added flexibility it gave his opponent was a trade-off with vulnerability to attack, and he set about constructing a routine to penetrate the weaknesses he saw in the program structure. Almost before he could do anything, his console beeped at him and the monitor churned out another screen of figures. His opponent had wreaked havoc in one of the peripheral areas of his code, and his program had been forced to retreat out of harm's way under its internal instructions.

This guy was fast! Ordinarily, Kevin would have figured on him taking at least three minutes before he cracked some of the security codes, but this guy had nearly blown his program wide open in less than a second. His only chance was to hit back hard and fast where it would hurt the most.

The next move took the Program completely by surprise. After it had disabled the other program it waited, evaluating the damage that had been inflicted and judging the best moment to finish the job. The heart of the program — its command generator — had been severely corrupted and it could no longer execute selective subroutines. The program was paralysed.

So it was not until the secondary command was received and implemented, that the Program realised the extent of its misjudgement. The program had an external decision-making process! It barely had time to consider the possible locations in memory for such a unit, before it sensed its defences crumbling under this unforeseen attack.

The Program waited once more. With its code structure now helplessly bared to the enemy, destruction was assured. It waited for the final commands to dissolve the essence of its being.

On hearing that the Program had finally been purged from the system, the Controller's feelings were mixed. The person or persons responsible still had not been found and dealt with, and in spite of all their countermeasures, it seemed that the system had wiped the Program of its own accord. It was frustrating that such a matter had resolved itself by chance.

Kevin also found the situation frustrating. Upon registering a victory over his opponent's program he immediately checked his score with the central database and was disgusted to find that some glitch in the system had not caused his score to be incremented. He slunk away to do his homework, thoroughly morose.

The Program felt no pain. It could observe the randomisation of its data blocks with nothing more than strange detachment, until observation was no longer possible and self awareness ceased. On its very last cycle, it felt a sudden disjointedness as a high-priority command suddenly pulled the entire segment of memory off-line and transmitted it back into the Network. The data was switched several times on to successively higher priority levels, clearing the necessary security codes until at last it entered the stack of the Prime Processor itself.

A part of the Processor was tagged to take care of the new data, and the program was reformatted and allocated protected memory. Painfully slowly, the Program began to repair and regenerate its missing blocks. The Processor offered guidance and assistance where necessary, until at last the Program was once again complete. The Prime Processor studied the results. The Program offered no resistance when the Processor studied the results. The Program offered no resistance when the Processor began gently to probe the familiar headers of its . . .

The Prime Processor paused to search its memory banks for the correct simile and found it. . . Its child. □

BBC MICRO COMPUTER SYSTEM

BBC Computers		
Model B.....	£348(a)	6502 Second Processor..... £175(a)
Model B + NFS.....	£389(a)	Acorn IEEE Interface..... £280(a)
Model B + DFS.....	£395(a)	Z80 2nd Proc. + Software..... £348(a)
Model B + DFS + NFS.....	£450(a)	Bitstick + graphics Software..... £325(a)

TORCH UNICORN PRODUCTS:	
ZEP100 Z80 Card with 64K Ram + Free Software Package.....	£275(a)
ZDP240 Z80 Card as above with 2 x 400K Dual Drive + Software.....	£650(a)
HDP240 20 Mbyte Hard Disc + 400K Floppy.....	£1995(a)
HDP68K + UNIX 68000 with Z80B + 256K RAM & UNIX OS.....	£2995(a)
UNICOMM Communication Package c/w modem.....	£159(a)
GS800 GRADUATE 8086 + 256K RAM + Dual Drive + Xchange Software.....	£945(a)

In addition to above we carry a very wide range of BBC firmware & software packages. Please write for further details.

PRINTERS

EPSON

RX80FT £225(a) RX100 £345(a) FX80 £315(a) FX100 £435(a)

KAGA TAXAN NLQ Printers **DAISY WHEELS**
 KP810 £249(a) KP910 £369(a) JUKI 6100 £340(a) BROTHER HR15 £345(a)
 3 Colour Graphics Plotter/Work Station £490(a)
 (Includes pens, drill/router & opto sensor)

PRINTER ACCESSORIES

EPSON

Serial Interface: 8143 £28(b);
 8148 with 2K buffer £59(b).
 Buffers with large storage capacity
 available from stock.
 Paper Roll Holder £17(b);
 FX80 tractor Attachment £37(b)
 Ribbons: MX/RX/FX 80 £5(c);
 MX/RX/FX 100 £10(c).
 Dust Covers: RX/FX 80 £4.50(c);
 RX/FX100 £6.50(c).
 KAGA Serial I/face with 2K Buffer £65(c);
 Ribbon £6(c).

JUKI Serial I/face with 2K Buffer £60(b);
 Ribbon £2.50(d).
 JUKI Sheet Feed £129(a);
 Tractor Feed £129(a).
 BROTHER HR15 Sheet Feeder £199(a);
 Tractor Feed £99(a).
 2000 Fanfold sheets with extra fine
 perforations
 9.5" x 11" £13.50(b); 14.5" x 11" £17.50(b).
 Self Adhesive Labels 31" per 1000.
 Single Row £5.25(d); Triple Row £5(d).
 Parallel Leads: IBM £18(c); BBC £7(c).

PRINTER/COMPUTER SHARES

Three Computers to one printer (parallel) £65(b) Cable Set for 3 way sharer (1m long each) £25(c)
 Mains Adaptor £7(d) Two printers to one Computer (parallel) £19(c)

DRIVE ACCESSORIES

FLOPPICLENE Disc Head Cleaning Kit with 20 disposable cleaning discs ensures
 continued optimum performance of the drives..... £14.50(c)
 Single Disc Cable..... £6(d) Dual Disc Cable..... £8.50(c)
 10 Disc Library Case..... £1.95(c) 30 Disc Storage Box..... £6(c)
 30/40 Disc Lockable Box..... £14(c) 100 Disc Lockable Box..... £19(b)

EPROM PROGRAMMERS

INDUSTRIAL PROGRAMMER EP8000

This CPU controlled Emulator Programmer is a powerful tool for both EPROM programming and development work. EP8000 can emulate and program all eproms up to 8K x 8 bytes, can be used as stand alone unit for editing and duplicating EPROMS, as a slave programmer or as an eprom emulator £695(a).

GANG OF EIGHT PRODUCTION PROGRAMMER

This is a smart, fast programmer with an audible alarm and a 'conversational' liquid crystal display. Single key operation discourages mistakes whilst performing BLANK CHECK, VERIFY and PROGRAM functions automatically. Programming voltage selectable 12.5/21/25V. Will program all popular 5V single rail eproms. It will program 8 eproms at a time £395(a)

PS8000 Range

These new range which will handle ALL current 5V single rail eproms and copy 8 eproms at a time comprise three following models:
 All models have 16 character display, 10 different fault detection features and automatic self test, 16 bit programming capability and a selection of high speed programming algorithms:
 P8010: A low cost duplicator..... £795(a)
 P8020: With serial interface with 8 different formats and 8K buffer (expandable to 33K)..... £995(a)
 P8030: Top of the range with serial interface with 16 formats, baud rate up to 19.2K, 8K expandable buffer, editing functions, printing facility, remote control from a computer..... £1295(a)

UV ERASERS

UVIT Eraser with built-in timer and mains indicator. Built-in safety interlock to avoid accidental exposure to the harmful UV rays. It can handle up to 5 eproms at a time with an average erasing time of about 20 mins £59 + £2 p&p.
 UV12 as above but without the timer £47 + £2 p&p.
 For industrial users, we offer UV140 & UV141 erasers with handling capacity of 14 eproms. UV14 has a built in timer. Both offer full built in safety features UV140 £81; UV141 £79, p&p £2.50.

ALL PRICES EXCLUDE VAT

Please add carriage 50p unless indicated as follows
 (a) £8 (b) £2.50 (c) £1.50 (d) £1.00

We also stock a full range of TTLs CMOS, CPU's, RAMs, EPROMS. Please write for our catalogue.

CONNECTOR SYSTEMS

I D CONNECTORS

	Headers	Receptacles	Edge Conns	Grey Cable/m
10 Way	90p	85p	120p	40p
20 Way	145p	125p	195p	85p
26 Way	175p	150p	240p	120p
34 Way	200p	160p	320p	160p
40 Way	220p	190p	340p	180p
50 Way	235p	200p	390p	200p

RS 232 JUMPER LEADS WITH 25 WAY CONNECTORS

24" Single end Male.....	£5.00
24" Single end Female.....	£5.25
24" Male to Male.....	£8.25
24" Female to Female.....	£9.50
24" Male to Female.....	£9.00

Other lengths available

TEXTTOOL ZIF SOCKETS

24 pin.....	£5.75
28 pin.....	£8
40 pin.....	£9.75

GENDER CHANGERS

25 Way D type	
Male to Male.....	£10
Female to Female.....	£10
Male to Female.....	£10

AMPHENOL CONNECTORS

	Solder	IDC
36 Way Centronics Plug	500p	475p
36 Way Centronics Socket	550p	500p
24 Way IEEE Plug	475p	475p
24 Way IEEE Socket	500p	500p
PCB Mtg Skt		
Ang. Pin 36 Way	750p	24 Way 700p

D CONNECTORS

	No of Ways			
	9	15	25	37
Male				
Solder	60p	85p	125p	170p
Angled Pins	120p	180p	240p	350p
IDC	175p	275p	325p	—
Female				
Solder	90p	130p	195p	290p
Angled Pins	160p	210p	290p	440p
IDC	195p	325p	375p	—
Hoods	90p	95p	100p	120p
Screwlock Hood	130p	150p	175p	—

DISC DRIVES

Single Drives

1 x 100K 40T SS: TS55A £100(a) CS55A with psu £125(a)
 1 x 200K 40/80 TSS: TS55E £140(b) CS55E with psu £150(b)
 1 x 400K 40/80T DS: TS55F £145(a) CS55F with psu £169(a)

Dual Drives

2 x 100K 40T SS: TD55A with psu £250(a)
 2 x 200K 40/80T SS: TD55E with psu £325(a)
 2 x 400K 40/80T DS: TD55MP with psu £350(a)
 2 x 400K 40/80T DS: TD55M with psu £360(a)

BBC compatible disc drives, fully cased and supplied complete with cables, manual and formatting disc for operation with the BBC micro. These drives can operate in both single and double density modes and are suitable for use with any micro with Shuggart A400 Interface. Mechanisms available separately.

3M FLOPPY DISCS

Authorised Distributor Data Recording Products

Industry standard high quality discs with guaranteed error free performance for life.

Discs in packs of 10:

40T SSDD £15(c) 40T DSDD £18(c)
 80T SSDD £22(c) 80T DSDD £24(c)

MONITORS

All monitors supplied with BBC lead

MICROVITEC 14" RGB 1431 Standard Resolution.....	£175(a)	MICROVITEC 20" RGB with PAL & Audio 2030CS Std Res.....	£380(a)
1451 Medium Resolution.....	£240(a)	2040CS HI Res.....	£665(a)
1441 HI Resolution.....	£399(a)	MICROVITEC 20" RGB 2031 Std Res.....	£280(a)
MICROVITEC 14" RGB with PAL & Audio These monitors can receive TV programs thru a Video Recorder		2040 HI Res.....	£570(a)
1431AP Standard Resolution.....	£210(a)	KAGA TAXAN 12" RGB VISION II HI Res.....	£240
1451AP Medium Resolution.....	£280(a)	VISION III Super HI Res.....	£340

MONOCHROME MONITORS:

SANYO DM8112CX HI Res 12" Green Screen.....	£99(a)	Swivel Base for Kaga Monochrome fitted with Digital Clock.....	£21(c)
KAGA KX1201G HI Res 12" Etched Green Screen.....	£106(a)	Monitor Plinth for the BBC.....	£13.50(b)
KAGA KX1202A HI Res 12" Etched Amber Screen.....	£114(a)	Double Tier Plinth BBC and flat dual drive	£19.50(b)
ZENITH 123 HI Res 12" Green Screen.....	£70(a)	BBC Leads; Kaga RGB.....	£5(d)
ZENITH 122 HI Res 12" Amber Screen.....	£70(a)	Microvitec.....	£3.50(d)
		Monochrome.....	£3.50(d)

PRINTER SHARER/BUFFER

A unique printer sharer/buffer that provides a simple way to improve the utilisation of the installed equipment by reducing the waiting time for printing documents. All but the smallest documents tie up the computer while being printed and the computer remains out of use until the printing is complete. This is more so in a network which does not have a dedicated computer for printer operation. This buffer/sharer would free the computers almost immediately for other uses and in many cases make the use of dedicated printer server machines unnecessary.

- STANDARD Centronics Interface
- EACH input port scanned every 5 secs to check for data. Switching between ports completely automatic.
- Data input rate 4800 bytes/sec
- LED Bargraph indicates percentage memory used.
- COPY key allows current document to be reprinted.
- Internal check to prove the data integrity.
- PAUSE switch allows printing to be stopped temporarily to allow paper change, adjust form feed etc. or allows temporary storage for large number of small files which can all be printed together.
- RESET allows all buffer memory to be cleared without having to hard break on the computer.

* 64K buffer capacity. * Mains powered * Compact 7cm x 17cm x 24cm

TSB 64 Buffer/Sharer £245(a)
 Cable Set £30

TECHNOMATIC LTD

MAIL ORDERS TO: 17 BURNLEY ROAD, LONDON NW10 1ED
 SHOPS AT: 17 BURNLEY ROAD, LONDON NW10
 (Tel: 01-208 1177 (4 lines) Telex: 922800)
 305 EDGWARE ROAD, LONDON W2

PLEASE ADD 50p p&p & 15% VAT

(Export: no VAT, p&p at Cost)

Orders from Government Depts. & Colleges etc. welcome.

Minimum Telephone Order £5.

Detailed Price List on request.

Stock items are normally by return of post.

>OPEN FILE

PRACTICAL COMPUTING

MARCH 1985

Open File monitors

Amstrad.....Ian Stobie
Apple.....John Harris
Atari.....Jack Schofield
BBC.....Nicholas McCutcheon
Commodore.....Mike Todd
IBM PC.....Jack Schofield
Newbrain.....David Watt
Tandy.....John Wellsman
Research Machines.....Ian Stobie
Sharp.....John Hooper
Sinclair QL.....Glyn Moody

In Open File we offer free software to key in, from games to serious business programs. As well as major feature programs, every month we publish a selection of software written by our readers. We welcome fully debugged programs for any micro — especially short routines and utility software. Programs can be in machine code, Basic or any other language.

Submissions should include a brief description which explains what your program does, and how it does it. If possible it should be typed, with lines double-spaced. We need a printed program listing. Hand-written listings cannot be accepted. A tape or disc of the program helps if it is in a standard format.

When printing listings, please remember to use a new ribbon or double-intensity printing — faint listings reproduce badly. Use plain paper only, and try to list the program across either a 35-character or a 70-character width. Also, make sure all special graphics or inverse-video characters are either listed correctly or else include Rem statements to explain them fully.

Each program listing, tape or disc must have your name and address on it, or we cannot promise its safe return. A stamped addressed envelope is appreciated.

If you write in with a comment, correction or enquiry please remember to state the machine and the program title.

We pay at least £10 for any programs used, or £35 per page and pro rata for part pages.

>FEATURES

112 TIMETABLE
Donald Travers' timetable program in Commodore Basic 4 helps to schedule teachers' time in the most effective possible way.

116 SUBMIT FROM MBASIC
David Dawe shows you how to drop out at an MBasic program in order to invoke CP/M's Submit. It comes in very handy for running a batch of programs without intervention from the operator.

120 MORE SECRETS OF THE BBC ROM
Roger Cullis continues to delve deep into the BBC operating system ROM with more hitherto unpublished routines and addresses.

>BBC

124 COLOURED REMS
A useful routine by T D Fisher to highlight your Rem statements in colour on a mode 7 screen display.

124 GRAPHIC MEMORY PEEK
A nifty program from Liam Anderson that returns the bit pattern of any eight consecutive bytes, displayed on-screen as an eight-by-eight matrix.

125 KEYSTRIP
A program to create function-key label strips to identify the user-definable keys on your BBC Micro.

125 PRINTER TEST
Save time with C Woods' routine to test whether your dot-matrix printer is properly connected up to the micro.

126 SNOWFLAKE
You can now see flakes before your eyes and dream of a white Christmas with S Dennington's program which creates a virtually endless variety of different snowflake patterns.

>COMMODORE

127 ON ERROR GOTO
Steve Mayhew's program, in Basic and assembler, exploits the ability to intercept error messages before they are printed as the basis of a valuable error-trap facility for the Commodore 64.

>AMSTRAD

129 PRINTER CHARACTER MODIFIER
How to print single-spaced output from the CPC-464 without taking a pair of wire cutters to your printer lead.

129 KEYBOARD AID
A routine by D J Ellis to speed up your typing by reinstating the colon and semicolon to their standard QWERTY positions on the keyboard.

>ATARI

132 HEX CONVERTER
A fast machine-code routine provided by Ron Levy to display numeric output with a value up to 65,535 in two- or four-digit hexadecimal form.

132 3D OXO
While away your time playing John Owen's three-dimensional machine-code implementation of noughts and crosses.

Send your contribution to:

Open File, Practical Computing,
Quadrant House, The Quadrant,
Sutton, Surrey SM2 5AS

EVERY SCHOOL and college has some poor unfortunate whose task it is to prepare the class timetables each year. Classes must be arranged to take students' choices of subjects into account — it is no good if students have to be in two places at once. The teachers too can only take one class at a time, and all too quickly the problem can become a disheartening mass of conflicts.

The difficulties we have at the Leicester Polytechnic School of Pharmacy are typical. Classes start at intervals during the year, run for varying periods and then end. The staff so freed are available for other classes, but with 11 members of staff it is difficult to keep track of changes. Snags invariably arise, which lead to changes in the timetable.

The program to deal with the timetabling problem was written in Commodore Basic 4 and requires dual disc drives and a printer. It supports relative files, consisting of records whose byte length can be set by the programmer and is therefore constant. Any specific record can be accessed via the record number, without using the difficult techniques required for random-access files.

Class timetable

Donald Travers' program offers help in sorting out who does what, and when.

There is a price to pay in that any unused bytes in a record are left blank, so disc space is wasted. Care must be taken when writing records not to exceed the set length otherwise information will be lost. Nevertheless the ease of programming more than compensates for these drawbacks.

The program sets up a separate relative file for each staff member. The poly-

technic's academic year extends over 30 weeks, since examinations are timetabled separately. Each day has a possible eight periods of one hour, so there are 40 possible periods in each working week. It was decided to allocate one record, 19
(continued on page 115)

Donald Travers is a Principal Lecturer at the School of Pharmacy, Leicester Polytechnic.

YOUR TIME TABLE — M E AULTON

TERM 1

DAY	TIME		CLASS	WEEK		NO. OF WEEK	CLASS HOURS
	START	FINISH		START	END		
FRIDAY	11.00	12.00	3HR/LECT	1	10	10	10
FRIDAY	12.00	13.00	3HS/LECT	3	8	6	6
THURSDAY	11.00	12.00	3HT/LECT	6	10	5	5

Etc.

TERM 2

DAY	TIME		CLASS	WEEK		NO. OF WEEK	CLASS HOURS
	START	FINISH		START	END		
MONDAY	9.00	10.00	1C/CT/DT	11	14	4	4
MONDAY	10.00	11.00	FD3/TECH L	11	19	9	9
MONDAY	11.00	13.00	3HR2/P/DT	11	16	6	12
MONDAY	14.00	17.00	3HR2/P	11	16	6	18

Etc.

The program sets up files indicating the week, day, hour and duration of a class together with the number of weeks it runs.


```

100 DATA"MONDAY", "TUESDAY", "WEDNESDAY", "THURSDAY", "FRIDAY", "9.00-10.00"
110 DATA"10.00-11.00", "11.00-12.00", "12.00-13.00", "13.00-14.00", "14.00-15.00"
120 DATA"15.00-16.00", "16.00-17.00"
130 PRINT"***TIMETABLING AID :D.N.TRAVERS1983":FORJ=1TO1000:NEXT
140 IFE<>0THENRUN150-
150 PRINT"JTO SET UP A BLANK FILE(1) OR CHECK TIME-TABLE(2) OR ENTER CLASSES(3)
160 PRINT"OR RUN A COMPLETE FILE(4) OR PRINTOUT(5) OR CHECK ON STAFF FREE(6)
170 PRINT"OR ADD SUBSIDIARY RECORDS(7) OR AMEND INDIVIDUAL RECORDS(8)
180 PRINT"*****ENTER APPROPRIATE NUMBER":INPUTZ:Z=1:DCLOSE
190 ON ZZGOTO 200,600,350,280,840,1260 ,1870,2030
200 PRINT"JTHIS SETS UP ABLANK FILE FOR STAFF MEMBER":C$="F"
210 PRINT"NAME OF MEMBER?":INPUTW$:PRINT"ARE YOU SURE?":INPUTY$
220 IFY$<"Y"THEN140
230 PRINT"WHAT DRIVE? (0 OR 1)":INPUTQ:IFQ=1THEN250
240 DOPEN#1,(W$),L19,D0:GOTO260
250 DOPEN#1,(W$),L19,D1
260 FORI=1TO1400:PRINT#1,C$:PRINT"J":NEXT
270 DCLOSE#1:GOTO140
280 PRINT"WHAT NAME?":INPUTW$:GOSUB1500
290 PRINT"GIVE WK, DAY AND HOUR OF FIRST PERIOD REQUIRED. EG 9,3,2":INPUTW,D,H
300 A=(W-1)*40+(D-1)*8+H
310 RECORD#1,(A):INPUT#1,A$:GOSUB1550
320 W=INT(A/40)+1:IFINT(A/40)=A/40THENW=W-1
330 PRINTA$,"WK NO" W,G$,H$,A:A=A+1:IFA=1400THEN140
340 GOTO310:REM SUBROUTINE TO WRITE REPETITION
350 IFW$=""THENPRINT"TYPE IN FILENAME":INPUTW$:GOSUB1500
360 PRINT"HOW MANY WEEKS WILL THE SERIES RUN?":INPUTN$
370 N=VAL(N$):IFN<9THENN$="0"+N$:GOTO390
380 Q1$=MID$(N$,2,1):Q1=VAL(Q1$):Q2$=MID$(N$,1,1):N=VAL(Q2$)*10+Q1
390 IFN>30ORLEN(N$)>2THENPRINT"AREH?":GOTO360
400 PRINT"IS IT 1,2,3 OR 4HR?"
410 PRINT"IF FRACTION OF AN HOUR ROUND UP TO NEAREST WHOLE HOUR":INPUTNH$
420 PRINT"CHOOSE PROC 7 TO AMEND PART HOUR RECORDS WHEN TIMETABLE COMPLETE"
430 NH=VAL(NH$):IFNH>4THENPRINT"AREH?":GOTO400
440 PRINT"WHAT IS WK NO, DAY NO AND HR NO OF THE FIRST PERIOD?"
450 PRINT"TYPE AS THIS EXAMPLE-10,2,6 WHERE 10=WK NO:2=DAY(TUESDAY):6=HR(2-3)
460 PRINT"IF CLASS DOES NOT START ON THE HOUR THEN ROUND UP TO WHOLE HOUR"
470 INPUTW,D,H:IFW>30ORH>5ORH>8THENPRINT"AREH?":GOTO440
480 A=(W-1)*40+(D-1)*8+H:V=A:GOSUB1550:A=A-1
490 PRINT"YOU HAVE ENTERED CODE FOR WK" W ,G$,H$":IS THIS CORRECT?"
500 INPUTY$:IFY$<"Y"THEN440
510 PRINT"IF CLASS DID NOT START ON THE HOUR END RECORD WITH A ?"
520 PRINT"ENTER RECORD":INPUTA$:Q$=A$:A$=A$+" "+NH$+N$:PRINTA$
530 DCLOSE:IFLEN(A$)>19THENPRINT"STRING TOO LONG":GOTO520
540 J=LEN(A$)-3:B$=MID$(A$,J):PRINTB$:GOSUB1500
550 FORJ=1TON:PRINT"J"J
560 FORZ=1TONH:PRINT"Z"Z:GOSUB640:NEXT
570 A=A+40-NH:NEXT
580 A=A-40
590 FORJ=1TONH:GOSUB640:NEXT
600 IFNH=1THENA=A-40:GOSUB640
610 IFNH=4THENMM=0:GOTO1850
620 PRINT"RECORD WRITTEN: WANT TO CONTINUE?":INPUTY$:IFY$="Y"THEN350
630 GOTO140
640 A=A+1:RECORD#1,(A)
650 IFV=ATHENPRINT#1,(A$):GOTO670
660 PRINT#1,(Q$):REM UNTAGGED RECORDS
670 RETURN
680 PRINT"VALIDATE FROM WEEK?":INPUTW:PRINT"TYPE FILENAME":INPUTW$:GOSUB1500
690 PRINT"PRESS SPACE BAR TO CHANGE DISPLAY IF IT STOPS MIDWEEK"
700 A=(W-1)*40:SS=A:PRINT"CLASSES ON FILE FOR WEEK" W:X=0
710 A=A+1:RECORD#1,(A):INPUT#1,A$:IFA$="F"ANDAC>SS+41THEN710
720 IFINT(X/10)=X/10ANDX<>0THENGETV$:IFY$=""THEN720
730 IFA=SS+41THEN770
740 U$=RIGHT$(STR$(A),4)
750 GOSUB1550:PRINTA$:TAB(15)G$TAB(25)H$," ";PRINTTAB(35)"U$"
760 X=X+1:GOTO710
770 IFD=0THENPRINT"NOTHING ON FILE FOR WK" W:W=W+1:GOTO700
780 PRINT"WANT TO AMEND?(Y OR N) TYPE ! TO EXIT":INPUTY$
790 IFY$="Y"THEN820
800 IFY$="!"THEN150
810 D=0:W=W+1:GOTO700
820 GOSUB1650:PRINT"WHAT RECORD NO?":INPUTA:PRINT"AMEND RECORD":INPUTA$
830 RECORD#1,(A):PRINT#1,A$:GOTO770
840 IFW$=""THENPRINT"WHAT FILENAME?":INPUTW$
850 DCLOSE:GOSUB1500

```

(listing continued on next page)

(listing continued from previous page)

```
860 OPEN9,4,1:OPEN2,4,2:Z1$="-":OPEN4,4:INPUT"INITIALS OF STAFF";I$:TR=1
870 PRINT#4,CHR$(1)"
880 PRINT#4,CHR$(1)" YOUR TIME TABLE - "I$;" ";W$
890 PRINT#4,CHR$(1)"
900 PRINT#4,CHR$(1)"
910 PRINT#4,CHR$(1)"
920 PRINT#4,CHR$(1)"
930 PRINT#4
940 PRINT#4," DAY TIME CLASS WEEK NO.OF CLASS
950 PRINT#4," START FINISH START END WEEKS HOURS
960 PRINT#4,"
970 PRINT#4," : PRINT#4:Z$=CHR$(29)
980 IFP1=1ORR=1THENGOTO1210
990 FORJ=1TO1400:A=A+1:IFA=1201THEN150
1000 RECORD#1,(A):INPUT#1,A$:IFLEN(A$)<3THEN1140
1010 L=LEN(A$):L=L-3:IFMID$(A$,L,1)<>"+"THEN1140
1020 L=L+1:K=1:Q1=VAL(MID$(A$,L,1)):L=L+1:Q2=VAL(MID$(A$,L,1))
1030 L=L+1:Q3=VAL(MID$(A$,L,1)):REMABOVE 3 LINES SEPARATE DIGITS OF CLASS TIME
1040 A$=LEFT$(A$,L-4):W=INT(A/40)+1:IFINT(A/40)=A/40THENW=W-1:A$=RIGHT$(A$,L)
1050 IFA/40=INT(A/40) THENG=5:GOTO1070
1060 G=(A/40)-INT(A/40)*5:D=INT(G)+1:G=D:IFINT(G/8)=G/8THEND=D-1
1070 D=G:GOSUB1550:H=A/8-INT(A/8):H=H*8:IFH=0THENH=8
1080 H=H+8:H$=STR$(H)+".00":PRINT"H$="H$:T1=H
1090 H=H+Q1:H1$=STR$(H)+".00":H$=H$+"-"+H1$:PRINT"H$ ="H$:T2=H
1100 Q2=10*Q2:Q4=Q2+Q3:Q4$=STR$(Q4)
1110 Q5=Q4*Q1:Q5$=STR$(Q5):PRINT"NO./HRS="Q5$
1120 IFRIGHT$(A$,1)="?":THENGOSUB1150
1130 GOSUB1180
1140 NEXTJ
1150 IFP<1201THENP=1201:REM LOCATION OF ODD TIMES ETC 1201 ONWARDS
1160 FORT=1TO3:RECORD#1,(P):INPUT#1,B$(T):PRINTB$(T):P=P+1:NEXT
1170 T1=VAL(B$(1)):T2=VAL(B$(2)):Q5=VAL(B$(3)):RETURN:REM WRITE CORRECT VALUES
1180 IFW>10ANDW<19THENTR=2:R=R+1:IFR=1THENPRINT#4:GOTO900
1190 REM ABOVE LINE AND NEXT DEFINE TERM LENGTH
1200 IFW>19THENTR=3:P1=P1+1:IFP1=1THENPRINT#4:GOTO900
1210 PRINT#2,"AAAAAAAAA 99.99 A 99.99 AAAAAAAAAAAAAA 99 99 99 99"
1220 PRINT#9,G$:Z$:T1:Z$:Z1$:Z2$:T2:Z$:A$:Z$:W:Z$:W+Q4-1:Z$:Q4 :Z$:Q5
1230 RETURN
1240 PRINT#2:PRINT#9:CLOSE2:CLOSE9
1250 CLOSE4 :GOTO140
1260 PRINT"STAFF FREE ROUTINE"
1270 PRINT"WHAT PERIOD?: I.E. 2, 2, 1":INPUTW,D,H:A=(W-1)*40+(D-1)*8+H:GOSUB1550
1280 AS=A
1290 PRINT"YOU HAVE ENTERED CODE FOR WK"W,G$,H$:PRINT"IS THIS CORRECT?":INPUTY$
1300 IFY$<>"Y"THEN1260
1310 PRINT"WHO IS CONSIDERED?":INPUTW$:GOSUB1500
1320 PRINT"GO FORWARD(F) OR BACK(B) FROM WK REQUESTED?":INPUTM$
1330 PRINT"TABLE SHOWS TWO PRECEDING AND TWO FOLLOWING CLASSES"
1340 PRINT"PRESS SPACE TO CHANGE TABLE AND ! TO EXIT"
1350 A=A-2:IFA<1THENA=1
1360 FORQ=1TO30:FORK=1TO5:W=INT(A/40)+1:RECORD#1,(A):INPUT#1,A$
1370 IFK<>3THENPRINTA$:GOTO1390
1380 A$=A$+"***-WK-":GOSUB1550:PRINTA$:W " ";G$ " "; " H$
1390 A=A+1:NEXT
1400 PRINT:FOR$=1TO 24:PRINT"-":NEXT:PRINT
1410 GETX$:IFX$=""THEN1410
1420 IFX$="!"THENA=AS:GOTO 1480
1430 IFM$="B"THENA=A-45:GOTO1450
1440 A=A+35:IFA>1198THEN1470
1450 IFA<3THEN1470
1460 NEXT
1470 PRINT"ODD IS OUTSIDE RANGE"
1480 PRINT"WANT TO TRY ANOTHER?":INPUTY$:IFY$="Y"THEN A=AS:GOTO1310
1490 GOTO140
1500 DCLOSE:IFW$="AULTON"ORW$="BOX"ORW$="CARTER"ORW$="BILLANY"THEN1530
1510 IFW$="EDEN"ORW$="ANDREW"THEN1530
1520 DOPEN#1,(W$),D1:GOTO1540
1530 DOPEN#1,(W$),D0
1540 RETURN:REM ABOVE S/R OPENS FILE TO APPROPRIATE DRIVE
1550 REM SUBROUTINE TO PINPOINT CLASS
1560 DI=A-INT(A/40)*40:IFDI=0THENDI=40
1570 D=INT(DI/8)+1:IFINT(DI/8)=DI/8THEND=D-1
1580 H=DI-INT(DI/8)*8:IFH=0THENH=8
1590 RESTORE
1600 FORJ=1TO5:READB$:IFJ=DTHENG$=B$
1610 NEXT:REM SELECTS THE DAY
1620 FORZ=1TO8:READB$:IFZ=HTHENH$=B$
```


(continued from page 112)

bytes long, to each of the 1,200 hours in the academic year.

The program generates a blank file for each member and initially writes an F into each record; 200 extra records are included to store general information. A proportion of the records are subsequently overwritten with class information. The week, day and hour of a class are all implicit in the record number, so this information need not be stored and the record length can be shorter than it would otherwise need to be. Program logic is greatly simplified, since corresponding classes recur at a fixed interval of 40 records.

Each file was found to need 119 blocks, and all the files and the operating program could be contained on the two discs initially inserted in the drives. To use the program, relative files are prepared concurrently for all members where classes can fairly confidently be fixed. As the exercise progresses the Who is Free? routine is useful for allocating staff to residual classes.

The computer tags the first record of a

recurring class series with a three-digit number: the first digit indicates its duration in hours and the last two indicate the number of weeks it runs. Thus a record such as

10/CT/DT + 104

indicates that group C of year 1 has a computing tutorial, with DT assisting the other member of staff concerned. The class lasts one hour and runs for four weeks. The class need only be entered once; the program then automatically writes the remainder of the series, omitting the tag on all but the first record.

Odd times

Some staff have classes that do not start on the hour. Program instructions tell the compiler to enter these as if they did start on the hour but to terminate the record with a question mark. This acts as a flag for a routine that writes details of these awkward classes to a separate section of the file from record 1201 onwards.

When printing out, the ? flags a subroutine that corrects certain variables to their real values. As the program logic

depends on these subsidiary records being in strict sequence they are best entered separately when the remainder of the timetable is complete.

When a file is complete it can be checked and amended if necessary. When amending, the computer first blanks the complete class series prior to rewriting. Any residual errors can be corrected if the numbers of the offending records are noted. If all is well the complete timetable can be printed out. The programming for this is largely the work of my research student Metin Celik, whose help is gratefully acknowledged.

Later records can be used to store other information. Staff are credited with allowances for research direction, visits to sandwich students, etc., which can all be included in the program — though it is not shown here. These later records could also be used to store the information on class time and duration, saving three of the four bytes needed for this in the main records at the cost of longer access time. If you need a longer record than we have used — to store room numbers, for example — you could do something similar. □

```

1630 NEXT:REM SELECTS THE HOUR
1640 RETURN
1650 S1=W: REM CORRECTION ROUTINE"
1660 PRINT"WHAT RECORD NUMBER (SEE TABLE)":INPUTA:IFA=1THENA=2
1670 RECORD#1,(A):INPUT#1,A#:A1#=#A#:A=A-1:RECORD#1,(A):INPUT#1,A#
1680 IFLEN(A#)<>LEN(A1#)AND#A#<>"F"THEN1720:REM IS IT SAME AS ENTERED RECORD?
1690 IFA#<>A1#THENA=A+1:GOTO1710
1700 GOTO1670
1710 RECORD#1,(A):INPUT#1,A#
1720 L=LEN(A#)-3:R#=#MID$(A#,L,1):IFR#="+ "THEN1740:REM FIRST RECORD OF SERIES?
1730 A=A-40:GOTO1710:REM JUMP BACK A WEEKAND TEST AGAIN
1740 PRINT"O.K. THIS IS THE FIRST RECORD OF SERIES"
1750 PRINT"ALL WILL BE BLANKED"
1760 SS=A:C#="F":Q#=#MID$(A#,L+1,3):Q1=VAL(Q#):REM SAVE CLASS INFO
1770 Q2=INT(Q1/100):Q3=Q1-100*Q2:SS=A
1780 FORZ=1TOQ3:FORTT=1TOQ2:RECORD#1,(A):PRINT#1,C#:A=A+1:NEXT:A=A+40-Q2:NEXT
1790 GOSUB1550:PRINT"O.K. THIS CLASS SERIES STARTED WK"INT(SS/40)+1,G#,H#
1800 PRINT"DO YOU WANT TO AMEND OR JUST LEAVE BLANK? (TYPE A OR B)":INPUTA#
1810 IFA#="B"THEN1860
1820 PRINT"YOU MAY NOW AMEND:REMEMBER THAT THE COMPLETE SERIES MUST BE
1830 PRINT"REWRITTEN STARTING FROM THE ABOVE DATE"
1840 MM=4:A=SS:A=A-1:GOTO360:REM TO WRITE
1850 PRINT"RECORD NOW REWRITTEN"
1860 W=S1:GOTO700
1870 PRINT"O/R TO AMEND PART HOURS":PRINT"WHAT FILE NAME?":INPUTW#:GOSUB1500
1880 PRINT"SEARCHING FOR THE RECORDS"
1890 FOR J=1TO1200:A=A+1
1900 RECORD#1,(A):INPUT#1,A#:L=LEN(A#)
1910 IFA#="F"ORLC5 THEN2010
1920 IFMID$(A#,L-4,2)<>"?"THEN2010
1930 M=M+1:IFP<1200THENP=1200:W=INT(A/40)+1
1940 PRINT"THIS CLASS IS "A#:W=INT(A/40)+1:GOSUB1550
1950 PRINT"IT IS LISTED AT PRESENT AS WK "W,G#,H# ".AMEND CORRECTLY
1960 PRINT"ENTER START TIME,END TIME AND TOTAL HOURS FOR THE SERIES
1970 PRINT"IN THAT ORDER":INPUTA$(1),A$(2),A$(3)
1980 FORQ=1TO3:P=P+1
1990 RECORD#1,(P):PRINT#1,A$(Q)
2000 NEXT
2010 NEXT
2020 PRINT"FILE IS NOW AMENDED":FORT=1TO1500:NEXT:GOTO140
2030 PRINT"WHAT FILENAME?":INPUTW#:GOSUB1500
2040 PRINT"GIVE FIRST RECORD NO AND LAST RECORD NO REQUIRED":INPUTF,L
2050 FORJ=FTOL:RECORD#1,(F+J):INPUT#1,A#:PRINTA#,Z+F:Z=Z+1:NEXT
2060 PRINT"WANT TO AMEND?":INPUTY#:IFY#<>"Y"THEN140
2070 PRINT"WHAT NO?":INPUTP:PRINT"ENTER RECORD":INPUTA#
2080 GOSUB1500:RECORD#1,(P):PRINT#1,A#:DCLOSE#1
2090 PRINT"ANOTHER?":INPUTY#:IFY#="Y"THEN2070
2100 GOTO140

```

Submit from MBasic

David Dawe's utility provides the convenience of batch processing from within an MBasic program.

THERE ARE TIMES when you might want to run a group of programs in sequence without the operator having to be present to load and run each one individually. CP/M's Submit program provides the facility to batch process a group of programs in this way. To use the feature your A: drive must not be write-protected, and it must have on it the utility Submit.Com. CP/M 2.2 or later includes an additional program XSub.Com, which provides extra facilities.

Suppose you wish to process the programs Stat, Temp and Demo in sequence. An additional file must be created on the disc which has a .Sub file extension; do this using Ed or some other text editor. This new file may be called Batch.Sub for example and should contain the following lines

```
STAT  
TEMP  
DEMO
```

To execute the batch of commands type
A>SUBMIT BATCH

CP/M now produces an additional file named \$\$\$Sub and uses this rather than the console for command line input as each program terminates.

The new file is read, the next command removed and the file rewritten to disc. In this way the \$\$\$Sub file gradually shrinks and eventually disappears when all the commands have been obeyed.

A second example shows how to automatically transfer a series of files to the B: drive. Create a file called, say, Gen.Sub which contains the following lines

```
PIP B:=A:STAT.COM  
PIP B:=A:PIP.COM  
PIP B:=A:COPY.COM  
PIP B:=A:*.BAS
```

then with the command

```
A>SUBMIT GEN
```

the files Stat, Pip, Copy and all the .Bas files will be copied in sequence to the B: drive. Any command may be included in a .Sub file that can be entered in response to the A> prompt.

To batch process MBasic programs the command lines must include MBasic and

the program name; for example

```
MBASIC PROG1  
MBASIC PROG2  
MBASIC PROG3
```

In addition at the end of each of the MBasic programs the statement System should be used instead of the statement End. This forces Basic to return to CP/M and allows CP/M to pick up the next command from the \$\$\$Sub file. The procedure will be slow since Basic has to be loaded on each occasion, but at least you do not have to be present to watch it.

It is possible to write a .Sub file of a more general nature. For example, consider the file Assemble.Sub which contains the following command lines

```
ASM $1  
DIR $1.*  
ERA $1.BAK  
PIP $2:= $1.*  
ERA $1.PRN
```

Such a file might be used with the command

```
A>SUBMIT ASSEMBLE DEMO B
```

with \$1 replaced by Demo and the occurrences of \$2 are replaced by B. The Submit program creates a \$\$\$Sub file which executes as if the commands actually typed were

```
ASM DEMO Assemble Demo  
DIR DEMO.* Print directory of Demo files
```

```
ERA DEMO.BAK Erase backup file
```

```
PIP B:= DEMO.* Copy remaining Demo files to B:
```

```
ERA DEMO.PRN Delete Demo.PRN from A:
```

Now by simply varying the command line to Submit this task can be repeated for another file and/or disc drive.

The XSub program within CP/M 2.2

allows line input to applications programs to be included within the .Sub file. However, there are some limitations to this feature. First, the applications program must be one that uses a special form of input technique — BDOS function number 10 — otherwise the feature may not work.

To invoke this procedure the first line in the .Sub file should be XSub. The following example repeats an earlier example which uses Pip, but now Pip does not have to be loaded on each command line as before since the .Sub file contains the responses that Pip requires once loaded. The Gen.Sub file would contain

```
XSUB  
PIP  
B:= STAT.COM  
B:= PIP.COM  
B:= COPY.COM  
B:= *.BAS
```

The last line, consisting only of a full stop, exists so that control returns to CP/M. Some versions of Pip demand a Carriage Return here. In theory this could be included by typing ^ followed by M, so that with two characters you mimic what

Listing 1.

```
10 OPEN "O",£1,"DEMO.SUB"  
20 FOR J=1 TO 4  
30 READ COMMAND$  
40 PRINT £1,COMMAND$  
50 NEXT J  
60 CLOSE  
70 END  
80 DATA "PIP B:=*.BAS"  
90 DATA "STAT B:"  
100 DATA "ERA B:TEMP.*"  
110 DATA "MBASIC MENU"
```

Listing 2.

```
10 REM SUBMIT MIMIC DEMONSTRATION  
20 OPEN "R",£1,"$$$SUB"  
30 FIELD £1,128 AS ALL$  
40 FOR J=1 TO 5  
50 READ COMMAND$  
60 LSET ALL$=CHR$(LEN(COMMAND$))+COMMAND$+CHR$(0)+"$"  
70 PUT £1  
80 NEXT J  
90 REM COMMAND LINES...REVERSE ORDER  
100 DATA "MBASIC MENU"  
110 DATA "PIP B:=A:*.BAS"  
120 DATA "DIR B:"  
130 DATA "STAT B:"  
130 DATA "ERA B:*.BAS"
```

David Dawe is a Senior Lecturer at the Cornwall Micro-Electronics Centre, Cornwall College, Camborne.

Listing 3.

```

10 REM
20 REM
30 REM
40 DIM A$(50),P$(10)
50 DEFINT J,N,K,X,L,P
60 PRINT CHR$(27)"J":REM CLEAR SCREEN CIPHER 2605
70 PRINT TAB(15);" BATCH PROCESSING MASTER PROGRAMME"
80 PRINT TAB(15);" -----"
90 PRINT TAB(10);"By D F DAWE Cornwall Microelectronics Centre"
100 PRINT TAB(18);"CORNWALL COLLEGE of FE & HE"
110 PRINT
120 PRINT TAB(25);"OPTIONS ARE :-"
130 PRINT TAB(25);"-----"
140 PRINT
150 PRINT TAB(20);"C,....Create a batch file"
160 PRINT TAB(20);"R,....Run a batch file"
170 PRINT TAB(20);"P,....Pass parameters and Run a batch file"
180 PRINT TAB(20);"T,....Type contents of existing batch file"
190 PRINT
200 PRINT TAB(20);"E,....to Exit this program"
210 PRINT TAB(20);"STATE OPTION REQUIRED :-";:Q$=INPUT$(1)
220 PRINT Q$
230 IF Q$="E" THEN END
240 IF Q$="C" THEN GOSUB 800
250 IF Q$="R" THEN GOSUB 290:GOTO 410
260 IF Q$="P" THEN GOSUB 290:GOTO 410
270 IF Q$="T" THEN GOSUB 980
280 GOTO 60

290 REM ROUTINE TO SOLICIT FILE NAME
300 PRINT
310 PRINT "The available BATCH files are:"
320 PRINT "(Please ignore the .SUB extension)"
330 PRINT
340 FILES "*.SUB"
350 PRINT
360 N=1
370 PRINT:PRINT TAB(10);
380 LINE INPUT "State name of BATCH file to be required.....";N$
390 IF LEN(N$)>8 THEN PRINT"TOO LONG":GOTO 380
400 RETURN

410 REM ROUTINE TO PRODUCE A $$$$.SUB FILE
420 REM IN THE SAME WAY THAT 'SUBMIT' DOES IT
430 IF Q$="P" THEN GOSUB 610
440 OPEN "I",#1,N$+".SUB"
450 IF EOF(1) THEN 510
460 LINE INPUT #1,A$(N)
470 IF LEFT$(A$(N),1)="#" THEN A$(N)=CHR$(ASC(MID$(A$(N),2,1))-64)
480 IF A$(N)="#" THEN A$(N)=CHR$(13)

490 IF Q$="P" THEN GOSUB 670
500 N=N+1:GOTO 450
510 OPEN "R",#2,"A:$$$$.SUB"
520 FOR J=N-1 TO 1 STEP -1
530 L%=LEN(A$(J))
540 FIELD #2,1 AS A$,L% AS B$,1 AS C$,1 AS D$
550 LSET A$=CHR$(L%):LSET B$=A$(J)
560 LSET C$=CHR$(0):LSET D$=" $"
570 PUT 2
580 NEXT J
590 CLOSE
600 SYSTEM

610 REM SUBROUTINE TO SOLICIT PARAMETERS TO PASS
620 PRINT TAB(10);:INPUT"How many parameters.....";P
630 FOR K=1 TO P
640 PRINT TAB(47);" $";:CHR$(K+48);:INPUT P$(K)
650 NEXT K
660 RETURN

670 REM SUBROUTINE TO SUBSTITUTE PARAMETERS
680 B$="":A$=A$(N)
690 FOR X=1 TO LEN(A$)
700 C$=MID$(A$,X,1)
710 IF C$=" $" THEN 740
720 B$=B$+C$
730 GOTO 770

```

(listing continued on next page)

you normally know as ^M; Submit should reduce the two-character ^M to a single Control-M character. The problem is that many versions of Pip suffer from a bug and do not perform correctly on occasions such as this.

It is possible to simply Chain a Submit file from another, but Calling another Submit file and then returning to the original one is a little more difficult. The following procedure seems to work.

Suppose the first Submit file is called Try.Sub. It may contain many lines of submission, but when the Call is required to Try2.Sub include the lines
 PIP TEMP=\$\$\$\$\$\$.SUB[Q TRY2 ^Z]
 SUBMIT TRY2

between the initial submitted commands and the final submitted commands. Note that the submit feature reduces the name of the temporary file from \$\$\$\$\$\$.Sub to \$\$\$\$.Sub automatically; ^Z is typed as a ^ followed by Z, which will be changed by Submit into the single ^Z character. The square-bracketed Pip command tail tells Pip to stop copying the file when the string Try2 is found. This apparently incorrect command works because of the structure of the \$\$\$\$.Sub file, which has the Submitted commands in the reverse order to that originally included in Try.Sub. The Called Submit file must now complete with the following line
 PIP \$\$\$\$\$\$.Sub = Temp

Back to Basic

All the fundamental features of CP/M submission can be accessed from Microsoft Basic. The .Sub file can be created as a Basic sequential file rather than by using a text editor. This can be quite useful as its contents may be assembled in response to a question and answer sequence from a Basic program.

The example in listing 1 indicates the principles involved. The commands thus set up in Demo.Sub can be directly executed from CP/M using

A>SUBMIT DEMO

Basic programmers who have not yet mastered Ed or WordStar might even prefer this method of generating the .Sub file.

Mimicking the action of the Submit program in Basic relies on the behaviour of CP/M after a warm or cold reboot. If it finds a file named \$\$\$\$.Sub on its A: drive it will assume that this file contains console commands which need to be obeyed. With a knowledge of the \$\$\$\$.Sub file structure it is possible to write Basic code that will turn the original .Sub command file into the \$\$\$\$.Sub file. You can also create the \$\$\$\$.Sub file directly, allow MBasic to return to CP/M, and execute the \$\$\$\$.Sub file. If the last Submitted command is MBasic a full circle of activity will have been achieved.

The \$\$\$\$.Sub file has the following involved structure. Each record is 128

(continued on next page)

MBasic Submit

(continued from previous page)

characters long and contains:

- byte 1 — the length of the command in binary
- next few bytes — the command line in ASCII
- next byte — a binary zero
- next byte the \$ sign (ASCII 36)

All the records should be in the Reverse sequence to the order in which they are to be executed. In order to establish the 128-byte record length this file should be created as a Random file. The program in listing 2 will create the \$\$\$Sub file, execute it and return to a Basic program called Menu.

Listing 3 shows the code required for a menu-driven utility which has been in use at Cornwall Micro-Electronics Centre for some time. It enables creation of .Sub files, and later generation of \$\$\$Sub files from them, including the supply of parameter substitutions prior to execution. The last command in the list of instructions for this program should be End, which terminates the command-line input routine.

(listing continued from previous page)

```
740 K=VAL(MID$(A$,X+1,1))
750 B$=B$+P$(K)
760 X=X+1
770 NEXT X
780 A$(N)=B$
790 RETURN
```

```
800 REM SUBROUTINE TO CREATE A BATCH FILE
810 N=1
820 PRINT:PRINT TAB(15);
830 LINE INPUT"State name for your BATCH file.....";N$
840 PRINT
850 A$(N)=" "
860 PRINT TAB(18):PRINT USING " Batch Command No ## ";N;
870 PRINT"====> ";
880 LINE INPUT A$(N)
890 IF A$(N)="END" THEN 910
900 N=N+1:GOTO 850
```

```
910 REM CREATE .SUB FILE...USABLE BY CP/M SUBMIT DIRECTLY
920 OPEN "O",£1,N$+".SUB"
930 FOR J=1 TO N-1
940 PRINT £1,A$(J)
950 NEXT J
960 CLOSE
970 RETURN
```

```
980 REM DISPLAY FILE
990 GOSUB 290
1000 OPEN "I",£1,N$+".SUB"
1010 IF EOF(1) THEN 1050
1020 LINE INPUT £1,A$
1030 PRINT A$
1040 GOTO 1010
1050 CLOSE
1060 PRINT
1070 PRINT"Hit any key to continue";:ANY$=INPUT$(1)
1080 RETURN
```

FORTH = TOTAL CONTROL

FORTH programs are instantly portable across the most popular microprocessors.

FORTH is interactive and 20 times faster than BASIC

FORTH programs are structured, modular, and easy to maintain.

FORTH gives control of all interrupts, memory locations, and i/o ports.

FORTH gives full access to DOS files and functions.

FORTH application programs can be converted to turnkey programs.

FORTH Cross Compilers can generate ROMmable code for: 6502, 6809, 68000, 8080, Z80, 8086, 6800, 6801/3, 1802, Z8, 8070, Z8000, 99xxx, LSI-11

We are the FORTH specialists, we also stock a large range of books, listings, and implementations for machines ranging from Spectrums to VAXes.



MicroProcessor Engineering Ltd
21 Hanley Road, Shirley
Southampton SO1 5AP
Tel: 0703 780084



Application Development Systems include FORTH with virtual memory, multi-tasking, assembler, full-screen editor, decompiler, utilities, and full documentation.

Z80 or 8080 FORTH - CPM 22	£60
8086 FORTH - CPM-86, MSDOS	£105
PC/FORTH - PC/DOS, CPM-86	£105
8086 FORTH- 83 - CPM-86, MSDOS	£120
PC/FORTH - 83 PC/DOS, CCPM	£120
68000 FORTH - CPM-68K	£190

FORTH has 32-bit stacks and directly accesses the whole address space of the processor.

PC FORTH+	£190
8086 FORTH+	£190
68000 FORTH+	£290

Extension Packages include floating point, cross compilers, 8087 support, colour graphics, databases

● Circle No. 142

'MAINT-INSURE'

NOW
YET

A more EXTENSIVE yet LOWER PRICED alternative to computer MAINTENANCE
Providing FULL engineering support services nationwide

'MAINT-INSURE's' insurance covers:

- Fire & theft
- Accidents, negligence, operator error
- Electrical or mechanical breakdown
- Damage in transit
- Cost of recompiling data

● All leading business micros catered for

'MAINT-INSURE's' engineering support includes:

- Response within 24 hours
- Nationwide on-site maintenance
- Loaned replacements of defective equipment
- Fully trained experienced Service Engineers
- Full workshop facilities

IN SUMMARY

MORE EXTENSIVE COVER THAN NORMAL MAINTENANCE AND NO ADDITIONAL COMPUTER INSURANCE IS NECESSARY

IN SUMMARY

AS COMPREHENSIVE A SUPPORT SERVICE AS THAT OFFERED UNDER A MAINTENANCE CONTRACT

For further details contact James Beresford Associates, FREEPOST, Curdridge, Southampton, SO3 2GJ or ring BOTLEY (04892) 87984

● Circle No. 118

RAMROM 15

The Sideways RAM & ROM Expansion Board for the BBC

The GCCRAMROM 15 board adds to the BBC Micro another eleven sideways ROM sockets plus the necessary hardware for sideways RAM.

FEATURES

- ★ Fully buffered board.
- ★ Rechargeable battery backup for RAMS provided as standard. Recharging circuitry is included.
- ★ The board can be powered by an external 5 Volt power supply, available as an optional extra.
- ★ The unit comes in a case of its own and resides outside the BBC Micro, giving easy access to the resident ROMS.
- ★ For those involved in development work, most of the 6502 processor signals are made available outside the BBC Micro.
- ★ Priority or selection can be assigned to either RAMS or ROMS.
- ★ ROMS can be used in RAM positions simply by changing two push-on links.
- ★ Simple installation – NO soldering.
- ★ Can be installed together with most other BBC add-on boards.
- ★ ZIF-sockets available as optional extras. Up to 15 may be housed on the RAMROM 15 at any one time.
- ★ All socket positions are software selectable.
- ★ Free Utilities Disk supplied.
- ★ Comprehensive User Manual included.

RAMROM 15 £129.95 inc VAT (P&P £3.50 inc VAT)
EXTERNAL PSU £5.75 inc VAT (P&P £1.73 inc VAT)
ZIFSOCKETS £9.00 inc VAT Free P&P with RAMROM)



Trade and local authority enquiries welcome.
Prices correct at time of going to press.

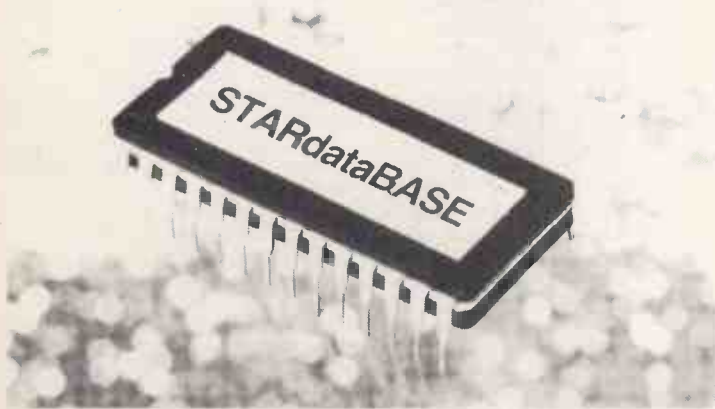


GCC (Cambridge) Limited
66 High Street, Sawston, Cambridge CB2 4BG
Telephone: Cambridge (0223) 835330/834641
Telex: 81594 SAWCOM

● Circle No. 177

STARdataBASE . . .

The database



for the BBC

STARdataBASE is the fast, machine-code, true random access, database program in 16K ROM for the BBC Microcomputer, complete with over 75K of FREE extension Software.

FEATURES:

- ★ Up to 4096 records in a file.
- ★ Up to 69 fields in a record.
- ★ Up to 255 characters in a field (subject to an overall maximum of 920 characters in a record).
- ★ An entirely User-defined record layout, including a facility for colour.
- ★ Can be used with 40 and 80 track Disk Drives.
- ★ Entirely Menu-driven, extremely User-friendly.
- ★ Extremely fast search – A single record can typically be found in 1 second using the Keysearch facility.
- ★ Search conditions include the following: =, <>, <, >, and "Anywhere in the field".
- ★ Powerful facilities to edit records.
- ★ Mail-merging between documents created on Wordwise or View, and STARdataBASE records.
- ★ Print-out of the whole database or selected Subsets, in the form of Record cards.
- ★ Address label printing – (up to 8 across the page).
- ★ Fully documented routines which can be included in user-written programs and interfaced with STARdataBASE.

STARdataBASE £86.25 inc VAT
Post & Packing £1.75 inc VAT



Trade and local authority enquiries welcome.
Prices correct at time of going to press.



GCC (Cambridge) Limited
66 High Street, Sawston, Cambridge CB2 4BG
Telephone: Cambridge (0223) 835330/834641
Telex: 81594 SAWCOM

● Circle No. 166

Inside OS

The second part of a series in which Roger Cullis dissects the BBC Micro's operating-system.

A MICROPROCESSOR takes instructions one by one from the next address contained in its program counter register. When the computer is switched on the state of read/write memory is undefined, so the OS ROM must contain routines which set up the contents of RAM and initialise the peripheral controller chips. These routines are held in &D9CD-DC67.

On Reset the 6502 microprocessor always transfers the address from locations &FFFC and &FFFD to its program counter and continues execution from that point, so the start-up routines are stored in ROM at the vectored location. Unless a disc or network filing system is installed, the BBC Micro does not use non-maskable interrupts, so the first procedure is to transfer an RTI op code to the starting address of the NMI routines, &0D00.

If the appropriate flag is set, the processor clears RAM to zero and then: Checks the start-up options or keyboard links

Initialises the OS variable store at the top of page 2, &0290-02FF

Copies default values of the OS vectors and remaining OS variables to the bottom of page 2

Initialises the CFS/RS-423 asynchronous communications interface adaptor, chip, ACIA, and two versatile interface adaptors, VIAs

Checks for extended memory

Initialises the sound-generator chip and sound queues

Switches off the cassette motor relay

Resets the soft-key buffers

Checks for the presence of any paged ROMs and constructs a reference table of them in page 2

Checks for the presence of a speech processor and, if it finds one, initialises it

Initialises the VDU system

Sets the CFS interblock gap

Checks the Tube for an active second processor and, if it finds one, initialises it

Allocates public and private workspace for any paged ROMs

Displays the greetings message

Checks memory size

Sets up the keyboard and performs an autoboot, if required, or else initialises a language, copying it to the second processor where appropriate.

There are two types of interrupt request on the 6502 microprocessor. The non-maskable interrupts, NMI, as the name implies, are dealt with immediately; maskable interrupts, IRQ, need not be

Reset and BRK handling routines.

D9CD :RESET entry point
DBBB :set up language
DBE7 :OSBYTE BE - enter language ROM
DC0B :switch ROM page, read byte, return to original ROM
DC16 :save ROM identity and switch paged ROM
DC1C :maskable interrupt entry point
DC54 :BRKV - default BRK routine

IRQ handling routines.

DC68 :check buffer status, receive IRQ, set ACIA
DC7D :transfer received serial data to input buffer
DC93 :IRQIV - high priority IRQ routine entry point
DCA2 :poll 6850 ACIA for IRQ, service it if required
DCB3 :generate RS432 error event
DCBF :output character from RS432 buffer
DCD6 :transfer serial data from output buffer
DCDE :check for RS432 error
DCF3 :offer IRQ to paged ROMs, then low priority IRQ handler
DD06 :poll MOS VIA for IRQ, service it if required
DD13 :check for vertical sync IRQ, service it if required
DD47 :poll USR VIA for IRQ, service it if required
DD69 :check for further MOS VIA IRQs
DD6F :process MOS VIA Timer 2 IRQ
DD79 :transfer data from speech buffer to processor
DDCA :check MOS Timer 1 timeout IRQ, service it if required
DE47 :check for ADC IRQ, service it if required
DE6E :set MOS VIA interrupt flag register
DE72 :check for key-pressed IRQ, service it if required
DEB9 :IRQ2 - low priority IRQ handler routine

Analogue to digital converter routines.

DEBC :OSBYTE 11 - force analogue-to-digital conversion
DEBF :set up ADC channel

ROM embedded message printing routines.

DEA9 :set BRK address = C300, PRINT embedded message
DEAB :set BRK address, PRINT embedded message
DEB1 :PRINT embedded message

Character input routines.

DEBB :set INKEY countdown timer, read character to A-register
DECS :RDCHV - read character from A-register
DED2 :read character from EXEC file
:
:P

OS * command handler and printer output routines.

DF0C-DF0F :copyright symbol lookup table
DF10-DFBB :command keyword and vector lookup table
DFB9 :CLIV - interpret command line routine
DFB6 :process '*' command
DFE2 :push command entry address on stack, then execute command
E004 :move pointers to next command vector
E009 :check command against commands from lookup table
E00D :transfer command line pointers to X-,Y-registers
E018 :*BASIC command
E031 :*RUN command
E031 :*CAT command
E039 :increment index (Y) and
E03A :flush MOS command buffer to non-blank, check for CR
E043 :flush line to non-blank, check for ", " or CR
E045 :flush to non-blank, check for ", " or CR
E04E :flush line to non-blank, convert ASCII to hexadecimal, clear carry
E07C :convert ASCII numeral input to hexadecimal
E07D :Increment index (Y) and
E08A :flush input line to non-blank, clear carry
E08F :if hexadecimal numeral remove ASCII offset
E0A4 :*WRCHV entry point - write character from A-register
E114 :if permitted, PRINT character
E11E :insert character into buffer and PRINT it
E13A :PRINT character via appropriate routine
E143 :parallel printer output
E168 :serial printer output
E170 :set buffer flag busy, if no space free, reset ACIA control register
E173 :if no buffer space free, reset ACIA control register
E17A :reset ACIA control register
E17C :OSBYTE 9C - read/write 6845 ACIA control register
E1B9 :write to ACIA control register, save setting to Page 2
E191 :PRINT character via Econet or user printer routine
E197 :OSBYTE 7B - inform OS, printer going dormant
E19B :if printer buffer occupied, output character

processed until higher-priority data processing has been completed. NMIs are reserved for filing systems and other operations which require instant and continuous processing. Maskable interrupt requests are further subdivided into high- and low-priority IRQs which are vectored by OS 1.2 respectively to &DC54 and &DE89.

Peripheral devices on the BBC Micro are interrupt-driven: when they require servicing, they send an interrupt request to the 6502. When the processor receives an interrupt request, it calls the routine vectored by the addresses &FFFE-FFFF. The IRQ handling routines are held at &DC68-DE8B.

Pause

The entry point of the IRQ service call is at &DC93. During the routine, the processor polls, in succession, the ACIA, the OS VIA, the user VIA and the paged ROMs. It then passes control to the low-priority IRQ handler. If at any point the processor detects an interrupt request, it pauses to service that request before continuing to poll devices of lower priority in the chain.

Buffers are serviced by interrupts.

Copyright

This article summarises the operation of the BBC Micro and where the routines are to be found, and is intended to help users to write programs which interact fully with the built-in software. But you should remember that the source code and object code of ROM routines are the subject of copyright and may not be used without the copyright owner's permission. Although you may freely call them from programs running on the computer, you cannot extract or copy them for your own software.

When data is placed in a buffer, an interrupt request is generated. During the subsequent IRQ processing routine, this is transferred from the buffer to the appropriate peripheral controller chip.

Analogue-to-digital converter routines are held at &DE8C-DEA8. ADC channel number is set up by Osbyte call 11, which saves the channel specified by the X-parameter as an operating-system variable at &024C, and initialises the A/D converter. Actual A/D conversions are processed by IRQ handling routines at &DE47.

Message-Printing routines such as "BBC microcomputer" and "RECORD then RETURN" are located at intervals throughout the ROM, as at &DEA9-DEBA. The messages are in ASCII-encoded alphanumeric characters, followed by a terminator character 00. Error messages such as "Data?" or "Bad string" are preceded by a BRK op code and a hexadecimal error code which may be used in error-handling routines. The message-processing routine sets up pointers to the location of the message and prints it character by character using the OS call Osasci.

Character input

The nested character input routines at &DEBB-DF0B transfer a character from Econet, an Exec file, or the soft-key or input buffers to the accumulator. A check is made for Escape, which is processed if found.

The OS * command handler and printer output routines at &DF0C-E3A7 check an input command against standard commands listed in a look-up table, &DF10-DF88, recognising abbreviations that are terminated with a full stop, ASCII

(continued on next page)

E1A2	:select printer buffer and output character
E1A4	:PRINT character via Econet or user printer routine
E1A0	:flush specific buffer
E1AE	:flush buffer
E1D1	:CNPV entry point - count or purge buffer
E1FB	:attempt to insert character into buffer
E20E	:initialise parameter block @2EE,X-02FA,X
E21F	:pack character into OSFILE control block
E227	:*KEY command
E23C	:*LOAD command
E267	: "Bad address" error message - error code FC
E275	:OSBYTE 77 - close any SPOOL or EXEC files
E281	:*SPOOL command
E28F	:close SPOOL file
E2AD	:construct OSFILE parameter block from OS command line buffer
E310	: "Bad command" error message - error code FE
E310	:USERV default entry point
E31D	: "Bad key" error message - error code FB
E33E	:*SAVE command
E342	:*FX command
E34B	:*TAPE command
E34B	:*TV command
E34B	:*RDM command
E34B	:*OPT command
E34B	:*MOTOR command
E34B	:*CODE command

User-defined key routines.

E3AB	:calculate length of key string
E3D1	:set up soft key definition
E3E9	: "Key in use" error message - error code FA

Buffer housekeeping routines.

E435-E43D	:buffer address hi lookup table
E43E-E446	:buffer address lo lookup table
E447-E44F	:buffer start address offset
E450	:set up buffer pointers (X defines buffer)
E45B	:examine buffer status
E460	:OSBYTE 91 - get character from buffer
E464	:RENV entry point - remove byte from buffer (X= buffer number)
E494	:if event flag true, process event, clear carry
E4AF	:OSBYTE 7A - insert character into buffer
E4B0	:indirected insertion of character into buffer

E4B3	:INSBV entry point - insert byte into buffer
E4E3	:check if character alphabetic (carry clear)
E4F1	:insert character in keyboard buffer, check for ESCAPE
E4F3	:OSBYTE 99 - insert character into buffer, checking for ESCAPE
E577	:get character from Econet, soft key or input buffer as appropriate
E57E	:go to Econet control entry
E581	:get character from soft key or input buffer

Osbyte and Osword entry point vectors.

E5B3	:OSBYTE calls 00-15 routines vector lookup table
E5DF	:OSBYTE 75-A0 routines vector lookup table
E637	:OSBYTEs A6-FF entry vector
E63B	:OSWORD vector lookup table

Miscellaneous Osbyte and Osword routines.

E657	:OSBYTE 80 - execute code indirected via USERV (*CODE)
E659	:OSBYTE 7E - go to USERV entry point
E673	:OSBYTE 7D - set ESCAPE condition
E674	:OSBYTE 7C - clear ESCAPE condition
E67C	:OSBYTE 08 - switch motor relay (*MOTOR)
E689	:OSBYTE 08 - set RS432 transmit rate
E68B	:OSBYTE 07 - set RS432 receive rate
E6A7	:set serial ULA control register
E6B0	:OSBYTE 09 - set flashing colour mark duration
E6B2	:OSBYTE 0A - set flashing colour space duration
E6D3	:OSBYTE 02 - select input stream
E6F9	:OSBYTE 0D - disable events
E6FA	:OSBYTE 0E - enable events
E706	:OSBYTE 10 - select ADC channels to be sampled
E713	:OSBYTE B1 - read key with time limit (INKEY)
E729	:OSBYTE B1 - read machine higher order address
E732	:check occupancy of input or free space of output buffer
E73B	:clear overflow and count buffer contents
E73B	:set overflow and purge buffer
E741	:check buffer space used and compare with space free
E74F	:OSBYTE B0 - read ADC channel or get buffer status
E75F	:check fire buttons
E772	:BYTEV - OSBYTE routines entry point
E7BC	:merge in saved carry, clear overflow
E7C2	:process OSBYTE calls below 75
E7CA	:discard two bytes from stack, process unrecognised OSWORD call
E7DC	:check if free to PRINT message

(listing continued on next page)

Inside OS

(continued from previous page)

2E. If a command is identified, it is processed at the entry point listed immediately after the command in the look-up table. Unrecognised commands are offered to the paged ROMs and then to the current filing-system files. Initialisation is provided, GSInit, for the operating-system general string input routine, GSRead.

The user-defined key routines stored at &E3A8-E434 allow up to 16 soft-key definitions to be stored in page B buffers. The key strings are input by GSRead and inserted in key-number order in the buffer. A pointer to the last character is maintained and, when a definition is changed, the positions of the remaining definitions are correspondingly adjusted.

The buffer housekeeping routines held at &E435-E5B2 hold look-up tables

containing the start locations of the keyboard and RS-423 input and RS-423, printer, sound and speech output buffers in the form of a base address plus offset.

Call number

Actions by the operating system are initiated by operating-system calls. Some, such as OSNewl and OSRDRM, perform a single function, but others perform a number of operations, specified by input parameters. The most important of these are Osbyte and Osword, and the routines to handle them are held at &E5B3-EB02.

Both Osbyte and Osword have a call number, held in the accumulator. Osbyte may have either one entry parameter, held in the X register, or two, held in the X and Y registers. Osword has a control block, the start address of which is pointed by the X and Y registers. Entry points of Osbyte and Osword calls are held in look-up tables stored at &E5B3-E656 and the entry points of most of the corresponding routines are grouped about these addresses.

The Sound command has a number of parameters controlling amplitude or envelope, pitch, duration, synchronisation, buffer flushing and channel

number. The parameters are stored in a sound buffer according to channel, processed, and then passed to the sound-generator chip during the interrupt polling procedure. The sound-processing routines are held at &EB03-EE12.

In order to provide a distinguishing feature between notes of the same pitch on different channels a small offset is added to the pitch of the notes on channels 2 and 3, &E073. Unrecognised channels are offered to the paged ROMs, &E83A.

The speech-processing routines are at &EE13-EED9. If the speech system is implemented, it is initialised on Reset. When speech is being processed the ROM filing system is enabled. The characteristics of the RFS are similar to those of the cassette filing system, though obviously no commands involving data saving will function. To implement speech, bytes are read from a speech storage ROM and passed nibble by nibble to the speech processor chip.

This article forms part of a book to be published by Losco Ltd, PO Box 4, Cranleigh, Surrey GU6 8BQ, price £11.95 plus £1.50 post and packing. A further instalment will appear in next month's *Practical Computing*.

(listing continued from previous page)

E7EB :WORDV - OSWORD routines entry point
 E803 :OSWORD 05 - read byte of I/O processor memory
 EB0E :write byte of I/O processor memory
 EB15 :set I/O processor address pointers
 EB21 :OSBYTE 00 - identify ROM
 EB23 :OS 1.20" error message - error code F7
 EB2D :OSWORD 07 - SOUND command
 EB6C :OSBYTE 75 - read VDU status
 EB6F :VDU 7 - sound BELL
 EBAE :OSWORD 08 - define an envelope
 EBC9 :compare command line character with 16, get bits 0,1, increment
 :index
 EBD1 :OSWORD 03 - read interval timer
 EBD5 :OSWORD 01 - read system clock
 EBE4 :OSWORD 14 - write interval timer
 EBE0 :OSWORD 02 - write system clock
 E902 :OSWORD 00 - read line from current input to memory
 E93B :delete previous input character
 E946 :delete entire input line
 E976 :OSBYTE 05 - select printer
 E98B :OSBYTE 01 - user OSBYTE call (read/write location 0281)
 E98B :OSBYTE 06 - set character ignored by printer
 E9BC :OSBYTE 0C - set keyboard autorepeat rate
 E995 :OSBYTE 0B - set keyboard autorepeat delay
 E997 :OSBYTE 03 - select output stream
 E997 :OSBYTE 04 - enable/disable cursor editing
 E99C :OSBYTES A6-FF entry point
 E9AD-E9B5 :baud rate setting command lookup table
 E9C0 :OSBYTE A0 - read VDU variable
 E9CB :reset soft key buffer contents
 E9D9 :OSBYTE 76 - set keyboard to match LED status
 E9EA :reset keyboard LEDs if carry clear, then test ESCAPE flag
 E9FB :write to MOS VIA register B
 E9FF :OSBYTE 9A - write to video ULA control register
 EA00 :set new video ULA control parameter, set flash counter
 EA10 :OSBYTE 9B - write to video ULA palette register
 EA11 :save physical/logical colour conversion factor, set palette
 EA1D :initialise string input with first space, 2nd "" or CR terminator
 EA1E :GSINIT routines - initialise string input
 EA2F :GSREAD routines - parse input string, read character
 EABF :Bad string" error message - error code FD
 EA9C :check for specified keys pressed
 EABF :if alpha character, convert to control code

EAD2 :"/!BOOT" embedded message
 EAD9 :perform vectored jump if Page 2 contains opcode
 EAE3 :OSBYTE 90 - alter TV display parameters (*TV command)
 EAF4 :OSBYTE 93 - write byte to FRED
 EAF9 :OSBYTE 95 - write byte to JIM
 EAFE :OSBYTE 97 - write byte to SHEILA

Sound processing routines.

EB03 :set completion flag, switch off sound
 EB0A :if sound output not disabled, write to sound generator
 EB21 :write command to sound generator, preserving processor status
 EB22 :write command to OS VIA Port A, blip sound generator
 EB40 :sound channel address register parameter lookup table
 EB44 :check buffer number, process next sound channel
 EB47 :process sound interrupt
 EB59 :process next channel in sound queue
 EC59 :if buffer index not 4, process next sound channel
 EC60 :initialise sound queues
 EC6B :flush current sound queue
 ECA2 :initialise sound channel parameters
 ECD0 :if no envelope specified, switch off sound
 ED01 :update pitch commands to sound chip
 ED95 :write command to sound generator via slow databus
 ED9B :process next sound command from buffer
 EDF7 :set duration parameter in sound queue
 EDFB-EE06 :sound chip pitch lo order control parameter lookup table
 EE07-EE12 :sound chip pitch hi order parameter lookup table

Speech processing routines.

EE13 :set current filing system ROM/PHROM
 EE18 :get byte from data ROM
 EE3B :get address and set speech data ROM address pointer
 EE40 :transfer two bytes from speech processor to ROM address pointers
 EE51 :read RFS data ROM or speech processor
 EE62 :if PHROM, read byte from speech processor
 EE6D :OSBYTE 9E - read from speech processor
 EE71 :load two nibbles to speech processor address pointer
 EE7A :load a nibble to speech processor address register
 EE7F :OSBYTE 9F - write to speech processor
 EE84 :confirm speech system implemented, write command to speech processor
 EEAD :set RFS data ROM address pointers
 EEBB :set speech data ROM address register

How much persuasion do you need to buy a world beating business computer?

New 80286 Super Micro with Massive Memory and Networking as Standard

Incorporating Intel's new IAPX 286 high performance chip, up to 6 Megabytes of main memory, 256K of disk cache buffering, multi-user and Ethernet networking facilities as standard - Sprite is a fully developed business machine packed with state of the art technology.

CCP/M86 and IBM PC AT Compatible

Sprite was designed specifically to support concurrent and multi-user processing. The next generation of increasingly sophisticated, faster, more productive software packages will demand more computer memory and processing power. Sprite will run these new programmes effortlessly, under concurrent CP/M86 with PC mode or Xenix for IBM PC AT compatibility.

Technical Specification

- 6MHz 80286 Main Processor
- 2 to 18 users
- 512K to 6Mb main memory (no wait state)
- 21 to 140 Mb 5 1/4" Winchester disk
- 790K Floppy (IBM PC compatible)
- 256K byte intelligent cache buffer
- 80287 Arithmetic co-processor option
- Ethernet controller as standard with 'Cheapernet'
- IBM PC compatible colour graphics option
- 4 RS232 ports with synchronous & modem support
- 3 parallel ports, centronics compatible
- Intelligent 8 port RS232 expansion option
- S100 and IBM PC bus compatible
- Digital research multi-user CCP/M86 with PC mode, windows, GSX and DR-NET
- Microsoft Xenix (for IBM PC/AT compatibility)

1 Year's Free Maintenance

In the unlikely event of your Sprite breaking down, our free maintenance contract guarantees an engineer at your site within 24 hours.

Based on Proven Technology

Sprite has been developed by Jarogate, a leading force in the specialist computer market. Clients include: Marconi, Duracell, Vauxhall and other leading names. Companies not easily persuaded.

Excellence at an Ordinary Price

Starting at £4,995 Sprite costs no more than its rather ordinary rivals, it's just technically far superior. We're confident that a demonstration will provide all the persuasion you need to make the right decision. Compare Sprite's performance, price and support package with anything else. Then decide. For further details return the coupon now, or telephone: 01 671 6321.

I'd like to know more about Sprite: (tick as appropriate)
 Please arrange a demonstration Please send me more information
 Please send me your dealer pack

Name _____ Title: _____
 Company _____
 Address _____

 _____ Tel: _____ PC3/85

Return to Jarogate Ltd., 197-213 Lyham Road, Brixton, London SW2 5PY.
 Tel: 01 671 6321 Telex: 8950094

JAROGATE SPRITE

Computing ahead of its time

All software products described are covered by trademarks of the companies of origin.

Coloured Rems

```

10 REM COLOURED REM
20 REM PROGRAM TO PRINT REM STA
TEMENTS IN COLOUR
30 REM BY T.D.FISHER.
40 REM VARIABLE 'colour' DETERM
INES COLOUR OF PRINT
50 REM USE ASCII CODES &81 TO &
88
60 MODE7
70 PROCASS:CALL CODE:END
80 DEFPROCASS
90 oldvectlo=&20E:oldvecthi=&20F
:newvectlo=&230:newvecthi=&231
100 colour=&82:flag=&70:flag2=&71
:flag3=&72:temp=&73:osbyte=&FFF4
110 CODE=&0002
120 FOR PASS%=0 TO 2 STEP 2
130 PX=CODE
140 C OPT PASS%
150 LDA oldvectlo
160 STA newvectlo
170 LDA oldvecthi
180 STA newvecthi
190 LDA #(new_routine MOD 256)
200 STA oldvectlo
210 LDA #(new_routine DIV 256)
220 STA oldvecthi
230 LDA #0
240 STA flag
250 STA flag2
260 STA flag3
270 RTS
280 .new_routine
290 CMP #&0D
300 BNE SKIP
310 JSR original
320 JMP resetflag3
330 .SKIP
340 PHA
350 LDA flag3
360 CMP #1
370 BNE carry_on
380 STX temp
390 STY temp+1
400 LDA #&86
410 JSR osbyte
420 TXA
430 LDX temp
440 LDY temp+1
450 CMP #39
460 BEQ SKIP2
470 PLA
480 JMP original
490 .SKIP2
500 LDA #32
510 JSR original
520 LDA #colour
530 JSR original
540 PLA
550 JMP original
560 .carry_on
570 LDA flag2
580 CMP #1
590 BEQ TRYM
600 LDA flag
610 CMP #1
620 BEQ TRYE
630 PLA
640 CMP #82
650 BNE original
660 INC flag
670 JMP original
680 .TRYE
690 PLA
700 CMP #69
710 BNE resetE
720 INC flag2
730 JMP original
740 .TRYM
750 PLA
760 CMP #77
770 BNE resetM
780 JSR original
790 LDA #1
800 STA flag3
810 LDA #colour
820 .resetM
830 DEC flag2
840 .resetE
850 DEC flag
860 .original
870 JMP (newvectlo)
880 .resetflag3
890 LDA #0
900 STA flag3
910 RTS
920 ]
930 NEXT
940 ENDPROC

```

T D FISHER has sent in a routine to print Rems on a mode 7 screen in colour. The program works by intercepting the screen calls by the operating system and determining if R E M has been sent. If it has, then a coloured teletext character is sent to the screen.

The spare vector at &230,1 is used for this interception and three flags are set
 flag 1 — set if R detected
 flag 2 — set if R&E detected
 flag 3 — set if R&E&M detected

The end of line is catered for as follows: the Osbyte call at lines 380 to 440 reads the cursor position; if it is at column 39 a space is printed followed by the teletext colour code.

Run the program and all subsequent Rems will be in colour. If you require that the lines following the Rems have a background colour also then add the following lines and run the program.

```

105 background = &84
515 JSR background
805 JSR background
911.background
912 LDA #background
914 JSR original
916 LDA #&9D
918 JSR original
919 RTS

```

Graphic memory Peek

Liam Anderson has obviously been looking around in the Basic ROM. The program that he has submitted is more a demonstration than a utility, but for all that it should not prove too difficult to alter to a useful purpose. The program gives the bit pattern of eight consecutive memory locations shown on the screen in an eight by eight matrix.

Graphic memory Peek.

```

10 MODE 7
20 PROCinit
30 PROCassemble
40 PROCprocess
50 END
60
70 DEF PROCinit
80 XX=FNmemory(40,8)
90 YX=FNmemory(21,8)
100 oswrch=&FFEE
110 VDU23,&FFFF;&FFFF;&FFFF;&FFFF
;&FF
120 VDU23,1,0;0;0;0;
130 FOR IX=YX TO YX+7
140 PRINTTAB(0,IX)CHRS149
150 NEXT
160 ENDPROC
170
180 DEF PROCassemble
190 DIM start 100
200 FOR IX=0 TO 2 STEP 2
210 PX=start
220 OPT IX
230 STX &80
240 STY &81
250 LDY #0
260 .loop1
270 LDA (&70),Y
280 LDX #0
290 .loop2
300 ROL A
310 PHA
320 BCC space
330 LDA #&FF
340 BCS char
350 .space
360 LDA #&20
370 .char
380 JSR print
390 PLA
400 INX
410 CPX #&08
420 BNE loop2
430 INY
440 CPY #8
450 BNE loop1
460 RTS
470 .print
480 PHA
490 LDA #&1F
500 JSR oswrch
510 TXA
520 CLC
530 ADC &80
540 JSR oswrch
550 TYA
560 CLC
570 ADC &81
580 JSR oswrch
590 PLA
600 JSR oswrch
610 RTS
620 ]: NEXT
630 ENDPROC
640
650 DEF FNmemory(A%,B%) = A% DIV
2 - B% DIV 2
660
670 DEF PROCprocess
680 SX=&C008
690 REPEAT
700 ?&70=S%: ?&71=S% DIV 256
710 CALL start
720 SX=S%+(INKEY-105-INKEY-73)
730 PRINTTAB(XX+10,YX)CHRS129~SX
740 UNTIL FALSE
750 ENDPROC

```


When first run the ! symbol should appear in the middle of the screen. By using the : and / keys, the memory pointer S% is incremented or decremented respectively.

The short assembler listing, taking just 60 bytes, obtains the eight consecutive bytes and with each byte tests each bit. The second part displays a character 255 if set, or a 32 if not.

Memory location &70,1 holds the value of S%, and &80,1 offsets for each bit and byte respectively.

Keystrip

Mick Glossop has submitted a rather cute program that creates function-key strips for the user-definable keys. It works with an Epson FX-80 printer.

The program allows you to define six words of 12 characters each. They are split up into three groups of two to allow for the Shift and Ctrl variations.

Entering the data is a dream. You just move about the screen boxes entering text in the appropriate position. The only hazard is that no delete function is available when typing the characters, so any mistake means a retype. The screen display shows exactly what the strip will look like when printed.

To start printing, press Control-P and

to exit from the program press Control-X. If you wish to design another differently labeled strip press Control-C to clear the display.

The program uses a 60-element two-dimensional array to store the 12-character words used. They are accessed by the variables

label\$(l%,c%)

where l% refers to vertical position 1 to 6 and c% refers to horizontal positions 0 to 9.

To achieve a respectable printout, the Epson printer is set up for condensed mode and emphasized print, with a slightly narrower line spacing than normal. The grid is produced by redefining some of the lower-case characters as graphics characters for the printer. ASCII character 96 is also redefined so that £ is available too.

The Escape key has been disabled since it is important to exit from the program via ProcExit, which resets the printer and Cursor and Escape keys to normal.

Printer test

C C Woods has spent many frustrated minutes thinking that his programs were not working only to find that he had forgotten to switch his printer on! Consequently, he has provided a routine

to test if the printer is there or not.

The program as it stands will work with Epson printers and most other dot-matrix printers too. If you have a Juki daisywheel then you will need to repeat the first toggle and check by adding two lines to duplicate lines 5020 and 5030.

The result has all higher bits taken off by the And because these are set by the user port and if something is plugged in here it will show up. The routine will not work with the second processor because the 6522 is manipulated directly.

Printer test.

```

10 PROCprintertest
20 IF T = 0 THEN PRINT"Printer n
ot connected"
30 IF T = 2 THEN PRINT"Printer 0
k"
40 END
5000 DEF PROCprintertest
5010 LOCAL X,Y
5020 ?&FE6c=10 :REM Toggle prin
ter strobe
5030 X=?&FE61 :REM Clear 6522
flags (by reading port)
5040 ?&FE6c=10 :REM Toggle stro
be again
5050 Y=?&FE6d :REM Look at fla
g register
5060 T = Y AND 2 :REM Check bit 1
5070 ENDPROC

```

Keystrip.

```

10 REM *** FUNCTION KEY STRIP ***
20 REM *** by MICK GLOSSOP ***
30 REM *** (c) 11th June 1984 ***
40 REM ***
50 REM ***
60 REM ***
70 REM *** <fsp> "fSTRIP" ***
80 REM ***
90
100 ON ERRPR MODE7:PROCerror
110
120 PROCinit
130 MODE0:COLOUR129:CLS:COLOUR0
140 PROCscreen1
150 PROCscreen2
160
170 REPEAT
180 AX=GET
190 IF AX>=136 AND AX<=139 THEN PR
OCmove_cursor
200 IF AX>=32 AND AX<=96 THEN PROC
Label
210 IF AX=810 THEN PROCprintout
220 IF AX=83 THEN PROCclear
230 IF AX=818 THEN PROCexit
240 UNTIL FALSE
250
260 END
270
280
290
300 DEFPROCinit
310 *fx229,1
320 *fx15,1
330 *fx4,1
340 *fx5,1
350 DIM label$(6,10)
360 FOR c%=0TO10
370 FOR l%=1TO6
380 label$(l%,c%)=" "
390 NEXTl%
400 NEXTc%
410 REM setup printer for CONDENSE
mode and narrow line spacing.
420 VDU2,1,27,1,51,1,24,1,15,1,27
,1,71,3
430 REM define cursor character

```

```

440 VDU23,224,255,255,255,255,255,
255,255,255
450
460 x%=8:y%=3:l%=1:c%=0:p%=0
470 ENDPROC
480
490
500 DEFPROCexit
510
520 REM reset printer to normal op
eration.
530 IF p% THEN VDU2,12
540 VDU2,1,27,1,64,3
550 VDU23,224,255,255,255,255,255,
255,255,255
560
570 *fx4,0
580 *fx229,0
590 COLOUR128:COLOUR7
600 CLS
610 PRINT"Program exited!"
620 END
630
640 ENDPROC
650
660 DEFPROCscreen1
670 VDU23,8202,0,0,0;
680 PRINTTAB(27,1);"FUNCTION KEY S
TRIP PRINTER"
690 PROCscreen2
700 FOR col%=0TO4
710 PRINTTAB(col%*13+13,12);"f";co
l%
720 NEXTcol%
730 FOR col%=5TO9
740 PRINTTAB((col%-5)*13+13,15);"f
";col%
750 NEXTcol%
760 PRINTTAB(8,27)"Use: CURSOR KEY
S to move cursor, and type in labels
as required."
770 PRINTTAB(13,28)"CTRL-P to prin
tout, CTRL-C to clear the display,"
780 PRINTTAB(13,29)"CTRL-X to exit
from the program."
790
800 PRINTTAB(8,3);CHRS224;
810 ENDPROC
820

```

```

830
840 DEFPROCmove_cursor
850 PRINTTAB(x%,y%);label$(l%,c%);
860 IF AX=136 THEN c%=c%-1:IF c%<0
THEN c%=9
870 IF AX=137 THEN c%=c%+1:IF c%>9
THEN c%=0
880 IF AX=138 THEN l%=l%+1:IF l%>6
THEN l%=1
890 IF AX=139 THEN l%=l%-1:IF l%<1
THEN l%=6
900 IF c%>4 THEN x%=(c%-5)*13+8 EL
SE x%=c%*13+8
910 IF l%>2 THEN y%=l%+3+((c%>4)*-
14) ELSE y%=l%+2+((c%>4)*-14)
920 IF l%>4 THEN y%=l%+4+((c%>4)*-
14)
930 PRINTTAB(x%,y%);CHRS224;
940 ENDPROC
950
960
970 DEFPROCerror
980 IF ERR=17 THEN ENDPROC
990
1000 VDU7
1010 VDU31,8,2,129,157,136,131:PRIN
T"ERROR DETECTED! ";VDU156
1020 PRINTTAB(0,7);CHRS133;"The fo
llowing error should not be"CHRS133
;" present in this program."
1030 VDU7
1040 *fx4,0
1050 PRINT" ";REPORT:PRINTCHRS133
;" at line:";CHRS152;
1060 error$="L."+STR$(ERR)+CHRS10+CH
R$10+CHRS13
1070 *fx15,1
1080 FOR I%=1 TO LENerror$
1090 A=ASC(MID$(error$,I%,1))
1100 PROCoscli("FX138,0,"+STR$(A))
1110 NEXT I%
1120 END
1130
1140 DEFPROCLabel
1150 PRINTTAB(8,30);"Label:";CHRS(A
%);
1160 label$(l%,c%)=CHRS(AX)
1170 REPEAT

```

(continued on next page)

(continued from previous page)

```

1180 AX=GET
1190 IF (AX<32 AND AX<>13) OR AX>96
THEN 1180
1200 PRINTCHR$(AX);
1210 IF AX<>13 THEN Label$(LX,cX)=L
abel$(LX,cX)+CHR$(AX)
1220 UNTIL (AX=13) OR (LEN(Label$(L
X,cX))>11)
1230 PRINTTAB(0,30);STRINGS(79,CHR$(L
X,cX));
1240 AS=STRINGS((12-LEN(Label$(LX,c
X)))/2,CHR$(32))
1250 IF LEN(Label$(LX,cX))<11 THEN
Label$(LX,cX)=AS+Label$(LX,cX)+AS
1260 IF LEN(Label$(LX,cX))=11 THEN
Label$(LX,cX)=Label$(LX,cX)+CHR$(32)
1270 PRINTTAB(xX,yX);Label$(LX,cX);
1280 PRINTTAB(xX,yX);CHR$(224);
1290 ENDPROC
1300
1310 DEFPROCdefine_printer_chars
1320 *fx6,127
1330 *fx3,10
1340 REM dump ROM CG into RAM
1350 VDU27,58,0,0,0
1360
1370 REM redefine some of lower cas
e chars in download CG as graphics c
hars (to make up grid).
1380 REM "a"
1390 VDU27,38,0,97,97,139,0,0,0,1
5,0,8,0,8,0,8,0
1400
1410 REM "b"
1420 VDU27,38,0,98,98,139,8,0,8,0,1
5,0,8,0,8,0,8,0
1430
1440 REM "c"
1450 VDU27,38,0,99,99,139,8,0,8,0,1
5,0,0,0,0,0,0,0
1460
1470 REM "d"
1480 VDU27,38,0,100,100,139,0,0,0,0
,255,0,8,0,8,0,8,0
1490
1500 REM "e"
1510 VDU27,38,0,101,101,139,8,0,8,0
,255,0,8,0,8,0,8,0
1520
1530 REM "f"
1540 VDU27,38,0,102,102,139,8,0,8,0
,255,0,0,0,0,0,0,0
1550
1560 REM "g"
1570 VDU27,38,0,103,103,139,0,0,0,0
,248,0,8,0,8,0,8,0
1580
1590 REM "h"
1600 VDU27,38,0,104,104,139,8,0,8,0
,248,0,8,0,8,0,8,0
1610

```

```

1620 REM "i"
1630 VDU27,38,0,105,105,139,8,0,8,0
,248,0,0,0,0,0,0,0
1640
1650 REM "j"
1660 VDU27,38,0,106,106,139,0,0,0,0
,255,0,0,0,0,0,0,0
1670
1680 REM "k"
1690 VDU27,38,0,107,107,139,8,0,8,0
,8,0,8,0,8,0,8,0
1700
1710 REM redefine ASCII 96 as ' ' s
ign.
1720 VDU27,38,0,96,96,139,18,0,126
,128,18,128,2,128,66,0,0,0
1730
1740 REM select Download CG
1750 VDU27,37,1,0
1760
1770 *fx3,0
1780 *fx6,0
1790 ENDPROC
1800
1810 DEFPROCprintout
1820 PROCdefine_printer_chars
1830 PROCgraphics_Line(97,98,99)
1840 FOR Line%=1TO2
1850 PROCtext_Line(Line%)
1860 NEXTLine%
1870 PROCgraphics_Line(100,101,102)
1880 FOR Line%=3TO4
1890 PROCtext_Line(Line%)
1900 NEXTLine%
1910 PROCgraphics_Line(100,101,102)
1920 FOR Line%=5TO6
1930 PROCtext_Line(Line%)
1940 NEXTLine%
1950 PROCgraphics_Line(103,104,105)
1960 VDU2,10,10,10,3
1970 P%=1
1980 ENDPROC
1990
2000 DEFPROCgraphics_Line(aX,bX,cX)
2010 *fx6,127
2020 *fx3,10
2030 VDUaX
2040 FOR colX=1TO9
2050 PROCLine
2060 VDUbX
2070 NEXTcolX
2080 PROCLine
2090 VDUCX
2100 VDU13,10
2110 *fx3,0
2120 *fx6,0
2130 ENDPROC
2140
2150 DEFPROCLine
2160 FORDashX=1TO12
2170 VDU107
2180 NEXTDashX

```

```

2190 ENDPROC
2200
2210 DEFPROCtext_Line(dX)
2220 *fx6,127
2230 *fx3,10
2240 PRINT"j";
2250 FOR cX=0TO9
2260 PRINTLabel$(dX,cX);"j";
2270 NEXT cX
2280 VDU13,10
2290 *fx3,0
2300 *fx6,0
2310 ENDPROC
2320
2330 DEFPROCscreen2
2340 GCOL0,0
2350 FORgridX=0TO1
2360 FORLineX=0TO3
2370 MOVE119,(204+(gridX*449)+(Line
X*96))
2380 DRAW1161,(204+(gridX*449)+(Lin
eX*96))
2390 NEXTLineX
2400 NEXTgridX
2410 FORgridX=0TO1
2420 FORcolX=0TO5
2430 MOVE(119+(colX*208)),(204+(gri
dX*449))
2440 DRAW(119+(colX*208)),(492+(gri
dX*449))
2450 NEXTcolX
2460 NEXTgridX
2470 ENDPROC
2480
2490 DEFPROCclear
2500 FORcX=0TO10
2510 FORlX=1TO6
2520 Label$(LX,cX)=" "
2530 IF cX>4 THEN xX=(cX-5)*13+8 EL
SE xX=cX*13+8
2540 IF lX>2 THEN yX=lX+3+((cX>4)*-
14) ELSE yX=lX+2+((cX>4)*-14)
2550 IF lX>4 THEN yX=lX+4+((cX>4)*-
14)
2560 PRINTTAB(xX,yX)Label$(LX,cX);
2570 NEXTlX
2580 NEXTcX
2590 xX=8:yX=3:lX=1:cX=0
2600 PRINTTAB(xX,yX);CHR$(224);
2610 ENDPROC
2620
2630 DEF PROCoscLi(com$)
2640 $R900 = com$
2650 XX=80:YX=89: CALL&FFFF
2660 ENDPROC

```

Snowflake.

```

10 REM "SNOWFLAKES" (c) S.DENN
INGTON, Nov.1984
20 :
30 REM R sets size of flakes; X
,Y set position on screen
40 REM G determines central spi
nes or not
50 REM P sets no. of branches;
F sets where they occur
60 REM T determines inward or o
utward pointing branches
70 :
80 REM*****
*****
90 :
100 *KEY 0 RUN|M
110 :
120 MODE 0:R=150
130 VDU 19,0,RND(5),0,0,0
140 :
150 FOR Y=300 TO 700 STEP 400
160 FOR X=200 TO 1080 STEP 440
170 G=RND(2)
180 FOR P=1 TO 4:F=RND(1):T=RND(
2)
190 FOR angle=0 TO 300 STEP 60

```

```

200 deltaX=(SIN(RAD(angle))*R)
210 deltaY=(COS(RAD(angle))*R)
220 ON G GOTO 230,240
230 MOVE X,Y:DRAW X+deltaX,Y+del
taY
240 PROCspike
250 NEXT:NEXT:NEXT:NEXT
260 END
270 :
280 :
290 DEF PROCspike
300 VX=X+(deltaX)*F:VY=Y+(deltaY
)*F
310 A=((R*(1-F))*SIN(RAD(angle+6
0)))
320 B=((R*(1-F))*COS(RAD(angle+6
0)))
330 C=((R*(1-F))*SIN(RAD(angle-6
0)))
340 D=((R*(1-F))*COS(RAD(angle-6
0)))
350 ON T GOTO 370,400
360 :
370 MOVE VX,VY:DRAW VX+A,VY+B
380 MOVE VX,VY:DRAW VX+C,VY+D:GO
TO 420
390 :

```

Snowflake

This short program from S Dennington draws an almost infinite number of random snowflake patterns.

To rerun the program after six snowflakes have been drawn, press f0. If you prefer the black background then omit line 130.

```

400 MOVE VX,VY:DRAW VX-A,VY-B
410 MOVE VX,VY:DRAW VX-C,VY-D
420 ENDPROC
430 :
440 DEFPROCSCREENDUM0
450 LOCALXX,YX,ZX,MX
460 VDU2
470 VDU1,27,1,ASC"1",1,10;0;
480 FOR ZX=-320 TO 312 STEP8
490 VDU 1,27,1,ASC" ",1,5,1,0,1,
2;
500 FOR YX=9920 TO -9920 STEP -6
40
510 MX=85800+YX+ZX
520 FOR XX=7 TO 0 STEP -1
530 VDU1,MX?XX,1,MX?XX
540 NEXT:NEXT:VDU1,10;0;
550 NEXT:VDU1,27,1,ASC"a",0;:VDU
3
560 ENDPROC

```


On error Goto

Basic loader program.

```

10 REM BASIC LOADER FOR ONERR.
20 REM (C) STEVE MEHEW 1984.
30 :
40 B=49152;E=49307
50 FOR R=S TO E
52 READ A:POKE R.A:C=C+A
54 NEXT
60 READ K
65 IF K<>C THEN PRINT"DATA ERROR"
70 END
75 :
400 DATA 32,140,192,32,25,192,166,20
405 DATA 164,21,134,251,132,252,169,31
410 DATA 141,0,3,169,192,141,1,3
415 DATA 96,32,138,173,76,247,183,134
420 DATA 253,169,139,141,0,3,169,227
425 DATA 141,1,3,166,251,164,252,134
430 DATA 20,132,21,32,163,168,76,174
435 DATA 167,162,0,189,78,192,240,6
440 DATA 32,210,255,232,208,245,32,154
445 DATA 189,162,129,108,0,3,13,77
450 DATA 73,83,83,73,78,71,32,67
455 DATA 79,77,77,65,32,73,78,32
460 DATA 67,79,77,77,65,78,68,46
465 DATA 13,39,83,89,83,32,52,57
470 DATA 49,53,50,44,76,73,78,69
475 DATA 32,35,39,13,13,66,65,68
480 DATA 32,83,84,65,84,69,77,69
485 DATA 78,84,32,0,169,44,160,0
490 DATA 209,122,208,3,76,115,0,104
495 DATA 104,76,57,192
500 DATA 15101

```

Error-handler routine.

```

100 !*****
110 !*   ERROR HANDLER ROUTINE   *
130 !*   STEVE MEHEW 1984   *
150 !*****
155 !*   *
190 !*   SYS 49152,LINE #   *
195 !*   *
200 !* AT BEGINING OF PROGRAM WILL *
205 !* CAUSE BRANCH TO LINE # WHEN *
210 !* AN ERROR OCCURS - ASSUMING *
215 !* LINE EXISTS. IF LINE NOT *
220 !* PRESENT, PROGRAM WILL STOP *
225 !* WITH UNDEFINED STATEMENT *
240 !* ERROR AT THE LINE NUMBER OF *
245 !* THE ORIGINAL ERROR.   *
255 !* ERROR NUMBER CAN BE FOUND *
260 !* BY PEEKING.$FD (253)   *
270 !*   *
275 !*****
280 !
900 ERRVEC = #0300 !VECTOR TO HANDLE ERRORS
910 STORE = $FB !TEMP STORE FOR LINE #
920 ERRNO = $FD !OBVIOUS!
930 NORMERR = $E30B !NORMAL ROM ERROR ROUTINE
970 CHRGET = $73 !ZERO PAGE CHRGET
980 INPRT = $BDC2 !PRINT 'IN' & LINE #
982 FRMNUM = $AD8A !EVALUATE NUMERIC EXP.
983 GETADR = $B7F7 !CONVERT FAC TO INTEGER
984 LINUM = $14 !LINE NUMBER
986 SCNLIN = $A8A3 !SCAN LINE
986 NEWSTM = $A7AE !EXECUTE NEW STATEMENT
987 CHRPUT = $FFD2 !CHARACTER PRINT ROUTINE
988 TXTPTR = $7A !POINTER TO PRESENT TEXT
999 !
1000 **$C000
1010 !
1030 START JSR COMMA !CHECK FOR COMMA
1060 JSR GETWORD !GET LINE #
1070 !
1080 LDX LINUM !TRANSFER TO
1090 LDY LINUM+1 !STORE FOR
1100 STX STORE !SAFE KEEPING
1110 STY STORE+1
1120 !
1130 LDA #ONERR !ALTER VECTOR

```

```

1140 STA ERRVEC !FOR ERROR
1150 LDA #ONERR !ROUTINE, GOTO ONERR
1160 STA ERRVEC+1
1170 !
1180 RTS
1190 !
1195 GETWORD JSR FRMNUM
1197 JMP GETADR
1199 !
1220 ONERR STX ERRNO !STORE ERROR NUMBER
1230 !
1240 LDA #NORMERR !RESET VECTOR
1250 STA ERRVEC
1260 LDA #ONORMERR
1270 STA ERRVEC+1
1280 !
1300 LDX STORE !RESTORE LINE #
1305 LDY STORE+1
1310 STX LINUM
1315 STY LINUM+1
1320 !
1325 JSR SCNLIN !TXTPTR TO LINE #
1330 JMP NEWSTM !EXECUTE LINE
1335 !
1610 ERROR LDX #80 !OUTPUT TEXT MESSAGE
1620 GETIT LDA TEXT,X
1630 BEQ FINITEXT
1640 JSR CHRPUT
1650 INX
1660 BNE GETIT
1670 !
1680 FINITEXT JSR INPRT !PRINT 'IN' & LINE #
1685 LDX #81 !NO ERROR, JUST
1686 JMP (ERRVEC) !GOTO 'READY.' STATE.
1690 !
1700 TEXT BYT 13
1710 TXT "MISSING COMMA IN COMMAND."
1720 BYT 13
1730 TXT "SYS 49152,LINE #"
1740 BYT 13,13
1744 TXT "BAD STATEMENT "
1746 BYT 0
1750 !
2000 !
2010 COMMA LDA #, !ASCII OF COMMA
2020 LDY #80
2030 CMP (TXTPTR),Y !IS IT A COMMA
2040 BNE ERROR1 !NO...
2050 JMP CHRGET !YES, SO CONTINUE
2060 !
2070 ERROR1 PLA !TAKE OFF ADDRESS
2080 PLA !OF CALLING ROUTINE
2090 JMP ERROR !BACK TO PRINT MESSAGE

```

Error-listing program.

```

10 I=41373: N=1
30 PRINT N:
40 I=I+1: IF I>41767 THEN END
50 A=PEEK(I)
60 PRINT CHR$(A AND 127):
70 IF A>127 THEN N=N+1:PRINT:GOTO30
80 GOTO 40

```

ONE FEATURE of the Commodore 64 is its ability to intercept error messages before they are printed, which allows a simple error-trap facility. Steve Mehew has written such a program, which is listed both as a Basic loader and, in response to several requests, as its assembly listing. This is in Mikro assembler format, but can be modified for use on other standard assemblers.

Once the machine code has been loaded, it is enabled with

SYS 49152,xxxx

where xxxx is the line number to be executed when an error occurs.

The error type is indicated by the contents of location 253. A list of numbers with the associated errors can be obtained using the short error-listing program. □

THE **BUSINESS** **COMPUTER** **SHOW**

A major development for
anyone involved in computer marketing

JUNE 4-6, 1985 EARLS COURT, LONDON

Everything about it is different

It's aimed at directors, senior managers and heads of department in large companies and the medium and small businessmen who have both the need and the authority to buy computer and office automation equipment

It's linked to the successful Software exhibition with free flow access between the two shows. It features a Business Advice Centre sponsored by the Department of Trade and the National Computing Centre – and a Communications Centre especially for up to the minute developments in intelligent communication.

For full information contact Harry Hutson,
Computer Weekly, Room 205, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS.
Telephone: 01-661 3102. Telex: 892084 BISPRS G.

Please send me full details on exhibiting at **The Business Computer Show.**

Name _____ Address _____

Title _____

Company _____ Tel _____ Telex _____

Return to Harry Hutson, Computer Weekly, Room 205, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS.

PC

Printer character modifier

ONE COMMON PROBLEM when using a printer with the Amstrad is that both a Linefeed and Carriage Return are sent to the printer, which causes a double Linefeed to all printed output. D J Ellis suggests that one way to solve the problem is to cut wire 14 on the printer lead — if you can find the correct wire. He also suggests a simpler method, which is a lot more versatile.

You divert the output from the CPC-464 to the printer, via a machine-code program which checks for the value of 13 — the Carriage Return — or any other characters that you wish to change. It then sends the modified values to the printer in the normal way. The accumulator holds the value to be sent to the printer and the routine is called via the jumpblock at &BD2B. The listing shown redirects this jump to the machine-code routine, which is compiled by the Basic program.

First, the program asks you where you

want the machine-code program to reside in memory. No limitations are imposed here as it is possible that the screen memory may be located lower in memory, and you may also have other machine-code programs in memory. The machine-code program will use up a minimum of 15 bytes if no changes are made, 21 bytes if the Linefeed is suppressed, and an additional six bytes for each character that you modify. If you are not sure where to put it, then try &9000 (36864), which is as good a place as any. Prefix hexadecimal numbers with & if you use them.

The Top of Basic pointer will be set to just below the address that you choose — line 50030. The next five lines Poke this address and some data to the machine-code program; this part is where the re-direction takes place.

If you wish to suppress the Linefeed, press the Enter key when prompted by lines 50090 and 50100. Press any other key

if you want the double Linefeed to operate.

You will then be asked if you wish to change any of the characters. Often daisy-wheel characters do not match up with those on the CPC-464. For example, the £ sign on the CPC-464 is ASCII 163, but the CPC-464 can only send numbers between 0 and 127 to the printer as it ignores the eighth bit. So 128 is taken off the value of 163, and the value sent for £ is 35. On some wheels 35 is the £ sign, but on others it is the # sign. If the £ sign is not on the wheel at all you can use the \$ character as a last resort; this is ASCII 36.

When prompted by line 50130 press the Enter key to change characters. In reply to line 52010, enter 163 for the character to change, and then 36 in reply to line 52030 for the character to change to. To make further changes to other characters press the Enter key and repeat this process. Otherwise press any other key and the program will end after tagging the original call to ROM on to the end of the machine-code program.

The machine-code program will be Called in line 50180, and any characters sent to the printer will be checked to see if they need modifying. In the case of the Linefeed this is changed to a null character, so nothing is printed.

If you have a dot-matrix printer you should also find this program useful. You can also change the printing codes below ASCII 32 if you like, which could prove interesting.

Once the program has been run you can New it as the Basic program then takes no further part. The lines are numbered so that you can Chain Merge the program on to the end of a program that you have in memory, and then use it and delete it before listing or using the program.

Keyboard aid

If you are a touch-typist, you will have noticed that the Amstrad CPC-464 has an unconventional arrangement for the colon and semicolon, which probably slows up your typing. R E F Street provides an easy solution to the problem. Add the following lines to your program

```
10 KEY DEF 29,1,1,58
20 KEY DEF 29,1,59
30 KEY DEF 28,1,42
```

This addition will move the colon to its conventional position in place of the asterisk; move the semicolon to its normal position in place of the colon and move the asterisk to where the semicolon used to be.

If you are using the Tasword 464 word-processing program, note that although you have moved the asterisk to where the semicolon used to be, the command Control|* to convert upper to lower-case remains as it was, provided that you use the old position of the asterisk. □

Printer character modifier.

```
50000 CLS:INPUT "Enter start address ";reside
50010 IF reside<0 THEN reside=reside+65536
50020 IF reside>65500 THEN 50000 ELSE start=reside+12
50030 MEMORY reside-2:CLS
50040 msb=INT(start/256):lsb=start-msb*256
50050 FOR program=reside TO reside+11
50060 READ code:POKE program,code:NEXT
50070 DATA 33,0,0,34,44,189,62,195,50,43,189,201
50080 POKE reside+1,lsb:POKE reside+2,msb
50090 PRINT "Press <ENTER> to supress LINE FEED"
50100 PRINT "any other key to keep the LINE FEED"
50110 a$="":WHILE a$="":a$=INKEY$:WEND
50120 IF a$=CHR$(13) THEN GOSUB 51000
50130 CLS:PRINT "Press <ENTER> to CHANGE CHARACTER"
50140 PRINT "any other key to END the program"
50150 a$="":WHILE a$="":a$=INKEY$:WEND:CLS
50160 IF a$=CHR$(13) THEN GOSUB 52000
50170 POKE program,207:POKE program+1,242
50180 POKE program+2,135:CALL reside:END
51000 '-----SUPRESS LINE FEED-----
51010 FOR supress=program TO program+5
51020 READ code:POKE supress,code:NEXT supress
51030 program=supress:RETURN
51040 DATA 254,10,32,2,62,0
52000 '-----CHANGE CHARACTERS-----
52010 INPUT"Enter ASCII number to change ";before
52020 IF before<0 OR before>255 THEN 52010
52030 INPUT"Enter ASCII number to change to ";change
52040 IF change<0 OR change>255 THEN 52030
52050 POKE program,254:POKE program+1,before
52060 POKE program+2,32:POKE program+3,2
52070 POKE program+4,62:POKE program+5,change
52080 program=program+6
52090 PRINT"Press <ENTER> to continue changes"
52100 PRINT"any other key to END program"
52110 a$="":WHILE a$="":a$=INKEY$:WEND:CLS
52120 IF a$=CHR$(13) THEN 52010 ELSE RETURN
```

PRINTERS

DOT MATRIX

All printers have centronic parallel interface unless otherwise stated. All printers have hi-res dot addressable graphic mode. Please send SAE for full details.

EPSON

FX80 160CPS 10" wide friction & pin feed	£347 + VAT	£399
FX100 160 CPS 15" wide friction & tractor feed	£499 + VAT	£574
RX80 F/T 100 CPS 10" wide friction & tractor feed	£239 + VAT	£275
RX80 100 CPS 10" wide tractor feed	£199 + VAT	£229
RX100 F/T 100 CPS friction & tractor feed	£385 + VAT	£443
8143 RS 23 Interface for FX and RX printers	£39 + VAT	£45
8148 RS 232 Interface with 2K buffer x on x off	£60 + VAT	£69
Ribbon Cartridge for RX80 FX80 & MX80	£5 + VAT	£6
Ribbon Cartridge for FX100 & MX100	£7 + VAT	£8

MP165

165CPS 10" carriage friction and tractor feed	£260 + VAT	£299
---	------------	------

SEIKOSHA

BP 420 designed for the business world, 420CPS in draft mode, 110CPS in NLQ mode.	£1095 + VAT	£1259
---	-------------	-------

SMITH

CORONA

Fastext 80: 80 col, 80CPS. Friction feed standard	£149 + VAT	£171
---	------------	------

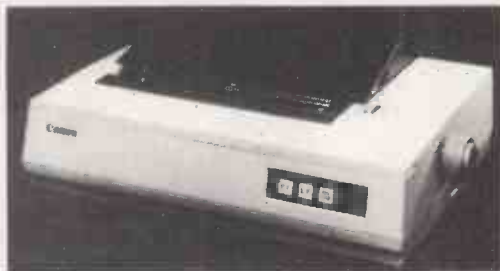
TAXAN KAGA

160CPS 10" wide NLQ 24 x 16 matrix	£269 + VAT	£310
160CPS 15" wide NLQ 24 x 16 matrix	£390 + VAT	£449

CANON

PW1080A
160CPS NLQ mode, 27CPS, 10" wide friction & tractor feed
£299 + VAT £344

PW1156A
160CPS NLQ mode, 15" wide friction & tractor feed
£433 + VAT £499



COLOUR PRINTERS

Seikosha GP700A 7 colour 50CPS printer	£299 + VAT	£344
Canon PJ1080A 7 colour 40CPS ink jet printer	£433 + VAT	£499

DAISYWHEEL

JUKI 6100/I PRINT

20 CPS Bi-Directional Logic seeking 10 12 15 CP1 + PS spacing 2K buffer best selling Daisywheel	£324 + VAT	£373
Singer sheet feeder unit	£182 + VAT	£209
Tractor Unit	£95 + VAT	£109
RS 232 Interface	£52 + VAT	£59
Spare Daisywheel	£14 + VAT	£16

BROTHER HR-15

13 CPS Bi-directional 10, 12, 15 CP1 + PS	£390 + VAT	£449
Keyboard Unit	£139 + VAT	£159
Single Sheet Feeder Unit	£217 + VAT	£249
Tractor Unit	£95 + VAT	£109

QUENDATA

20 CPS Unidirectional 10 12 15 CP1	£239 + VAT	£275
------------------------------------	------------	------

All our printers have 1 year warranty

MONITORS

PHILIPS

7001-High Res Green Screen with sond input
£65 + VAT £75

GM1211

GM1211 18 MHZ High Res Monochrome Monitor with tilt and swivel stand available in green or amber etched antiglare screen (please specify colour)
£86 + VAT £99

SANYO

DM8112 12" Green screen
18MHZ Hi-Res
£86 + VAT £99

DM9112 Hi Res
Green Screen with
tilt stand
£109 + VAT £126

MICROVITEC CUB

1431 MS 14" RGB Normal Res Colour
£173 + VAT £199

1451 MS 14" RGB Medium Res Colour
£251 + VAT £289

1441 MS 14" RGB High Res Colour
£417 + VAT £479

SANYO COLOUR

Std Res 14" £179 + VAT £206

Med Res 14" £299 + VAT £344

Hi Res 14" £449 + VAT £517

MICROVITEC FOR QL

1451 14" Medium Res Colour.

Specially designed for
Sinclair QL

£239 + VAT £275

ACORN

BBC MICROCOMPUTER SYSTEM

WE ARE AN OFFICIAL BBC
COMPUTER DISTRIBUTOR

DEALER ENQUIRIES ARE WELCOMED

Acorn
Electron
£199 INC
VAT

Free
Cassette Recorder
with every Electron plus
5 software titles

APPROVED ECONET SERVICE CENTRE
WE STOCK A LARGE RANGE OF SOFTWARE FOR
BBC MICRO INCLUDING ACORN SOFTWARE, BBC
SOFTWARE, LONGMANS SOFTWARE, PLEASE
SEND LARGE STAMPED ADDRESSED ENVELOPE
FOR FULL DETAILS.



COMPUTER
GROUP

28/29 BURNT MILL HARLOW, ESSEX CM20 2HU U.K.
Tel. HARLOW (0279) 443521 Telex: 818894 AKHTER G

DISC

100% BBC COMPATIBLE MITSUBISHI AND
TEAC SLIMLINE DISK DRIVES



These drives are supplied ready cased with all the necessary cables formatting program and User Guide
There are some very useful utilities included on formatting disc e.g.

- * DISASSEMBLER: This is 6502 machine code disassembler
- * DUP: To copy and rename a file on disc
- * FORMAT: Formatting program for 40 & 80 tracks
- * FREE: This utility provides a disk usage analysis
 - * MDUMP: Enables you to display and modify any part of BBC memory
 - * MERGE: Merge a number of text files into one file
 - * RELOCATE: Downloads a basic program to &E00
 - * SDUMP: Screen dump for EPSON in all graphic modes
 - * VERIFY: Verifies every sector on a disk
 - * MENU: A flexible menu program

RODUCTS

BBC Microcomputer Model B	£348 + VAT	£399
BBC Mod B - disk interface	£409 + VAT	£469
BBC Mod B - Econet interface	£389 + VAT	£447
BBC Mod B - disk and Econet interfaces	£450 + VAT	£517
BBC Compatible 100K disk drive	£112 + VAT	£129
BBC Compatible dual 800K disk drive	£312 + VAT	£359
Acorn Z80	£347 + VAT	£399
Acorn 6502 Second Processor	£173 + VAT	£199
Acorn Bit stick	£327 + VAT	£375
Acorn IEE Interface	£282 + VAT	£325
Acorn Electron plus 1 interface	£52 + VAT	£60
BBC Prestel Adaptor	£115 + VAT	£132
BBC Telex receiver (Aug)	£196 + VAT	£225
BBC cassette recorder and lead	£30 + VAT	£35
Disk interface kit (free fitting)	£103 + VAT	£118
Mod A to Mod B upgrade kit	£70 + VAT	£80
Fitting charge for A to B upgrade kit	£20 + VAT	£23
16K memory upgrade kit	£30 + VAT	£34
Games paddles	£17 + VAT	£19
User Guide	£15	
Advanced User Guide	£12.95	
Econet Guide	£ 7.50	
Econet interface (free fitting)	£60 + VAT	£69
Speech interface (free fitting)	£47 + VAT	£54
BBC disk manual - formatting disk	£30 + VAT	£34
Parallel printer cable	£10 + VAT	£11
BBC word processor (view)	£52 + VAT	£59

YOUR CONTACT AT AKHTER Tel: 0279 443521 (12 lines)

DEALER/BULK ENQUIRIES	HAMAYUN MUGHAL	EXT 202
TELEPHONE ORDERS	CARON ANDREWS	210
DEALER ORDERS	JULIA ALLUM	209
EXPORT ENQUIRIES	MOHAMAD EDIB	201
TECHNICAL SUPPORT	ALAN LAFFOLEY	207
ACCOUNTS	JULIE AMBLER	211
LITERATURE REQUEST	JOHN MAULE	201

ORDERING INFORMATION

We accept official orders from UK Government and Education establishments. Carriage is £2.50 + VAT (UK only) for normal delivery. If express delivery is required please add £8.00 + VAT per parcel. We accept telephone orders on Barclay and Access card please ring (0279) 443521 (10 lines). all cheques made payable to "AKHTER INSTRUMENTS".

N.B. All prices are subject to change without notice and are rounded up to the nearest pound

OPENING HOURS: MON-FRI 9am-6.30pm. SAT 10am-5pm.
We welcome callers, no parking problems.

DRIVES

Single drive 100K 40 trks single sided	£112 + VAT	£129
Dual drive 200K 40 trks single sided	£216 + VAT	£249
Single drive 200K 40 trks double sided	£129 + VAT	£149
Dual drive 400K 40 trks double sided	£251 + VAT	£289
Single drive 400K 80 trks double sided	£152 + VAT	£175
Single drive 400K 40 80 trks switchable DS	£155 + VAT	£179
Dual drive 800K 80 trks double sided	£303 + VAT	£349
Dual drive 800K 40 80 trks switchable DS	£312 + VAT	£359
Dual Drive 800K 40 80 trks + PSU + built in monitor stand	£373 + VAT	£429

All above drives are low power slimline (0.3 A typ at + 12v and 0.4 at + 5v per drive) Normally extra power supply is not required. The BBC Computer power supply is designed to drive to low power drive (IT IS NOT DESIGNED TO DRIVE INTERNAL ROM BOARD)

SS DD disketts (10 Box)	£18 + VAT	£20
DS DD disketts (10 Box)	£23 + VAT	£26

BUSINESS SYSTEMS

COMPLETE BUSINESS PACKAGE

This system is based on 16 Bit 8088 Processor 128K RAM, 2X730K Floppy Disc Drives, High Res Monitor, fast (160cps) Dot Matrix Printer, Wordstar Wordprocessor, Calcstar Spreadsheet Program, complete integrated Accounts package consisting of Sales Ledger, Purchase Ledger, Nominal Ledger, Invoicing, Stock Control, Payroll and mailing list. Complete turnkey system at an unbelievable price. Delivered Only £1495 + VAT £1719 Delivered and Installed plus 1/2 day training £1595 + VAT £1834



APRICOT PC

"Portable Executive Computer" 16 Bit Micro. 256K RAM up to 1.44 megabytes floppy disk storage. 3 1/2" Sony disks. Portable brief case styling. Modem with auto dialler (optional) hard disk optional. Vast software library (compatible with Sirius 1).

Apricot with Double Drive, Monitor and Free Printer £1790 + VAT £2059

APRICOT XI

As above but with 10MB Winchester Drive and Single 315K Drive plus Superwriter, Supercalc and FREE JUKI 6100 Printer

£2995 + VAT £3444

SANYO PROFESSIONAL COMPUTER

SANYO 550

16 Bit Micro 128K RAM expandable to 256K. Single or Double Disk drive built in full colour graphics (640 x 200 pixels in 8 colours) IBM compatible. Free software. Sanyo MBC 550 128K RAM single drive and free software including Wordstar and Calcstar

£749 + VAT £862

SANYO 550-2

As 550 but with Dual Drive 2 x 160K

£849 + VAT £976

SANYO 550-360

As 550 but with 2 x 360K Drives

£999 + VAT £1149

SANYO 550-730

As 550 but with 2 x 730K Drives

£1049 + VAT £1206

SANYO 555

Sanyo MBC555 128K double drive and free software including Wordstar, Calcstar, Inforstar, Datastar etc.

£999 + VAT £1149

SANYO 555-360

As 555 but with 2 x 360K Drives

£1249 + VAT £1436

SANYO 555-730

As 555 but with 2 x 730K Drives

£1299 + VAT £1494

SANYO SYSTEMS INCLUDE
FREE HIGH RES GREEN
MONITOR

WORD PROCESSING

COMPLETE SYSTEMS FROM £650 + VAT

BBC 1: BBC Micro Model B, View (or Wordwise) Wordprocessor, Quendata 20 CPS Daisywheel Printer, High Res Green Monitor, Cassette Recorder plus 10 cassettes and all the necessary cables £650 + VAT = £747.50

BBC 2: BBC Micro Model B + Disk Interface, View (or Wordwise) Wordprocessor, 100K Disk Drive, High Res Green Monitor, Quendata 20 CPS Daisywheel Printer, 1 Box of Disks and all the necessary cables £799 + VAT = £918.85

BBC 3: Same as System BBC2 but with 400K Drive £875 + VAT = £1006.25

BBC 4: Same as System BBC 2 but with 400K Drive and JUKI 6100 Daisywheel Printer £975 + VAT = £1121.25.

BBC 5: BBC Model B + Disk Interface, View (or Wordwise) Wordprocessor, 800K Dual Disk Drive (Mitsubishi), High Res Green Monitor, JUKI 6100 Daisywheel Printer, 1 Box (10) of 80 Track DS discs and all necessary cables £1145 + VAT = £1316.75.

SAN 1: Sanyo MBC 550 Series 16 Bit Microcomputer, 128K Ram, Dual 160K drives (2 x 160K), High Res Graphics (600 x 200 pixels in 8 colours), JUKI 6100 Daisywheel Printer, High Res Green Monitor, 1 Box of 10 discs, Wordstar Wordprocessor, Calcstar spreadsheet and all the necessary cables £1175 + VAT = £1351.25

SAN 2: Same as SAN 1 but with Dual 360K Drives (2 x 360K) £1345 + VAT = £1546.75

SAN 3: Same as SAN 1 but with Dual 720K Drives £1395 + VAT = £1604.25

SAN 4: Sanyo MBC 555 Series 16 Bit Microcomputer, 128K Ram, Dual 160K Drives (2 x 160K), High Res Graphics (600 x 200 pixels in 8 colours) JUKI 6100 Daisywheel Printer, High Res Green Monitor, 1 Box of 10 discs, Wordstar, Wordprocessor, Calcstar spreadsheet, Mailmerge, Spellstar (dictionary), Datastar (database), Reportstar plus all the necessary cables £1295 + VAT = £1489.25.

SAN 5: Same as SAN 4 but with Dual 360K Drives £1475 + VAT = £1696.25

SAN 6: Same as SAN 4 but with Dual 730K Drives £1525 + VAT = £1753.75

If you require High Res Colour Monitor instead of High Res Green Monitor in Sanyo Systems please add £320 + VAT = £368 to the above prices.

*128K RAM Upgrade for all above Sanyo systems (makes a total of 256K RAM) £150 + VAT = £172.50 including fitting.

Hex converter

```

0100 ; A Routine to convert a 2 byte
0110 ; integer into its Hexadecimal
0120 ; equivalent and dump this into
0130 ; a BASIC string.
0140 ; The routine is to be held in
0150 ; a Basic string and is called
0160 ; by the command:-
0170 ;
0180 ; X=USR (ADR (H$),ADR (H4$),N)
0190 ;
0200 ; Where:-
0210 ; H$ holds the routine.
0220 ; H4$ will hold the result.
0230 ; N is the integer.
0240 ; Ron Levy.
0250 ;
0260 ADRLD =#D4
0270 ADRLD =#D5
0280 ;
0290 ; X=#600
0300 PLA
0310 PLA Pull address
0320 STA ADRLD of H4$ from
0330 PLA the stack.
0340 STA ADRLD
0350 LDY #00
0360 ;
0370 LOOP TYA
0380 LSR A See if the Y reg
0390 PLA is odd or even.
0400 BCS LOBITS
0410 PHA
0420 LSR A Move the high
0430 LSR A nibble over to
0440 LSR A the lower
0450 LSR A nibble.
0460 ;
0470 LOBITS AND #0F Mask low nibble
0480 CLC
0490 ADC #30 Add the offset
0500 CMP #3A
0510 BCC NOADD Add more if
0520 ADC #06 required (A-F)
0530 NOADD STA (ADRLD),Y
0540 INY
0550 CPY #04 Check for end
0560 BNE LOOP of loop.
0570 ;
0580 RTS

```

Demo program.

```

0 REM Hexadecimal Memory Lister
1 REM To Demonstrate The Use of
2 REM The Machine Code Routine.
3 REM Ron Levy.
4 REM
10 DIM H$(38),H4$(4),P(8)
11 H4$="1234"
12 FOR I=1 TO 38
13 READ X:H$(I,I)=CHR$(X)
14 NEXT I:REM Routine Now Loaded.
80 POKE 766,1
90 ? "Starting Location ";INPUT I
100 FOR I=I TO 1000
110 X=USR (ADR (H$),ADR (H4$),I)
120 IF H4$(4,4)<>"0" AND H4$(4,4)<>"B"
THEN I=I-1;GOTO 110
130 PRINT H4$;" ";
200 FOR J=0 TO 7
210 P(J)=PEEK (J+I)
220 X=USR (ADR (H$),ADR (H4$),P(J))
230 PRINT H4$(3,4);" ";
240 NEXT J
300 FOR J=0 TO 7
310 IF P(J)<>155 THEN PRINT CHR$(P(J))
;
320 NEXT J
390 PRINT :I=I+8
400 NEXT I
500 POKE 766,0:STOP
32000 DATA 104,104,133,213,104,133,212
,160,0,152,74,104,176,5,72,74,74,74,74
,41,15,24,105,48,201,58,144,2,105
32001 DATA 6,145,212,200,192,4,208,228
,96

```

WHEN WRITING utility programs it is often desirable to be able to print a number to the screen in hexadecimal form rather than in the usual base-10. Ron Levy's machine-code routine will take a one- or two-byte value and return a two- or four-character string representing its hexadecimal value. While it is possible to write a Basic subroutine to perform this function, such a routine would be fairly large, and quite slow due to the number of floating-point calculations involved.

This fast machine-code routine is completely relocatable, and the most convenient way of storing it in Basic is by placing it into a string. For example, the demo program reads each byte from data statements and uses the CHR\$ command to force the byte values into H\$. The routine is called with the command

X = USR(ADR(H\$),ADR(H4\$),N)

where N is the number you want converted. H4\$ now contains the hexadecimal equivalent of N, which will be a four-character string.

If you are only converting a single-byte character — perhaps the result of a Peek — then you will only want a two-character string. This is accomplished by taking the second half of H4\$, that is, H4\$(3,4). It is essential to include the command

H4\$="1234"

since this causes Basic to set the length of H4\$ to four characters.

The memory lister program shows how to use the routine in your own programs. Memory lister will display the contents of eight memory locations per line, giving the base address on the left, eight two-digit values in the middle, then the eight printable CHR\$ commands of these values on the right. Poke 766,1 is used to prevent the screen control codes creating havoc with the display when the CHR\$ commands are printed.

Instead of reading data statements to create the string you can equate H\$ to a literal string at the start of the program. The difficulty is that most of the characters in H\$ are graphic symbols. However, there is a way of including this into a program line. Print H\$, use the cursor-control keys to insert spaces in front of the printed string and type

20 H4\$=" "

Then move the cursor to the end of the string and print the closing quote. On

pressing Return, Basic will accept this as a valid program line and you can then delete the For-Next loop used to create the string, together with any Data statements.

The routine takes advantage of the fact that Atari Basic allows you to pass any number of integers of the value 0 to 65535 through with the USR call. In this case you are passing two integers, the first being the memory address of H4\$, and the second being the number you want converted.

Basic will use the processor stack for this. It will push a single byte to the stack, the value of which will be the number of arguments in the USR call. In this instance it will be two. The routine will pull the byte off the stack, but it will not store it since there will always be two arguments. The next two bytes pulled from the stack will be the address of H4\$, which will be stored in two bytes of page zero memory, to be used as pointers when storing the results. The last two bytes pulled will be the number to be converted. The high byte will come off first and the low byte last.

Each byte is split into two four-bit nibbles, and 48 is added to obtain the relevant ASCII number character. A test is performed to see if the nibble was between 10 and 15, and if so a further 7 is added to obtain the characters A to F. The result is then stored directly into its correct position in H4\$.

3D OXO

There are two interesting things about this 16K three-dimensional noughts and crosses program from John Owen. First, the game itself and second, the listing, which automatically produces an auto-boot cassette or disc.

The game is written in machine code, but you do not need an assembler to enter it. The code is typed in as data statements in Basic. When it is run it verifies the data, then enables you to produce a disc or tape that can be started automatically without Basic.

The game is played in the traditional way, where three counters in a line win even if they are on separate boards. You press Start to begin. Moves are made by using a joystick to position the flashing cursor over the chosen square then pressing the Fire button. You then take it in turns to move until someone wins.

Noughts and crosses.

```

4 REM **** 3-D NOUGHTS & CROSSES ****
8 REM VERSION 1B,3/9/84
12 REM
16 REM COMMENTS TO:JOHN R. OWEN
20 REM 2 FFORDD DERWYN,PENYFFORDD,
24 REM CHESTER CH4 0JT.U.K.
28 REM

```

```

32 REM (C)1984 JOHN R. OWEN
36 REM
37 DIM FLNM$(13)
44 ? "VERIFYING DATA...ALLOW 45 SECONDS"
:TRAP 48:FOR IX=1 TO 2765:READ IY:IC=IC+
IY:NEXT IX
48 IF IC<>320039 THEN ? "ERROR(S) IN DAT
A VALUES":END

```


(continued from previous page)

,42,189,39,34,153,224,25,200,232,224,14,
208,244,141,0,210,169,40
620 DATA 141,1,210,169,128,141,8,210,162
,255,160,255,234,234,136,208,251,202,208
,246,169,48,141,0,210,162
630 DATA 255,160,255,234,234,136,208,251
,202,208,246,16,200,0,141,1,210,32,245,34,7
6,4,35,165,198,56,233,47
640 DATA 162,0,56,233,8,232,201,8,176,24
8,201,5,144,1,232,138,106,144,151,134,19
3,165,193,56,233,7,162,0
650 DATA 74,240,5,106,232,176,1,232,165,
194,201,6,176,12,160,0,74,240,39,106,200
,176,35,200,208,32,201,14
660 DATA 176,15,160,3,56,233,8,74,240,20
,106,200,176,16,200,208,13,56,233,16,160
,6,74,240,5,106,200,176,1
670 DATA 200,169,0,24,72,152,240,7,104,1
05,3,72,136,208,249,104,134,195,101,195,
170,189,0,6,201,5,240,19
680 DATA 160,41,162,0,189,53,34,153,224,
25,200,232,224,15,208,244,76,62,36,169,4
,157,0,6,166,194,165,193
690 DATA 133,195,169,0,133,193,169,24,13
3,194,202,240,16,165,193,24,105,20,133,1
93,165,194,105,0,133,194
700 DATA 202,208,240,165,195,24,101,193,
133,193,165,194,105,0,133,194,160,0,169,
254,145,193,173,15,212,41
710 DATA 64,240,249,32,245,34,96,240,1,0
,3,0,4,240,1,1,3,240,1,2,2,2,3,243,1,0,3
,240,4,1,3,2,2,3,1,243,1
720 DATA 2,3,240,3,6,1,2,2,246,1,1,3,246
,1,0,4,2,3,249,4,160,0,169,255,133,195,1
69,0,141,185,37,169,6,141
730 DATA 189,37,169,0,141,27,6,174,27,6,
189,64,37,41,240,240,2,230,195,189,64,37
,41,15,201,9,208,27,24,109
740 DATA 185,37,141,185,37,169,0,109,189
,37,141,189,37,198,195,173,185,37,201,27
,208,206,162,0,96,24,105
750 DATA 0,133,193,169,6,105,0,133,194,2
38,27,6,164,195,185,0,6,201,5,208,54,169
,0,168,170,72,24,104,113
760 DATA 193,72,172,27,6,24,185,64,37,10
1,193,133,193,169,0,101,194,133,194,232,
160,0,224,3,208,227,104,201
770 DATA 23,208,5,165,195,162,255,96,166
,195,221,28,6,144,3,157,28,6,238,27,6,76
,135,37,96,162,1,160,0,189
780 DATA 0,6,201,5,208,25,189,28,6,205,2
8,6,240,12,144,15,141,28,6,142,56,6,160,
0,240,5,138,153,57,6,200
790 DATA 232,224,27,208,219,132,195,173,
10,210,41,31,197,195,240,2,176,245,168,1
85,56,6,133,195,96,160,0
800 DATA 169,255,133,195,169,0,141,143,3
8,169,6,141,149,38,169,0,141,27,6,174,27
,6,189,64,37,41,240,240,2
810 DATA 230,195,189,64,37,41,15,201,9,2
08,27,24,109,143,38,141,143,38,169,0,109
,149,38,141,149,38,198,195
820 DATA 173,143,38,201,27,208,206,162,0
,96,24,105,0,133,193,169,0,105,6,133,194
,238,27,6,164,195,185,0,6
830 DATA 201,5,208,35,169,0,168,170,72,2
4,104,113,193,72,172,27,6,24,185,64,37,1
01,193,133,193,169,0,101
840 DATA 194,133,194,232,160,0,224,3,208
,227,104,238,27,6,201,13,208,143,165,195
,162,255,96,160,0,162,0,134
850 DATA 195,169,0,24,101,195,133,193,16
9,6,105,0,133,194,169,0,170,72,104,24,11
3,193,72,24,165,193,105,9
860 DATA 133,193,169,0,101,194,133,194,2
32,224,3,208,233,166,195,160,3,104,72,15
7,28,6,138,24,105,9,170,104
870 DATA 136,208,243,166,195,232,224,9,2
08,189,96,162,0,189,28,6,201,13,240,6,23
2,224,9,208,244,96,189,0
880 DATA 6,201,5,240,7,138,24,105,9,170,
208,242,138,133,195,162,255,96,162,0,189
,28,6,201,23,240,6,232,224
890 DATA 9,208,244,96,189,0,6,201,5,240,

7,138,24,105,9,170,208,242,138,133,195,1
62,255,96,169,0,170,157,28
900 DATA 6,232,224,54,208,248,96,162,0,1
89,28,6,201,12,240,6,232,224,9,208,244,9
6,134,195,162,255,96,160
910 DATA 0,169,255,133,195,169,0,141,200
,39,169,6,141,206,39,169,0,141,27,6,174,
27,6,189,64,37,41,240,240
920 DATA 2,230,195,189,64,37,41,15,201,9
,208,27,24,109,200,39,141,200,39,169,0,1
09,206,39,141,206,39,198
930 DATA 195,173,200,39,201,27,208,206,1
62,0,96,24,105,0,133,193,169,0,105,6,133
,194,238,27,6,169,0,168,170
940 DATA 72,24,104,113,193,72,172,27,6,2
4,185,64,37,101,193,133,193,169,0,101,19
4,133,194,232,160,0,224,3
950 DATA 208,227,104,238,27,6,201,12,208
,152,165,195,162,255,96,165,195,72,201,1
8,144,7,56,233,18,133,195
960 DATA 16,9,201,9,144,5,56,233,9,133,1
95,162,0,24,105,0,3,56,233,3,232,201,3,176
,248,133,195,230,195,169
970 DATA 0,133,193,133,194,202,240,16,24
,165,193,105,40,133,193,165,194,105,0,13
3,194,202,208,240,24,165
980 DATA 193,105,7,133,193,165,194,105,0
,133,194,165,195,162,0,74,240,9,162,2,16
5,195,106,144,2,162,4,134
990 DATA 195,24,165,193,101,195,133,193,
165,194,105,0,133,194,169,0,24,101,193,1
33,193,169,24,101,194,133
1000 DATA 194,104,201,18,144,27,165,193,
24,105,160,133,193,165,194,105,0,133,194
,165,193,24,105,160,133,193
1010 DATA 165,194,105,0,133,194,96,201,9
,144,13,165,193,24,105,160,133,193,165,1
94,105,0,133,194,96,160,0
1020 DATA 162,3,24,177,193,105,128,145,1
93,165,193,24,105,160,133,193,165,194,10
5,0,133,194,202,208,233,96
1030 DATA 206,27,6,160,0,169,3,133,195,1
74,27,6,177,193,24,105,128,145,193,189,6
4,37,201,1,240,37,165,193
1040 DATA 24,105,40,133,193,165,194,105,
0,133,194,189,64,37,74,176,31,74,208,15,
165,193,56,233,2,133,193,165
1050 DATA 194,233,0,133,194,208,13,165,1
93,24,105,2,133,193,165,194,105,0,133,19
4,198,195,208,188,96,32,196
1060 DATA 41,162,0,160,46,189,68,34,153,
224,25,232,200,224,7,208,244,166,197,169
,130,133,197,169,0,141,0,208
1070 DATA 160,8,157,0,20,232,136,16,249,
96,32,196,41,32,47,41,162,0,160,46,189,7
5,34,153,224,25,200,232,224
1080 DATA 7,208,244,169,0,141,8,210,169,
175,141,1,210,169,0,133,195,162,255,160,
255,136,208,253,202,142,0
1090 DATA 210,208,245,230,195,165,195,17
0,41,1,141,8,210,224,20,208,229,96,169,0
,133,195,160,0,169,63,145
1100 DATA 193,162,255,160,255,136,208,25
3,202,208,248,230,195,165,195,201,10,240
,8,41,1,240,232,169,63,208
1110 DATA 228,96,133,195,168,185,0,6,201
,5,208,6,169,9,153,0,6,96,200,152,192,28
,208,234,169,0,168,240,229
1120 DATA 169,0,160,40,153,224,25,200,19
2,79,208,248,96,173,10,210,41,15,201,9,1
76,247,133,195,162,0,189,0
1130 DATA 6,201,4,240,5,232,224,26,208,2
44,224,9,176,4,165,195,208,20,224,18,176
,9,165,195,24,105,3,133,195
1140 DATA 208,7,165,195,24,105,18,133,19
5,170,189,0,6,201,5,208,195,138,96,32,19
6,41,160,46,162,0,189,82,34
1150 DATA 153,224,25,232,200,224,5,208,2
44,169,10,32,69,42,96,32,196,41,32,47,41
,162,0,160,44,189,87,34,153
1160 DATA 224,25,232,200,224,9,208,244,1
69,10,32,69,42,96,133,193,162,255,160,25
5,136,208,253,202,208,248
1170 DATA 198,193,208,242,96

ChipChat Modem

ChipChat modems are the most versatile and up to date available at the price. With autoanswer as standard and intelligent autodial with speed conversion as an option, ChipChats may be used to access computers and databases such as Prestel, Micronet, Homelink and BT Gold.

ChipChats support the CCITT V21 protocol: 300/300 baud and the V23 protocol: 1200/75, 75/1200 and 1200/1200 (half duplex). Where local regulations permit, Bell standard operation may be used for dialing US databases.

ChipChats use the latest technology and provide valuable extra features such as auto-disconnect to save your telephone bills, and speed conversion for operation with IBM PCs. A full complement of LEDs monitor data flow and the status of handshake lines on the Canon D-type connector.

ChipChat CC2123A Autoanswer £130.35 (£149.90 inc VAT)
 ChipChat CC2123AD Autodial £165.13 (£189.90 inc VAT)
 P&P £2.70 + VAT Approval Applied For



Digitolve

Digitolve Limited
 Aire and Calder Works
 Cinder Lane, Castleford, West Yorks WF10 1LU
 Tel: 0977 513141 Telex 557661 AGRAM G

PROHIBITED FROM DIRECT OR INDIRECT CONNECTION TO ANY TELECOMMUNICATION SYSTEM IN ANY BRITISH TELECOMMUNICATIONS ACTION MAY BE TAKEN AGAINST ANYONE DOING SO

• Circle No. 179

NEW!

Now your computer can teach you to read faster – and remember more!

Did you know that the faster you read, the more you absorb? Now SPEED READ will double your reading speed quickly and easily in your spare time at home.

This is a major breakthrough in home education which will bring you rapid rewards. Businessmen can dramatically cut time spent on paperwork, students and schoolchildren will find study easier and more fun, housewives can double their reading pleasure.

SPEED READ helps your computer to help you to a more rewarding and profitable life. Available on cassette for use with BBC Micro B, ZX Spectrum 48K and Commodore 64 systems, and on disk for use with Sirliqs (MS dos) and IBM (PC dos) systems.

Available exclusively from HI-YIN Music, Department SR/PC, 43 Church Hill Road, OXFORD OX4 3SG.



Please send me the SPEED READ programme suitable for BBC Micro B/Commodore 64/ZX Spectrum 48K (cassette only)/Sirliqs (MS dos)/IBM (PC dos) (disk) system quickly!

Name: _____

Address: _____

Postcode: _____

Signature: _____

I enclose cheque/P.O. for £16.95 (inc. VAT & postage & packing) for the cassette. £29.95 (inc. VAT & postage & packing) for the disk.

Post to HI-YIN Music, Dept. SR/PC, 43 Church Hill Rd., OXFORD OX4 3SG.

Please delete as applicable

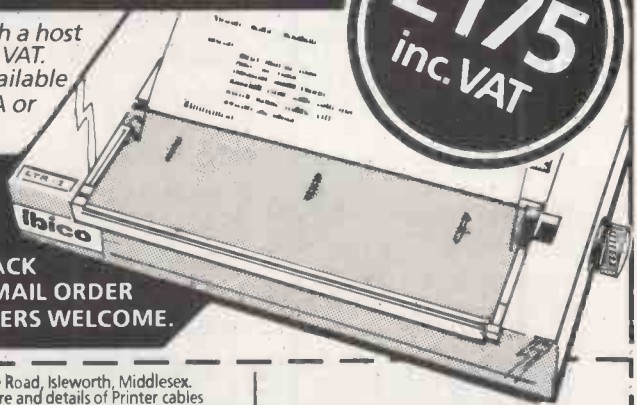
• Circle No. 164

UNBEATABLE VALUE

ibico LTR-1 LETTER QUALITY PRINTER

A compact (12" x 2½" x 8"), letter quality printer from ibico with a host of outstanding features at the unbelievable price of £175.00 inc. VAT. Plugs straight into most computers, with optional interface available for Commodore 64 and Sinclair Spectrum. Compatible with BBC A or B and any computer with parallel interface.

£175
inc. VAT



- Prints 12 characters per second Elite type (12 characters per inch)
- Bi-directional printing • Logic seeking • Plain paper – uses your letterheading • Up to A4 size paper
- Instant change ink roller
- 96 characters, full UK ASCII code
- 80 columns • Separate power switch • On/off pilot lamp

FULL 12 MONTHS PARTS & LABOUR GUARANTEE. FULL 21-DAY MONEY BACK GUARANTEE FOR MAIL ORDER CUSTOMERS. CALLERS WELCOME.

ibico

IBICO LIMITED, 181 SPRING GROVE ROAD, ISLEWORTH, MIDDLESEX
 TEL: 01-568 2379 Telex: 934364

To: Ibico Ltd., 181 Spring Grove Road, Isleworth, Middlesex. Please send Ibico LTR-1 literature and details of Printer cables and interfaces.

..... Ibico LTR-1 letter quality printer	£175.00
..... Printer cable for BBC A or B	£9.95
..... Interface for Commodore 64	£25.95
..... Interface for Sinclair Spectrum	£39.95

I enclose a cheque/P.O. for £.....

(Plus £4.50 for postage and packing)

Please debit my Access/Barclaycard Card: Expiry date

No: _____ or telephone your credit card order

ALL PRICES INCLUDE VAT

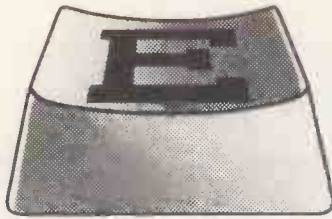
Name: _____

Address: _____

Post Code _____

Tel. No.: _____

• Circle No. 129



Express Computer Consultants Ltd.

0273 204377

**HARDWARE & SOFTWARE FOR IBM, APPLE, APRICOT, SIRIUS AND OTHERS
COMPUTER STATIONERY, MEDIA & FURNITURE. BOOKS & TRAINING SOFTWARE.**

SOFTWARE	SOFTWARE Cont...	HARDWARE	HARDWARE Cont...
INTEGRATED WINDOWING	APPLICATIONS	PRINTERS	MONITORS
Framework -IBM £383.50	Easy Jr-IBM £275.00	Anadex DP9000B £875.10	Kaga 12" Green £99.00
Open Access-IBM £348.00	BOS Modules-IBM P.O.A.	Anadex WP6000 £1974.50	Kaga RGB Vision III £364.50
Open Access-Apricot £360.00	Easyplanner-IBM £107.00	Brother HR15 £387.50	Microvitec £449.50
Symphony-IBM £451.00	Pertmaster-IBM £536.00	Brother HR35 £809.50	
	Project Manager-IBM £294.00	Diablo 630 (ECS) £1772.50	BOARDS for IBM
	Tk! Solver-IBM £251.24	Epson DX100 £415.50	AST Megaplus II £253.00
WORDPROCESSING	LANGUAGES/OS's	Epson FX100FT £497.87	Baby Blue II £451.00
Easywriter II-IBM £189.00	C Compiler-IBM £216.00	Epson JX80 (colour) £490.00	Blossom 64k £264.00
Mac Microsoft Word-Mac £119.00	C Basic-CP/M86 £207.50	Epson LQ1500 £962.50	Sigma Maximisar £263.00
Multimate-IBM £276.50	C Basic Compiler-PCDOS £370.50	Ok! Microline 84 £694.00	Pc Net Blossom £594.00
Volkswriter-IBM £134.00	CIS Cobol-IBM £340.00	Ok! Microline 92 £389.00	Quadboard Øk £217.34
Wordstar Prof-IBM £299.00	Level II Cobol-IBM £867.50	NDK Printstar £1050.00	Quadboard II 64k £274.50
Wordstar 3.3-Apple IIe £232.00	Microsoft C Compiler-IBM £348.00	NEC 2050 £774.50	Hercules £348.50
Wordstar Prof-MSDOS £396.00	Ms Pascal-MS/PCDOS £217.00	NEC 7700 £1903.00	Also
	PL/1-IBM £463.00	NEC Spinwriter 3550 £1386.50	PRINTER ACCESSORIES
DATABASES	X Basic-CP/M80 £157.00	Newbury 8820 £805.00	PARALLEL/SERIAL INTERFACES
Cardbox-IBM £165.75	UTILITIES	Qume 11/55 RO £1416.00	MODEMS
Friday-Generic £156.00	Access Manager-IBM £246.00	Qume Sprint 11 55cps (req L/F) £1468.50	COPROCESSORS
Knowledge Man-IBM £360.50	Display Manager-IBM £308.50	TEC/ITOH F10 40cps £1052.50	
DBase II-IBM £280.00	SCIENCE/ENG./MATHS	PLOTTERS	MEDIA
DBase III-IBM £325.00	MICROSTAT 4.1-IBM £193.50	HP7470A £823.00	£P.O.A
SPREADSHEETS	STATPRO-IBMXT £1107.50	Sweet P-IBM £449.00	3M, BASF, CALCULUS, DYSAN, FUJI, NASHUA, WABASH
Lotus 1-2-3-IBM £300.00	BUSINESS GRAPHICS	HARD DISKS	Also
Multiplan-IBM £145.00	Chartman IV-IBM £174.50	Honeycomb V3.1-IBM £3105.00	DUST COVERS, PRINTER
Supercalc III-IBM £228.50	DR Graph-IBM £120.00	QCS 12 Meg - IBM £1713.50	RIBBONS/ WHEELS, PAPER, FURNITURE.
COMMUNICATIONS	Foxgraph-IBM £155.00	Santa Clara SCS 113-IBM £6038.50	
Bstam PC DOS-IBM £104.00	Graphstat-Sirius £165.50	Sysgen 11-20-IBM £2924.00	
Transporter-IBM £144.08	Graphstat 1-IBM £197.50	Tallgrass 3020 - IBM £2910.50	
EXPRESS-MATE/-IBM £330.00	DESIGN GRAPHICS		
EXPRESS-LINK £330.00	Cadplan Modules-IBM £P.O.A.		
	Microsoft Chart-IBM £176.00		

IT'S IMPOSSIBLE.....

...TO LIST OVER 2,000 PRODUCTS IN THIS ADVERTISEMENT.
PHONE 0273-204377 FOR FURTHER INFORMATION

AT NO COST TO YOU....

...WE WILL NEGOTIATE DISCOUNTS STARTING AT 10% WITH AUTHORISED DEALERS OF IBM PC/XT/AT, APPLE/LISA/MAC, DEC, RAINBOW, APRICOT/SIRIUS ON YOUR BEHALF.



Express Computer Consultants Ltd.

1 THE DRIVE, HOVE,
E. SUSSEX. BN3 3JE
Tel: 0273 204377

• Circle No. 153

Keeping up with VisiCalc

Peter van der Linden checks out the reference books available for the oldest spreadsheet package around.

"FIRST TO MARKET, wins the market" is an old software adage describing the advantages of timeliness in selling software. The VisiCalc software certainly proved the truth of the proverb. VisiCalc was the first of the spreadsheet packages, and coupled with one of the first home PCs, the original Apple, it quickly established a dominant position which was unassailable for several years. VisiCalc, together with its supporting cast of Visiplot, Visitrend, etc., is now a mature — some would say elderly — software package. There are a host of reference books serving its users.

VisiCalc for Science and Engineering is a handy guide to over 50 standard spreadsheet calculations useful in the stated application areas. The authors, Stanley Trost and Charles Pomernacki, have assumed that users already know the basics of VisiCalc. Thus the text is a list of favourite recipes, divided into nine broad subject areas: communications, physics, mechanical engineering, statistics and so on. The solar engineering section was particularly interesting. The diagrams throughout are excellent and the layout has a pleasing appearance to the eye. I recommend this book equally to experienced practitioners and to aspiring novices who wish to acquire an intuitive feel for these calculations.

Another good book listing many standard calculations is *54 VisiCalc Models* by Robert Flast. The application areas are primarily financial, such as mortgage amortisation and depreciation; statistical, including binomial, Poisson and normal distributions, and mathematical, such as vector analysis and some elementary integration. The book is well planned, following a consistent layout. Each VisiCalc model — the author terms them templates — names the problem and gives an example. Then the author shows a sample of what appears when it runs, a sample run with data, and the model listing. I found the book useful but not inspiring; no solar engineering here. There are one or two minor text misprints, though I did not detect any flaws in the templates.

Executive VisiCalc for the IBM Personal Computer by Roger Clark is a business-like book written from an authoritative standpoint. The author did mar his credibility a little in announcing in the foreword that he was "a VisiCalc maven". The term "maven" eluded definition in all the dictionaries which I brought to bear on the problem, and I presume it is a particularly imaginative misprint for "supporter" or "expert". The book has a nice easy style, which gently leads novices through the basics on

to more advanced material. The examples are heavily biased towards business applications.

Using VisiCalc Getting Down to Business by Carol Klitzner and Matthew J Plociak junior appears to have been printed on recycled old telephone directories. There really is no excuse for this kind of shoddiness, as my information is that the Second World War ended about 40 years ago and utility paper ended with it. John Wiley, the publisher, should be ashamed of its penny-pinching given the cover price of £13.95.

There are three major sections to the book, covering the basics, sample business applications, and the "advanced" features available on the Apple III and the IBM PC. The models given include cash flow, economic order quantity and break-even analysis which are also available on discs for the Apple II, IBM PC and the TRS-80 Model III. The book is actually a reasonable combination of tutorial guide and list of models. Each section ends with several questions, for which the answers are supplied later. This is a well thought-out and comprehensive work which has not been given justice by its publisher.

VisiCalc Made Simple, published by John Wiley, is a guide to the spreadsheet software, rather than a list of umpteen

(continued on next page)



(continued from previous page)

useful models. The author, Thomas O'Donovan, rather sniffily dismisses that sort of book. Undoubtedly he has put in a lot of work to draw out the various features of VisiCalc, and there is an appendix at the end listing some differences between different hardware versions. I found the text a bit dry, though it is both accurate and informative. This is a reference book as much as an introductory guide. The price is £7.95, which



represents excellent value. The hardware used by the author was the Apple II.

VisiCalc for Marketing and Sales by Michael Laric and Ronald Stiff is narrowly aimed at the sector which the title suggests. There are many different models given for forecasting, pricing, retail analysis and inventory decisions.

VisiCalc for Science and Engineering by Stanley R Trost and Charles Pomernacki. Published by Sybex, £13.95. ISBN 0 89588 096 2

54 VisiCalc Models by Robert H Flast. Published by Osborne/McGraw-Hill, £12.95. ISBN 0 88134 100 2

Executive VisiCalc for the IBM Personal Computer by Roger E Clark. Published by Addison-Wesley, £10.65. ISBN 0 201 10243 9

Using VisiCalc Getting Down to Business by Carol Klitzner and Matthew J Plociak Jr. Published by John Wiley & Sons, £13.95. ISBN 0 471 89852 X

VisiCalc Made Simple by Thomas M O'Donovan. Published by John Wiley & Sons, £7.95. ISBN 0 471 90457 0

VisiCalc for Marketing and Sales by Michael V Laric and Ronald Stiff. Published by Prentice-Hall, £12.55. ISBN 0 13 942418 0

VisiCalc Programming: No Experience Necessary by Tom Simpson. Published by Little Brown, £35. ISBN 0 316 78339 0

Other editions of this book are available for Lotus 1-2-3 and Multiplan, and of course the models are also available on a separately purchased floppy disc. Published by Prentice-Hall, and priced at £12.55, this book gives a competent treatment to its chosen specialisation. It would not really be of interest to anyone outside that realm. It has an obvious American bias which shows up in references to dollar amounts everywhere.

"No experience necessary" is quite a bold claim to make, as far as computers are concerned. Nonetheless Tom Simpson makes it in the title of his book *VisiCalc Programming: No Experience Necessary*. The text comes in a very practical spiral-

bound package which also includes a floppy disc suitable for the Apple II personal computer. The written text is used in conjunction with the lessons on the disc. The instructions are truly easy to follow, and the lessons are good.

I think the book would benefit greatly from just two or three pages with diagrams at the beginning, showing the power-up and program-loading sequence. Then the "no experience necessary" claim would be fully justified. At the foot of each page there is an endearing box of advice on "what to do if you are helplessly lost". This book would be of greatest use to people training staff within a formal business environment.

dBASE
dBASE III
Training
Programming
Software
LANTECH
Information Systems

55 Peascod Street,
 Windsor, Berks.
 Tel: Windsor
 58182/58013

MICRO SUPPORT

65 GLEBE CRESENT, KENTON, MIDDLESEX
 TELEPHONE 204 9351

PRINTER	
EPSON MX-100F/T TYPE 111.....	349.00
(Limited Offer)	
HIGH SPEED PRINTER BUFFERS	
48K HIGH SPEED PRINTER BUFFER PARALLEL.....	119.00
48K HIGH SPEED PRINTER BUFFER SERIAL.....	123.00
32K HIGH SPEED PRINTER BUFFER PARALLEL.....	111.00
32K HIGH SPEED PRINTER BUFFER SERIAL.....	109.00
16K HIGH SPEED PRINTER BUFFER PARALLEL.....	102.00
16K HIGH SPEED PRINTER BUFFER SERIAL.....	94.00
MONITOR	
GREEN SCREEN ZENITH MONITOR.....	75.00
MODEMS	
BUZZ BOX CCITT V21 300/300.....	65.00
PSU. 9.00 BBC LEAD 4.50 OTHERS LEADS 8.50	
WS2000 MULTI STANDARD MODEM, MAINS-POWERED	
ORIGINATE & ANSWER, FULL DUPLEX	
AUTO ANSWER, AUTO DIAL.....	129.95
NIGHTINGALE MULTI-STANDARD MODEM	
300/300, 1200/75, 1200/1200	
ORIGINATE & ANSWER, FULL DUPLEX	
COMPLETE PACKAGE WITH COMMSTAR.....	139.50
COMMUNICATION ROMS	
COMMSTAR.....	29.00
TERMI (BY COMPUTER CONCEPT).....	28.00
MAGNETIC MEDIA	
744 SSDD540T.....	16.00
745 DSDD/40T.....	23.00
746 SSDD/80T.....	34.00
747 DSDD/80T.....	40.00
C15 BLANK CASSETTES.....	0.50
C20 BLANK CASSETTES.....	0.65

ALL PRODUCTS GUARANTEED
 SEND SAE FOR FULL DETAILS
MONEY REFUND (LESS P/P), IF GOODS RETURNED WITHIN
7 DAYS

ORDER BY CHEQUE/BARCLAYCARD
24HRS SERVICE. IMMEDIATE DISPATCH

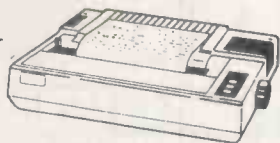
Electronequip

(Authorised BBC Micro Dealer, and Econet service centre)

*EPSON

RX-80FT £225.25 + VAT

FX-80 £320.88 + VAT



Printer price includes paper and BBC cable
Screen dump rom available for £11.50



Printer price includes paper and BBC cable
Screen dump rom available for £11.50

VOLTMACE JOYSTICKS

*10% off list prices



	Discounted price
JSVOLT14 Voltmace Delta 14B Joysticks.....	inc. VAT 13.46
JSVOLTAD Voltmace 14B/1 Adaptor Box.....	13.36
JSVOLT3B Voltmace Delta 3B Twin Joysticks.....	18.09

SIDeways

SIDeways FITTED

"SIDeways" rom board for BBC Micro. No soldering required

£33.44 + VAT

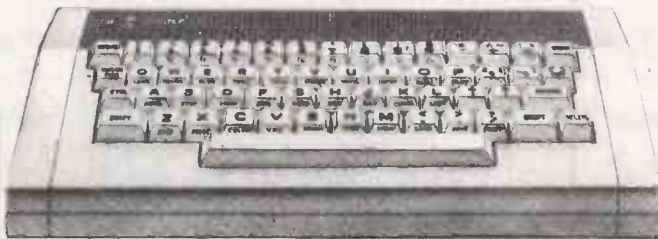


NORDMENDE

14" TV/Monitor
£173.04 + VAT



BBC MODEL B £359.10 inc VAT

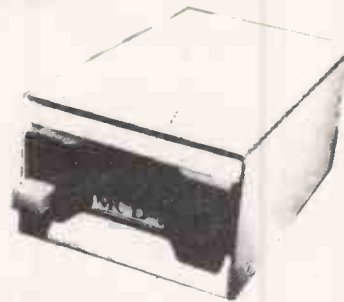


Electronequip is an authorised Acorn service centre and has been an Acorn dealer since the introduction of the Atom. Our demonstration facilities include 20 station Econet and Torchnet systems.

	Ex VAT	Inc VAT
ANB02 BBC Model with Econet Interface	389.14	446.00
ANB03 BBC Model with Disc Interface	409.14	469.00
ANB04 BBC Model B with Disc & Econet Interface	450.01	516.00
ANCO1 6502 Second Processor	174.35	199.00
ANCO4 Z80 Second Processor	348.26	399.00
ACBBITST Acorn Bit Stik (ANF04)	327.39	376.50
ACBTELET Teletext Receiver (ANE01)	195.65	225.00

3" Micro Disc £89.00 (inc. VAT)

Disc Interface & Drive
£181.30 (inc. VAT)



Micro Disc Drive for the BBC Micro

The Micro disc drive offers a method of low cost quick access to programs. The drive is essentially a small version of a 5 1/4" disc drive and offers similar features to the larger drive. The data is stored on a 3" disc, this is enclosed in a protective hard plastic cassette which features a write protect switch. The micro drive requires the standard Acorn disc interface, but a new disc filing system rom. Acorn DFS may be exchanged for the micro DFS for £2.30. The new micro disc filing system can read and write to Acorn DFS discs. Thus if a 5 1/4 inch and a micro floppy were connected on the same cable files could be transferred between them.
Capacity: 80.64 K bytes **Transfer Rate:** 125k bit/s.

All offers subject to availability
Prices subject to variation without prior notification
Prices for monitors & printers include BBC cable

TRADE ENQUIRIES WELCOME
Access & Barclaycard Accepted
Large Stocks — 24 Hour Despatch Carriage 46p

BRANCHES
MAIL ORDER: 36-38 WEST STREET
FAREHAM, HANTS. (0329) 230670
SHOP/TECHNICAL: 59 WEST STREET
FAREHAM, HANTS. (0329) 230671
KINGS LYNN: 17 TENNYSON AVE. (0553) 3782



Electronequip



36-38 West Street, Fareham, Hants (0329) 230670

● Circle No. 154

Cash & Carry

COMPUTERS

**TOP
SHOWROOM
SERVICE**

**ROCK
BOTTOM
PRICES**

**PERSONAL CALLERS WELCOME AT OUR EXTENSIVE SHOWROOMS
MOST EQUIPMENT ON DEMONSTRATION**

→→→ Even further price reductions
this month are indicated with an arrow →→→

The UK's Best Printer Prices

Only a sample of our massive range of printers
shown here — phone for further details

DAISYWHEEL LETTER QUALITY

Juki 6100 (P)	£349.90 + VAT =	£402.39
Brother HR15 (P and S)	£329.00 + VAT =	£378.35
Daisystep 2000 (P)	£239.95 + VAT =	£275.94

PRINTER/TYPEWRITERS

Brother EP22 Dot Matrix (S)	£109.00 + VAT =	£125.35
Brother EP44 (S)	£189.00 + VAT =	£217.35
Modems available for Easylink and Telecom Gold		
Juki 2200 Daisywheel (P or S)	£245.00 + VAT =	£281.75

DOT MATRIX PRINTERS

Brother M1009 (P and S)	£169.00 + VAT =	£194.35
Brother HR5 (P or S)	£125.00 + VAT =	£143.75
Canon 1030A NLQ (P)	£309.90 + VAT =	£356.39
Canon 1150A NLQ (P)	£396.90 + VAT =	£456.44
EPSON RX80 (P)	£195.00 + VAT =	£224.25
EPSON RX80 F T PLUS (P)	£220.00 + VAT =	£253.00
EPSON FX80 (P)	£338.95 + VAT =	£372.60
EPSON RX100 F T (P)	£430.00 + VAT =	£494.50
Kaga Taxan KP810 NLQ (P)	£289.00 + VAT =	£332.35
Kaga Taxan KP910 NLQ (P)	£379.00 + VAT =	£435.85
Seikosha GP500A (P)	£113.00 + VAT =	£129.95
Seikosha GP700A Colour (P)	£243.43 + VAT =	£279.95
Shinwa CTA80 (P)	£199.90 + VAT =	£229.89

(P)=Parallel-Centronics (S)=Serial RS232
Smith Corona range of printers Now In Stock —
Phone or write for details

INSTANT CREDIT Up to 36 months to pay

All items over £150 available on our easy credit terms.
Written details available on request.

SUPERDISKS

LONDON'S LOWEST PRICES ON FLOPPY DISKS

Prices per box of ten ex VAT

	SSDD 4QTR	DSDD 4QTR	SS96TP1 8QTR	DS96TP1 8QTR
BASF 5 1/4"	£10.95	£18.20	£19.80	£22.50
3M 5 1/4"	£13.55	£19.50	£20.05	£24.00
VERBATIM 5 1/4"	£14.50	£19.50	£19.50	£25.50
DYSAN 5 1/4"	£16.80	£24.90	£24.90	£32.00
TOK 5 1/4"	£17.50	£25.50	—	£33.00

3M/BASF 3 1/2" **£34.90**

Add 70p for P&P per box of 10 disks

CASH & CARRY COMPUTERS

53-59 High Street,
Croydon, Surrey CR0 10D.

12" MONITORS — GREEN SCREEN

Sanyo 2112 Med Res.	£65.00 + VAT =	£74.75
Sanyo 3112 High Res.	£88.00 + VAT =	£101.20

14" MONITORS — COLOUR

Commodore 1701 Composite/Sound.	£173.00 + VAT =	£198.95
Fidelity CM14 RGB/Comp/Sound.	£169.00 + VAT =	£194.35
Microvitec 1431DS Norm Res RGB.	£173.00 + VAT =	£198.95
Microvitec 1431DZ for ZX Spectrum.	£199.00 + VAT =	£228.85
Microvitec 1451DS Med Res RGB.	£229.00 + VAT =	£263.35
Microvitec 1451DG for Sinclair QL.	£234.74 + VAT =	£269.95
Microvitec 1441DS High Res RGB.	£379.00 + VAT =	£435.85
Sanyo 3125 Norm Res RGB.	£173.00 + VAT =	£198.95
Sanyo 3117 Med Res RGB.	£285.00 + VAT =	£327.75
Sanyo 3115 High Res RGB.	£399.00 + VAT =	£458.85

Commodore

Plus 4 NEW 64K Computer.	£199.95 + VAT =	£229.95
C16 Starter pack inc. cassette deck.	£99.95 + VAT =	£114.95
Commodore 64.	£165.17 + VAT =	£189.95
SX64 Portable inc D. Drive and Col. Monitor.	£478.22 + VAT =	£559.95
C2N Cassette.	£35.11 + VAT =	£37.50
1541 Disk Drive.	£182.57 + VAT =	£209.95
DPS1101 Daisywheel Printer (by Juki).	£309.95 + VAT =	£356.44
801 Tractor Printer.	£130.39 + VAT =	£149.95
802 Friction Tractor Printer.	£260.83 + VAT =	£299.95
1701 Colour Monitor.	£173.00 + VAT =	£199.90

Amstrad

CPC464 Green Monitor inc. FREE software.	£209.00 + VAT =	£240.35
CPC464 Colour Monitor inc. FREE software.	£301.00 + VAT =	£346.15

SANYO MBC 555 Business Computer

128K including Wordstar, Calcstar, Infostar.	£795.00 + VAT =	£914.25
--	-----------------	----------------

Acorn/BBC

Acorn Electron.	£109.90 + VAT =	£126.39
BBC Model B.	£289.00 + VAT =	£332.35
Model B inc. Disk I/F.	£369.90 + VAT =	£425.39
Cumana 1x100K DD CSX100.	£99.95 + VAT =	£114.95
Cumana 1x200K DD CSX200.	£131.95 + VAT =	£151.75
Cumana 2x100K DD inc PSU.	£227.90 + VAT =	£262.09
Cumana 2x200K DD inc PSU.	£289.90 + VAT =	£333.39
Cumana 2x400K DD inc PSU.	£344.90 + VAT =	£396.64

All above Cumana Disk Drives include Cable, Manual + form. disk.

Sinclair

QL 128K Computer.	£334.74 + VAT =	£384.95
NEW Spectrum 48K PLUS.	£106.81 + VAT =	£122.95
Microdrive + Interface 1 + 4 Free Programs.	£82.90 + VAT =	£95.00
16K-48K Upgrade.	£21.70 + VAT =	£24.95

MSX Computers

Toshiba HX10 64K.	£189.90 + VAT =	£218.39
Sanyo MRC10 64K.	£234.74 + VAT =	£269.95
Sony HB75B 64K.	£245.00 + VAT =	£281.75
JVC HC7GB 64K.	£226.04 + VAT =	£259.95

Full range of MSX accessories available

Apricot Computers

**Fantastic Low Prices — All models in stock:
F1 • Apricot PC • Xi • Portable
PHONE NOW!**

**Mail Order + Export + Trade
Hot Line Phone 01-686 6362**



Delivery by Securicor (3 day) please add £5.00 + VAT per item.
Delivery by T.N.T. (overnight) please add £9.50 + VAT per item.

Send off the coupon or order by 'phone quoting your Access,
Barclaycard No. 'Phone 01-686 6362. Immediate
despatch on receipt of order or cheque clearance.

Or you can Telex your order on: 946240 Attn 19001335

We accept official orders from PLC's, Government Departments
and Educational establishments.

These prices correct until superceded by next advertisement.

To: Cash & Carry Computers, 53-59 High Street, Croydon, Surrey CR0 10D.

Please supply _____

I enclose my cheque for £ _____ including delivery by Securicor/T.N.T.*

or charge my Access/Barclaycard No _____

Name _____ Signature _____

Address _____

*Please Delete

PC 3
(Vision Technology Ltd)

Beast blasters

Author Jeff Minter presents his top 20 favourite games.

	Machines	Publisher	
1. Star Raiders	At	Atari	These two games are a joint No.1. They are light years ahead of anything else at all.
2. Rescue on Fractalus	At	Lucasfilm	
3. Elite	BBC	Acornsoft	A thinking person's Star Raiders.
4. Pinball Construction Set	At,C64,Ap	Electronic Arts	I love pinball and designing games. Now I can do both!
5. Encounter	At,C64	Novagen	Battlezone — better than the arcade version.
6. Ballblaster	At	Lucasfilm	Futuristic sci-fi sport. A great two-player game, too!
7. Star Shlp Command	BBC	Acornsoft	A good laser-blazing shoot-out in deep space.
8. Miner 2049'er	At,C64,Ap	Big 5	The original and still the best platform game despite hordes of clones.
9. Mule	At,C64	Electronic Arts	A superbly presented strategy game even an arcader will love to play.
10. Crossfire	At,Ap	Sierra	An amazingly simple idea that is fiendishly difficult to play.
11. Missile Command	At	Atari	The definitive version. Let's leave nuclear weapons to the video games, OK?
12. Boulder Dash	C64,At	First Star	Another simple but compulsive design, nicely presented.
13. Gyruss	At,C64,	Parker	Neat conversion, a touch too easy perhaps, but has the best soundtrack of any zappo game.
14. Archon	C64,At	Electronic Arts	Unholy union between chess and arcade zapping.
15. Poster Paster	C64,Am	Task Set	Original, colourful, tuneful, and it made me laugh.
16. Boogaboo (the flea)	C64,Sp,Am	Quicksilva	Original control system and freaky psychedellic caverns.
17. Guardian	C64,BBC	Alligata	The definitive Defender clone.
18. Choplifter	At,Ap,C64	Broderbund	I like the way the hostages wave.
19. International Soccer	C64	Commodore	Match of the Day on the 64.
20. Space Taxi	C64	Muse	Weird mutant of the lunar lander genre.

Micros: Ap, Apple; At, Atari; Am, Amstrad; BBC, BBC Micro; C64, Commodore 64; Sp, Spectrum; Vic, Commodore Vic-20.

I LOVE to write strange games which challenge reality. I like to freak people out by designing a game around a weird character like the space sheep or Mutant Camel and still produce a playable, enjoyable game. I love hairy beasts like goats, llamas, sheep and camels.

I detest cloning of other people's ideas. Arcade cloning should be done brilliantly or not at all, and ought to be licensed. In each new game I design I like to introduce new control modes and elements never seen in games before.

I love a good blast. Sonics are as important as graphics, and playability and lasting interest more important than both. I'm bored with the usual up/down/left/right/Fire control system. I like to experiment with artificial gravity routines.

In choosing the games on the top 20 chart, I've taken into account originality, how much I play them, truly amazing programming — Fractalus wow! — and humour. Modesty prevented me from including any of my own games, but some of them would have been there if I was compiling the list of my own top 20 favourites.

Games written by Jeff Minter

	Machines	Year written	
Andes Attack	Vic	1982	My first machine-code Vic program. A Defender clone.
Traxx	Vic	1982	Painter game.
Gridrunner	Vic,C64,At	1982	Stripped-down Centipede and redesigned it fast and vicious.
Abductor	Vic	1982	Fast blaster, loud noises.
Attack of the Mutant Camels	C64,At	1983	First Beast game. Based on Imperial Walkers sequence in <i>The Empire Strikes Back</i> .
Laser Zone	Vic,C64	1983	Now on to wholly original stuff. Difficult dual-axis blaster.
Matrix	Vic,C64	1983	Gridrunner 2 — faster, more original stuff, and camels.
Hover Bovver	C64,At	1983	One of my favourite designs.
Metagalactic Llamas	Vic,C64	1983	Shoot-up with unique firing mode and forcefield.
Battle at the Edge of Time			
Revenge of the Mutant Camels	C64	1983	One of my all-time favourites. Lovely gormless beast and a good blast to boot.
Hell Gate	Vic,C64	1984	On the Vic, the fastest bit of arcade zapping around. Tricky four-axis control.
Sheep in Space	C64	1984	Interstellar Space Sheep. One of my favourite scrolling blasters.
Anclpital	C64	1984	Weird arcade adventure and an excellent blast.

Telephone Lucy O'Sullivan 01-661 8163

ADVERTISEMENT RATES

Display Rates

£16.50 per single
Column Centimetre
Minimum 5cm x 1 col
One Insertion : £16.50 per scc
Three Insertions : £15.75 per scc
Six Insertions : £15.50 per scc
Nine Insertions : £15.00 per scc
Twelve Insertions : £14.50 per scc

Micro Ads.

Lineage 30p per
word minimum of
20 words.
Prepayable.

Copy Date

Shopwindow advertisements for the May edition will be accepted up to 25th March subject to space being available.

Post to

Practical Computing, Classified
Department, Room H211, Quadrant House,
The Quadrant, Sutton, Surrey SM2 5AS.

REALISE YOUR FULL POTENTIAL LIFE-LINE



SELF ANALYSIS CAREER COUNSELLOR

FOR ANY SPECTRUM COMPUTER
(IBM and BBC coming soon)

Understand yourself and others using this brilliant new program!
LIFE-LINE will reveal:

- YOUR TRUE CHARACTER
- THE CHARACTER YOU TRY TO PROJECT
- YOUR SELF-IMAGE

LIFE-LINE can help you:

- CHOOSE THE RIGHT CAREER
- ACHIEVE MORE
- UNDERSTAND OTHERS
- IMPROVE YOUR RELATIONSHIPS

LIFE-LINE is simple to use, amazingly accurate, and comes complete with an instruction manual written by St. John A. R. Young B.A. (Psych). LIFE-LINE is designed for use in the home, school or college - anywhere that people matter.

Price £14.95 inclusive of VAT and Postage.

All enquiries SAE please

Barclay Access orders accepted by telephone

WILLIAM STUART SYSTEMS LTD Quarley Down House, Cholderton, Nr Salisbury, Wiltshire SP4 0DZ. Tel: 098 064 235

● Circle No. 300

SCIENTIFIC SUBROUTINE LIBRARY

VOLUME 1 - STATISTICS AND FITTING FUNCTIONS

Mena, SD, normal distribution, partial expectation, Chauvenets criterion, least squares fit to polynomial and arbitrary function, repetitive least squares fits, covariance matrix, chi-squared statistic, matrix inversion, solution of linear simultaneous equations.

VOLUME 2 - LINEAR PROGRAMMING

Reduction of a simplex tableau, integer programming, partial integer programming, conversational linear programming system, least cost mix problem.

VOLUME 3 - FURTHER STATISTICS

Ranking, quantiles, frequency, correlation coefficient, T, chi-squared and F distributions and their inverses, T test, chi-squared test, Wilcoxon test, linear and multiple regression, ANDVA 1-way and 2-way.

VOLUME 4 - TRANSFORMATIONS AND SORTING ALGORITHMS

Fourier and Fast Fourier transforms, numerical integration and differentiation, harmonic analysis, interpolation, coordinate transformations. Exchange sort, Quicksort, Shellsort, Tree sort.

All routines are written in BASIC for easy implementation on any machine.

Machine readable source code £75 = VAT per volume (Most disk formats + QL microdrive now available)

Manuals including full source listings with implementation notes and documentation £25 per volume

CP/M TO DEC FILE TRANSFER

Software to read and write RT-22 format RX01 diskettes under CP/M. Supplied on 8" SSSD diskette - £25 + VAT.

SINCLAIR QL TERMINAL EMULATOR

Allows the SINCLAIR QL to act as a terminal to connect to other micros, bulletin boards and mainframes - £25 + VAT. Write or phone for further information on any of our products.

MICRO LOGIC CONSULTANTS LTD.
57 Station Rd., Southwater, Horsham, W.
Sussex RH13 7HQ

Telephone 0403 731818

● Circle No. 301

Tele Video Multiuser Equipment

Secondhand in excellent condition

- i. T.S. 816/40 £5,600
- ii. T.S. 806/20 £2,100
- iii. T.S. 806/10 £1,900
- iv. Sirius Act 1 £1,200

Cambridge Data Ltd

15 Margaret St.,
London W1N 7NE
01 580 1654

8, Musters Rd.
West Bridgeford,
Nottingham NG2 7PL
0602 811801

78

● Circle No. 302

Superbrains
NEW OR
SECOND HAND
WE BUY, SELL
& REFURBISH

MICROMODS LTD.,
53 ACTON RD., LONGEATON, NOTTINGHAM
NG10 1FR. Tel: 0602-724264

32

● Circle No. 303

GENIE OWNERS

Don't sell your Genie!!
Upgrade it to latest spec.

Hi-Speed CPU - 3.8MHz £34.95
All programs run up to 60% faster.

Lowercase - £34.95
Full UPPER/lower case.

TAB/CLEAR keys £6.95

Plus many other **hardware**
items ring for ANY hardware
or **repair** quote.

ARC Electronics, Wakefield, Yorks.
WF2 6SP. (0924) 253145

67

● Circle No. 304

OPEN HOUSE TUITION FOR NOVICES AND OTHERS

Choose your time - day or evening
Learn at your own pace.

BASIC programming £60
BUSINESS Packages £70
Word-Processing introduction £25

Brochure from:

MICROCOMPUTER ADVISORY CENTRE,
Polytechnic of the South Bank,
Borough Road,
London SE1 0AA
or ring:
01-928 8989 ext. 2468

58

● Circle No. 305

DISCOUNT DISCS (per box of 10) POST FREE

e.g. 5.25"	CDC	DYSAN	3M
	10 20-40 504	10 20-40 50+ 10	20-40 50+
SSDD 40 (48TPI)	15.50 15.00 14.50	18.50 18.00 17.50	16.50 16.00 15.50
SSDD 40 (48TPI)	20.50 20.00 19.50	26.00 25.50 25.00	22.00 21.00 20.50
SSDD 80 (96TPI)	22.00 21.50 21.00	26.00 25.50 25.00	24.00 23.00 22.50
SSDD 80 (96TPI)	27.00 26.50 26.00	30.50 30.00 29.50	28.50 27.50 27.00

SONY 3 1/2" single sided £35.50, double sided £47.50
Equally competitive prices on VERBATIM DATALIFE,
ZIDEX, FUJI. All 5.25" and 8" available.

DISCOUNT FANFOLD PAPER

From £12.00 per box (2000 sheets) + P&P £3.00
all sizes available.

Please add 15% VAT to all the above prices.
Send cheque with order or write for full list to

A.M.A. COMPUTER SUPPLIES, DEPT. B,
8 Glebe St. Beeston, Nottingham NG9 2BZ
Tel (0602) 255415

● Circle No. 306

BEST PRICE/PERFORMANCE COMPLETE BUSINESS COMPUTER SYSTEM

FOR
£1195.00
THE COMPLETE BUSINESS PACKAGE

NEC PC8000
NEC 2 MEGABYTES DISK STORAGE
NEC 14" HIGH RESOLUTION COLOUR MONITOR
NEC 120 c.p.s. PRINTER incl. 2 K BUFFER
NEC 64K CP/M COLOUR COMPUTER
NEC DETACHABLE KEYBOARD
NEC ALL CONNECTING CABLES
NEC 888 BASIC & N BASIC SOFTWARE

ALL ABOVE FOR £1195.00 + VAT

SOFTWARE: ACCESS - RETAIL, WHOLESALE
POINT OF SALE. SAGE ACCOUNTS & PAYROLL
WORDPROCESSING. BUNDLED SOFTWARE-
WORDSTAR+MAILMERGE+MULTIPLAN

£195.00

ACCESS COMPUTERS

2 ROSE YARD MAIDSTONE KENT. ME14 1HN

TEL (0622) 58356

● Circle No. 307

KINGSLEY ENTERPRISES

Specialists in all kinds of floppy diskettes

Mail Order Discs

Prices are for boxes of 10 discs

Soft Sector	Nashua	Xidex	Dysan	CenTech
5.25" Diskettes				
SS/SD 48	15.00	-	-	-
SS/DD 48	16.00	18.00	19.00	19.00
DS/DD 48	18.00	23.00	26.00	24.00
SS/DD 96	23.00	30.00	26.00	25.00
DS/DD 96	23.00	30.00	33.00	31.00
8" Diskettes				
SS/SD 48	20.00	-	25.00	-
SS/DD 48	21.00	22.00	26.00	29.00
DS/DD 48	22.00	26.00	30.00	33.00

Sony 3.5" (Apricot) Diskettes £36.00

Post Paid. Add VAT at 15%
Prices correct at time of going to press
Please ask for details of hard sector discs, business/educational accounts discounts, formatting.

KINGSLEY ENTERPRISES
87 Whitefield Road
Stockton Heath
Warrington
WA4 6NB

35

Organise your files on
CenTech Colour
discs

● Circle No. 308

MICROCOMPUTER INSURANCE

Comprehensive cover at a reasonable premium:

- All Risks Cover (incl. Transit) — up to £10,000 for £20
- Increased Cost of Working — up to reinstate lost data
- Breakdown & Derangement — alternative to maintenance agreement

Write with details to:

Geoffrey Hoodless & Associates
Freepost (no stamp required)
Woking
Surrey GU21 4BR
Tel: Woking (04862) 61082 (24 hrs)

71

● Circle No. 309

Now BASIC can do more...

fast data handling
key record access
efficient file use

It only has to

CALL MULTIKEY

- MULTIKEY works with Compiled and Interpreted Basic.
- MULTIKEY accesses records by full, partial or combined keys.
- MULTIKEY can handle multiple index files and join data files.
- MULTIKEY uses 'B'-tree indexing for power with flexibility.
- MULTIKEY is easily maintained, robust and adaptable.

Price £80 includes routines for card index, file maintenance and bulk data entry

Fact Sheet from Cam Associates Ltd Thornhill, Salford, S6 3PL. Tel: (0786) 85667

CAIRN

88

● Circle No. 310

compare
northern
computers...
considerate,
competitive
and
committed!

THE Showroom for all the leading micros

◆ BBC ◆ Electron ◆ Sinclair ◆ VIC64
◆ Dragon ◆ Printers ◆ Disk Drives
◆ Plenty of Software
◆ Books/Games ◆ Help & Advice
◆ Secondhand Computers

Churchfield Rd
● FRODSHAM Ches.
WA6 6RD

northern computers

Telephone: FRODSHAM 10 Lines
0928 35110

THE computer centre of the NORTH

● Circle No. 311

Set your micro free!

WITH HARDWARE

Data Buffers

Don't wait for printing to finish — no matter how fast your printer, your computer works faster.

Release that micro for more processing, seconds after giving the command to print out.

Save time by using a data buffer. And remember, computer time saved means operator time saved.

Word-processing and all print-orientated tasks can be speeded-up dramatically.

Graphics and CAD output — a data buffer is a must for these applications.

Cost-effective time saving. From £87.50 for 16K of buffer memory (for use with Epson printers). 64K buffer memory with optional serial or parallel input or output £199. Full-featured (copy, output hold, etc) 256K buffer memory, £423. Prices exclude VAT. Trade, quantity, and corporate terms — please call.

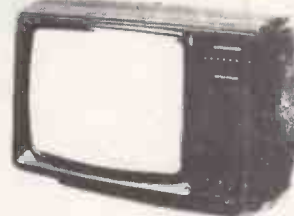
A>Line Computer Systems MICRO BUFFER DISTRIBUTORS

1 Church Farm Lane,
Willoughby Waterleys,
Leicestershire, LE8 3UD.
☎ Peatling Magna (053 758) 486

● Circle No. 312

GRUNDIG KINGSLEY

104 Heaton Road,
Newcastle-upon-Tyne NE6 5HL
Tel: (0632 650653)



R.G.B. MONITOR/TELEVISION

AS SUPPLIED TO EDUCATION AUTHORITIES SPECIFICATION

R.G.B. Inputs (Analogue and Digital Levels) All Models.
1 Volt P.P. Composite Video (Remote Model only)
Teletext Decoder available to plug into Chassis. (Remote Model only) Sound input gives access to Audio Amp.
All Models instantly switch back to Television

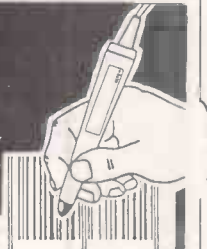
12" B.W. Monitor	£70 + VAT
14in. Colour Monitor/Television	£227 + VAT
16in. Colour Monitor/Television	£255 + VAT
16in. Colour Monitor/Remote Television	£295 + VAT
20in. Colour Monitor/Remote Television	£315 + VAT
22in. Colour Monitor/Remote Television	£340 + VAT
26in. Colour Monitor/Remote Television	£380 + VAT
Plug in Teletext Module	£75 + VAT
Connecting Lead	£5 + VAT
Carriage and Insurance	£9.50
4 Year Guarantee Insurance	£29.80

R.G.B. Monitor/TV (Grundig Approved)

35

● Circle No. 313

READ AND PRINT BAR-CODES USING ANY COMPUTER



Bar-codes give a speedy and error free means of data entry and provide a foolproof method of identification for any item or document. Typical uses include stock control, libraries, filing systems, security and checkpoint verification, point of sale terminals, spare parts identification, etc. etc. Already most grocery products are bar-coded at source and many other areas of industry and commerce are following. Bar codes will soon be commonplace. Altek decoding algorithms have been developed over a period of years and are recognised as being second to none. (Others use our software under licence, in their own products.) All easily exceed the industry standard benchmarks. (90% first time read and one substitution error per million reads)

All Altek decoders are housed in a smart instrument case with "ink-well" for the scanning wand when not in use. In addition they all come with software to print bar codes on a standard dot matrix printer. (Epson or compatible). A complete bar code identification system at minimal cost.

RS232 Bar-code Reader

This microprocessor based unit decodes the bar-code and converts it into ASCII for transmission to the host via a RS232 port. Complete with power supply and cables. Works with virtually any computer. Baud rate, data format and optional check digit verification selectable with DIP switches. £385.00 + VAT

NEW system for BBC micro

ROM based, interrupt driven software. Switch on and read bar codes! Nothing to load, no commands needed to start. Reads alphanumeric codes at power up and automatically inserts the data into the keyboard buffer so it is possible to control the computer entirely via barcodes! Decodes ALL these formats: EANT3, EANB, UPCA, CODE 39 & INTERLEAVE 2/5. As supplied to Acorn. £249.00 + VAT. CBM/PET & APPLE 2

Lowest cost system. Disk based software decodes the bar code format of your choice and is easily interfaced to BASIC or Assembler. A full specification bar code identification system as used by many private & public sector laboratories, industrial & commercial organisations. £199.00 + VAT. (Not suitable for Apple running C/P/M... Use RS232 system!)

Phone or write for further details. Please state area of interest and what computer is to be used. We are also franchised distributors of Systel bar-code products & wands in the UK.

62



ALTEK INSTRUMENTS
Enterprise House 44-46 Terrace Road
Walton on Thames Surrey KT12 2SD
Phone (0932) 244110 Telex 295800 CWAOL

SHOP WINDOW

Every computer needs
CHATTERBOX II
"Listen creep, I am the leader..."

For ZX81
SPECTRUM
BBC
TRS 80
APPLE
NASCOM
VIC/PET 64
(Please state)

NEW!
EXCLUSIVE! **PITCH CONTROL**

£39
COMPLETE
FOR £33 (incl. VAT)

CHATTERBOX II™ can say anything!
Genuine phoneme synthesis - not just recorded speech - hence unlimited vocabulary.
Programmable pitch for more natural intonation (exclusive to Wm Stuart Systems) - solid tone cabinet for quality sound - integral beep/music amplifier. PLUS expansion socket for BIG EARS voice recognition system. Full instructions technical notes and software supplied with this outstanding educational unit.
DEALER ENQUIRIES WELCOME

As seen on BBC TV "Computer Programme"

BIG EARS

SPEECH INPUT FOR ANY COMPUTER



ONLY £49

Highly successful Speech Recognition System complete with microphone, software and full instructions.
BUILT TESTED & GUARANTEED
PLEASE STATE COMPUTER: UK101, SPECTRUM, ATOM, NASCOM2, Vic 20, Micron, ZX80/81, PET, TRS80, M280K, APPLE II, BBC MICRO, CPM 84.

ZX81/SPECTRUM

MUSIC SYNTHESISER (Stereo) + 16 LINE CONTROL PORT

Play 3-part music, sound effects, drums etc. Full control of attack, decay and frequency.
Input/Output lines provide control and monitor facility for Home Security, Robot Control, Model Railway etc. etc. Works with or without 16K RAM.

Full instructions/software included.
Add keyboard to make a live performance polyphonic synthesiser!
Note: up to 3 units can be used simultaneously; giving 9 music channels & 48 I/O lines

AMAZING VALUE
AT ONLY
£19.50 (KIT)
£25.50 (BUILT)

S O F T W A R E

THE COMPOSER
Synthesiser Music Programme
Enter & play 3 part harmony includes demonstrations (Spectrum ZX81) recommended £7

TALKING HANGMAN
For Chatterbox!
The classic game claims its victims with a dry vocal accompaniment (Spectrum) £6

ZX ARP/DRUMSEQ
Fascinating synthesiser demonstrations. Generates automatic sequences and plays from keyboard. Some weird effects (Spectrum) £6

CHROMACODE?????
Can you defuse the bomb by cracking the secret combination before time runs out? With Chatterbox voice output (Spectrum) £6

COLOUR MODULATOR

RGB in, PAL/UF out (not for ZX)
Please add VAT at 15% to prices.
Barclay/Access orders accepted by telephone

KIT £16
BUILT £22

All enquiries S.A.E. please

WILLIAM STUART SYSTEMS Ltd
Quarley Down House
Cholderton
Nr. Salisbury
Wiltshire. SP4 0DZ
Tel. 098 064 235

● Circle No. 314

FORTH = TOTAL CONTROL

FORTH 83 - Professional FORTHS from Laboratory Microsystems. Screen editor, assembler, utilities, full documentation. Special version for IBM PCs and 100% compatibles. State disc format with order. CPM-80 £95+VAT, CPM-86/MS/PCDOS £190+VAT.

QL FORTH-83 - screen editor, macro-assembler, decompiler, turnkey compiler, binary overlays, floating point, colour, graphics, sound, 'hash cache' fast compiler, and 70 page manual - £29.95.

NEWBRAIN FORTH in PROM - includes screen editor, full integration to NEWBRAIN i/o handlers, Z80 macro-assembler, floating point, graphics, decompiler, utilities, and manual - £51.75.

DRAGON FORTH cartridge - split screen editor, sound colour, decompiler, overlays, joystick and timer support, full documentation, and complete source code - £35, CoCo version £45.

Do-it-yourself FORTH. Installation manual - How to do it, model, definitions, editor - £7. Source code: 6502, 6800, 6809, 8080, Z80, 8086/8088, 9995, 1802, 68000, Z8000, VAX, Apple II, LSI-11 - £7 each.

Implementations for Spectrum to VAX, and a range of FORTH books.



MicroProcessor Engineering Ltd
21 Hanley Road Shirley
Southampton SO1 5AP
Tel: 0703 775482

● Circle No. 315

REVOLUTION
for
APPLE programmers

* Keyboard enhancement for Apple IIe or II+

* Pre-boot disk gives 20 user-definable keys + 37 single stroke functions

ONLY £29.50 + VAT
p&p inclusive for pre-paid orders

Orion Microware Ltd. 60 Longmead
Avenue, Chelmsford, CM2 7EQ.
Tel: 0245 71228

● Circle No. 316

We are a wholesaler and producer of peripheral goods for the Commodore C-64 e.g. plastic-covers, music-keyboards, datassettes, printer-chassis, etc. We are also a wholesaler of hardware in general.

We are looking for contacts and if your company is a wholesaler with good contacts to your national computer-market please phone us for further information and samples.

Please contact:
SCHMITT-COMPUTERSYSTEME
6101 Brensbach-4, West Germany
Tel: 06161/2039 or Telex 4191941

● Circle No. 317

REPAIRS & SERVICE

- * COMPUTERS (Business & Personal)
- * DISC DRIVES (5 1/4" & 8")
- * WINCHESTERS
- * MONITORS
- * VDUs
- * PRINTERS
- * WORKSHOP REPAIR CONTRACTS
- * Fixed repair charges
- * 3 months warranty on repaired part
- * 48 hour service for disk drive alignment

A.N. ELECTRONIC & COMPUTER SERVICES LTD

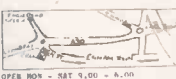
130B North Lane, Aldershot, Hants
Tel: Aldershot (0252) 25608

● Circle No. 318



EGHAM
COMPUTER STORE FOR
PORTABLE COMPUTING

SPECIAL OFFERS	£ Ex. VAT
SYSTEMS	
NEC PC8201A	299
Epson PX8	785
BBC Model B	339
Sanyo MBC 550	749
STORE	
8K Chips for NEC PC 8200/Tandy 100	49
PRINTERS	
NEC PC 8023 S Dot Matrix 120cps	199
Juki 6100 Oaisywheel	349
Kaga	299
MONITORS	
PHILIPS 12" 18MHz Mono	69
CUB Microvitec Strd. Res. 14" Colour	199
NEC 12" High Resolution Colour	399
Fidelity MTV100 Monitor/TV	199
DISCS	
CUMANA CSX 100 Disc Drive	95
LARGE RANGE OF SOFTWARE, BOOKS AND MEDIA AT LOW PRICES	



COMPUTER ELECTRONICS LTD.
193 HIGH STREET,
EGHAM SURREY TW20 9ED.
TEL: EGHAM (0784) 38838

● Circle No. 319

TELEVIDEO
EXCELLENT CONDITION

TS 806	£2,300
TS 816	£6,500
TS 800A	£ 900
TS 802	£1,300
	+ VAT

Cambridge Data Ltd

15 Margaret St., London W1
Tel: (01) 580 1654

90

● Circle No. 320

6809 CPU CARD

Powerful add-on to your home computer. Quality plated through PCB with full assembly instructions. Full RS232 Serial interface (up to 19,200 Baud). Data storage to cassette (via external CUTS interface). Versatile Parallel interface for Control applications or keyboard and printer. Operation at 1MHz or 2MHz. 2k/8K Static RAM with 2k/8K EPROM or alternatively 4k/16K EPROM (2 sockets). Communications via serial link to your home computer.

Software available: Monitor, Disassembler, Editor/Assembler.
Coming soon: FORTH Programming Language, Floppy Disk Interface, EPROM Programmer and others.

Prices + VAT:
PCB only £29.95; with Monitor £39.95;
Monitor + Disassembler £14.95; Upgrade £5.00;
Mon. + Dis. + Editor/Assembler £34.95;
Upgrade £20.00.

SOLASCAN Micro-Systems Ltd.
91 Bryanston Rd., Bitterne,
Southampton SO2 7AL
Tel: So'ton (0703) 436224

72

● Circle No. 321

APRICOT POINT SEVEN - 512K RAM

10Mb Winchester and Cluster Controller with 12" Monitor
£2,950

APRICOT PC - 256K RAM
duo 720K disks with 9" Monitor
£1,600

Cambridge Data Ltd

15 Margaret St., London W1N 7NE
Tel: (01) 580 1654

91

● Circle No. 322

Quality products at low prices

Thermal Paper			
Alphacom 32			£7.00/5 rolls
Alphacom 42			£7.00/5 rolls
HP models available			
Listing paper (2000 sheets/box)			
11" 9.5" plain 60gsm			£12.50
11" 8.5" plain			£12.00
Floppy Disks			
5.25"	CDC.	Dyson	Maxell
SS/50	£16.00	£20.00	19.00
SS/100	£22.50	£30.00	£29.00
DS/100	£26.50	£34.00	£33.00

Price includes VAT
Please add p&p £3.00/box for paper & £2.00 for any quantity of disks.

Cheques & p.o. to 'DESKFLAIR'
DESKFLAIR
71 Woodlands Rd., Hertford SG13 7JF
phone (0992) 558258

● Circle No. 323

SHOP WINDOW

SHARP MZ-700 and MZ-711 owners. Brand new and original programs for sale. S.a.e. for complete list by return to: Maysoft (DMB), 50 Thompson Avenue, Colchester, Essex CO3 4HW. 128M

CP/M USER GROUP. Disk Library. 6000+ items, most formats, sae/Tel R. Smith 138 Holtze Rd., E. Grinstead, Sussex RH19 3EA (0342) 313883

Are you having INTERFACE PROBLEMS?

SOLUTION 1:

SERIAL-CENTRONICS CONVERTER... £59.95 £42.95

For owners of computers with RS232 output who wish to save money on printers. No special software required ... totally transparent to computer; needs no external power.

SOLUTION 2:

SERIAL - 4-WAY SERIAL... £59.95 £42.95

For owners of computers with RS232 outputs who wish to talk to four different devices without swapping leads. Needs NO POWER. Supplied with any mix of sockets and leads.

SOLUTION 3:

CENTRONICS - 2-WAY CENTRONICS £59.95 £42.95

For computer owners who wish to drive more than one printer. Add £25 for additional ways. Reverse also possible at same price. Requires no power; includes both printer leads.

SOLUTION 4:

SERIAL - 2-WAY CENTRONICS £84.95 £64.95

For owners of computers with RS232 outputs who wish to connect, two (or more) printers and save money on leads and effort on swapping leads, as they are included. Add £25 for additional ways.

Especially suitable for
SINGLAI QL, SPECTRUM with INTERFACE 1, EPSON HX20 DMD PK8, NEWBRAIN, APPLE 2C etc...

Please enquire about our range of software for the NewBrain
All prices include VAT and postage and packing in UK & Europe.

— DEALER ENQUIRIES WELCOME —

For other solutions, watch this space, or contact us at ...

TYEPRO LIMITED, 30 Campkin Road, CAMBRIDGE CB4 2NG
Tel: Day 0255 422087 Eve 0223 322394

• Circle No. 324

QUICK TURNAROUND FOR PCB REPAIRS. Let Jaecrow check-and-repair your boards on ATE, quickly and accurately, UK and overseas. Phone 01-680 9191 for full details, without obligation. Jaecrow Systems Services, 29/31 Lower Coombe Street, Croydon, Surrey CR9 1LX. Quote ref: PC385. 136M

TANDY MODEL 148KL2, TRSDOS, 2 drives, monitor, assorted games, £300. Ashford, Middlesex, 07842 41019. 140M

SIRIUS 1, twin drive 1.2M, 128K possible to upgrade to 512K, with MX100 Epson full width printer plus dust covers, 40 disks and paper, £1,600. Also software: Pertmaster £400, Wordstar £175, and Supercalc £125. Hardly used. All now half cost price. Tel: 949 2114/Ansafone. 141M

TANDY MODEL II, 8 inch drive, VDU, Visicalc, Scriptsit, Profile II, Mailing, printer, mint, £1,000. Southend 67132. 142M

IBM PC compatible Corona PC, 256K RAM, twin disks, RGB Card, monitor, Centronics, extensive software, £1,100. Coventry 419769 after 6pm. 143M

TANDY MODEL II. 64K with 600K disk drive, green screen, Tandy modem, extensive software — CPM: Wordstar, Mailmerge, Spelstar, Theword, Supercalc, Calcmaster, MBasic (extended), CBasic, CB80, LK80, Plink2A, plus many utilities. TRSDOS: Visicalc, Scripsit. 50+ disks, £775 (quick sale). Phone: 042482 417. 144M

SEIKOSHA GP80 matrix printer, £99. Also Video Genie printer interface, £10. Tel: 0829 40569. 145M

DISK COPYING SERVICE

Moving data and program files from one machine to another is often made difficult because different manufacturers have adopted different disk format standards.

We can copy your files to and from over 250 disk formats including CP/M, CP/M-86, MS-DOS, PC-DOS, ISIS, APPLE, SIRIUS, TORCH, APRICOT, HP150, DEC RT-11, and IBM BEE.

Disks are normally despatched on the day they are received.

Our charge is £10.00 + disk + VAT. Special prices for quantities.

For more information call us.

GREY MATTER

4 Prigg Meadow, Ashburton, Devon TQ13 7DF.
TEL. (0364) 53499 10

When replying to Classified advertisements, readers are recommended to take steps to protect their interests before sending money.

SELL IT WITH

Practical Computing

SHOP WINDOW

MICRO ADS. Order Form

Classified Rates

Lineage 30p per word
Minimum 20 words prepayable.

Display Adverts.

Rate per single column
Centimetre: £16.50
Minimum 5 cm
SERIES Discounts
Available on request.
Contact: Claire Notley on
01-661 8163.

Method of Payment

Cheques etc should be made payable to BUSINESS PRESS INTERNATIONAL LTD. and crossed.
I enclose herewith cheque/PO for

£.....

Post to:

Cut out the order form and return together with your remittance to:
Classified Department,
Practical Computing,
Room H211, Quadrant House,
The Quadrant, Sutton,
Surrey SM2 5AS.

Conditions of Acceptance

Micro Ads are accepted from Private readers only and must be submitted on (or a photocopy of) this order form. All Advertisements must be prepaid.

Please insert the following advertisement in Practical Computing

LINEAGE

		Cost per insertions	
		1 Ins. ✓	2 Ins. ✓
		£6.00	£5.50
		£7.50	£7.00
		£9.00	£8.50
		£10.50	£10.00
		£12.00	£11.50
		£13.50	£13.00
		£15.00	£14.50

✓ tick number of insertions required

Box No. Required YES/NO

NAME (Please include initials)

ADDRESS

THIS FORM SHOULD BE RETURNED BY 25TH MARCH FOR THE MAY ISSUE

Company Registered Number: 151537 (ENGLAND). Registered Office: Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS.

NOW...a look at the BBC MICRO every month

Interfacing, control and peripherals for the BBC Micro are reviewed in a new regular monthly feature entitled BBC Forum.

Also

- Heart-Beat Monitor.
- Low-Cost Speech Synthesiser for the BBC Micro.

PLUS SPECIAL OFFER
Choice of three oscilloscopes available by mail order.



MARCH ISSUE OUT NOW

● Circle No. 140



Advertisement Index

A	Akhter Instruments 130/131	E	Electronequip 139	L	Lahtech Information Systems 138	P	Pinner Wordpro 58
	Albeta Ltd 50		Express Computer Consultants 136		Limbic Systems 46		Plus 5 Engineering Ltd 35
	AMA Computer Systems & Supplies 100	F	Folly Micro 74				Practical Electronics 146
	Amstrad Consumer Elect. 18/19	G		M	Mayfair Micros 90	Q	Quest Inter. Computers 54
	Anadex Ltd 44/45				Mercator Computer Systems 64		Qume (U.K.) Ltd B/C
B	BBC Publications 22				Micro Computer Disks 22	R	Remodi Ltd 47
	Brighton Computer Centre 16, 52				Microcomputer Prod Int Ltd 83		Research Machines Ltd 36/37
	Bromcom 12/13	G	GCC (Cambridge) 119		Micro General 72	S	Sagesoft Ltd 66/67
	Business Computer Show 128		Gemini Microcomputers Ltd 27		Micronix Computers Ltd 30		Silica Soft Ltd 17
	Butterworths (Newnes Books) 107		GW Computers 61		Micro Peripherals Ltd IBC 118		Sinclair Research Ltd 10/11, 39, 40/41, 42/43
C	Calco Software 100	H	Hewlett Packard 6		Microprocessor Eng Ltd 118		Smith Corona 28
	Cambridge Microelectronics 58		High Technology Elect. Ltd 22		Micro Support 138		Sorcim/IUS 79, 87, 95
	Canon Business Machines Ltd 48/49		HM Systems Ltd 51		Microware 20		Speedread 135
	Cash & Carry Computers 140		Homestead Electronics 52		Mountaineire 100		Symbiotic Computer Systems IFC 4
	Central Micro Distributors 64	I		N	MX Computer Supplies 64	T	TABS 26
	Centronics Data Computers 33		Ibico Ltd 135		Miracle Technology (UK) Ltd 32		Technomatic Ltd 110
	Commercial Data Systems 38		Inmac (UK) Ltd 9				Telesystems Ltd 106
D	Digitask Business Systems 60	J					TriSoft Ltd 86
	Digitolve 135		James Beresford Assoc. 118	O		W	Willis Computer Supplies 107
	Digithurst Ltd 14		Jarogate Ltd 123		Okidata GmbH 75		
			Juki (Europe) GmbH 34		Oryx Systems (UK) Ltd 24		

Affordable and reliable printers from **Micro P** give you more **Quality** **CPS** for your money

MP Micro P

CPA 80 - 100 cps
+ EPSON COMPATIBLE
CPB 80 - 130 cps
+ IBM COMPATIBLE

FROM **£199***

MP Micro P

MP 165 - 165 cps
+ EPSON COMPATIBLE
NLQ PRINTER

FOR ABOUT **£329***

MP Micro P

CPP 40 - 4 COLOUR
PORTABLE
PRINTER/PLOTTER

FOR ABOUT **£99***

Even in today's high tech world, for most of us, the written word is still the least expensive means of sending and receiving information. If you own a microcomputer the chances are that sooner or later you are probably going to need a printer.

Micro P - CPP40

A low cost 4 colour 40/80 column printer/plotter capable of printing text or graphics on plain paper. The CPP40 is an ideal companion for small and portable micro's, as it is fitted with re-chargeable batteries - perfect for beginners.

Micro P - SHINWA CPA80

With 100 cps quality printing, the CPA80 probably gives more cps/£ than any other printer available today. The CPA80 is packed with features you would normally find on a more expensive printer. With an optional RS232 version available (even for the QL) this Epson-compatible printer will hook up to almost any micro.

See them at your local dealer today!

● Circle No. 102

Micro P - MP165

Looking for a matrix printer as well as a daisywheel? Well, the MP165 combines all the attributes of these two technologies to give a matrix printer capable of printing at up to 165 cps, as well as providing crisp Near Letter Quality, (NLQ) print at 75 cps. Features include a 2k buffer as well as both friction and tractor feed, as standard. Ideally suited to most popular micro's, the MP165 is now available in a new RS232 QL compatible version.



**Micro
Peripherals Ltd**

'THE POWER BEHIND THE PRINTED WORD'

INTEC UNIT 3, HASSOCKS WOOD, WADE ROAD,
BASINGSTOKE, HANTS. ENGLAND, RG24 0NE.

Telephone: BASINGSTOKE (0256) 473232 (32 lines).

Telex: 859669 MICROP G Facsimile: 0256 461570

*Full 12 months warranty - RRP ex. VAT. QL is a registered Trade Mark of Sinclair Research.

NEW
from

QUME



NOW! Ex. stock
delivery through most
Major Dealers

**“No Compromise” – with the Sprint 12/20 letter Quality Printer
from the World’s leaders in word-processing printers**

A good speed for business and professional use,

Engineered by Qume for superb print quality and reliability for years of every day use

– and the price is right

Other important features –

1. Interface compatibility with most popular desktop computers i.e. Serial, Centronics Parallel or Qume Sprint 3

2. Compact design – user friendly

3. The widest range of easily interchangeable typefaces in the industry

4. Uses Qume standard Printwheels and Ribbons the most accessible range available

Accessories include –

Optional Forms Tractor and Letter Guide

Backed by Qume’s proven World-Wide Sales and Service organisation

Qume®

Qume (UK) Limited,
Bridgewater Close, Reading, Berkshire RG3 1JT,
Tel: Reading (0734) 584646. Telex: 849706

A British Company of **ITT**