

PRACTICAL COMPUTING

FOR BUSINESS AND PROFESSIONAL MICRO USERS



WHICH WORD PROCESSOR?

HARDWARE Panasonic JB-3300 • Epson PC

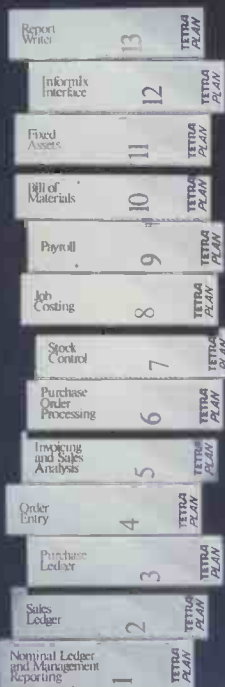
SOFTWARE Practibase: a cheap dBase clone
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COVER FEATURE



WHICH WORD PROCESSOR?

Our special feature looks at some of the latest developments in the field of word programs. On page 90 Susan Curran surveys the rapidly growing number of low-price packages designed for business. Then Mike Lewis tries out two programs with innovative spelling checkers, Turbo Lightning and AI Typist, starting on page 91. On page 94 we look at the glamorous world of thought processors, and Roger Cullis examines a pair of scientific word processors on page 96

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PRACTICAL COMPUTING

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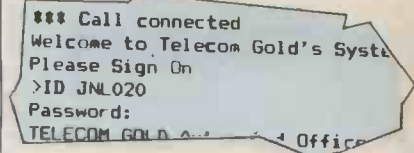
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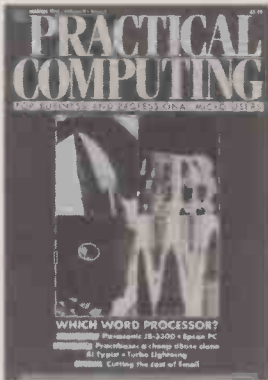
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Would-be authors are welcome to send articles to the Editor but PC cannot undertake to return them. Payment is at £35 per published page. Submissions should be typed or computer-printed and should include a tape or disc of any program.

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.

VERTICAL VIRTUES

The Amiga has arrived, and that's official. After months of rave previews, the machine that will make or break Commodore has finally been shown to the public — though they can't buy it yet. The question is, when the time comes, who will want to buy it and for what?

Technically the machine is impressive. In particular, its graphics and sound capabilities set it head and shoulders above the competition. But as a general business machine — which seems to be Commodore's sales pitch — it is way off-beam. IBM compatibility may be boring but nowadays it is essential; the Amiga's looks distinctly bolted-on and shaky. It looks increasingly as if the Amiga is going to be backed into a couple of specialist corners.

This is not the disaster it sounds. Over the last year or so there has been a subtle but profound shift in the micro world. Hitherto, the micro has been the ultimate vanilla machine: you can make it do anything simply by pouring in the appropriate software. Any suggestion that a machine should be designed for a specific task is almost a slur on its purity.

But micros are now everyday tools; it is absurd to go on designing a compromise machine. Consider other common appliances: nobody tries to sell you an all-purpose clock. Instead, recognising that certain characteristics need to be emphasised for certain tasks, clock manufacturers offer wrist watches, alarm clocks, cuckoo clocks or even tea-making clocks. It is the same with tape recorders. There is no such thing as a general tape recorder: you buy a reel-to-reel, a Walkman, a Dictaphone or an answering machine.

Initially, of course, software bore the computer's burden of specialisation. This was the classic route of using the micro as the general-purpose engine which was then driven in a particular direction by application programs. We have witnessed a tremendous diversification of software: alongside horizontal products like spreadsheets, vertical packages have been developed for every conceivable specialist nook and cranny. In this issue, for example, we report on some of the latest fine tuning going on in the field of text handling.

But the point is soon reached where the software spends most of its time overcoming the limitations imposed by the hardware. In the process it often grows needlessly complicated. Ultimately the hardware itself has to become more malleable, and adapt to accommodate the needs of a particular application.

This is beginning to happen. Perhaps the most dramatic example is the Amstrad PCW-8256. For all that it can handle general business software, first and foremost it is a dedicated word processor. Its runaway

sales reflect the fact that what people have been waiting for it not just a good-value machine, but one which is actually designed for their needs, namely word processing.

The other area of this verticalisation of hardware may not have as high a profile, but in the long term it promises to be one with perhaps the most far-reaching effects for business users. In January we looked at Acorn's Communicator, and this month we review Tandata's PA. Both are interesting examples of machines designed with communications specifically in mind. Both are dramatically different from conventional ideas of what a business micro should be, yet in their own ways both correspond far more closely to the needs of the average executive than the grand but ultimately inappropriate desk-top micro. It seems likely that such communications engines are the shape of business machines to come.

Commodore will doubtless be very hurt that nobody sees its beautiful new baby in quite the way it wants them to; parents are all the same. But it should take heart. Just as the Commodore 64 met a particular and happily enormous market need, so its new Amiga could come to dominate certain areas of an increasingly fragmented micro world. Instead of clinging to an outdated and untenable horizontal world view, Commodore should stand up and proclaim the virtues of the vertical.

5 YEARS AGO...

Computing should receive a much higher priority in Government plans for industry with the appointment of Kenneth Baker as Industry Minister responsible for information technology. Baker, 46, who is MP for St. Marylebone, London, is a long-standing computer enthusiast and has identified computer-related technology as "the key growth sector in the economy".

He has also been Parliamentary Private Secretary to Edward Heath and is regarded as something of a Tory leftist. In a speech reported by *The Guardian* last year he outlined a program of education which calls for:

- Every secondary school to have a British-built micro within 18 months.
- Several teachers from every school to attend a computer-assisted learning course on computing techniques.
- Every school leaver to have some hands-on experience and understanding of computers and their associated technology.
- Careers advisers to steer their charges away from "pure" science, where there is every prospect of unemployment, towards more directly useful computer-orientated skills.

PC Volume 4 Issue 3



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pfs:

MS-DOS user group

I WOULD like to form an MS-DOS computer user group, which would cover the IBM PC family and compatibles, and the Apricot computers.

We would meet initially every two or three months in Birmingham or Wolverhampton, whichever was most convenient to the members.

I intend the group to be non-profit making, but obviously there would have to be a small charge to cover costs. The meetings would consist of demonstrations of packages or help with any problems the members may have, including a bespoke software service if required.

I would also like to hear from any dealers or software houses in the area who would be prepared to give demonstrations or offer discounts to group members on items such as discs, ribbons, paper, hardware or software, or even provide equipment for an evening. This would give small software houses a chance to show any program to an interested audience at no cost.

It would help if replies are in the following format: name; company if applicable; address; phone; make and model of your computer; content of meetings you would like to see; location you would prefer, Birmingham/Wolverhampton/other; what evening you would prefer to meet.

KEVIN POWIS,
18 Burfield Road,
Cradley Heath,
Halesowen,
West Midlands.

Apple User

FURTHER to your article on page 108 of the December issue, I should point out that *Acorn User* isn't one of our publications.

Perhaps you were thinking of *Apple User*.

CLIFF McKNIGHT,
Apple User,
Database Publications,
via Telecom Gold.

FEEDBACK

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.

Write to

Feedback, Practical Computing,
Quadrant House, The Quadrant,
Sutton, Surrey SM2 5AS

OPEN ALL HOURS

READING your editorial article "Happy New Year?" in the January issue you said: "This is cold comfort to the British manufacturers, who have already hit hard times and gone under."

I would like to comment, as an end-user, that is their own blasted hard luck. And I have not the slightest sympathy towards them. Until they learn to sell their computers at times and days when people like myself can go and see them they deserve to go bust!

I can only evaluate computers on a Saturday from 9 a.m. to 5 p.m. But no! Nobody is open on a Saturday for selling British micro or minicomputers. They stick to the office hours of nine to five, Monday to Friday. Yet I can get an IBM PC from Monday to Saturday with no trouble at all. So if the Yanks can do it, why can't the British?

The only way the British computer industry will survive is to operate like the Yanks: open all hours.

JOHN CRAWSHAW,
Sutton Coldfield,
West Midlands.

Evaluating polynomials

IN CONNECTION with the reply in January's Ask PC to J Macpherson, I think I should point out that it is always preferable to evaluate polynomials by the traditional nesting method. That is, given a polynomial

$$Y = A_0 + A_1 * X + A_2 * X^2 + \dots + A_N * X^N$$

one rewrites it in the form,

$$Y = A_0 + X * (A_1 + X * (A_2 + \dots + X * (A_{N-1} + X * (A_N)) \dots))$$

This avoids all use of the

exponential function and reduces the evaluation to a series of additions or subtractions and multiplications.

A single line of Basic suffices for this,
Y=A(N);FOR I=N-1 TO 0 STEP
-1:Y=A(I)+Y*X: NEXT I

If the micro has the FN () function, this can be used even more conveniently for the evaluation of the nested form. The listing shows both the direct and nested evaluation by this method.

Incidentally, the polynomial I have chosen is often useful in spotting arithmetical errors since

it is zero for the integers 1 to 8 inclusive, and is very sensitive to small changes in the coefficients. With my Newbrain with OS 2.0, which has a very good maths pack for an eight-bit micro, the answers are exactly 0 in each instance.

The writing of a polynomial in nested form is much less forbidding than it appears. The coefficients are written down in order in the form shown in line 80 of the example, and then followed by closing brackets to the number of the highest power of the variable, in this case 8.

L E WEAVER,
St. Leonards-on-Sea,
East Sussex.

Excellent Olivetti

THE PC VERDICT on the Olivetti M-24SP, published with my review in the January 1986 issue, does both Olivetti and myself a disservice. I rated this machine as Good throughout, except for the documentation, which I did not see. In fact, when compared purely with IBM PC compatibles — thus excluding the Apricot Xen — it is probably worth an Excellent. It certainly isn't Average, as printed!

JACK SCHOFIELD,
Sutton,
Surrey.

Data security add-on

I WRITE in response to the letter from Mr Milner in the November issue of your magazine regarding the problems of ensuring the security of data held on the fixed disc of an IBM PC.

My company markets an add-on accessory to the IBM PC, PC-Fileguard, which provides a method of physically locking the machine without any modification to the system box.

The PC-Fileguard system consists of a floppy disc containing the PC-Fileguard Alarm Program together with a device which locates and locks securely to the front of floppy drive A of the PC. The idea is that once the floppy and the lock are in place any attempt to power-up the machine will cause it to boot using the program contained on the disc. The purpose of the program is to sound an audible warning and lock the keyboard. You cannot use the machine unless you have the key.

PC-Fileguard can also be used without the disc in drive A but

(continued on next page)

POLYNOMIALS

```
10 REM EVALUATION USING EXPONENTIATING FUNCTION
20 DATA 1,-36,546,-4536,22449,-67284,118124,-109584,40320
30 FOR I=8 TO 0 STEP-1:READ A(I):NEXT I:RESTORE
40 DEF FNP(X)=A(8)*X^8+A(7)*X^7+A(6)*X^6+A(5)*X^5+A(4)*X^4+A(3)*X^3+A(2)*X^2+A(1)*X+A(0)
50 FOR X=1 TO 10: ?X;FNP(X):NEXT X
60 GOSUBBO:END
70 REM NESTED METHOD
80 DEF FNP(X)=A(0)+X*(A(1)+X*(A(2)+X*(A(3)+X*(A(4)+X*(A(5)+X*(A(6)+X*(A(7)+X*(A(8)))))))
90 FOR X=1 TO 10: ?FNP(X):NEXT X
100 RET
```

(continued from previous page)

with the locking device fitted. This prevents the use of software other than that which is available on the fixed disc, forces the system to boot from the fixed disc — password security can be installed at this point — and prevents the copying of data from the fixed disc to floppies. Only a user with a key can back up the data on the machine or run additional programs.

GRAHAM LANE,
HWL Computer Accessories Ltd,
40 Crawford Road,
Hatfield,
Hertfordshire AL10 0PE.

Apple Turnover

WE NOTED with interest your piece on the Top 100 software packages in the January issue of *Practical Computing*. May we just make the point regarding the Apple Turnover utility.

Turnover, as it is now called, will in fact transfer software to and from IBM PCs and Apple computers; it is not only a one-way transfer. Turnover will now cope not only with Apple DOS and Apple CP/M, but also Apple

Turbo Pascal

IN OUR review in the November 1985 issue we omitted to report that Turbo Pascal and its extensions may be obtained from Altor Ltd, as well as from the suppliers mentioned. Altor's address is 11a Anderston Centre, Glasgow. Telephone: 041-226 4211.

Dataline

WE REPORTED on Dataline's telex packages on page 24 of the December 1985 issue. Dataline's phone number is 01-403 2221, and not as printed.

One Per Desk competition

OUR ICL One Per Desk competition last year gave you the chance to win a £1,500 system, kindly donated by ICL. Entry was simple: six attributes of the machine had to be placed in order of their importance.

As with our recent Zenith PC competition, there was a very healthy number of entries — just a touch under 750. As it turned out, judging was not as daunting as it might have been, as only one reader agreed with the judges' final order. The winner was JJ Villamil from north London.

It was probably just as well that the tie-breakers were not needed as they were uniformly feeble. JJ Villamil's was hardly original but suitably terse and in the end prophetic. It read: One Per Desk is the one for me.

For the record, the judges' final order was: easy access to email, access to viewdata, personal computing facilities, advanced telephone facilities, inter-OPD messaging, communications with in-house computers. *Practical Computing* would like to record its thanks to ICL for putting up the prize.

III SOS, UCSD p-System, and Prodos.

Systems Constructors are the major European distributors of the product and others of the Vertex range, and provide a total service in the complete area of cable-less data transfer between hundreds of different computer types.

N T POWELL,
Systems Constructors,
Bournemouth.

Accessing free RAM

IN THE December edition of *Ask PC*, Mr Hanlon was looking for ways of accessing free RAM space, while running *Basica*/*GWBasic* under *MS-DOS*.

Mr Hanlon may be interested to know that *Complex Software Ltd* has developed a program to do precisely that. The program, *BRAM 128*, enables the user to create up to 128 singly-dimensioned arrays outside *Basic's* 64K workspace. Each array may be dimensioned up to 16,383 long and may be of integer, real, double-precision, or

string type. Arrays can be saved to disc, read back, and also transferred between interpreted and compiled programs. *BRAM 128* is available from *Complex Software* for £40.

E J ROBINSON,
Complex Software Ltd,
19 Smithay Meadows,
Christow,
Exeter,
Devon.

Multi-user Mirage

AS SOMEONE who spends a fair amount of his working life trying to remove the "non-standard" label from the *Mirage* operating system you referred to in your survey of multi-user micros, I felt it worthwhile writing to you in response to some of the points raised by Glyn Moody in his introduction to the Top 10 survey in the November issue.

Of the 10 machines listed, four are built around the 68000 processor. In turn, two of these machines have *Mirage* as the primary or alternative operating system. A third, the *Alpha*

Micro, runs an operating system, *AMOS*, which is a close cousin to *Mirage*. More generally, *Mirage* is available on quite a number of 6800 based systems. For example *TDI Pinnacle*, *Stride 400*, *Sage*, *Accron Fastnet*, *MicroAPL*, *Spectrum*, *HP-200 Series*, *U-Micro*, and, shortly, the *Gemini Challenger*.

We agree with your comments that networking is a serious solution to many organisations' computing requirements. We do not, however, see the situation in such black and white terms as your article suggests. In practice, we have found that a combination of single-user and multi-user micros, together with some networking capability is often what is really required.

Mirage is inherently a networking operating system, and I would estimate that about 30 percent of installed sites make some use of networking. We have fairly strong views about what networking actually is, and I will refrain from widening the scope of this letter. Let me just say that, on a *Mirage* network, each user on each system has, subject to security, full access to all data on all connected machines.

Our current work on networking involves the use of intelligent terminals such as the *IBM PC* using departmental *Mirage*-based microcomputers. The terminals are able to run the wide variety of packaged software available, but equally to transfer data to and from the multi-user micro as well as running in terminal-emulation mode. This allows such installations to make use of popular single-user packages, with recourse to more powerful systems for large, or inherently multi-user problems, as well as offering a software route to share resources such as expensive printers. In turn the multi-user systems can be linked in a wider network to join offices.

DAVID EASTWOOD,
Sahara Software Ltd,
London SW8. ☐



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The print on the left is certainly legible, which is quite good enough for most purposes.

But it's nothing to write home about. Or with.

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The LX-80 is a dot matrix printer that can print in correspondence quality (like this) as well as in draft. Yet at only £255+VAT it's no more expensive than any of its less capable rivals.

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Changing fonts on the LX-80 doesn't involve a complicated rigmarole as it does on other machines. By simply pressing a combination of buttons on the front, you can change from one font to another to another to another. As easily as that.

The LX-80 will justify or centre type if you like. It will even print your own symbols.

Alternatively, you can use the standard 1K buffer to free your computer for other tasks more quickly.

The LX-80 takes plain sheets as standard, though a variety of paper feed options are also available.

It should go without saying that the LX-80 is as reliable as Epson printers have always been. But there, we've said it anyway.

There's still more to tell, of course. But fill in the coupon - in whatever style you like - and we'll fill you in completely.



EPSON

Please send me more information on the LX-80.

Name _____ Address _____

_____ Tel No _____ LPCS

To: Epson (UK) Ltd., Dorland House, 388 High Road,
Wembley, Middlesex, HA9 6UH.

● Circle No. 272

HARDWARE SHORTS

● Comart has launched the CP-2580T a 1Mbyte RAM, 80286 machine running under Concurrent CP/M with an 80Mbyte Winchester and tape streamer. Cost is around £10,000. More on (0793) 871520.

● A disc server for the Macintosh Appletalk LAN has been produced by Symbiotic Computer Systems Ltd. The disc server is a 68000-based unit and costs £1,395. More information on 01-683 1137.

● So you thought the Commodore Pet was dead? In fact, RAM upgrades are still available for it: a 16K upgrade costs £55 and a 24K upgrade costs £60. They are available from Supersoft on 01-861 1166.

● Miracle Technology has cut the cost of its WS-2000 modem from £129.95 to £108.70. Details on (0473) 216141.

● U-Microcomputers has developed a RAM expansion board for its U-Man Series 1000 and GT micros. This allows models with 2Mbyte and 4Mbyte RAM to be offered. More on (0925) 54117.

● Morgan Computer Company is offering a 256K and MS-DOS upgrade for the Philips P-2012 micro for £110 plus a nominal fitting charge against the previous £450. Details on 01-636 1138.

ACORN QUINTET MAKES BBC MASTER SERIES

ACORN has launched the latest incarnations of the BBC Micro, drawing heavily on its existing co-processor technology. Under the rather grand name Master Series, five machines in all have been announced.

The basic machine has a 65C12 running at 2MHz, with 64K main RAM and a further 64K in four 16K pages. There is 128K of ROM, which includes the operating system, a new BBC Basic and line editor, two disc-filing systems and two applications — the View word processor and the Viewsheet spreadsheet.

There is a new cartridge slot, and a numeric keypad in an otherwise familiar casing which has been extended and raised. Inside, the changes are more radical, with the old-fashioned multiple-chip layout largely superseded by a few custom chips. It is claimed that applications developed on the earlier machine will be transferable with little or no modification.

The next model in the series is the Master Turbo. In addition to the standard features it possesses an additional 65C102 processor running at 4MHz and a new Basic called Hi-Basic, both designed to give dramatically improved performance. Acorn claims a 50 percent increase in speed over standard BBC Basic. The Turbo is available as an upgrade board.

Perhaps the most interesting new machine in the range is the



Master 512. This seems to be aimed directly at the business and professional user. It comes with 512K RAM and an extra 80186 processor running Digital Research's DOS Plus, which is claimed to provide CP/M-86 and MS-DOS 2.1 compatibility. Also provided is DR's Gem Collection — Desk Top, Paint and Write.

The other main version is the Master Scientific, which has 512K RAM and a 32016 co-processor. A wide range of scientific software is provided, including Acorn's Panos operating system, which is also used on the Cambridge Workstation, Fortran 77, ISO Pascal, C, BBC Basic and 3200 macro assembler.

Bringing up the rear is the Master ET, a cut-down version which functions as an Econet terminal.

Prices have been announced only for the Master 128, Master ET and Master Turbo upgrade board. The 128 costs £435.22, the ET £348.26 and the Turbo upgrade £109.35; all prices include VAT. The other two machines will not be available until the second quarter of this year.

It is expected that the Master 512 will cost about £1,000, and the Master Scientific about £2,000.

Details from Acorn Computers Ltd, Fulbourn Road, Cherry Hinton, Cambridge CB1 4JN. Telephone: (0223) 245200.

Amstrad hard disc

NORTHERN COMPUTERS has announced a 20Mbyte Winchester disc for all four Amstrad micros, including the PCW-8256. The Amstore comes complete with file-server software, parallel printer interface, printer-server software and print spooler.

Partitioning of the disc is not necessary, since this is carried out automatically by the unit, which also compacts the information. There are no problems with the 8Mbyte CP/M file-access limit because the system stores all files in a tokenised form.

The Amstore costs £999, and is also available for BBC, Apple, Apricot and IBM machines. Details from Northern Computers Ltd, Churchfield Road, Frodsham, Cheshire WA6 6RD. Telephone: (0928) 35700.



ICL upgrades Quattro and adds OPD link

ICL has announced a high-level upgrade to its Quattro system launched a few months ago. The new Model 59 has a 50Mbyte internal Winchester, expandable up to 150Mbyte. There is also a tape-streamer backup.


Communication facilities are well developed: there is a board allowing direct linking to the Open Systems local area network system, and software for handling

the X-25 protocol, widely used in the telecommunications field. Prices for the Model 59 start at about £6,500.

ICL has also announced a Quattro-OPD link which allows One Per Desks to be hooked up to the Quattro and use its comms facilities. More on both products from ICL, Bridge House, Putney Bridge, London SW6 3JX. Telephone: 01-788 7272.

Octima chord keyboard

THE OCTIMA chord keyboard is a one-hand eight-key computer keyboard. Mnemonics are used to allow the full range of commands to be given. It is now available for the IBM PC, Apple II, DEC VT-52 and VT-100 terminals. The cost is £345.

Further details from MBA Software Ltd, Millbank House, Catherine Wheel Road, Brentford, Middlesex TW8 8BW. Telephone: 01-847 1686. 



520ST roundup

ATARI is changing the bundle of software included in the price of its 520ST machine. Instead of Gem Write and Gem Paint you will now get 1st Word for word processing and a simple drawing program called Doodle — it is not Trilex's Doodle. Beefing up the new bundle is the DB Master One database.

Atari says it has made the changes because Gem Write and Gem have not been supplied on time. ST purchasers still get Gem Desktop, DR's operating environment.

Meanwhile Quest has announced a Basic compiler designed to allow programmers the ability to port existing MBasic applications across to the Atari ST. The Philon Fast Basic-M and compiler costs £99.95 including VAT. More details from Quest International Computers, School Lane, Chandlers Ford, Hampshire SO5 3YY. Tel: (04215) 66321.

Two new spreadsheets are available now for the Atari machine. K-Spread, price £49.95 including VAT, comes from Kuma Computers in the U.K. VIP Professional at £194.35 including VAT is a full 1-2-3 clone brought in from the U.S. by Silica Shop.

Contact Kuma Computers Ltd, 12 Horseshoe Park, Pangbourne, Berkshire RG8 7JW. Telephone: (07357) 4335. Silica Distribution Ltd, 1-4 The Mews, Hatherley Road, Sidcup, Kent DA14 4DX. Telephone: 01-309 1111.

HMSO puts data on disc

HMSO is publishing government industrial data on disc. Available for most CP/M and MS-DOS systems, the Business Data Packages each provide a wide range of sales, wage and price data on a specific industrial sector.

The first three cover domestic electrical appliances, carpets and synthetic resins. More are on the way. The price of £325 gets you the basic information package with a simple database program to manipulate it, plus three quarterly updates.

More details from Gordon Robbie, Room 2F08, HMSO, St. Crispins, Duke Street, Norwich NR3 1PD. Telephone: (0603) 622211 ex. 7550.

MACINTOSH ACCOUNTING

APPLE'S U.K. arm has launched its own suite of accounting software for the Macintosh. Requiring 512K and a hard disc to run, Apple Accounting comes in five modules: sales, purchase and nominal ledger, sales invoicing and stock control.

Individual modules are priced at £395, while the three ledgers are also available together as a set for

£995. One distinctive feature of the suite is that accounts data can be transferred easily to other Mac applications such as Excel, Jazz or Macwrite. All modules can be used either independently or integrated together.

Details from Apple Computer (U.K.) Ltd, Eastman Way, Hemel Hempstead, Hertfordshire HP2 7HQ. Telephone: (0442) 60244.



Email packages link with Appletalk

TWO competing electronic-mail packages have been launched to run on Macintosh computers linked together with the Appletalk local area network. Top Mail, priced at £250, is produced by a U.K. company, Topexpress of Cambridge. The £257 package Mail Centre comes via P&P from Videx of Oregon.

Both let you transfer messages, Mac documents, programs and pictures to as many users as you

like on the network. In neither case is it necessary to leave your Mac application to do this — the mail function is implemented as a desk accessory on the Apple menu.

Details from Topexpress Ltd, 13-14 Round Church Street, Cambridge CB5 8AD. Telephone: (0223) 355427. P&P Micro Distributions is at Carrs Industrial Estate, Haslingden, Rossendale, Lancashire BB4 5HU. Telephone: (0706) 217744.

3D spreadsheet

DATAMENSION'S Report Manager claims to be the first three-dimensional, programmable spreadsheet. Running on the IBM PC and most other MS-DOS machines the £495 package gives you a workspace of 255 rows, 255 columns and 255 pages. You can operate on data from any row or column through all pages in the pile.

This 3D feature is particularly useful if you need to consolidate data from related spreadsheets — for instance to compare per-

formance over time or geographical area. Report Manager has a similar command structure to Lotus 1-2-3, and allows you to import data in DIF or ASCII format from packages such as 1-2-3 Multiplan and Supercalc.

Other features include built-in graphics and a macro language for more experienced users. Report Manager requires 256K to run.

Details from Sapphire Systems Ltd, 180 Cranbrook Road, Ilford, Essex IG1 4LX. Telephone: 01-554 0582.

SOFTWARE SHORTS

● Autocad 2.1 is the latest version of the best-selling professional drafting package. It offers quicker plotting, support for more printers, plotters and input devices, and the ability to take advantage of a maths co-processor. The basic Autocad costs £1,000 and various extension modules are available. The program runs on Apricot and IBM-compatible machines. Phone 01-928 7868.

● ALLM Books claims to stock all books and journals devoted to Pick. Catalogue from ALLM Books, 21 Beechcroft Road, Bushey, Hertfordshire WD2 2JU.

● The Software Users' Yearbook, lists 4,500 micro software packages, and 3,000 for minis and mainframes. It comes in two volumes totalling over 2,000 pages. The micro volume costs £47.20, the two volumes together £83.40. Details from 01-439 4242.



Two-finger typist

TWO FINGERS is a typing course designed to convert existing two-fingered typists to touch-typing.

Instead of starting from scratch, typing drills like ASDFG, you always type proper words and sentences; bad habits are eliminated one by one. The claim for the method is that at no point during training does your typing speed drop significantly.

Two Fingers costs £24.95 including VAT for disc-based Amstrad systems, £39 excluding VAT for other CP/M systems, and £49 plus VAT for IBM and MS-DOS machines.

Contact Iansyst Ltd, Omnibus Building, 41 North Road, London N7 9DP. Tel: 01-607 5844.

Tandy 1000, 2000 and 3000, superiority in numbers.



When the facts and figures in your business start getting serious its time to find the right numbers to trim some weight from your daily workload. The Tandy 1000, 2000 and 3000 will give you superiority in your numbers nightmare.

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When it comes to taking that first step into computers the Tandy 1000 goes a long way to making sure it's

the right one. Our own Deskmate Software is included to ensure it works for you from day one, so you can tackle not only those number crunching problems, but handle letters, reports, telecommunications, electronic mail plus your daily calendar. PC compatibility also means that as you grow you can develop more solutions using the most popular business software available.

If your business needs are already that much more than the Tandy 2000 can provide the power for you to grow in to, not out of. Available in twin 720K floppy version or with 10-mb of hard disk



storage you have the flexibility to run all the important business software programs like Lotus 1-2-3, Autocad, dBase II, Multimate and many more.

In any range of computers there has to be a sophisticate that can span the breadth of businesses both big and small. The Tandy 3000 has that breeding. It is as ideally suited to a small firm as it is to a corporation needing to manipulate 'large scale' data bases. IBM PC AT compatibility with up to 30% increased speed of operation enables complete integration into existing computer environments.

So in the everyday numbers marathon there can be superiority, and it doesn't take long to figure out that it all adds up to the Tandy 1000, 2000 and 3000.

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Multimate TM Software Systems Inc. dBase TM Ashton-Tate

● Circle No. 118

IBM PC/RT will run Unix

IBM has announced first details of a new top-end PC which runs Unix as its native operating system. Its five-figure price and its ability to run multi-user Unix software means that the machine will probably appeal mainly to specialised technical users.

The machine is to be known as the 32-bit Unix-based Workstation in Europe, and the PC/RT in the U.S. The RT in the U.S. name stands for Risc technology, the in-vogue Reduced Instruction Set Computer type of CPU design, which should give it very high performance. The machine is built around a custom 32-bit Risc processor chip of IBM's own design.

To go with the machine IBM is supplying a new operating system, called Aix. This is a version of AT&T's Unix System V which IBM has modified to make it more user friendly.

The machine comes in two versions: desk-top and floor-mounted. The desk-top variant looks physically very similar to the IBM PC/AT. The minimum configuration, with 1Mbyte of RAM, a 40Mbyte hard disc and a 1.2Mbyte 5.25in. floppy, is £9,043. The keyboard and a monitor cost extra.

You also pay separately for the Aix operating system, which costs £2,627. However, IBM may well bundle some application software in with Aix. As an option IBM is offering a PC/AT co-processor board. With this installed, the company says it will be possible to switch between Unix and AT environments and to run both types of software concurrently.

Contact IBM U.K. Ltd, PO Box 32, Alencon Link, Basingstoke, Hampshire RG21 1EJ. Telephone: (0256) 56144.

Touch-pad keyboard

CERATECH has introduced a combined keyboard and touch-pad called the KB-5153. It offers a cursor mode, whereby movement of the finger across the pad moves the cursor. It can also act as a virtual mouse or as a graphics pad.

The cost is £430. More information from Ceratech Electronics, Lenten House, 20 Lenten Street, Alton, Hampshire. Telephone: (0420) 88674.



SONY JOINS THE FRAY

SONY has entered the PC market with an idiosyncratic clone using its own 3.5in. floppy discs. As well as two 720K drives, the SMC-210 has an 80C88 running at a standard 4.77MHz, a full 640K RAM, serial and parallel ports, and an integral modem currently undergoing tests for approval.

Sony has shrewdly included an interface for a 5.25in. IBM disc drive as standard, which should allow software to be ported across easily. Softsel has also announced that over 250 titles will be available on the 3.5in. format directly.

A choice of screens is available, including a large 80-column by

25-line LCD or 10in. monitor. The LCD version will cost around £2,200, and the monitor version around £2,300.

Also of note is the unit's compact size: its footprint is only about 14in. by 11in. The whole thing will fit in a briefcase, though it is not intended as a transportable machine and there is no provision for battery operation.

The SMC-210 will be sold through a dealer network which is being set up. More information can be obtained from Sony (U.K.) Ltd, Sony House, South Street, Staines, Middlesex TW18 4PF. Telephone: (0784) 61688.

Paradox: the new dBase II/III?

PARADOX is a powerful relational database which, its authors claim, is also easy to use. This is achieved using a form of artificial intelligence known as query by example. To find a class of records you type in a sample output.

In other respects operation is similar to Lotus 1-2-3, using a small menu of options along the top of the screen. Paradox even stores data in a spreadsheet-like format of rows and columns, which many users may find comforting.

These tables can contain up to a theoretical 260Mbyte, with up to 65,000 records, 4,000 bytes per

record and 255 fields per record. Other features include an extensive form and report generating facility.

A whacking 512K RAM is required to run Paradox on either the IBM PC or PC/AT, and the price is a similarly heavy £550. It is distributed by P&P Micro Distributors Ltd, 1 Gleneagle Road, London SW16 6AY, telephone 01-677 7631; and Softsel Computer Products Ltd, Softsel House, Syon Gate Way, Great West Road, Brentford, Middlesex TW8 9DD, telephone 01-568 8866.

IBM SHORTS

- Olivetti has announced a range of price cuts on its M-24 and M-21 machines with hard discs. For example the M-24 is about 15 percent cheaper. More on 01-785 6666.

- Smart has added a spelling checker to its integrated family. It has 80,000 words, and is an anglicised version of Webster's Collegiate Dictionary. The cost is £95.

- The Swiss typewriter manufacturer Hermes has produced the H-100, an IBM clone. The machine has an 8086 running at 8MHz and 256K RAM. More on (0206) 84251.

- Compaq has cut the price of its top-of-the-range machine with a 70Mbyte Winchester. The new price is £7,995, down from £9,555.

- Channel Electronics has launched the CMS PC, an 8088 256K system costing £1,400. More information on (0323) 894961.


- Multi-user Pick is available on the Sperry IT. Cost is £995. More information on (0742) 487768.

- Baby/36 turns your IBM PC into a System/36 software-development tool. Cost is £2,250. Details on (0753) 41278.

- Crystal is an expert-system builder from Intelligent Environments. It costs £395 and is available on 01-930 2967.

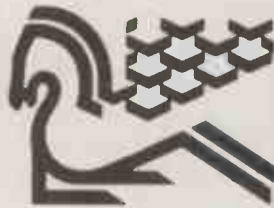
Hard discs on a card

ONE OF the latest flavours of the month in the U.S. is plug-in hard discs. They come on cards which plug into an expansion slot, and require no further fiddling in terms of installation or extra power supplies. Pluscard offers 10Mbyte or 20Mbyte for £750 or £850 respectively. It is available from Plus 5 Engineering Ltd, Lexdon Lodge, Crowborough Hill, Crowborough, East Sussex TN6 2EG. Telephone: (08926) 63211.

Drivecard has a 20Mbyte Winchester disc and controller on a full-length card. It requires all of one slot and part of another. The cost is £995. It is available from P&P, 1 Gleneagle Road, London SW16 6AY, telephone 01-677 7631; and Midwich Thame Ltd, Gilray Road, Diss, Norfolk IP22 3EU, telephone (0379) 4131. 

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SAGESOFT/AMSTRAD ACCOUNTS FOR RENT

SAGESOFT is piloting a rental scheme which gives users a suite of its business software together with an Amstrad PCW-8256 computer to run it on. For £10.75 a week you get the Amstrad machine and Sagesoft book-keeping, payroll and database programs. Sagesoft

also provides a day's free on-site training and on-site hardware maintenance.

The Amstrad machine is ideal for thtype of user because it is cheap, and comes complete with a printer and its own word processor. Sagesoft is trying out the Sage Rent

scheme initially in the South-East. If the scheme proves successful, the company plans to go nationwide later this year.

Contact Sagesoft plc, NEI House, Regent Centre, Gosforth, Newcastle-upon-Tyne NE3 3DS. Telephone: 091-284 7077.

European PCs boom

PERSONAL COMPUTER sales may have slowed down in the U.S., but business this side of the Atlantic is still booming. This is a key conclusion of a 540-page report published by market research company Intelligent Electronics Europe. The report is based on over 650 interviews with PC dealers and manufacturers.

The report expects the overall European PC market to grow by 38 percent in 1986. This is slower than the 56 percent growth reported in 1985, but still very healthy. Growth of PC sales in the U.K. is forecast at 27 percent, reflecting the greater maturity of the U.K. market, which recorded its boom period two years ago. Most rapid growth is likely to be in Italy — forecast at 70 percent for the coming year — where business micros are only now beginning to take off.

The full report, much of it devoted to a detailed consideration of distribution channels, costs \$1,450. A single-country report is \$200. Contact Intelligent Electronics Europe, 15 Rue Buffon, Paris 75005, France. Telephone: (010 331) 45 35 43 83.



Alarming sounds to deter thieves

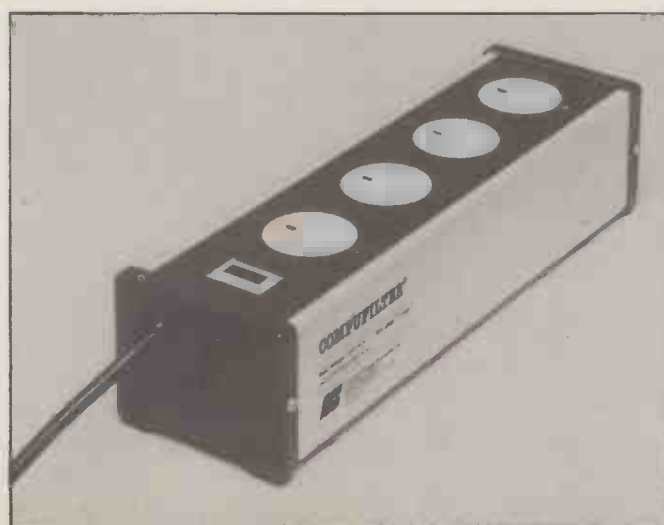
THIS ALARM UNIT from Action Computer fits underneath any costly but stealable item such as a computer printer or even the PC itself. Hidden from view, it emits a piercing 105dB noise immediately the protected unit is lifted. The only way to silence it is to unscrew the battery compartment.

At a mere £11.95 the alarm unit is a must for all fun-loving pranksters and the security conscious. For more details contact Action Computer Supplies, 6 Abercorn Trading Estate, Manor Farm Road, Wembley, Middlesex HA0 1WL. Telephone: (0800) 333333.

Mains cleaner

COMPUFILTER removes voltage fluctuations and other interference from dodgy mains power supplies. In addition, its four output sockets are isolated from each other to prevent your different items of equipment interfering with each other. Compufilter costs £75 and is rated at 13A, making it about the right size for most office micro systems.

Contact Cetronic Power Products, Hoddesdon Road, Stanstead Abbots, Ware, Hertfordshire SG12 8EJ. Telephone: (0920) 871077.



GENERAL SHORTS

- Accountancy firm Binder Hamlyn has produced an extremely clear 30-page guide to the Data Protection Act, available free to anyone who requests it. Try the phone book for your local office or contact the City office at 01-353 3020.

- Users of the One-to-One electronic-mail system can now find out the number of any fellow subscriber connected to the system. The new on-line directory will give you a mailbox number if you type in a name; it also works the other way round, giving you the name which matches any mailbox number. Neither of these useful and obvious facilities are available on the U.K.'s largest electronic mail system, Telecom Gold. Contact One-to-One on 01-351 2468.

- Inmac is now offering coloured floppy discs. The 5.25in. discs come in five different colours; you get two of each colour in a mixed box of 10. Price for a box of standard double-sided double-density discs is £33. Contact Inmac (U.K.) Ltd on 01-740 9540.



Printer stand

ACCO'S printer stand creates space for a stack of continuous paper underneath your printer and folds the printed output neatly. Two models are available. For the 80-column printers the price is £34.90; the wider stand for 132-column printers costs £39.90.

For further information contact Action Computer Supplies, 6 Abercorn Trading Estate, Manor Farm Road, Wembley, Middlesex HA0 1WL. Telephone: (0800) 333333.

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1986 GETS OFF TO A SLOW START

THE 1986 Which Computer? Show ran from 14-19 January at the National Exhibition Centre, Birmingham. There was little that was earth-shattering inside its two cavernous halls: manufacturers seemed content to rest on their laurels.

Some of the show launches had in fact been announced earlier. Several machines — for example the Tandy 3000, Sharp PC-7000, Tandon PC, and Torch Triple X — have already been reviewed in this magazine. Others which were hardly hot news included the Data General's IBM compatible Dasher/One, the AM Stearns Great Communicator and of course the Commodore Amiga. What follows is a look at the best of the rest.

IBM: back into the mainstream

THEME of the IBM stand seemed to be bringing PCs back into the mainstream of professional computing. Among the products on show were the latest version of IBM's own Displaywrite word-processing program, and a file-transfer program.

Displaywrite 3 now lets you exchange documents more easily with versions of Displaywrite running on IBM System 36 minis and 370 mainframes. You can also merge Lotus 1-2-3 and dBase data into text to create personalised letters. Displaywrite costs £418.

Kopy-King lets you link IBM PCs to a CICS, DOS/VSE or MVS mainframe environment. The main feature of this program is the wide number of file formats it can support, including Lotus 1-2-3, dBase and DCA on the PCs.

For more details of these products contact the IBM PC enquiry office on 01-578 4399.

Professional services

AN INTERESTING continuing development at the show was the presence of three management arms of accountancy firms. Arthur Andersen, Binder Hamlyn, and Stoy Hayward were all offering a range of consultancy services.

FULL-PAGE PRINTERS MAKE THEIR MARK

PAGE PRINTERS have definitely now arrived, judging by the number on show. We counted nine in the low-cost category that we had not seen before, most of them laser printers. Most interesting of the bunch were the three page printers from Datasouth, NEC and Document Technology which use light-emitting diodes (LEDs) rather than a laser.

LED printers work by rotating an photocopier-style drum in front of an array of LEDs, while laser printers use a moving beam of laser light. The LED technique involves fewer moving parts and so is potentially cheaper and more reliable.

Datasouth's Pagewriter 8 costs £2,850. It has unusually good paper handling for a page printer: a 250-page input tray and 250-page catcher are standard, with a

LOW-COST PAGE PRINTERS

	Type	Speed	Price
Burroughs AP-9208	laser	8	£3,250
Canon LBP-8 A2	laser	8	£3,845
Datasouth Pagewriter 8	LED	8	£2,950
Dataproducts LZR-1200	laser	12	£3,100
Document Technology DL-20	LED	12	£6,500
NEC Pagewriter	LED	8	£2,500
Qume Laser 10	laser	10	£4,000
Ricoh LP-4080	laser	8	£3,000
Xerox 4045	laser	10	£4,045

Speeds are quoted in pages per minute.

second input tray optional. As well as interfacing to the IBM PC and other RS-232 or Centronics-equipped micros it will also hook up to IBM system 34, 36 and 38 minis. Contact Datatrade Ltd, 38 Billings Road, Northampton NN1 5DQ. Telephone: (0604) 22289.

Datasouth's printer is based

around a mechanism manufactured by NEC, whose own offering has a slightly reduced specification and a lower price, expected to be about £2,500. More information from NEC Business Systems (Europe) Ltd, Printer Division, 35 Oval Road, London NW1 7EA. Tel: 01-267 7000.



Ferranti's AT-alike has bundled software

FEW British companies are in the market with an AT clone, but Ferranti unveiled an extremely good-looking product in this category. The PC 2860AT comes with 640K of memory, a 20Mbyte hard disc and 1.2Mbyte floppy for £3,898; a colour monitor costs an additional £425.

The machine is built around the Intel 80286 and will run at IBM's 6MHz, you can switch to 8MHz from the keyboard. Four full-

length AT-compatible card slots are housed under a lift-up lid for easy access. Ferranti supplies the machine complete with a year's on-site servicing included in the price, and WP, filing and calc programs from the Perfect II software range.

Contact Ferranti Computer Systems Ltd, Personal Computers Division, Derker Street, Oldham, Lancashire OL1 3XF. Telephone: 061-624 9552.

Clones get even cheaper

IBM compatibility is hardly likely to come much cheaper than the Walters XT system. For £599 you get a 256K system with single 360K floppy, keyboard and monochrome monitor all included.

The system is assembled in the U.K. from mainly Far Eastern components. It is built around an eight-slot chassis which takes standard IBM-compatible cards; a monochrome text-display card and parallel printer card are included in the price. The XT system can be expanded to 640K on-board and additional discs can be added, including 10Mbyte and 20Mbyte Winchester.

Walters also do an IBM PC/AT clone for £1,995. For this you get a system complete with 512K of RAM, a 1.2Mbyte floppy, a monitor and a hard-disc controller; with the 20Mbyte-hard disc fitted the price of the system comes to £2,480. The Walters AT is built around the Intel 80286 processor, which is switch-selectable between 6MHz and 8MHz.

In case the reliability of these slightly mongrel systems worries you, Walters is offering customers a two-year maintenance agreement the first year of which is free. Contact Walters International Ltd, Matrix House, Lincoln Road, Cressex Industrial Estate, High Wycombe, Buckinghamshire HP12 3RD. Telephone: (0494) 32751.



Document Technology's DL-20 prints at a fast 12 pages a minute and has a 500-page input tray as standard. It has its own built-in disc drive, so you can load alternative fonts from disc. The price is £6,500. IBM's anticipated low-end page printer could well turn out to be a badge-engineered

DL-20. For more information contact Quest International Computers, School Lane, Chandlers Ford, Hampshire SO5 3YY. Telephone: (04215) 66321.

Rank Xerox showed the Xerox 4045 laser printer which also works as an ordinary office copier. It costs £4,995. Ring (0895) 51133.

Amiga software

THE Commodore Amiga was finally unveiled to the public. There was also some software in evidence. Commodore's own frame grabber was on show, which allows video input to be captured and manipulated by the micro. Metacomco, the developer of Amigados, was showing ABasic, MCC Pascal and Cambridge Lisp. There was also a comms package from Computer Communication Systems for viewdata and electronic mail, and an office program called Acquisition from Taurus.

Future FX-50

THE BRITISH FIRM Future has launched its top-of-the-range FX-50. It has an 80286 CPU, 640K RAM, a 40Mbyte Winchester and a built-in LAN. Full AT compatibility is claimed. Systems start at £5,200.

Contact Future Sales Ltd on 01-680 6040.

SHOW SHORTS

TDK was showing a range of advanced-technology discs including a 1Gbyte Worm disc, a magneto-optical disc, magnetic discs using perpendicular recording techniques, and a video floppy disc.


Victor has launched its V-286 AT-alike. Cost is around £3,000 for a 20Mbyte version. More on (0494) 450661.

PCML is introducing a 10.65Mbyte hard disc on an IBM PC expansion card, called rather improbably, the Dinasti. Details on (0372) 67282.

Lotus announced a new release of Jazz for the Mac to take advantage of the features of the Mac Plus. Release 1A also gives Lotus an opportunity to correct some of the bugs in the original release. Lotus is inviting registered users to upgrade to Jazz 1A at a cost of £20. Lotus also had more details of its users' club on Telecom Gold which will give 1-2-3, Symphony and Jazz users the ability to download templates and macros, and swap information.

Microsoft's latest operating system, Xenix Version V, was on both the Apricot and Texas Instruments stands. This product is designed for powerful multi-user systems and is compatible with the Unix System V which is widely used on minis. Contact Apricot on 021-501 2284, or Texas Instruments on (0234) 67466.

Computer Frontier had a new hard-disc version of the Tava Flyer transportable computer on its stand. This IBM-compatible machine packs a 20Mbyte hard disc, a standard 360K 5.25in. floppy-disc drive and 640K of memory into a compact 14lb. package. An 80-character by 25-line liquid-crystal display is built-into the hinged lid. Price is £4,250. Ring (0438) 316561.

Digital Research showed off the new version of Gem and a number of Gem applications. Most interesting of these was the IBM version of AM Technology's Vicom, an excellent comms program well known to many Macintosh users. Vicom costs £155 in its IBM version. 

Toshiba portables

TOSHIBA launched two mains-powered portables with plasma displays. The T-2100 offers a dual-speed 8086, 256K RAM and two 720K 3.5in. floppies. No price has yet been fixed.

The AT-compatible T-3100 has a dual-speed 80286, 640K RAM, 720K floppy and 10Mbyte hard disc. The price is £3,200. Contact Toshiba at Toshiba House, Frimley Road, Frimley, Camberley, Surrey GU16 5JJ. Telephone: (0276) 62222.

These machines are of particular interest because it is rumoured that the long-awaited IBM Convertible lap-top will be closely similar in spec.



Bigger Mac steals the limelight

ALTHOUGH not strictly part of the show, the Apple Mac Plus was one of the highlights of Birmingham. It offers 1Mbyte RAM expandable to 4Mbyte, 800K disc instead of 400K, a new keyboard with

numeric keypad and cursor keys, and a new 128K ROM with modified file system. It also has an extra SCSI port intended mainly for peripherals such as hard discs. The price is £2,295.

High-capacity floppy

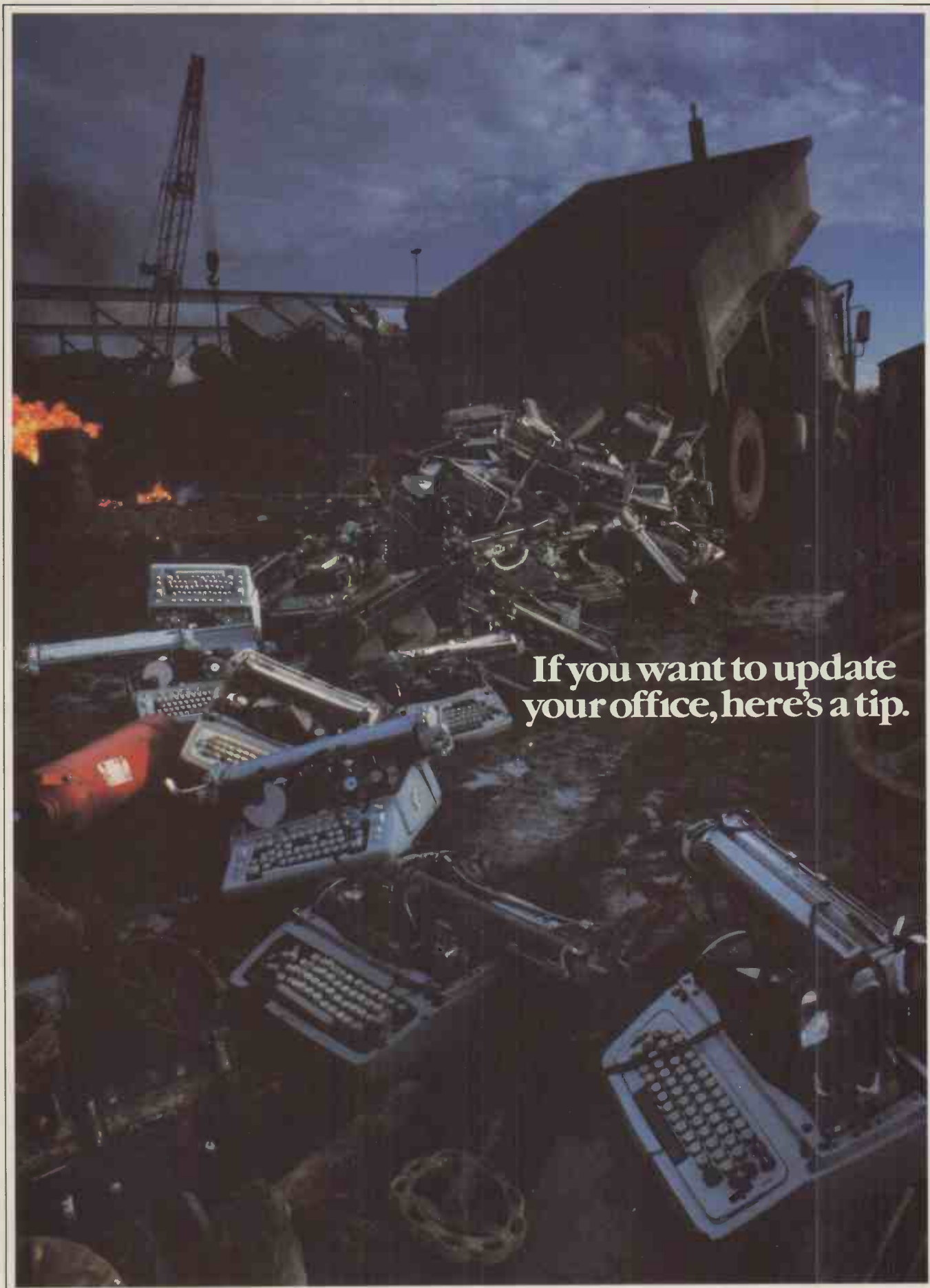
EPSON's BM-5 is a 5.25in. floppy-disc drive with a formatted capacity of 4.8Mbyte. It costs £925 with the appropriate interface and works with the QX-16 and with IBM-compatible computers including Epson's new PC.

The secret of its very high storage capacity is a special type of high-grade floppy disc. These discs cost around £20 each from Maxell.

Obvious uses for the BM-5 are keeping large quantities of archive material on a set of discs, or backing up a fixed hard disc. Access times are somewhere between a conventional floppy and a hard disc.

Details from Epson (U.K.) Ltd, Dorland House, 388 High Road, Wembley, Middlesex, HA9 6UH. Telephone: 01-902 8892.





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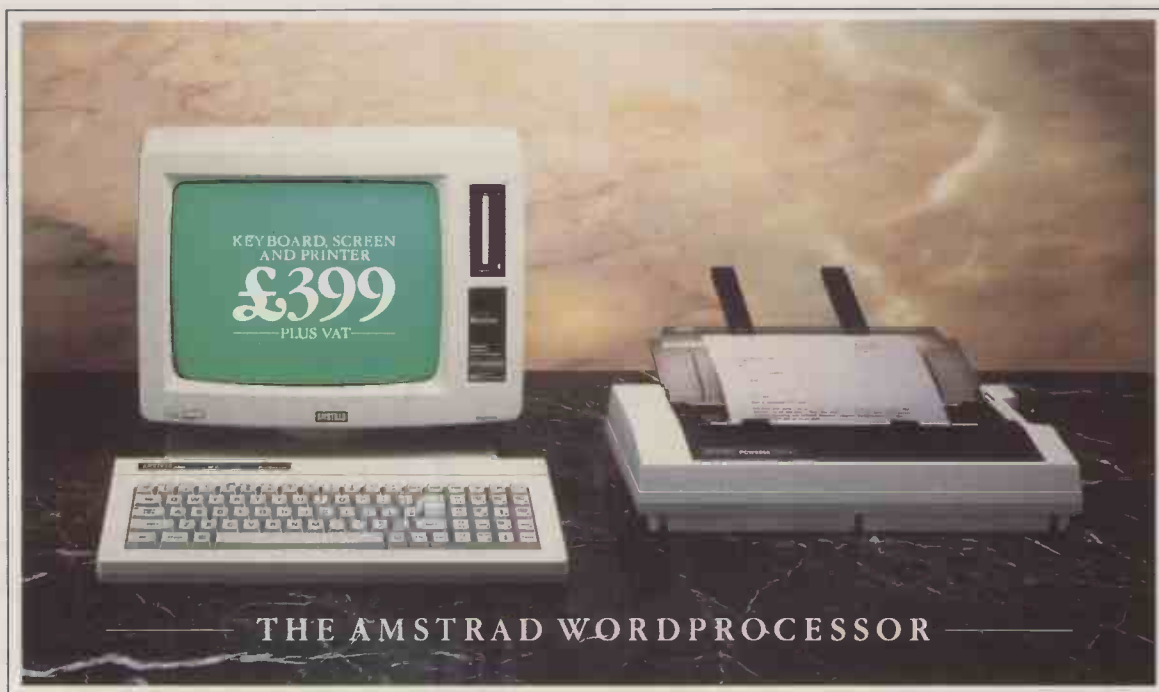
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The place featured on the opposite page.

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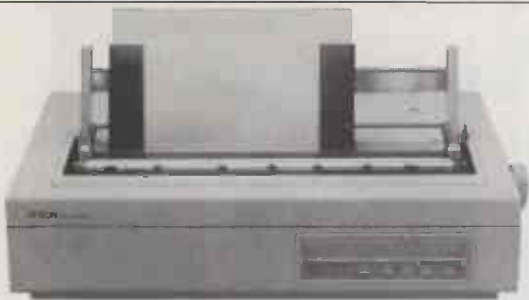
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● Circle No. 129

PRACTICAL COMPUTING March 1986



BY MIKE LEWIS

WHAT'S THE CACHE?

You can reduce disc accesses and increase speed by storing your most-used disc files in RAM.

directories other than its own. It saves the need for an extra copy of the program and overlays in every directory containing text that you want to edit.

All this indicates another problem: the need to plan drive use carefully to get the best out of the system. Often, much file copying needs to be done during the session, so a RAM disc is not something that the casual user can just switch on and forget about.

By contrast, the technique known as disc caching suffers none of these disadvantages. It is certainly worth exploring if you have only a limited amount of spare memory, even though it will not always bring about such a drastic reduction in physical accesses.

80:20 RULE

The theory behind disc caching is that, in any computing session, a relatively small number of disc sectors will be accessed a large number of times. Much of the activity in a database might be concentrated on a small section of the file; a WP user might constantly scroll back and forth over a consecutive block of paragraphs; or the same overlay file might be read over and over again. Often, the 80:20 rule will apply: 80 percent or thereabouts of disc transfers will be on about 20 percent of the data.

A caching program takes advantage of this simply by arranging to hold in RAM a copy of each disc sector that is read, on the assumption that it might well need to be read again before long.

(continued on next page)

```

1000 'Fragment of program showing file access via a disc cache. This
      shows two subroutines: initialisation, and get record. Note that
      all variables are integers unless otherwise declared.

2000 'Initialisation routine. Allocates arrays, initialises various
      counters and opens the file whose filename is passed in FNAME$
2010 NBUF=8 'Number of buffers
2020 DIM FREQ(NBUF), RECPOINT(NBUF), BUFFER$(NBUF)
      'Frequency parameter, record number, buffer
2030 INCR=64: TRIGGER=NBUF: CLOCK=0: MAXINT=32767
      'Increment amount, trigger for halving freq,
      cycle counter, highest possible integer
2040 FOR J=1 TO NBUF: FREQ(J)=0: RECPOINT(J)=0: NEXT J
2050 OPEN "R", #1, FILNAME$, 128
2060 FIELD 1, 128 AS SECTOR$
2090 RETURN

3000 'Get record. Required record number is passed in RECNO. Data is
      returned in RECORD$
3010 'First check the clock. If this has reached the trigger point,
      halve all the frequency parameters
3020 CLOCK=CLOCK+1
3030 WHILE CLOCK=TRIGGER
3040     FOR J=1 TO NBUF: FREQ(J)=FREQ(J)\2: NEXT J
3050     CLOCK=0:
      WEND

3060 'Now search the cache for the required record, identifying the lowest
      frequency param at the same time. If record found, move it to RECORD$
      and increment frequency.
3070 LOFREQ=MAXINT: 'This will hold lowest frequency parameter
3080 FOR J=1 TO NBUF:
      IF FREQ(J)<LOFREQ THEN
          LOPOINT=J: LOFREQ=FREQ(J)
          'LOPOINT points to lowest frequency
3090     IF RECPOINT(J)=RECNO THEN
          RECORD$=BUFFER$(J): FREQ(J)=FREQ(J)+INCR: RETURN
          'Required record found in cache and returned
3100     NEXT J
3110 'If record not found in cache, read it from disk
3120 GET #1, RECNO
3130 'Store it in the buffer with the lowest frequency
3140 BUFFER$(LOPOINT)=SECTOR$: FREQ(LOPOINT)=INCR: RECPOINT(LOPOINT)=RECNO
3150 'Finally, return the record to the calling program
3160 RECORD$=SECTOR$: RETURN

```

It's all very well having oodles of cheap RAM, but it is not always easy for our programs to take advantage of it. After all, not all programming problems can be solved just by adding memory. One possibility is to find ways of using the extra kilobytes to cut down disc access. Since these are frequently the biggest bottleneck in the system programs will then run appreciably faster.

A popular way of achieving this is the well-known RAM disc, in which a chunk of internal memory is dressed up as an ordinary disc drive, complete with make-believe sectors, directories and file structure. Application programs can use the RAM drive without knowing that it is not a real disc, while the delays associated with

physical disc transfers are virtually wiped out.

But there are problems, chief of which is that the information on the RAM disc disappears as soon as you turn off the electricity. Apart from the obvious risk of premature data loss, this means that the relevant files must be copied to the drive as they are needed. If they are altered, they must eventually be copied back again. Finally, they must be deleted from RAM when no longer required in order to make way for new files. All this takes time, which could well defeat the original object.

A less obvious disadvantage of RAM discs is that they cannot be used on a small scale. Since they must always hold at least one file and a directory, there is a

minimum size below which they are ineffective. So you cannot use this technique if you have just a few hundred bytes to play with.

It is a good idea to confine the RAM disc to read-only files, like programs and overlays, or to work files that do not need to be kept between sessions. I use mine mainly for the output from compilers and linkers during debugging. No great harm is done if I lose object modules and Com files while they are under development, provided of course that the source is safely on disc.

I also have a version of WordStar configured to run from the RAM disc. This is a good way of getting round the problem caused by WordStar's inability to read files, including its overlays, from

(continued from previous page)

Before each read, it scans this cache of sectors to see if the one it wants is already there. If so, it uses this copy rather than fetching it again from disc.

Because there is a limit to the number of sectors that can be held in RAM, the program needs a way of deciding when an old sector should be discarded to make way for a new one. One approach is to hold pointers to the sectors in a sequential list. Each time a sector is retrieved from the cache, its pointer swaps places with the one before it. Meanwhile each new sector displaces the one at the bottom of the list. This means that the more frequently used data will gradually trickle up to the top of the list and will have more chance of staying in the cache.

STAMP EACH SECTOR

A similar effect can be achieved by stamping each sector with the time of its last access and to discard the sector that was least recently used. The time is not necessarily the time of day — it could be a counter which is incremented each time a file transfer is requested. Alternatively, you could record the number of times a sector is accessed and discard the sector with the lowest frequency of use.

Most disc caches are implemented at operating-system level. This has the advantage that they can work across file boundaries. The controlling software does not need to know which sectors belong to which files, how physical sectors are organised into logical records, or which process requires the data.

For example, MS-DOS incorporates a caching technique which is controlled by the Buffers command in the Config.Sys file. Each buffer holds one 512-byte sector. By increasing the number of buffers, you can improve disc performance, albeit at the expense of memory.

A good way of demonstrating this is to run a user-group program called Where.Com, which searches all the directories of a hard disc for every occurrence of a specified file. With the MS-DOS default of two buffers, and with 16 average-size directories, I found that a typical search took about 10 seconds. After increasing the buffer count to 15, the first invocation of Where.Com still took about the same time, but successive searches averaged less than three seconds.

Unfortunately, this sort of improvement in performance is less likely in an eight-bit system because of the limited amount of RAM available. Standard CP/M

2.2, for example, does not support caching. Nevertheless, it is perfectly possible to build a disc cache into your own eight-bit programs, even in Basic. The listing shows two straightforward sub-routines which should point you in the right direction.

CALLING PROGRAM

The subroutines work with records of 128 bytes, which is the sector size in many versions of CP/M. It would be up to the calling program to unpack these sectors into logical records and fields. For simplicity, all access is from the same file. One subroutine opens the file and initialises various counters and arrays. The other subroutine is called whenever a record is required from the file.

The basic algorithm employed by these routines is a variation of the least-frequently-used method. Each time a sector is retrieved from cache, its associated frequency field is incremented. When a new sector is read from the file, it overwrites the record with the lowest frequency. However, there is a danger that certain sectors might be used very often at the start of a session, but not at all later, and that these will then become locked into the cache. To avoid this, all

the frequencies are halved at a fixed interval, consequently incorporating a time element into the algorithm.

The technique can be tuned by altering certain constants: the number of buffers, the amount by which the frequency is incremented, and the point at which the frequencies are halved. It would be very difficult to come up with a general method of optimising these; trial and error is probably the only way. Bear in mind that if you make the buffer count too high, the program might actually take longer to search the cache than it would to read the disc.

FLAG BUFFERS

Although the subroutines shown here are for reading only, they can easily be extended to allow for the rewriting of records back to the file. Each buffer would need a flag to say if it had been altered. The actual writing could be postponed until the record was due for displacement. However, it might be a good idea to go through the cache periodically, writing back all flagged sectors, in case of a power failure. This could be done after a fixed number of accesses, and again whenever a file is closed.

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When bulletin boards were pioneered in the U.S. in the 1970s, telephone calls were very cheap within a local call area, or even free. As a result the number of local BBSs serving a specific locality proliferated. On the other hand, long-distance calls cost a king's ransom, and only now are coming down to reasonable rates. Consequently several major networks such as The Source and Compuserve were spawned in the late 1970s to allow low-cost transmission of files and messages.

At the same time, communications enthusiasts considered setting up their own non-profit-making BBS networks. Several such networks were set up across the U.S. and Canada, but few have stood the test of time. The Fidonet system is one which has managed to survive, and has even made it across the Atlantic to Europe.

The Fido software is in the public domain and runs on a standard configuration of an IBM PC with dual drives and 640K RAM. The major difference between a Fido board and, say, a TBBS board, lies in the board's ability to forward messages on to other Fido boards around the world. To do this, Fido system operators have to switch messages between their boards at specific times of the day, usually during the early hours of the morning when call activity is low. Within the U.K. the call-switching period is between 4.30 and 5.30 in the morning, when each board will call out to other boards for which it has messages and pass data on as appropriate.

NODE NUMBER

Each board has a unique node number by which it is identified on the Fido network. Each node has a four-digit number, the first two digits of which are the international dialling code for the country concerned. The remaining two digits of a Fido board are the number allocated sequentially to that board by the Fido network as a whole.

At the specified time, any messages destined for other boards are processed so that a message may be sent on to the board intended. Potential sysops concerned for their phone bill will be pleased to learn that the Fido software will not accept a message not destined for itself. This prevents unscrupulous board operators passing their onward messages to a local board for international forwarding, thereby passing the bulk of the call costs on to another operator.

Most inter-board messages reach their destination board fairly

FIDONET

This U.S. public domain networking system looks destined for success in the U.K. Steve Gold explains why.

quickly. This is achieved by careful zoning of Fido BBSs in and outside a particular country and barring any non-Fido board calls during the mail time. But the Fido network is complex and has to be very carefully co-ordinated each time a board is added to the network as a whole. Calls can fail, and a message occasionally takes several days to reach its destination, although they will usually get through in a day or so.

In the U.S. most boards charge a subscription to callers before they are allowed to place messages for other boards on the Fido network. In the U.K. things are a little different. At present, most BBSs are run on a private basis, with several sysops taking advantage of the British Telecom Nightline service. This means that for a flat-rate fee, calls made from a specified phone line may be made free of charge between the hours of midnight and 6 a.m. The Nightline facility is still quite expensive when compared with call charges in general. But a sysop can still make a saving by installing it.

At the moment Fido sysops in the U.K. are a generous lot, keen to encourage users to call their boards, so few boards are currently charging users a subscription. But they are placing constraints on the number of calls a user may make to prevent wholesale wallet-weakening.

This situation seems unlikely to continue for much longer, given the proliferation of cheap modems and the consequent increase in the number of users. A subscription-based system seems the best option, although this raises the spectre of users being restricted to just one board unless their budget can stand it. Group subscriptions, where a subscription to one board allows use of several in a group, have not been successful in North America as there will always be a few boards that will get the lion's share of the income.

Fido could be extremely attractive to organisations who require a cheap and comprehensive network to switch messages, particularly on an international basis. For them, it could


provide an economical inter-office mail system with low running costs. The drawback is that while the commercial networks such as One to One and Telecom Gold provide guaranteed delivery, Fido does not, nor does it offer much security.

Given the advent of low-cost IBM PC clones, a typical system configuration, including auto-answer multi-speed modem, could be installed for as little as £1,000 a site. For a capital investment of, say, £10,000 any firm could have its own private Email service that covered the country, or even the world. The international aspect is one that should appeal to many organisations since commercial Email firms such as Telecom Gold charge heavily for international mail.

CHEAP MESSAGING

For those modem users with a less commercial eye, Fido offers a useful and cheap method of switching messages across continents, and avoids the sometimes high cost of accessing an international system such as The Source in the U.S. to pass messages internationally. In the not too distant future callers will have to subscribe to specific boards, unless commercial sponsors can be found. However, the subscriptions need be little more than £5 or £10, with message switching charges debited automatically from subscribers' account balances.

There are a few drawbacks to the Fido system. Because the software is in the public domain, authors have little incentive to improve their software though improved versions may be available from several sources. The major problem of slow message searches means that a wait of several minutes after each log on to the system is necessary to allow the computer to scan its message base. The reason for such slowness is that the Fido software stores each message as an individual file, unlike other BBS software, such as TBBS, which stores it as a composite file. Consequently the computer must access every file to identify if any caller has any messages waiting for him or her.

The IBM PC is a slow machine at the best of times. Such file accessing slows the software down to such an extent as to make the message search wait very tedious and time consuming for the user, not to mention the extra phone charges incurred. Nevertheless, the network shows every sign of gaining acceptance by a growing band of serious modem users. If the sysops can stand the bills, then its success is assured. 

FIDO IN EUROPE

U.K.

Node	Name	Number	Baud	Times
4403	Compulink	04867 6535	300	24hr
4404	Compulink-2	04867 88710	2400	22.00-09.00
4405	Haunting-Thunder	0752 364059	1200	24hr
4406	Jersey-Fido	0534 39389	300	24hr
4407	TeePee-Link	061 494 6938	300	22.00-09.00
4408	Colchester-Fido	0206 865737	300	16.00-08.00
4409	Dragon-Fido	0766 4154	300	24hr
4410	LaserMail	0903 212552	300	24hr
4411	Bulletin-AT	Coming soon		
4412	Dataflex	Coming soon		
4413	Microway	Coming soon		
4414	Sirius-Fido	Coming soon		
4415	Advance-Fido	0482 28367	300	08.00-23.00 (WE)

NETHERLANDS

3101	Fido-NL1	01031 8380 37156	300	24hr
3102	Fido-Ben	01031 3480 21407	300	05.00-02.00
3103	HCC-DB	01031 9458 889	300	24hr
3104	Fido-HCCN	01031 7211 6080	300	11.00-07.00

SWEDEN

4601	Day-Rainbow	01046 541 33170	300	24hr
4602	Sun-City	01046 541 66988	300	24hr
4603	ATL	01046 510 20409	300	24hr
4604	Yellow-PC	01046 876 03312	300	24hr

NORWAY

4701	Hackers-Unlimited	01047 243 1987	300	20.00-11.00
4702	Future-Fido	01047 751 5780	300	16.00-08.00
4703	Costa-del-vindenes	01047 558 2108	300	24hr

FINLAND

3501	DOSbox-Fido	01035 804 202223	1200	24hr
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Multi-user networking in style

The designers of Minstrel 4 were given a simple brief: produce a world-beating, cost-effective and practical multi-user system. And do it with style.



Minstrel power – 80186 master and HTS 186 dual processor slaves.

They passed the latter test with flying colours. But looks aren't everything. Inside this beautifully engineered chassis, you'll find a close coupled TurboDOS⁺ network that holds the key to all your multi-user computer projects.

Now, and for the future.

Minstrel 4 is a multiprocessor machine – every user of the system gets a DEDICATED CPU and 512 Kb RAM. This virtually eliminates the response time degradation you often find on timeshare minicomputers and so-called supermicros.

Minstrel 4 is more powerful than most minis, even in its most basic state. You can start with two users, but a full blown 16 user system will give you 9 MBytes dynamic RAM and 17 CPUs with 80186 instruction sets, running concurrently at 8 MHz. With that



Minstrel design – fast tape back-up for safety and convenience.



The new Minstrel 4

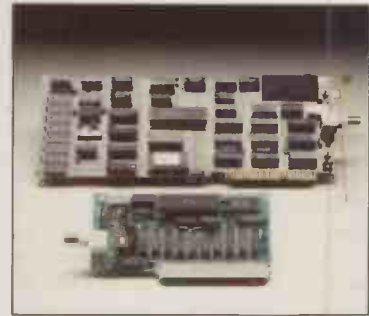


Minstrel workstations – come complete with function keys and business graphics potential.

sort of power, we're confident that you won't run out of steam.

Minstrel 4 has unprecedented networking capability. The Winchester controller has built in ARCnet. You can network IBM PCs, ATs, Apricots, Olivettis and all lookalikes if required. Gateways to IBM and ICL mainframes are available. Most important, you can network Minstrel 4s together – 255 of them to be precise.

Minstrel 4 supports CP/M, MP/M, MS DOS (including version 3.1 with file and record locking) and has PC DOS emulation, so you can run nearly all the popular business packages.



You can even network stand-alones into the Minstrel System, using Minstrel ARC net cards.

Storage capacity is only limited by your budget. A single Minstrel 4 holds up to 160 MBytes formatted disk capacity, with onboard streaming back-up of up to 60 MBytes. Direct memory access means you can download 20 MBytes onto tape in less than 4 minutes. Higher capacity drives can be supplied.

A two user Minstrel 4 system, complete with tape back-up and terminals will cost you less than £7,000. Additional workstations, just over £1,000 per user, a price/performance package you'll find unbeatable.

At last there is a serious alternative to the minicomputer, with the sort of costs and flexibility you'd associate with a micro. It's called Minstrel 4, and you should find out more about it. Write or call us for details.



With Minstrel, expansion is integral, not an afterthought.

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BY RAY COLES

MARKET FORCES

U.S. semiconductor manufacturers are going to the courts to try to stem the flood of cheap Japanese chips.

It seems only yesterday that I had to enlist the help of a strong assistant to help me lift an 8Kbit RAM unit and install it in a computer rack. The technology then was based on magnetic cores, painstakingly threaded with read, write and sense wires by skilled assembly operators who were often recruited from the Lancashire textile industry. At the time the press expressed considerable concern that this strategic British memory-manufacturing industry would soon be wiped out by competition from offshore assembly plants — in Spain for example — where labour costs were lower.

Today 8K of memory is a triflingly small quantity, and those Lancashire core threaders have long since had to channel their skills into other fields. First they were overtaken by cheaper foreign imports and then by changes in the memory technology itself. Most memories now manufactured in Britain are produced in semiconductor plants established by companies from the U.S. or Japan.

Sadly perhaps, we can now observe with some detachment the anguish of American semiconductor manufacturers who appear to be locked in a fight to the finish with their rivals in Japan. The first campaign is being waged in the dynamic RAM chip arena, and already there are signs of impending defeat for the Americans. Millions of 64K and 256K DRAM chips make up the spearhead of the invading Japanese field force. Their main weapons are prices so low that they can wrinkle the American and European competition out of their sockets and PCBs with consummate ease.

TUMBLING PRICE

In January 1984 a 256K DRAM chip was priced at about \$100. The same chip can now be had for about \$3, a price set by Japanese giants like NEC, Hitachi, Toshiba and Fujitsu. The Americans say that this is so low that it cannot cover manufacturing and marketing costs, let alone provide a profit margin.

To the Americans, what the Japanese are doing amounts to dumping — the export of over-production at prices aimed not at making a profit but at annihilating the competition. So they are demanding political action from Washington to protect their markets.

On the other hand, to the Japanese what is happening is a direct consequence of the world recession in the chip market when there is a 60 percent overcapacity in worldwide chip-manufacturing

plant. They argue: How can prices be anything other than weak in this situation? The market is just experiencing classic supply and demand economic forces and responding in a predictable way.

The Japanese arguments are perfectly legitimate and would be accepted unquestioned were it not for certain historical precedents in the many other industries which Japan has come to monopolise, ostensibly by accident. The American chip manufacturers have become fully paid-up subscribers to the conspiracy theory of history. They argue that unlike most companies in the West, Japanese companies are secure enough to take a much longer-term view in their corporate strategic planning. In part this is due to their past success, their sheer size and their vertical integration, but perhaps the most important advantage of all is that they have very patient shareholders. Thus the Japanese companies can afford to lose money in the short term in order to clean up later on when the competition has been eliminated.

DRAM TRAUMA

Whatever the facts may be, the American semiconductor industry has suffered serious casualties already. Memory pioneer, Intel, has announced that it is withdrawing from the DRAM market. Others such as Motorola, Texas and National are cutting back on production. There could be further failures or mergers before the recession is over, but the Japanese companies seem well able to weather the storm.

In the past, the ability of American industry to create newer and better products has kept it one step ahead of the Japanese, who are apparently less able to innovate or not inclined to. However, innovation requires not just bright, creative scientists and engineers. In today's semiconductor industry it requires massive investment.

With profits falling, companies failing and shareholders grumbling, massive investment may become increasingly difficult in the future, even for the largest U.S. companies. In 1985 the Japanese outspent the Americans by a significant margin on capital equipment for semiconductor manufacture. Also, by concentrating their R&D expenditure on the high-volume commodity parts, they have also gained a technology edge in selected areas such as DRAM development.

So the Japanese have already won the battle for the DRAM market, and the question now is which components will they concentrate on next? They are making

great strides in microprocessor chip development, mainly by introducing improved versions of U.S. designs such as the Z-80 and the 8086, often using the technological tools honed by their employment in the mass-memory market. But despite considerable Japanese success in this area there is no sign of a shodown yet.

A more likely second target is to be found in the non-volatile memory market. Here ultraviolet erasable EPROMs and electrically erasable EEPROMs offer tempting possibilities for suppliers with the basic fabrication technology to manufacture the simple and regular memory arrays required. As with the manufacture of DRAMs, success with PROMs relies less on circuit design ingenuity and more on the mass-production skills with which the Japanese have shown themselves to be so well endowed.

WORLD SUPPLIER

So what of it? Why not allow the Japanese to become the world suppliers of memory devices while the Americans and others concentrate their original circuit design expertise on the difficult bits like microprocessors and complex peripheral circuits?

Unfortunately, life is not that simple. The manufacture of microprocessors also requires the availability of the best in chip-fabrication technology. Without the commodity parts like DRAMs and EPROMs on which to debug these techniques, the Americans will find it increasingly difficult to keep up, and prohibitively expensive into the bargain. If American and European engineers are not to become mere ideas people for the Japanese chip manufacturers, it would appear to be essential that American semiconductor manufacturers retain a foothold in the high-volume memory markets.

When the normal free-market forces are allowed to operate in the traditional way, there appears to be little hope in the longer term that this foothold can be retained. Consequently, American companies are lobbying hard for intervention at the political level in order to gain a measure of protection for their industry. But this approach has been tried in other industries and by other countries with only modest success. Some companies are going much further than writing to their Congressional representatives. They feel that what the Japanese are doing is not just unfair but illegal, and they are hiring lawyers to help prove it.

The main thrust of the legal argument is that the Japanese are


dumping on the world market, a practice which is illegal under U.S. law. A secondary argument is that some Japanese manufacturers are just copying American designs and saving themselves a large proportion of the development cost.

Sometimes a direct accusation of illegal copying can be made, and lawsuits follow thick and fast when such skulduggery can be demonstrated. But in most cases the original designs and technology were passed over to Japanese companies under so-called second-sourcing agreements, which were entered into when times were good and American chip makers could not keep pace with demand.

VARIANTS

The Japanese honoured their agreements but learned a lot in the process and soon turned the tables on the Americans by introducing their own variants on which they do not need to pay royalties.

One of the results has been a recent marked reluctance by giants such as Intel to enter into second-source agreements with Japanese companies for new products like their 80386 32-bit processor which has cost \$100 million to develop. But this is a big gamble for Intel to take. These days a Japanese second source is a definite plus point to the fickle equipment manufacturers who want guaranteed availability and the promise of lower prices in the future.

We are witnessing the brutal logic of free-market economics at work. The outcome might be the best for us all, or it might not. Now we must judge for ourselves or wait until history provides a more reliable vantage point. 

Q Can you give me any information about word-processing packages for an IBM PC that allow the full use of Greek characters as well as the normal ones? I would really like a list of packages, and a description of them.

S WEATHERHEAD

A Your problem is really part of the larger question of how to extend word processing beyond simple letters, to include different styles of characters such as italics, or different fonts, characters for different languages such as French, German, Greek or Russian, and how to include chemical formulae and mathematical symbols.

In addition to the word processor itself, you will need to consider carefully what sort of printer you need to print the output. Word-processing packages that we know of for the IBM PCs and suchlike machines include the following:

- Star Polish adds extra features to WordStar.
- Vuwriter is a word processor written by Manchester University Computer Science Department in collaboration with Barclays Bank.
- Volkswriter Scientific, written by Lifetree Software; not to be confused with a word processor called Volkswriter de luxe by the same firm. It is reviewed, along with Vuwriter, later in this issue.
- Language Master, originated in Australia, works with a screen of 640 by 400 dots, which is exactly double that of the IBM PC. It only runs with a NEC APC-3 computer.
- Scientex Ltd, of Stevenage, Hertfordshire has written a specialist word processor which runs on the Sperry PC.
- Triad is a word processor from Riva Terminals that has foreign-language capabilities.

Q I have a spare full-height double-sided Tandon disc drive, removed from an IBM PC when a hard disc was fitted. The floppy drive has IBM initials on the front, but there is a Tandon label on the inside of the drive. I would like to fit this to a North Star Horizon, to replace an existing Shugart SA-400 drive, since the latter is only single sided and had a slow stepping speed. Can this be done, since Tandon drives fitted to North Star's at one stage? If it can be done, do I need to move the disc controller board from the Shugart drive to the IBM drive? Can the newer half-height drives be fitted to a Horizon?

K SWALES

8088/8086 COMPATIBILITY

Q Could you explain why the Intel 8088 microprocessor is not as fast as the 8086. Is it only because of the 8088's eight-bit data bus? Does this affect all types of program, including those in assembler, Pascal and C, for instance?

M STOODLEY

A Both the Intel 8088 and 8086 CPU chips are widely used in the IBM PC and its clones. Both carry out arithmetic within the chip using 16 binary bits at a time. However, arithmetic operations require the CPU chip to fetch the data needed for the calculation from RAM, then having got the numbers it must add or subtract or whatever; finally the results are usually transferred back to the main memory.

The 8088 chip has an eight-bit data bus, so when the CPU requests data from memory, it can access eight binary bits of data, and transfer them along the data bus to the CPU. To obtain 16 binary bits requires two accesses to memory. In contrast, the 8086 chip has a 16-bit data bus, so the CPU can access 16 bits of data from RAM with a single fetch. Exactly the same happens when the results are written back into RAM: the 8088 chip requires twice as many calls to memory as the 8086 chip.

When doing arithmetic with Basic or GWBasic the numbers stored in each variable used occupy 40 bits for single-precision real numbers, so more fetches are required with the 8088 than with the 8086. Since this all takes time, it follows that the 8086 will be able to do more useful work than the 8088, other things being equal. Our experiments show that the 8086 appears to do between 30 percent and 40 percent more work in the same time, although this depends on the type of work.

The addition of an 8087 maths co-processor will speed up processing in number-crunching applications by a factor of three, or in some cases more. The factor depends on the type of work, and will be the same on both chips, but clearly the 8086 will still be able to get and save numbers from memory faster than the 8088.

The 8088 chip and the 8086 chip have identical instruction sets, and so programs that run on one will also run on the other. However, because the 8086 executes instructions that move 16 bits of data faster than the 8088, it does not follow that time-optimal machine code written for the 8088 is also time optimal for the 8086 though it will do the same thing.

To increase the throughput of the 8088 CPU, the chip contains an instruction queue. The idea is simply that part of the chip gets the next instructions from memory and stores them in a queue ready for the main CPU. This is more efficient than the older CPUs like the 8080 and the Z-80, which requested an instruction and had to wait for it to be fetched from memory before it could be executed. The instruction queue eliminates this wait, and so keeps the CPU running for more of the time. On the 8088 the instruction queue is four bytes long, but on the 8086 it is three words or six bytes long. The length of the queue was chosen by Intel in order to maximise throughput.

The 80186 and 80188 chips are both upgrades on the 8086 and 8088, and have more instructions than their younger siblings. The difference between the 80186 and the 80188 is again that the 80186 has a full 16-bit address bus, while the 80188 only has an eight-bit address bus. Similarly the 80286 and 80288 are bigger siblings of the 80186 and 80188, with yet more instructions.

?.!?.!?.!?.!?.!?.!?.!?.!?.!?.!

A The North Star Horizon is a fine old machine — I have had one since 1978. Using the spare floppy-disc drive removed from the IBM PC would double the amount that can be stored on a disc, and with the faster rate that the stepper motor can move the read/write head you can access data faster than

with the old single-sided Shugart SA-400 drive. Fitting two half-height drives in one slot is also attractive, since it increases the amount of on-line disc store.

You can put the IBM double-sided drive into your Horizon without any problems. It is plug-compatible with the existing

Shugart SA-400 drive, and you do not need to replace the electronic board on the drive itself.

You will, of course, have to reconfigure the drive-select header on the disc — these are the jumpers labelled DS0, DS1, DS2, HX, etc. — as required by the Horizon configuration. At its simplest, these say whether it is drive 1 or 2, and there is a section in your Horizon manual on this. You do not say whether you are running North Star DOS or CP/M, but whichever operating system you are using you will have to patch a byte in DOS to tell it that the drive is double sided, and another byte to tell it that the drive is fast stepping; otherwise you will only use one side of the discs, and will use slow stepping on the drive.

There is no reason why you should not fit two suitable half-height disc drives in a single slot, thus doubling your disc-storage capacity. The Horizon power supply is enormous, and will handle it without difficulty. Interam Computers of 62 Weir Road, London SW19 8UG actually does this conversion for £250, and other good dealers probably do it too.

Q Your mention of customising WordStar 3.3 in last March's edition of *Practical Computing* whetted my appetite to do more of this with my own copy. In particular, I would like to shorten the time that the initial copyright message is displayed — to zero, if possible — to speed things up, and I would like to set up a different default for the length of the ruler line. I don't know what adjustments can be made. Please can you give a list?

JOHN C IMBER

A First you must get to the Patcher routine from the Install or WInstall program, as described in earlier replies. There are no less than seven different time delays built in to WordStar. First there are two time delays that are used after setting the cursor position or other screen functions. A delay is necessary because some terminals lose characters, show meaningless characters or behave erratically if a character is output too soon after a cursor-positioning sequence has been used. The values stored in the mnemonics DelCus: and DelMis: on versions up to 3.0, or :DelCus and :DelMis on versions 3.3 and later, determine the duration of these

delays, and correspond to the number of milliseconds delay on a Z-80 system with the CPU clocked at 4MHz.

These values tend to be set high so as to ensure that the terminal behaves properly. Type :DELCUS

and see the current value. Try decreasing the value by 10 and see if the terminal still behaves. Repeat until the terminal misbehaves, and then raise the value by 6 or 7. Then try for fine tuning in a similar way with the term :DelMis. Remember that :DelCus and :DelMis were designed to make WordStar work properly on free-standing terminals. Many of today's computers have built-in video circuitry, and do not require these time delays. Our North Star Advantage runs perfectly reliably with both terms set to zero.

The remaining delays are called :Del1, :Del2, :Del3, :Del4 and :Del5, and each may be reset between 1 for the minimum delay up to 127 for the maximum delay. Their uses are as follows.

Del1 is a short time delay, set to 3 by default, and used to control the rate at which the cursor blinks, for example when performing a find and replace command ^QA.

Del2 is a medium-short time delay, set by default to 9, and again used to control the rate at which the cursor blinks.

Changing Del1 and Del2 will not make the program run faster, but merely has a cosmetic effect on the cursor. Certain rates of blinking are irritating to many people, and may cause nausea.

Del3 is medium-long time delay, set by default to 25, used to control the delay between pressing one of the prefix keys and displaying the appropriate menu. The prefix keys are: ^J, Help menu; ^K, block menu; ^O, on-screen formatting menu; ^P, print menu; and ^Q, quick menu. For example, typing ^O, would give the menu, then selecting R would set the right margin, and 72 would set the margin to 72 characters. By typing the commands in quick succession you can save time since the menu display is suppressed. The default value allows for a very slow typist to type the next part of the command without getting the menu displayed, and the value can usefully be reduced.

Del4 is a long time delay, set by default to 64, used to control

the time the sign-on message is displayed, and also the time messages such as "New file" or "Abandon", or the time delay during horizontal scrolling when you are using a line length wider than the screen display.

Displaying the sign-on message for a long time is irritating, and the value can usefully be reduced a lot, but we do not advise making it too small since it affects the time other messages are displayed as well.

Del5 is another time delay, set by default to 9, and used to control the time delay between a keystroke and refreshing the screen during horizontal scrolling.

We actually set Del2 to 3, Del3 to 9 and Del4 to 10, but the choice is personal. Plainly altering Del3 and Del4 can significantly speed up the running of the program.

The default length of the ruler currently in use may be found by typing the mnemonic

INITLM:

on versions up to 3.0, or

:INITLM

on versions 3.3 on. The value displayed is the length of the ruler, expressed as the number of characters in hexadecimal. The default ruler is 64 characters (40 hex); other lengths may be chosen to suit your needs.

However, WordStar has a quirk that we cannot explain, and should you reset the ruler to a length between 76 and 80, you will get a default ruler 76 characters long.

Q My home system is an Atari ATR-8000 which can run both CP/M-80 and MS-DOS. My main problem at the moment is transfer between the two operating systems, which run as alternatives. Do you know of any utilities to read MS-DOS or PC-DOS discs under CP/M, or vice versa?

JOHN FLETCHER

A It would be worth writing to Atari in the U.S. to see if there is any special software to do the job. The Z-80 processor in the system is used to write to the discs, regardless of whether the Z-80 or the 16-bit processor is being used to do the calculations.

A commercially available program called Media Master has been specifically written for disc-to-disc transfers, to overcome the wide variety of different disc

formats that exist on various machines and operating systems. The program is menu driven and, for example, the IBM PC version can read, write or format discs for about 75 different machines.

There are also versions for the Osborne, DEC Rainbow and others. The price is £70 plus VAT, or £99 if a CP/M emulator is included to run these programs on an 8088- or 8086-based computer. We have not tried the program, but for more information you can contact Nigel Grant at a new firm with the interesting name Control Alt Deli, 44 Brown Daker Court, Milton Keynes MK14 6JH. Telephone: (0908) 662759.

If you have access to a free-standing serial printer buffer you may be able to use that instead. Power-up under MS-DOS and list the file into the buffer; then reboot under CP/M, and plug the Buffer Out lead into the computer reader port, which is often the same as the printer port. This may require a plug sex change, and a corresponding interchange of wires 2 and 3. Then use

PIP filename=RDR:

to read the file in. Transfers in the opposite direction would work in an analogous way, except that to read the file in you would need the command

COPY COM1: filename

Alternatively, if you can get your hands on a second CP/M or MS-DOS machine then you could connect the two together by their serial ports — pins 2 and 3 will probably have to be crossed — then use Pip or Copy at both ends, one transmitting and the other receiving. Finally change the operating system on the ATR-8000 and copy the file back.

If you are going to do this often, it would be worthwhile getting the Kermit communications program for both machines. This simplifies the transfer mechanism as it allows you to drive both computers from one keyboard, and also allows you to transfer a family of files, or a whole disc with a single command. An additional advantage is that Kermit detects any errors in transmission and automatically retransmits faulty data, thus guaranteeing error-free transfers. We have successfully bounced programs from a micro to a mainframe and back again, using Kermit via a telephone line and an acoustic coupler.

Q In an attempt to improve the speed of the modelling program

Micromodeller I bought an accelerator card for my faithful old Apple II+. Unfortunately I have encountered problems, either through the security dongle in the games port or through the apparent conflict with the 64K RAM card that the program uses.

After spending many hours on this problem, including help from many others, I have to admit defeat. I tried to console myself by using the card purely in Applesoft, but here again I had problems, with the low- or high-resolution pages being switched on. I have four disc drives, and I even ended up with both drives 2, in slots 5 and 6, running at the same time; on hitting Reset both drives 1 were running.

H F BINLEY

You do not say which accelerator card you have fitted. We have no first-hand knowledge of these cards, but the one made by Saturn Systems is highly rated and seems to be compatible with the majority of programs, whereas some other makes do give problems with compatibility. Though this might explain problems with Micromodeller, the failure to run Applesoft properly suggests deeper problems.

You appear to have memory conflicts, with both drives 1 switched on and running together. This could be the result of wrong settings assigning the same address to two memory boards. The accelerator board has its own fast CPU, and also some of its own memory, and the accelerator board must be made aware of other memory boards present in the system by way of jumpers. You should check these carefully, and also the manual for your extra memory board. The problem could also be a faulty accelerator board.

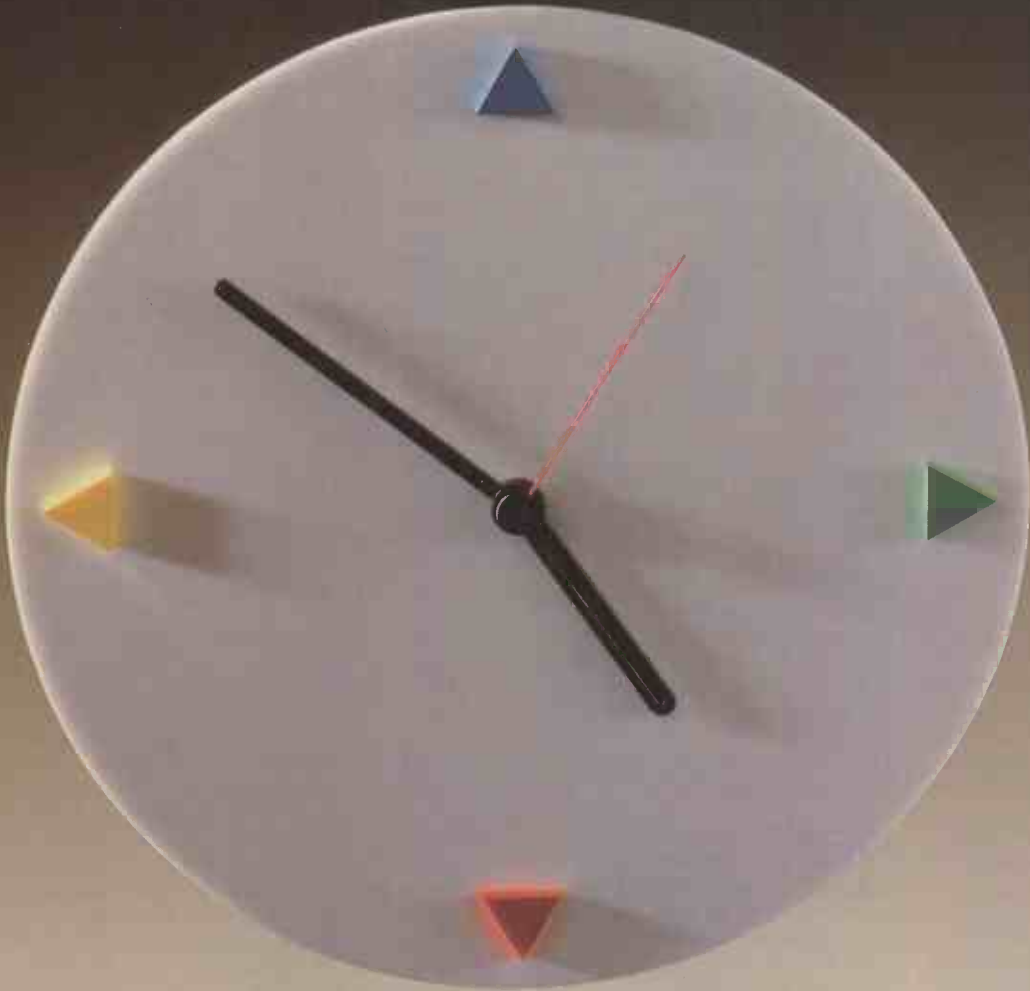
If you can't find anything wrong with the jumpers or switches for memory addressing, you should contact the agent who sold you the accelerator board, or alternatively try a reliable firm like P & P or our very helpful local Apple dealer, David Woolman, at Leicester Computer Centre Ltd, 9 Jarrom Street, Leicester, LE2 7DH. Telephone: (0533) 556268.



In "Ask PC" John and Timothy Lee answer questions on any area of microcomputing. If you have a nagging problem, write to us, marking ASK PC clearly on the top left-hand corner of the envelope. Letters should contain one question only. We cannot guarantee a personal reply, but to be considered your letter must include your name and address, together with a stamped addressed envelope. The most representative questions of general interest will be answered and published.

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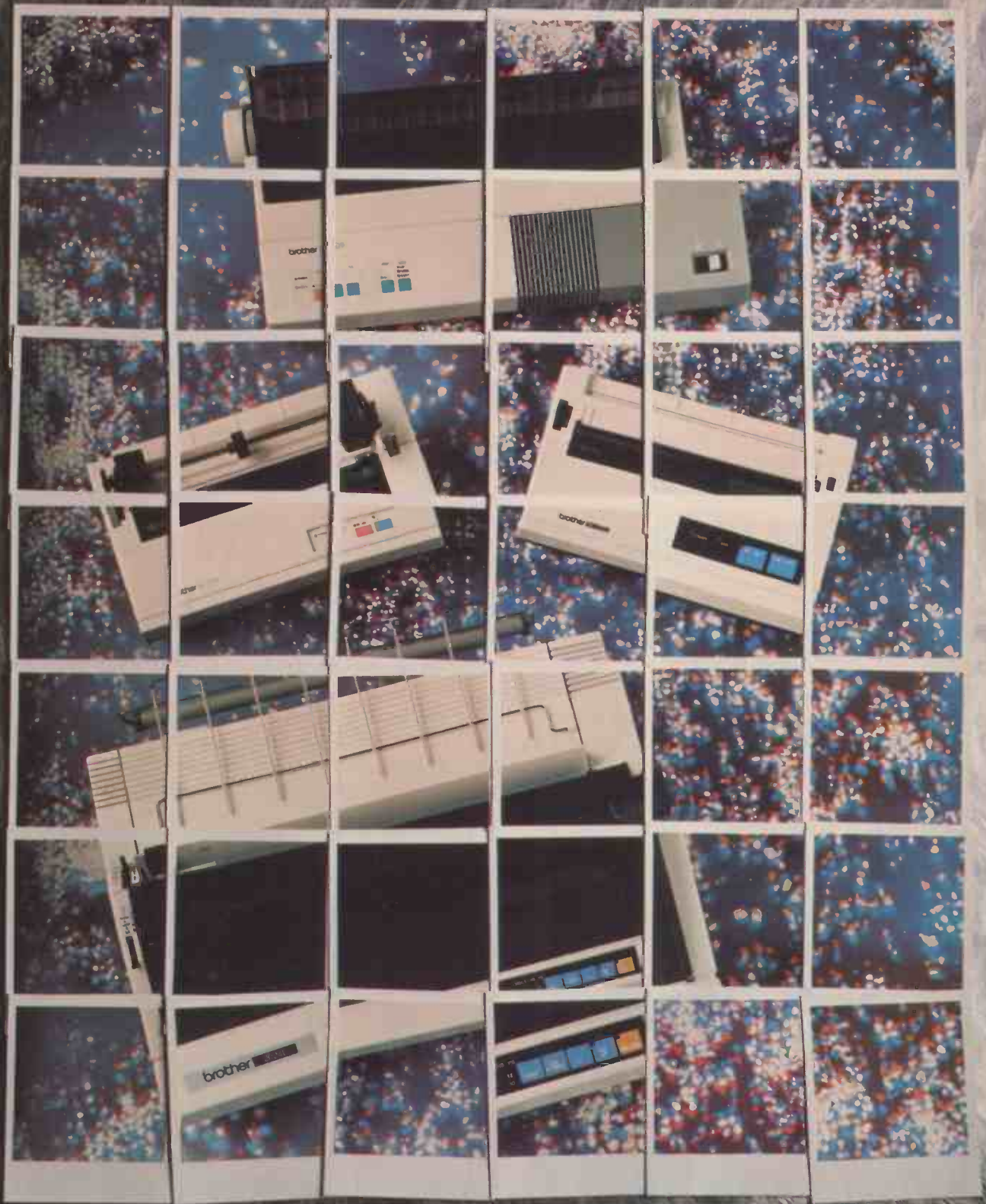


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Remarkable, when you consider that the Brother Twinriter 5 costs less than many 40 c.p.s. printers available. **P**riceless objects are evidently coming down in price.



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BOOK REVIEWS

THE Macintosh has become something of a cult machine. Although it is considered fairly humble in the U.S., this is not the case in Britain where £2,000 is still a lot for a personal computer.

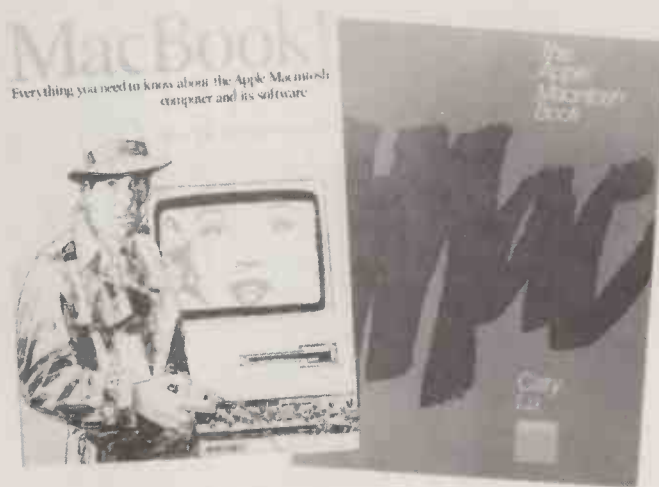
Publishers have decided to cash in: they figure that someone who will stump up £2,000 for a Mac will pay up to £20 for a book. This would not be too bad if the books were nicely bound but most of them are paperback. True, a lot of them are fat, but quantity does not equal quality.

Another problem is that the Mac is so simple and the manuals so clear, that it does not need much extra explanation. But that has not deterred people from milking the Mac market for all its worth. However, while none of the books reviewed below are strictly necessary, some are useful for ideas.

Phillips and Sallato's *The Apple Macintosh Encyclopedia* from Chapman and Hall is worthwhile. It is a user-friendly encyclopaedia which covers topics the Mac manuals either omit or cover inadequately. It is a visual book, with over 100 pictures taken from the Macintosh screen. Although closer to a dictionary than an encyclopaedia, the book goes into detail about Basic, for instance. It is also written in a light style, which is good news. One criticism is that all but one of the user groups listed is American. Like wine, books do not always travel well.

MacBook! is a British book from Micro Press. Trendy and cultish, it is nevertheless written in a clear, amusing style. It is aimed primarily at the young. There is a good chapter on file mixing — mixing text and graphics — that is a useful expansion of the manual. There is also an imaginative chapter on using the Mac to make dress patterns and prints. Not a bad book, but not worth £14.50.

However, I might be tempted by *The Apple Macintosh Book* from Microsoft Press, even though it does cost £16. A beautifully produced book, with mauve tinted



The cultish popularity of Apple's Macintosh has spawned a plethora of expensive books. **Joanne Bennett** finds out which of them are worth buying.

MAC MANIA



drawings and headings, it shows what a little extra colour can do to lift the duller book. But this one is not dull. It explores the Mac and its software in simple, direct language.

Author Cary Lu sets the tone in the introduction when he states that computers should work like people, not vice versa. It takes you from fundamentals, like using Macwrite, on to more complex software like spreadsheets, business graphics and communications. There is also an unusual chapter on reproducing information on the Mac screen in photographs, videos, films and print. If his book were a meal it would be a gourmet one.

The Apple Macintosh Primer is an unpretentious little book, written clearly and simply. It is really two books in one: a primer and a guide to the Mac for people deciding what kind of micro to

buy. It is also quite amusing, describing "user-friendly" as a polite way of saying "idiot-proof", and "mainframe" as a "big computer". It is a nice introduction, but I am sure there are cheaper ones since this extremely slim little number retails for £9.65.

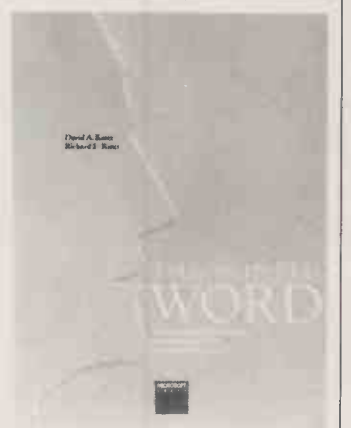
Six of the books reviewed here are from Microsoft, and while they are all pretty to look at, they cost between £15 and £20. I wonder why Microsoft cannot put as much effort into its manuals as into its books.

MacWork MacPlay is a collection of 20 original Mac projects. Unfortunately, "original" does not mean good. For instance, do you really need computer graphics to work out where to put what in your living room? The highlights of the book are two Mac-designed alphabets, one Art Nouveau and



the other an imaginative Art Deco. I also found the glossary of short cuts in using Mac software useful.

The Printed Word is also from Micro Press, and while it is not as sumptuously produced as *MacWork MacPlay*, it has better projects. However, it is an unnecessary book as Microsoft Word is not very difficult to use on the Mac. But the book has depth, and includes examples of a newsletter and a business brochure, as well as detailed information on creating reports and merging text and graphics effectively. I particularly enjoyed the chapters covering the Laserwriter and the typesetting potential of the Mac.



Steve Lambert has written two books for Microsoft Press: *Presentation Graphics on the Apple Macintosh* and *Microsoft Basic*. The graphics book is nicely produced and written in a lively style. It is about creating pie, line and bar charts with Microsoft Chart. However, business graphics are not just about charts. The author says he told Microsoft he was no graphic designer and it shows. So why did Microsoft get him to write the book? Business graphics can be very exciting and useful, but this book is neither. I would rather wait for a real business-graphics book.

Microsoft Basic is aimed at intermediate programmers and includes 17 programs. The most attractive one is Minipaint, a Macpaint-type program. There is also a Quick Transfer program. However, the author says the Apple Switcher should take care of most of the present file-transfer hassles.

The Waite Group has come up with two Microsoft Basic books for Microsoft Press. Both are weighty, expensive tomes. *Microsoft Macinations* is an introduction to Microsoft Basic which doubles as a reference book. It includes an interesting chapter on the graphics software component of the Mac's operating system, Quick Draw,

(continued on page 42)

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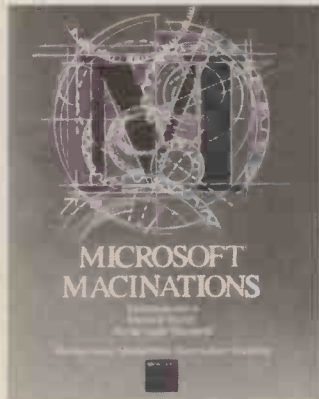
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BOOK REVIEWS



(continued from page 40)

which shows you how to access it — useful for utilising Macfonts. There are several MacBasic books to choose from at different prices. This one comes expensive at £16.95.

Midnight Madness, the Waite Group's other offering, comes with a nice moody-blue cover. It includes 17 programs on animation, graphics, games and music. There are also two utilities, Macgrid and Macgraph. The games programs include Macmouse for kids. The mathematically minded might appreciate Macmeasure on maps and Macfinance on money.

Rick Dayton has produced two Mac books, *Macintosh Microsoft Basic* and *Understanding The*

Macintosh Computer. Dayton says that the Basic book will enable you to write programs which are not currently commercially available. I hope some of his other programs are more exciting than the case history he chose, called Cash Disbursements. In fact, this book is boring. Not only that, but chapter 1 is the same as chapter 1 in Dayton's other book, which would make me very cross if I had bought both of them.

Understanding the Macintosh Computer tells you all about Macword, Macpaint, Macplan and Macchart. The book abounds in Americanisms like "columnar" and "facilitating better financial decisions". What would be wrong with "making decisions about money"? This slim little volume retails for a mere £18.40.

In contrast, *The MacPascal Book* from Brady has a beautiful cover of a soft-focus, luminous blue and green Mac. Inside is a comprehensive book on MacPascal which sets out to teach not only how to program in Pascal, but how to implement the programs on the Mac.

Macintosh Pascal from Computer Science Press is very



different. It is one of the most disgusting books I have ever seen. Typeset using the Mac, the type is so cramped as to be almost unreadable. Letter reproduction varies from smudgy to faint. The publishers want £19.95 for it; at this price I want a properly typeset book. It is not as if the savings are being passed on to the customer. However, if you can be bothered to plough through it, this is a straightforward beginners' book on MacPascal.

Introducing Macintosh from Granada is written in a dry,

uninviting fashion. Although unimaginative, the book does include a few useful chapters on scheduling and costing, IBM PC to Mac communications and Mac problems.

Mastering Your Macintosh from Prentice-Hall International is another slim but fairly expensive volume that tells you everything you already knew from your manual. However, the book does include a couple of interesting appendices on software development for the Mac using either the Lisa or the Mac itself.

Master Your Macintosh Software from Sunshine starts with a boring introduction about floppy discs. It then proceeds to reiterate the manuals using longer words, most of them unnecessary. The book deals with the two simplest applications, Macwrite and Macpaint. I particularly disliked the curriculum vitae given as a Macpaint example; it used a confusing number of typefaces and sizes and looked most inelegant. A textbook example of how not to design a document.

Lotus is another software company which has decided to supplement its manuals with glossy, expensive books. *The Lotus Guide to Jazz in Business* is a collection of jazz applications which includes communications, graphs, financial analysis and planning. Like the Microsoft books it is fat and attractive. It also has some nice cartoons.

Finally, there is *Macintosh: A Concise Guide To Applications Software* from Wiley Press. The book tells you how to use a number of programs from Macwrite, Macpaint and Macdraw through to Multiplan and Microsoft Chart. It also covers communications, three database programs and Thinktank. However, like many of the other books reviewed, this one is nice but not necessary. [R]



MAC MANIA

Mastering Your Macintosh by William Skyvington. Published by Prentice-Hall International, £8.95. ISBN 0 13 559527 4

Understanding Your Macintosh by Rick Dayton. Published by Prentice-Hall International, £18.40. ISBN 0 8359 8054 5

Macintosh Microsoft Basic by Rick Dayton. Published by Prentice-Hall International, £15.60. ISBN 0 8359 4158 2

The MacPascal Book by Paul Goodman and Alan Zeldin. Published by Prentice-Hall International, £18.15. ISBN 0 89303 644 7

The Macintosh Primer by William Sanders. Published by Prentice-Hall International, £9.65. ISBN 0 8359 0233 1

Macintosh Pascal by Lowell Carmony and Robert Holliday. Published by Blackwell Scientific Publications, £19.95. ISBN 0 88175 081 6

Macintosh Midnight Madness by The Waite Group. Published by Microsoft Press, £15.95. ISBN 0 91485 30 6

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Macintosh A Concise Guide To Applications Software by Dirk van Nouhuys. Published by Wiley Press, £19.60. ISBN 0 471 81153 X

Apple Macintosh Encyclopedia by Gary Phillips and Donald Scellato. Published by Chapman and Hall, £12.95. ISBN 0 412 00671 5

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Introducing Macintosh by Francis Samish. Published by Granada Publishing, £7.95. ISBN 0 246 12544 6

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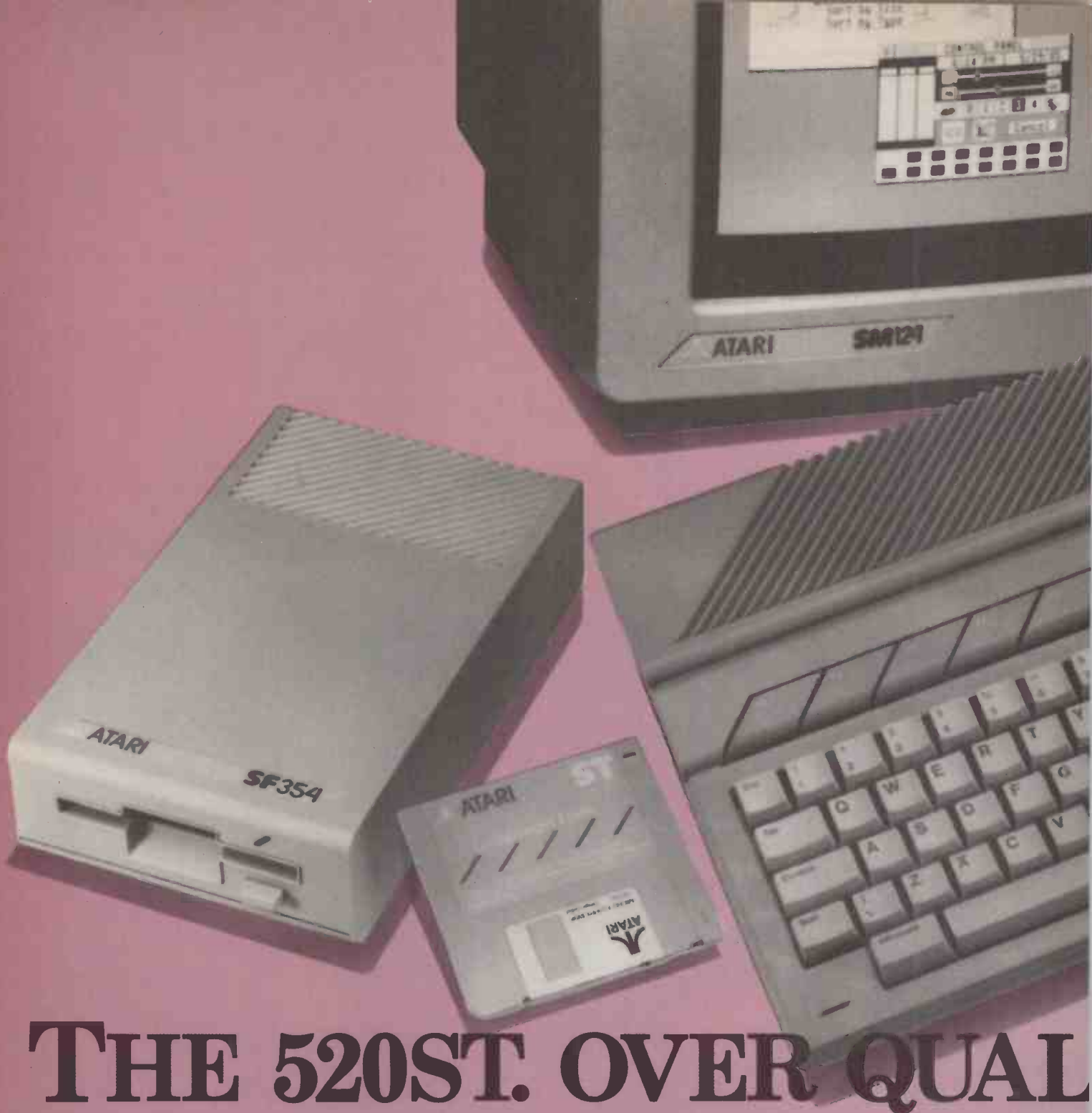
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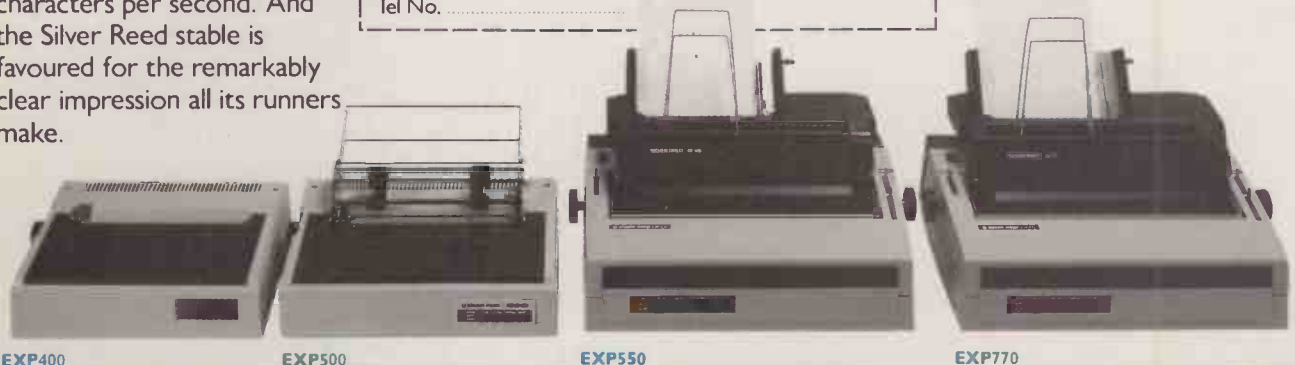
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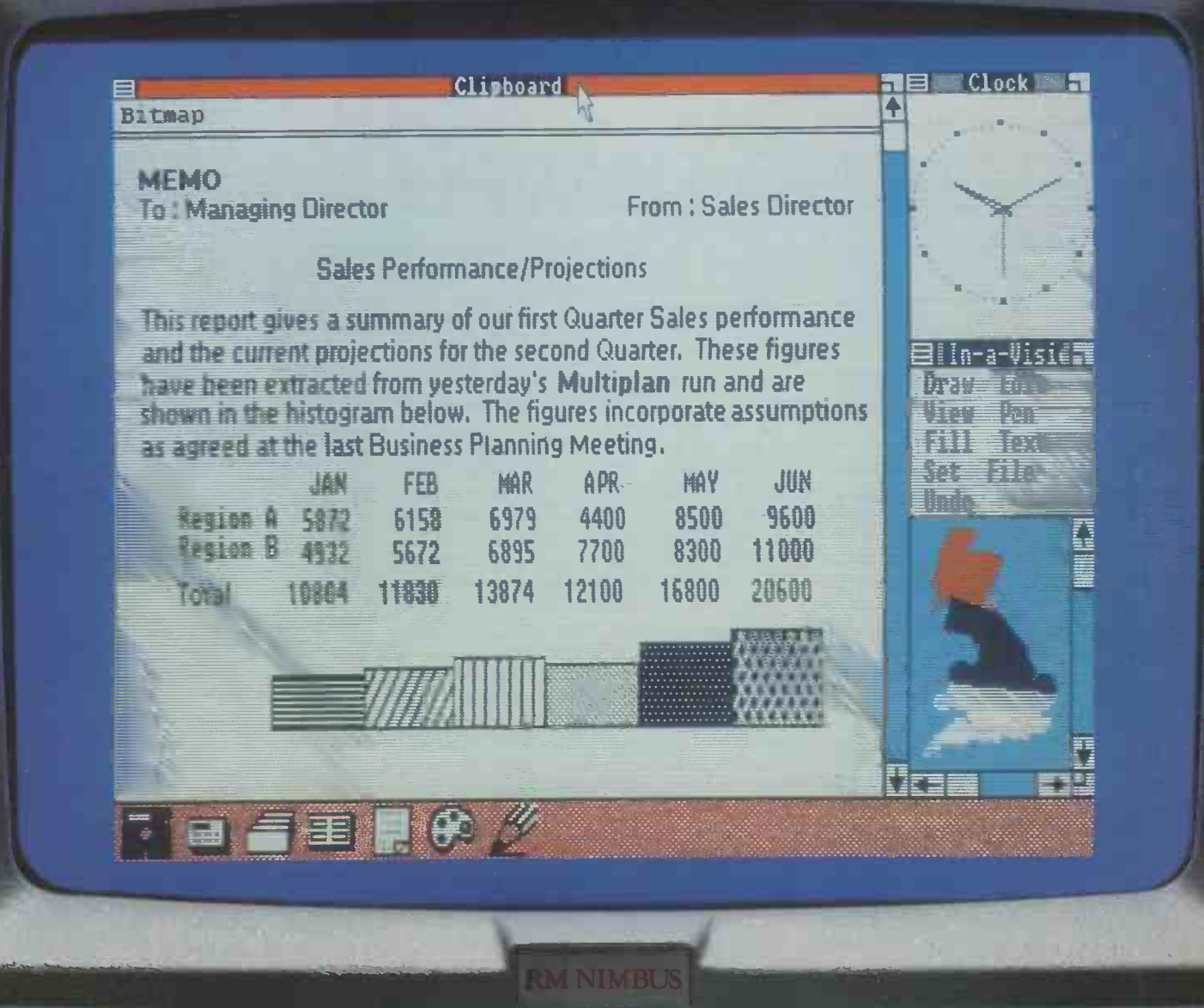
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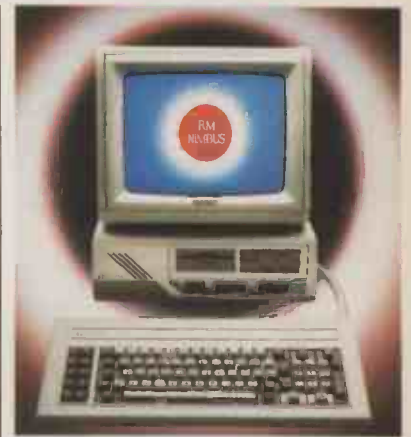
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*Wordstar, Windows and Multiplan are trade marks.

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PANASONIC JB-3300

A GLOWING EXAMPLE

By Glyn Moody

An unusually legible plasma display and good all-round design make this IBM-compatible transportable a leading contender, despite the high price.

For a subsidiary of a Japanese manufacturing giant with a turnover exceeding \$20 billion, Panasonic has a curiously low profile in the micro sector. Recently it has launched two new machines which may well signal the start of a more aggressive approach.

One of the machines, the Panasonic Executive Partner, is being launched only in the U.S., while the other is only available outside it. Both are IBM-compatible transportables using plasma-display technology. The European JB-3300 has an 8088 CPU running at the usual 4.77MHz. It comes with 256K RAM as standard together with serial and parallel ports, MS-DOS 2.11, GWBasic and a carrying case. The twin-floppy version of the European model costs £2,195. The more interesting version, reviewed here, has a built-in 3.5in. 10Mbyte Winchester and costs £3,395.

The unit is surprisingly compact, and weighs in at a reasonable 25lb. This places it firmly in the transportable class, though in terms of features it is more comparable with the heavier luggables. Ready portability is partly due to some well thought-out design. For example, the carrying handle is placed at the side of the machine so that it is carried vertically. In practice this turns out to be far more wieldy than the normal horizontal position. A neat and functional carrying case comes as standard; as well as providing the machine with some protection against the elements it has a side pouch which allows the mains lead and manuals to be carried.

Good design is also evident in the way the machine opens up. Small cantilevered catches are used which are very easy to release yet safe when closed. The keyboard

detaches from the front of the machine, and the plasma display swings up in the standard flip-top manner.

The area in front of the display includes a small recess with a projecting tab. This is for storing the disc-drive head protection cards when not in use, but you could also use it for storing discs in transit. Leaving them there while the machine is in operation is not a good idea since the power supply is situated just below. To the right of the power supply at the front are the discs, with hard disc below.

On the left-hand side of the machine, as well as the carrying handle, there is a compartment with the two ports, an on/off switch for the plasma display and another small compartment for accessing the outputs from any extra cards which may be installed.

PANASONIC JB-3300

PC VERDICT

	POOR	AVERAGE	GOOD	EXCELLENT
Performance	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ease of use	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Documentation	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Value for money	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

The best display around on a transportable, with the bonus of a hard-disc option.

The JB-3300 series has two easily accessible full-length IBM-compatible expansion slots — see photograph above.

The first thing you notice about the screen is its size. The actual display area is 7.5in. by 5.75in. In practice this is larger than the Apricot 9in. diagonal monitor used for this review and much the same as an ordinary IBM monitor. As a result, the characters are large and readily legible, if slightly blockish in shape. The hue is the red-amber colour found on plasma displays. I found it very easy on the eye, and the scrolling very



SPECIFICATION

CPU: 8088 running at 4.77MHz
RAM: 256K expandable to 640K
ROM: 16K
Dimensions: 155mm. (6.1in.) x 312mm. (12.3in.) x 432mm. (17in.)
Weight: 25lb. (11.3kg.)
Display: 7in. by 5.75in. orange neon plasma display; 80 columns by 25 lines, 620 by 400 pixels
Keyboard: standard IBM PC type
Mass storage: one or two 360K floppies; optional 10Mbyte Winchester
Interfaces: RS-232 and Centronics parallel
Software in price: MS-DOS 2.11, GWBasic
Hardware options: 8087 co-processor, graphics cards
Price: JB-3301 with two floppies £2,195; JB-3305 with 10MByte hard disc and one floppy £3,395
Manufacturer: Matsushita in Japan
U.K. distributor: Office Automation, Panasonic Industrial U.K. Ltd, 280-290 Bath Road, Slough, Berkshire SL1 6JG. Telephone: (0753) 822516

smooth. As well as the standard 80 columns by 25 lines the full 640 by 400 pixels are also offered.

Plasma displays work by ionising neon gas between a grid of wires whose intersections make up the pixels. The process of ionisation generates heat as well as light, so

BAGSHAW DISC BENCHMARKS

The following timings (in seconds) were obtained running the Bagshaw disc Benchmark routines — see *Practical Computing*, July 1984 page 101.

	BM0	BM1	BM2	BM3	BM4	BM5	BM6	BM7	BM8	BM9	BM10	BM11	BM12	BM13	Total
Panasonic JB-3300 — hard	21.6	6.2	8.2	9.1	5.6	15.3	4.5	25.6	6.2	3.2	5.1	100.5	44.8	20.7	271.9
— floppy	24.2	9	9.1	18.4	19.3	36.7	8.7	67.1	19.2	9.4	14.4	323.3	162	50.5	772.3
IBM PC — 360K floppy	21	10	21	21	20	30	8	65	17	7	15	311	145	51	742
IBM PC/XT — 10Mbyte hard	19	5	19	15	3	22	8	27	8	3	3	76	31	15	254



cooling is a must for such displays. As in the earlier Ericsson Portable, which in many respects is very similar to the new Panasonic, air is drawn in by a fan on the side of the machines, and passes up through the hinges into the display itself. It emerges at the top of the screen through small vents. Cooling is only possible when the screen is in its vertical position, and the display shuts off automatically when it is flipped down. Partly because of the dual function of the fan, the Panasonic proved slightly noisy in operation compared to similar LCD units. Displays with large graphics elements sometimes caused the screen to buzz.

The rest of the machine is more conventional. The keyboard follows standard IBM PC design, and is connected to the main unit by a coiled cable. I found the feel of the keys a little dead. There are small pips on the home keys for touch-typists.

As far as performance is concerned, the JB-3300 ran everything we threw at it, including Lotus 1-2-3 and Flight Simulator. The on-screen appearance of these programs

came as a pleasant surprise after years of staring at foggy LCDs. The image was visible, if slightly faint. More importantly the dots bound together to give a coherent image with good scrolling and no visible after-image. As the various Benchmarks show, the Panasonic is slightly faster than the ordinary IBM PC in terms of running Basic, but has slower hard and floppy discs. An 8087 maths co-processor board is available, as is a colour board.

The JB-3300 comes with three manuals. The user's manual is a good beginner's guide to setting the system up, complete with glossary and index. It is well written, if rather dull in layout. The reference guide gives more detailed information on the equipment, and is well supplied with DIP-switch settings and the like. Finally, there is a more functional MS-DOS manual.

The Panasonic JB-3300 solves the problems which it addresses rather well. It is genuinely transportable: you can carry it more than the desperate shoulder-wrenching 25 yards to a car which is the limit

on some other so-called transportables. It offers a more or less full-size screen with good legibility. This is particularly appealing in a market where it is usually the display which suffers in an attempt to reduce weight and bulk.

In this area, its only real competitors are the Ericsson, which also has a plasma display, and the Sharp PC-7000, reviewed in January's *Practical Computing*. This uses a back-lit LCD to enhance legibility quite successfully. Drawbacks of this approach include the more limited life span of the back-lighting device, and the rather misty appearance of characters. The Panasonic probably scores as the best-value IBM transportable, assuming that there is a genuine need for such a beast. Panasonic's American machine offers most of the features of the JB-3300 and, like the Sharp, has a built-in printer.

CONCLUSIONS

■ The Panasonic JB-3300 is a transportable IBM-compatible which uses plasma-display technology and offers a hard-disc version.

■ The screen is a marked improvement over traditional LCDs. The associated fan is slightly noisy.

■ Although the machine offers nothing spectacular in terms of performance, it is well built and compact.

■ The prices for the two versions look steep compared with the cut-price clones, but if you really need a transportable PC with a usable display and hard disc, the JB-3300 is probably the one to get.

BASIC BENCHMARKS

The following timing (in seconds) were achieved running the standard Basic Benchmark routines — see *Practical Computing*, January 1984.

	BM1	BM2	BM3	BM4	BM5	BM6	BM7	BM8	Av.
Panasonic JB-3300 — 8088	1.1	4.4	9.9	10.3	11.2	20.4	31.9	33.6	15.4
Olivetti M-245P — 8086	0.4	1.5	3.5	3.6	3.9	7.2	11.2	12.5	5.5
Sharp PC-7000 — 8086	0.8	3.3	7.5	7.7	8.4	15.3	23.9	25.4	11.5
IBM PC — 8088	1.3	4.8	11.8	12.2	13.4	23.6	37.6	36.6	17.7

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PASCAL		£295	CIS COBOL	£425	£425	
BUSINESS BASIC Compiler		£450	FORMS-2	£110	£110	
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			FORTRAN-77		£295	£295
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WANG APC MS-DOS MADE EASY

By Roger Cullis

Help for the user is the recurring theme of this powerful 80286-based setup: even the operating system can be menu-driven for ease of use.

First impressions are not always lasting ones, but in the case of the Wang APC the quality look of the machine is matched by its performance. Clearly a lot of thought has gone into ensuring that the presentation is just right and that the user will be guided as gently as possible through the initial learning period.

The machine itself is enclosed in a large metal case, somewhat reminiscent of the old S-100 computers. Its large motherboard has eight expansion slots for cards which provide different configuration options. There is also a smaller five-slot version for more limited applications. Only Wang cards can be accommodated, however, so the user does not have the freedom of choice available to the owner of a true IBM compatible.

The base machine comes with 512K of RAM, which can be expanded in 512K increments up to 2Mbyte. Mass storage is provided by half-height 5.25in. floppy discs and an optional hard disc. Capacities of 360K or 1.2Mbyte are available on the floppies, with 20Mbyte, 30Mbyte or 67Mbyte on the Winchester. Alternatively, a 10Mbyte removable-cartridge Winchester may also be fitted in place of the fixed hard disc. A tape streamer is also available.

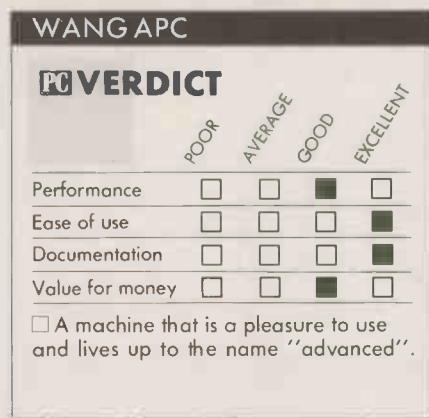
The APC comes already equipped with a systems card containing an 80286 processor, along with memory and serial and parallel ports. A variety of expansion cards are available for different types of display. The highest resolution attainable is 800 by 600 pixels; other cards cater for graphics, text and IBM emulation options. A Z-80 card permits emulation of CP/M-80.

The keyboard does not follow the

standard IBM format. Instead there are 101 keys in an arrangement designed to make life easy for the touch-typist. In addition to the normal QWERTY group there is a numeric keypad and a separate cursor pad.

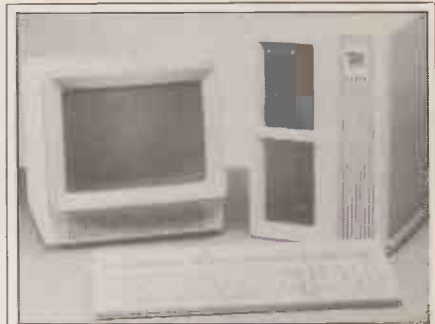
There are 16 configurable function keys marked with legends for standard word-processing operation such as Indent, Copy and Move. For those who do not wish to stray too far from ground made familiar by IBM, Wang supplies a set of replacement IBM function key caps.

For single-user applications the APC normally runs under a customised menu-driven version of MS-DOS. Users who are already familiar with MS-DOS can bypass



the menu and run it in the conventional way by entering commands at the prompt. Display defaults can be set up covering such items as date/time format, the decimal separator, the currency symbol, and so on. Part of the RAM can be configured as a silicon disc. A key feature is that all these defaults can be set up with menu-driven programs.

For the APC, Wang has developed IBM-emulation software which goes far closer than other machines which run only under MS-DOS. To support multi-user operation Xenix can be installed. For this, 1Mbyte of memory and at least a 30Mbyte Winchester



SPECIFICATION

CPU: Intel 80286 running at 8MHz; optional 80287 maths co-processor and Z-80 card
RAM: 512K, expandable to 2Mbyte
ROM: 16K bootstrap and diagnostics
Mass storage: one or two 5.25in. 360K or 1.2Mbyte floppies, or one floppy and one 20Mbyte, 30Mbyte or 67Mbyte hard disc
Operating system: menu-driven version of MS-DOS; Xenix available as optional extra
Ports: RS-232 and Centronics
Keyboard: special word-processing keyboard with integral loudspeaker; replacement keytops supplied for IBM emulation
Dimensions: 587mm.(23.1in.) x 244mm.(9.6in.) x 378mm.(14.9in.)
Weight: 22kg. (49lb.) including keyboard and monochrome monitor
Price: £5,080 for system with 512K RAM, 1.2Mbyte floppy, 20Mbyte Winchester and monochrome monitor
Supplier: Wang U.K. Ltd, Wang House, 661 London Road, Isleworth, Middlesex TW7 4EH. Telephone: 01-560 4151
Availability: now

are recommended. This configuration supports up to four users, attached by Wang Independent Work Stations.

Among the applications which have been tailored for use on the APC are Multiplan and an associated graphics program. A £225 WP package known as Wang Integrated Word Processing is unusual in the interaction it allows with the system's DOS. Many file-management utilities from the DOS System Utilities menu are available for WP file manipulation; WP files may also be converted into DOS text files and vice versa, permitting the interchange of information with other packages.

If there is any truth in the notion that you can judge a system by its documentation, the APC must be a quality product indeed. The manuals cater as fully for newcomers as they do for established users.

CONCLUSIONS

- The Wang APC is a thoroughly polished machine which is soundly constructed, performs well and is a genuine pleasure to use.
- From the operating system through to the manuals, great care has been taken to ensure that the machine is as easy to use as possible.
- Standard IBM cards will not fit the APC's expansion slots, so you are tied to Wang for expansion cards.

BENCHMARKS

The figures below show the time in seconds taken to run the standard Basic Benchmark routines on a selection of 80286-based machines — see *Practical Computing*, January 1984 page 102. The APC emerges substantially faster than the IBM PC/AT and chasing the fastest in the field.

	BM1	BM2	BM3	BM4	BM5	BM6	BM7	BM8	Av.
Wang APC	0.3	1.2	2.5	2.5	2.7	5.4	8.2	8.2	3.9
Apricot Xen	0.3	1.1	2.4	2.5	2.7	4.9	7.7	8.0	3.7
IBM PC/AT	0.5	1.9	4.6	4.7	5.2	9.1	14.6	13.5	6.8

A full communications capability is the key to this self-contained work station. Simple desk functions are built-in, but you can forget about using standard micro software — it doesn't even have discs.

TANDATA PA YOUR DESK IN A BOX

By Glyn Moody

Following in the wake of ICL's One Per Desk and the more recent Acorn Communicator, Tandata has joined the work station fray with its Tandata PA. This system is not a general business micro, but a dedicated communications unit with auxiliary desk-top functions. It is designed to allow professionals very easy access to electronic mail and viewdata services such as Prestel; to perform autodial and auto-answer functions with an external telephone handset plugged in to the back; and to provide rudimentary address book, memo and spreadsheet facilities. The cost for a unit with 64K of battery-backed RAM and a 12in. colour monitor is £999.

The work station concept is based on a simple premise: that many professionals do not need a full-function personal computer. Instead, they would benefit far more from a micro version of the basic desk functions: telephone, diary, address book, notepad and calculator. Additional options for the increasing number of users of on-line services might include Prestel and electronic mail. The Tandata PA is designed to meet just such needs. In many ways, it represents a logical development for Tandata, a company which has hitherto concentrated on modems and dedicated Prestel terminals.

KEYBOARD

The unit itself is not much bigger than its keyboard. In addition to the QWERTY set, there is a numeric keypad to the right which combines calculator functions with those of the push-button phone; the two keys * and # found on modem telephones are present. Along the top of the keyboard is a copious collection of function keys, most of which have three commands associated with them.

This compact packaging allows the PA to be carried around. It is about as portable as the large diary or Filofax it is intended to replace. For normal use a separate power supply is provided with the machine. An on-board two-line LCD and Nicad batteries permit about four hours use away from home base.

Compactness and portability are aided by the absence of any bulky mass-storage

devices. Instead, battery-backed RAM is used. This has the additional advantage that the user is unaware of any saving or retrieving of files, since storage is automatic and immediate. A set of lithium batteries with a 10-year life maintain the RAM, and the unit employs low-power CMOS technology virtually throughout.

Along the back of the unit there are a multitude of sockets, as befits a communications engine. Two BT telephone sockets allow a standard handset to be connected to the PA and the PA to the wall-socket. Unlike ICL's OPD or the Acorn Communicator the Tandata has no built-in phone. The handset will function normally when the line is not being used by the PA.

There are several video output sockets. In addition to the LCD, the Tandata comes with a colour monitor as standard for use in

TANDATA PA

OVERDICT

	POOR	AVERAGE	GOOD	EXCELLENT
Performance	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ease of use	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Documentation	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Value for money	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

A great idea, but not yet quite a great product.

normal desk-top operation. The provision of a UHF output means that the PA can be taken home and used with a domestic TV set. There is also an I/O expansion socket for later add-ons, an RS-232, a Centronics-type parallel printer port and a further port for a modem in addition to the one supplied internally.

Inside the machine, chips are very much in evidence, partly as a result of the use of RAM for storage and ROM for the programs. The main chip is the 80C88, the CMOS version of the processor at the heart of the



A comms setup routine (top) establishes log-on sequences which are then accessed using the comms menu (middle.)

Above: Separate diaries can be set up.

IBM PC, though there are no similarities beyond that. All the comms are handled by a separate 6502 processor. The internal modem is essentially the same as one of Tandata's previous stand-alone models. As well as autodial, auto-answer and the ability to switch between pulse and tone dialling, it can handle the main protocols such as V-21 and V-23.

The machine is powered-up by lifting the hinged LCD, and presents you with the main menu. The PA is operated throughout by a combination of menu and function keys; there are no conventional commands. To this extent Tandata has succeeded in devising a machine that avoids the programming mumbo-jumbo which can be so off-putting to those who are new to computing. Unfortunately this advantage is partly offset by the rather complex way in



Middle left: You can dial out by selecting an entry from the address book.
Left: The spreadsheet is rudimentary.



The Tandata PA takes up no more space than the large desk diary which, in many ways, it replaces. Though office-based, it is easy to move from site to site.

which the menus and function keys are used.

Selections from the main menu can be made in three ways: by using the cursor keys followed by Return; by choosing the appropriate number; or by using suitably distinctive abbreviations for each option. Although the basic form remains the same, what happens when you invoke one of the main menu options varies greatly in detail.

For example, the communications option takes you on to a sub-menu from which you can call up on-line services simply and easily, using what Tandata calls forms. These forms are just sets of parameters such as telephone number, log-on sequence, password and so on, which you set up for each service — Prestel, Telecom Gold and the rest. Once they have been set up and named, they appear on the first sub-menu. From there

they can be invoked with one keystroke. This should clearly be a great boon to the busy executive, who may well be totally bemused by the technicalities of logging on.

I found that the system was easy to set up and use with a normal domestic telephone, but that our office IBM PABX seemed to confuse it somewhat. The Tandata PA is superficially well equipped to deal with PABXs and their special requirements. For instance, it is possible to set up a default digit which is placed in front of ordinary telephone numbers — for example the 9 that is needed with our system. However, using the PA in the office was sometimes fruitless: instead of Prestel, the end result was the ringing of other phones in the vicinity.

As well as the basic options there are many more which allow you to set such things as stop bits, parity and error correction, all accessed from the subsidiary Datacom Screen menu. This is invoked by pressing down the key marked Menu/Function with

the Shift key held down. Pressing the same key without Shift usually takes you up a level in the command tree, though at several points the machine took me all the way up to the main menu. Tandata says that this will be made more consistent on production machines.

OTHER SOFTWARE

Compared with its comprehensive comms, the Tandata's other functions are limited. The Address book is no more than a minimal database in which you can store names, addresses and telephone numbers, grouped according to various phone books. So you might have one for work and the other for personal information. On selecting the address book, the first menu gives the choice of current phonebooks, and then you move through the alphabetic listing, either by scrolling or using the Goto function key.

One point of interest is the ability to phone a number from the phonebook without having to key it, though I could not

(continued on next page)



The hinged LCD doubles as an on/off switch.

SPECIFICATION

CPU: 80C88 running at 4.77MHz; a 6502 handles communications

RAM: 64K battery backed, expandable to 768K

ROM: 96K

Dimensions: 320mm. (12.6in.) × 230mm. (9.1in.) × 70mm. (2.8in.)

Weight: 2.5kg. (5.5lb.)

Display: 25 lines, 40 or 80 columns, seven foreground and eight background colours; built-in LCD provides two lines of 40 characters

Keyboard: full QWERTY, 14 function keys, numeric keypad, telephone* and # keys

Mass storage: battery-backed RAM only

Interfaces: two BT telephone jacks, RGB, video and UHF ports, I/O bus expansion, RS-232, parallel printer and external modem port

Software in price: all comms and desk-top utilities

Price: £999 for 64K machine, including 12in. colour monitor; £1,299 for 256K; 512K upgrade £825

Manufacturer: Tandata Marketing Ltd, Albert Road North, Malvern, Worcestershire WR14 2TL. Telephone: (06845) 68421

Available: now

(continued from previous page)

get this facility to work. Other features promised by Tandata, but not available on the review machine, are several modes of conducting a telephone conversation. One of these uses the machine's internal loud-speaker and microphone instead of the handset, leaving you with both hands free. You can also dial a number direct from the numeric keypad.

Very similar in format and operation to the phonebook is the diary. Once again you can set up different diaries for different purposes. A useful feature of this and all the other functions is that the Tandata PA always returns you to the last file used, at the point where you last left it.

The Notebook option, the system's main text editor, falls a long way short of a true word processor. For example, the review machine lacked even wordwrap, and Move/Copy was rudimentary. Tandata promises improvements for production machines, though these are unlikely to bring it anywhere near true word-processor capability.

Similarly, the spreadsheet is of the most basic kind, though it should suffice for very simple budgets and forecasts. It does allow simple formulae, but replication of cells is crude. As an adjunct to the spreadsheet there is a separate calculator feature, accessed from the main menu, which functions like a desk-top calculator with 10 memories.

Other facilities include a carousel which allows you to step through a sequence of Prestel frames, say, either automatically or with prompting. The Autoanswer feature enables the PA to be set up to receive calls at certain times, either to act as a multi-person

mailbox or for the user to access the PA from a distance via the telephone. There is also a system-management sub-menu from where you can set 40- or 80-column operation, date and time, global setup for comms and a means for establishing passwords for several users.

Currently, there is a rather major snag with passwords. If you forget or you accidentally change your password you are locked out of the machine permanently. The only way to regain control is to perform a cold boot, which causes all data to be lost. To get round this, there is an override password within the main ROM which only Tandata itself can access in the event of accidents. But this raises obvious questions of security for sensitive information, though Tandata says that it is aware of this dilemma and working on a solution.

DATA LIMITATION

You can also obtain a display of the current memory use. As you fill up the internal memory there is no way of dumping data to disc or equivalent; you simply have to buy more memory.

The Tandata PA comes with a ring-binder manual which we saw only in draft form. It is designed for the computer novice and is intended to be complete and transparent, but I found it curiously uneven. Some parts were well explained, while others skated over important subjects in a page or so. Perhaps later versions will correct this.

As well as tidying up several functions, and correcting some of the most glaring omissions, Tandata is also developing a number of upgrades. One is the multi-user Tandata PA-200 — the basic model is the PA-100. Multi-user operation is a possibility

because the operating system which lies at the heart of the PA is, in fact, a derivative of Unix.

Other future add-ons include some error-correction software which will plug into some of the machine's eight ROM slots. They are accessed by removing a flap in the machine's base.

An interesting package under development is a security system based on the Astron chip card — see page 21 of January 1986's *Practical Computing*. As well as providing a unique security number for each terminal it will provide for encryption of data and a full local audit trail to establish who used what and when.

The principle behind the Tandata PA is clearly a sound one. After all, a very simple and easy-to-use electronic diary, address book, notepad and calculator is all the computing capability most executives need on their discs. But my general impression of the machine is that it has great a potential which is not yet realised.

Most worrying is the lack of a clear overall operating logic. Although the system is supposed to be easy to use there are a multitude of sub-menus, and command keys are used unshifted, shifted and with the Control key. A system like this could work if it were rigorously consistent, but on the PA it is not; I found it confusing.

The limitations of the individual features are less of a problem, and will doubtless be cleared up in time, but I was concerned at what seemed the sluggish response at several points.

If you are attracted by the Tandata PA you would probably be well advised to wait until some of the initial inadequacies are sorted out. Ultimately it could emerge as one of the leaders in a hotly contested new area of business computing. A lot depends on what the opposition does: for example how the Acorn Communicator is marketed, and what ICL does with its OPD. Whatever happens, the work station is here to stay.

CONCLUSIONS

■ The Tandata PA is not a conventional micro, but a complete desk work station offering full communication facilities together with simple electronic address book, diary, notepad, spreadsheet and calculator.

■ While the comms facilities are fairly advanced, the other desk-top utilities are mostly primitive.

■ The use of battery-packed RAM to provide all storage is sensible for the uninitiated business user who wishes to avoid coming to grips with the details of filing systems. The drawback is that RAM upgrades are necessary for larger files.

■ In principle the machine should be very easy to work, with its function keys and menus; in practice the command structure needs some tidying to make the operation totally consistent and transparent.

■ The Tandata PA offers a very convenient one-machine solution to most needs of the desk worker. However, some further work on the machine is needed for it to fulfil its potential. The pricing is reasonable in view of the colour monitor provided as part of the system.

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REVIEW

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EPSON PC QUALITY ON A BUDGET

By Ian Stobie



SPECIFICATION

CPU: CMOS-type 80C88 running at 4.77MHz
RAM: 256K, expandable to 512K on motherboard or 640K with card
Keyboard: QWERTY plus numeric pad in IBM PC/AT layout
Discs: one or two 5.25in. 360K floppy drives, or one floppy plus one 20Mbyte hard disc
Display: built-in controller generates standard IBM text display, and graphics in either monochrome or four colours at 640 by 400 resolution, or in 16 colours at 320 by 200.
Interfaces: serial and parallel ports standard, three IBM expansion slots
Dimensions: 365mm. (14.4in.) x 376mm. (14.8in.) x 145mm. (5.7in.)
Weight: 10kg. (22lb.)
Software in price: MS-DOS 2.11
Price: £777 for system with 256K RAM, one floppy drive and keyboard; with two floppy drives, £898; with one floppy drive and a built-in 20Mbyte hard disc, £1,666; monitor not included
Software options: GWBasic £95, Taxi operating system extension with mouse and 64K memory card £195
Manufacturer: Epson Corporation; made in Japan
U.K. supplier: Epson (U.K.) Ltd, Dorland House, 388 High Road, Wembley, Middlesex HA9 6UH. Telephone: 01-902 8892
Availability: now

Has IBM conquered the personal computer world only to have success slip out of its grasp? The question is inevitably prompted by the arrival of Epson's Taxi PC. For only £898 you get the functional equivalent of an IBM PC, with 256K of memory and twin 360K floppy-disc drives; for just under double, £1,666, you get an XT clone, with a built-in 20Mbyte hard disc.

There have been cheap IBM clones before, but mostly from obscure Korean or Taiwanese companies. The difference is that this time the machine comes from a very well-known Japanese company with a good reputation among users for producing reliable equipment, and a well-established dealer network ready to sell the machine.

The system has obviously been designed with some thought, and the standard of construction is generally very high. The compact main system box has two extra feet along the right-hand side, so you can use it tipped up on its side to save space. All the switches are concealed behind neat flaps, putting Reset and power on/off out of the way of mischievous passers-by.

The keyboard looks good too, with function keys at the left and a numeric pad on the right. The layout resembles the PC/AT rather than the PC itself or XT layout, with the Backslash, Escape and Print Screen keys in the AT position. But it shows signs of having been engineered down to a price. It has a spongy feel, without the very positive feedback and reassuring click of the real thing.

MONITOR CHOICE

We were using the system with the £429 Taxan colour monitor supplied by Epson, which gave a really excellent display in both colour and monochrome. As with the IBM system itself and most clones you buy your monitor separately; £150 would get you a green or amber monochrome unit from Taxan, or you could go even cheaper. The Epson PC comes already equipped with the circuitry for monochrome and colour-graphics displays.

For when you want to add expansion cards, the Epson has three IBM-compatible slots. This is probably the weakest point of the Taxi's specification — you get five slots on the PC itself and eight on some popular clones. However, the Taxi PC does not need a floppy-disc controller, printer card or graphics adaptor, and it is better equipped than the IBM in other respects too. You get serial and parallel printer ports, mono and colour graphics as standard. Even so, three slots may not be enough for some users. We used up one up straight away by adding the optional Epson mouse/Taxi card.

But first we tried the Epson PC out as a

BASIC BENCHMARKS

Despite using a CMOS version of the 8088 chip the Epson PC is slightly faster than the 8088-based IBM PC at executing our standard Basic test routines — see *Practical Computing*, January 1984, page 102. Timings are in seconds.

	BM1	BM2	BM3	BM4	BM5	BM6	BM7	BM8	Av.
Epson PC — 80C88	1.1	4.4	9.9	10.3	11.2	20.4	31.9	33.6	15.4
IBM PC — 8088	1.2	4.8	11.7	12.2	13.4	23.3	37.4	30.0	16.8

straight IBM clone. The system comes with MS-DOS version 2.11 and boots up in the normal way. It ran everything we tried, including Lotus 1-2-3, Sidekick, VCN Execuvision, Microsoft Flight Simulator and Overhead Express. Epson seems to have got the software compatibility right.

The Basic Benchmarks reveal Epson's machine to be slightly quicker than the IBM PC, despite the fact it uses the 80C88, a CMOS version of the 8088 chip found in the IBM. Until recently CMOS chips tended to be slow, but this appears to be changing as the technology improves. Functionally the

features. If you are already familiar with MS-DOS you can bypass it and run the system just like a standard IBM setup.

Taxi is an interesting product in its own right, not least because Epson intends to sell it to IBM users generally, competing against Gem and Windows. Apart from being simpler to use, its big advantage over the competing products is that it leaves your existing memory untouched. For £195 you get the Taxi software itself on disc, a three-button mouse and an interface card. The card controls the mouse and also has 64K of memory on board for Taxi to use. We wrote about Taxi in last July's *Practical Computing*.

You control the system by pointing icons on the screen and then clicking on the mouse button. You can run applications and do most housekeeping tasks without dealing directly with MS-DOS at all. For the new user who just wants to be protected from the unfriendly MS-DOS command line, this is quite useful. It is also possible to use some Taxi features inside existing applications: for example, you can get Lotus commands on pop-up menus and use the mouse to move around the spreadsheet.

The installation process for Taxi is extremely tedious, and best left to a dealer. Taxi also suffers from a manual which is inaccurate in places. Once you are using the system this does not matter much, but a beginner trying to install the system could end up in trouble.

CONCLUSIONS

- A cheap, compact and very IBM-compatible machine.
- Epson has gone for good looks and a small desk footprint at the expense of space for expansion slots. This may be a drawback if you think you will need more than three slots for expansion cards.
- In performance terms the Epson PC is adequate; it is rather surprising that Epson's floppy drives were not faster.
- Small gripes apart, the Epson PC is well designed and assembled. Given the low price and Epson's reputation for reliability it is difficult to think of good reasons for buying the real thing or a more expensive IBM clone.
- For those who are in the market for a windows/icons/mouse extension to the MS-DOS operating system, Taxi is a good, simple product.

EPSON PC

PC VERDICT

	POOR	AVERAGE	GOOD	EXCELLENT
Performance	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Ease of use	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Documentation	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Value for money	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

An excellent-value machine which does everything the IBM PC can. If this is what you want, you might as well get the Epson offering.

80C88 and 8088 are identical. Epson probably chose the CMOS one purely because it uses less power and generates less heat than the standard version.

We were slightly surprised by the performance of the disc drives on the twin-floppy system we reviewed: they were noisier and slower than IBM's. This may not matter for most applications, but as Epson is a drive manufacturer in its own right it is not what you expect.

Epson provides a good three-volume set of manuals for the system, including an MS-DOS reference guide which has been completely rewritten to give full coverage to Epson-specific features. There is also an exceptionally clear and well-illustrated guide to setting up the hardware.

The Taxi PC gets its name from a software product called Taxi which Epson is offering as an option with the system. It is a windows/icon/mouse extension to MS-DOS, designed to hide its more unfriendly

BAGSHAW DISC BENCHMARKS

The Epson PC is substantially slower than IBM's own offering, itself no speed king. See July 1985 issue. Timings are in seconds.

	BMO	BM1	BM2	BM3	BM4	BM5	BM6	BM7	BM8	BM9	BM10	BM11	BM12	BM13	Total
Epson PC — 360K floppy	24	15	19	24	29	42	9	75	20	12	19	429	249	52	1018
IBM PC — 360K floppy	21	10	21	21	20	30	8	65	17	7	15	311	145	51	742

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Where possible, please indicate your system size and requirements. This will help us to give you more precise information about how SPRITE can help you.

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MONTH**

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Now that the micro is an accepted fact of business life, more and more emphasis is being placed on linking it up with the outside world. We look at some of the exciting ways you can do this, including frame-grabbing from video input and using a printer as an optical scanner.

HARDWARE

Lots of interesting new machines, including the Mac Plus from Apple, and the new BBC Micro, the Acorn Master. We also review a PC clone which tops the lot: a complete machine with a 20Mbyte Winchester for under £1,000. Is it too good to be true?

SOFTWARE

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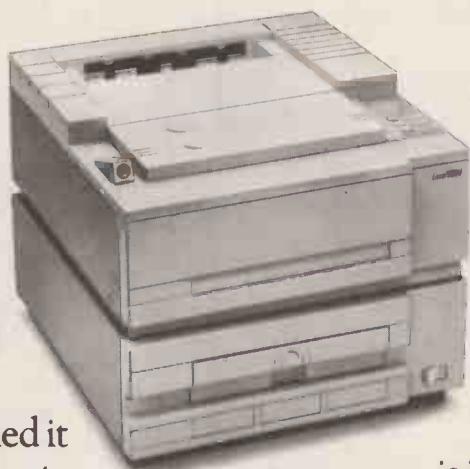
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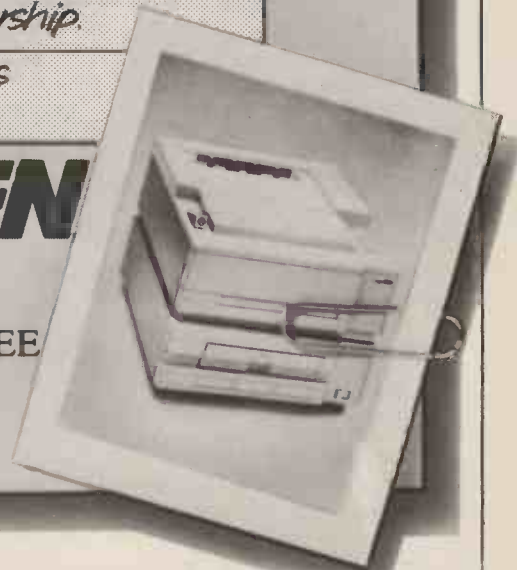
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PERSONAL MAPPER MAINFRAME SOFTWARE ON A MICRO

By Boris Sedacca

Sperry has adapted its fourth-generation applications generator to run on a common or garden PC.

Mention the phrase "productivity tools" and the reaction may be a politely stifled yawn. But drop "fourth-generation languages" into the conversation and the response is likely to be more enthusiastic. This voguish buzz-phrase applies to programs which themselves generate applications of a particular type, tailored to a user's precise needs.

The 4GLs are a halfway house between full-scale — and very expensive — bespoke programs and the off-the-shelf commercial programs which aim to please all the people all the time. A further advantage they offer is the ability to generate rough-and-ready outline programs very quickly and cheaply. Prototype programs of this type can save a lot of chasing up blind alleys and help end-users to specify exactly what they want from their program, something most people find extremely difficult to do from the beginning.

Sperry's Mapper evolved on mainframe systems as a super report generator. It was designed to be driven by departmental managers who specify the final applications rather than by specialist programmers. The

micro version, Personal Mapper, was launched last summer.

In its on-screen appearance, Mapper looks deceptively like a spreadsheet, with its row-and-column report format. All information contained in Mapper is regarded as a report. The commonly accepted terminology of files is not acknowledged.

The underlying file structure from which reports are extracted is itself designated as a report containing all the columns of information, whose format is assigned as number 0. Other reports formats displaying selected columns from the basic report format may then be created. Multiple columns may be sorted easily in ascending or descending order. Fields may be totalled horizontally or vertically, and the basic arithmetic functions such as multiplication and division are readily available.

REPORT REFINEMENT

Mapper allows you to search for a single item, multiple items and multiple items on the same line, and to search for items that begin with the same characters or items within a range. In this way, reports can be derived from other reports and continually refined by specifying the appropriate parameters. These reports are held in memory as Results until they are finally committed on to disc as permanent report formats.

The basic Mapper statements are used to

build up a series of step-by-step instructions, known as a "run" in Mapper parlance. Runs are then stored as procedural files called Run Control Reports. Run statements look forbidding at first, but runs may be created with a sort of recording facility called Mars that allows users to generate interactively what they want done automatically in future runs. The Mars run creates Mapper Run Control Statements and writes them into a Run Control Report. It leads the user through a simulated manual execution of a function. Data-entry forms may also be created within a run.

The facilities described so far offer no more power than a glorified spreadsheet. What makes 4GLs like Mapper stand out from the crowd is their ability to manipulate data from related files. Mapper's Match facility provides the fundamental tool for this. The report that sends data is called the Issuing Report, while the report that accepts data is called the Receiving Report.

Up to five fields may be matched, and up to 13 fields moved from the Issuing Report to the Receiving Report. Each match or move field can be a maximum of 63 characters. Reports should be pre-sorted for better efficiency. If the issuing or receiving reports are not pre-sorted, the Match function must first sort the two reports internally before matching.

Within Mapper runs, the @MCH statements does three things. First it

WHAT IS A 4GL?

The first generation of computer languages was based on the elementary 0s and 1s, representing electronic impulses, put together in simple codes to be read directly by the computer. Assembly language, the second generation, substituted mnemonics for binary digits: LDA instead of 010101 for Load Accumulator, for example. It was only with the appearance of the high-level languages of the third generation, such as Cobol and Basic, that it was possible to give commands to a computer in anything like everyday language.

By then, the computers themselves had become more powerful. Fourth-generation languages (4GLs) were introduced as a partial answer to the problem of generating the code to control these increasingly sophisticated and comprehensive computer systems. The production of a line of code today costs about the same as it did some 25 years ago. At that time, however, applications were less sophisticated and the code generated was less complex. Solving a problem in a modern computing environment requires many more lines of code because more encompassing functions and reports are required. End-users now require integrated systems, real-time

information, larger data files, remote communications and data security.

Among micro users bespoke software is prohibitively expensive. It is usual to install a package written in a sufficiently general form for it to be sold unmodified to a large number of customers, each of whom reaps the benefits of the economies of scale obtained.

The 4GLs represent a compromise between the one-off program written for a single customer and the commercial package which is sold by the thousand. A suitable 4GL can cut development time by a factor of 10, and the work needed to maintain software is also reduced. However, there is an overhead to be paid when using a 4GL. The load on the computer inevitably increases because of all the processing power being used up making life easier for the programmer.

Most 4GLs are run-time systems, though some may generate code for a lower-level language compiler or assembler. Third-party suppliers of software packages prefer to sell systems based on a language like Cobol, which is in the public domain, and not to have to pay royalties to other software suppliers.

(continued on page 66)

SPECIFICATION

Description: fourth-generation report generator with powerful calculation facilities and relational database manipulation functions

Hardware required: IBM PC/XT or equivalent with at least 8Mbyte hard disc

Copy protection: will not run without Mapper board; program may be reloaded repeatedly on to hard disc from the floppies

Price: £2,100

Supplier: Sperry Ltd, Sperry Centre, London NW10 8LS. Telephone: 01-965 0511

Availability: now



(continued from previous page)

compares a field from one report to a field in another report. Then, based on the matches it finds, it moves data from the one report to the other report so that it finally creates a Result.

In addition to its basic commands Mapper has a number of sophisticated functions such as the Binary Find. This is considerably more efficient and faster than conventional Find and Search processes, which scan the data line by line. It assumes that the data to be found is in ascending sort order. The system samples the data at mid-point in the report or series of reports to determine whether the required data is before or after this point, and continues dividing and sampling in this manner until it finds the item.

Advanced arithmetic computations and conditional evaluations are performed by using the Calculate function, including relational operators. A Date function performs computations on dates within reports and results, and creates a Result.

NINE DISCS

Sperry supplies Mapper as a set of nine discs accompanied by a board to plug into the host PC. We reviewed Mapper on Sperry's 80286 machine, the PC/IT, but it should run equally well on the IBM PC/XT, PC/AT or a compatible. The Mapper board carries its own 68010 processor chip and 512K of RAM. Some of the RAM is accessible to MS-DOS, which allowed our 512K machine to be expanded to an effective 640K.

Before Personal Mapper can be installed, the MS-DOS partition size has to be reconfigured to allow Personal Mapper to run under its own operating system. A minimum of 8Mbyte of disc space is required. Mapper itself occupies 4Mbyte, of which 1.5Mbyte comprises Mapper's three types of help facilities: standard, error messages and program syntax.

Existing MS-DOS files have to be backed up and the old MS-DOS partition deleted; a new partition has to be created and formatted before MS-DOS files can be restored. The maximum allowable space for the MS-DOS partition is 10Mbyte, otherwise Mapper may overwrite a portion of it. The MS-DOS partition on drive C must be designated as the start-up partition.

Once the MS-DOS files are restored, the system has to be prepared for the Mapper software. The first disc contains a program called Mapinit, which allows users to create and format a Mapper partition and to transfer the basic Mapper software to the hard disc. Formatting can take 10 minutes or more to complete, depending on the size of the partition used.

The system then guides you through a question-and-answer session, the most infuriating question being the one which asks for a list of bad track cylinder and head addresses, something which is done automatically in MS-DOS. On other PC/IT

PERSONAL MAPPER				
VERDICT				
	POOR	AVERAGE	GOOD	EXCELLENT
Performance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Ease of use	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Documentation	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Value for money	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Expensive for what it does, but useful for training people to use mainframe Mapper.

we had to remove the cover of the system box and jot down the necessary addresses from a list stuck on to the disc housing.

Once the Mapper kernel has been installed you load in the rest of the program at the MS-DOS C> prompt.

The discs are copied over one by one into the Mapper partition — an extremely time-consuming task.

When entering a Mapper command, you do hit the Scroll Lock key, not Return. If you are used to doing things in the normal way, you are likely to get into trouble. The system responds to Return followed by Scroll Lock with the message "Data entered but no function was requested."

The main Personal Mapper documentation occupies an awesome four volumes. Volume 1 comes in two sections, covering installation and managing the system administrative functions. Volume 2 introduces Mapper database concepts and

terminology before explaining what Mapper runs are and how to write them. The final two volumes provide full reference to the Mapper software and more advanced information about how to design Mapper runs.

Once Mapper is installed, you have to go through an elaborate site, station and user registration procedure more appropriate to a mainframe computing environment than to the humble Sperry IT. Not only is it laborious, but the documentation is confusing too. I cannot think of a more user-unfriendly procedure than this one.

It becomes increasingly obvious as one gets into the system that the Sperry IT is an uncomfortable corset for Mapper to squeeze into. Not everything is documented. For example, the manual refers to a Tab Back key which does not exist on the IT keyboard. Sperry leaves you to discover for yourself that the Shift key has to be used with the Tab key for back-tabbing.

DETECTIVE WORK

One of the early exercises in the manual describes how to make changes to a report, but makes no mention of a message which comes up saying "Enter report password to update the report". Again, a process of discovery is required, or a phone call to Sperry.

The inaccessible nature of Personal Mapper's documentation may prove a strong disincentive for non-technical users, of the kind Sperry claims to be wooing, to venture much further with Mapper. Presumably the necessary information is recorded somewhere within the massive manuals, but it is a little too much to expect people to plough through it all, going from one volume to another.

Another problem which the manuals fail to mention is that certain commands have to be entered on a completely blank area of the screen display, or else they malfunction. This means that once a command is keyed in, the rest of the line has to be deleted using Alt-9 before you hit Scroll Lock, which increases unnecessarily the number of keystrokes required.


One way to get around this is to patch in a run assigning these keystrokes to one of the function keys, in this case F10, register it as a run, and then run it every time Mapper is started up.

CONCLUSIONS

■ Mapper really does deliver on the promise of being a 4GL. It is an order of magnitude more powerful than conventional database programs.

■ Users who want to learn Mapper may not pick it up too easily from playing around with Personal Mapper alone; they would probably need to attend a properly structured training course.

■ Setting up and installing Personal Mapper is a fearsome task, fraught with hazards for non-technical users.

■ IBM has recognised that PCs stimulate demand for mainframes; Personal Mapper is a strategic product designed by Sperry to keep contact with its existing mainframe users. 



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Under the Mac Honor system you are expected to make a payment for any software you use.

You can now download a range of simple applications programs as well as several utilities with which to poke around behind the Macintosh's front end.

MAC FREeware BEHIND THE FRIENDLY INTERFACE

By John Lewis

The original concept for the Macintosh was that it should be a closed system, only running commercially available software. But the lack of ready-made software when the machine first appeared encouraged many users to follow the old Apple tradition of writing their own programs. The result has been that alongside the many official programs now available, there are at least an equal number of unofficial ones written by Macintosh devotees.

This user-written software is all in the public domain, and is available under either the Mac Honor system or as freeware. Mac Honor asks that if you like the program and intend using it you send a donation or contribution to the writer, or else pass the disc on to someone else. Freeware means what it says.

The public-domain programs range from the excellent, don't-know-how-we-managed-without-it variety through to the amusing and the downright ridiculous. They tend to fall into a few well-defined categories: communications, programmers' tools, entertainment, educational and enhancements to the official programs. Most originated in the U.S., and some were written by members of the Macintosh team. One or two will cause disastrous system crashes, so be careful.

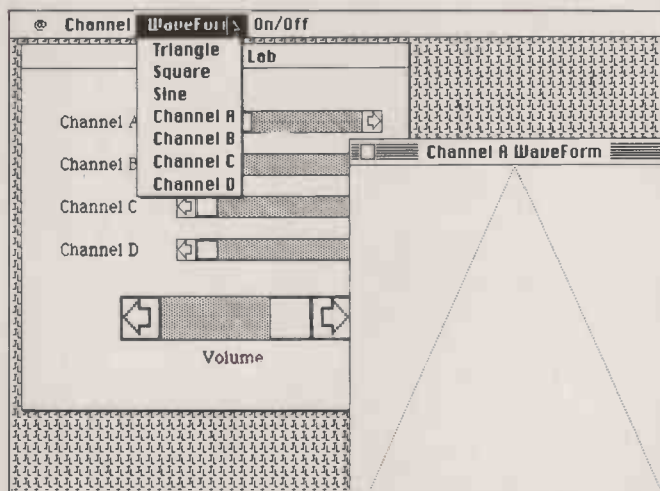
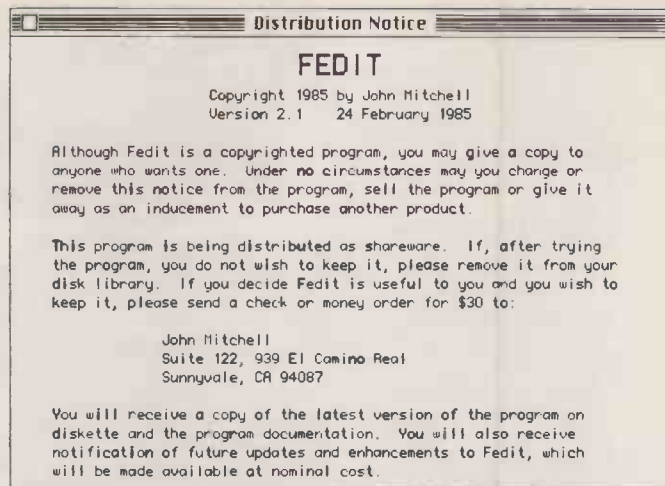
Bulletin boards and electronic mail were already well established in the U.S. when

the Macintosh was launched, and the official Macterminal communications program took some time to appear. Consequently comms programs were among the first to be written for the Mac. Examples include Mactep, Freeterm, PG Term and Red Ryder, whose documentation covers 33 A4 sheets. They have now been rendered obsolete by commercial programs such as Vicom and Macterminal itself.

For direct computer-to-computer links you can use Mackermit or Binhex, also known as Macbinary. Binhex provides a standard format for file transfers between Macs, and allows complete documents — from Macpaint for Macwrite, for example — to be transmitted without any need for conversion. Most terminal packages support it, and if you do a lot of file-transfer work it is well worth having, as Binhex files are transmitted more quickly than conventional files.

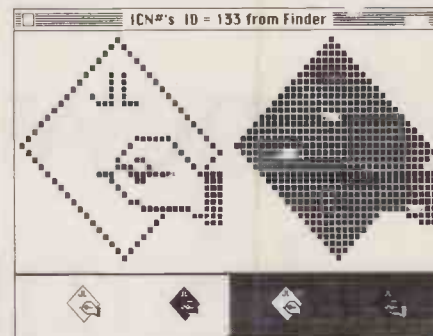
RESOURCE FORK

Any file on the Macintosh, whether it be an application or a document, has two distinct parts, known as the data fork and the resource fork. The resource fork is the important one for programmers, since it contains things like the code, icons, founts, alert boxes, etc. If you want to modify an application you need to be able to get into the resource fork. The best-known utility for doing this is Resedit. It lets you modify icons, founts, cursors and even the menu



Sound Lab provides four independent channels for which you may choose the waveform and volume.

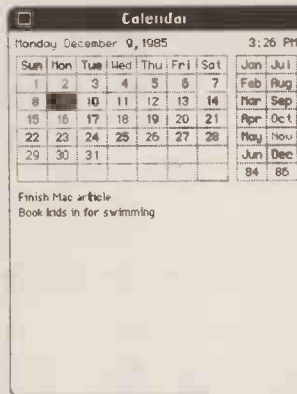
You can customise your icons with Resedit, using a Fatbits-like technique.



bar. Once you have got the resource you want, changing it is usually easy.

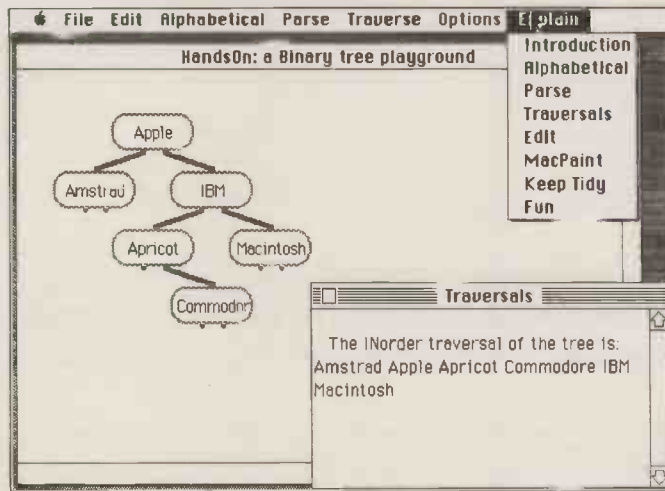
Redit is a German utility, similar in many respects to Resedit but more user-friendly, though some parts of my copy are not implemented. The RMOVER program, written by Andy Hertzfeld, allows specific resources to be moved between applications. There is also Menu Edit, which acts on the menu items, allowing you to change them or their style. Both Resedit and Redit can be used to personalise your desk top.

At this stage you may feel ready for some more comprehensive work behind the Mac's user-friendly front end. Apple publishes a set of loose-leaf papers known as *Inside Macintosh*, containing a lot of useful information in this area and setting out the philosophy behind the Macintosh interface itself.



Above: A complete on-screen simulation of the Hewlett-Packard HP 12C calculator. Above right: The Calendar includes space for notes against dates which are highlighted.

Hands On provides an informative animation of sorting on a binary tree.



The Extras desk accessory provides information about disc space and free memory, and allows you to delete files or compact memory to save space.

To manipulate code on disc you can use the program called Fedit. It allows you to view and alter the contents of each disc sector in either ASCII or hex, and check the header information. The Explorer desk accessory provides a window on to the memory contents, but does not allow you to edit what you see.

Many of the classic games have been rewritten and ported across to the Mac to take advantage of its excellent graphics. Life, Reversi, Breakout, Backgammon and Towers of Hanoi are all available. One nice touch, which has spread to some commercial games, is the ability to either blank the screen completely or replace the game by a spreadsheet — it can be useful when the boss puts in an unexpected appearance.

The sound channel on the Macintosh can be exercised using Macmelody or Sound Lab. Die Roller simulates a whole variety of dice, and System Bugs causes little beetle-like creatures to crawl up the screen. Neither of these are games, but they are entertaining to watch, and could even be used to liven up a presentation sequence.

The early Macintosh users wanted to spread the gospel and so went out of their way to explain how the Macintosh worked. The File demo, for example, is a pretty pointless example of windows, but it does show the techniques which can be used. A number of American bulletin boards carry files is from someone calling himself Simon Jester. He looks at the Macintosh application environment and how to manipulate icons,

as well as ways of cracking uncopyable programs — all in the interests of education, of course.

Hands On is one program I have spent a long time playing with. It demonstrates how a binary tree works, either for alphabetical or mathematical expressions. Particularly intriguing is the animated activity which takes place as each new item is added to the tree.

If you have trouble remembering what is in your Macpaint documents, Art Thief will be a great help as it allows you to see what the document contains without having to open up Macpaint itself. Lots of the newer desk accessories improve on those provided with the Mac. There are calculators like the HP 12C, a financial analyst, a calendar which allows you to write notes, and better clocks. Of particular use is Extras, which displays how much free memory is available, allows you to compact memory and even gives you the chance to delete files from the disc to make additional room. Bill Atkinson's Rolodex is a free-format data-retrieval system which emulates the card-index system of the same name. It could be used in conjunction with Switcher to make sure that phone numbers and notes are available immediately on-line.

TEXT EDITORS

A number of text editors are available, though none of them match Macwrite. One of the most interesting is the Mockwrite desk accessory and the associated Mockprinter which allows documents to be printed while you are still working on another task. If only someone would do the same for Macwrite.

A number of alternative founts are available to augment the standard ones supplied by Apple. Taliesin is a symbol fount like Cairo, and Warwick was taken from an early version of Macauthor. The others are mostly 36-point or 48-point founts, and so are not much use with Macwrite. However, they can be used to good effect in Macdraw and Macpaint.

For really outsize characters there is The Banner program. It prints out its message along the paper rather than across it, and enlarges each character to six inches or more in height. If you use it, watch out for your printer ribbon as it gets a real hammering.

SUPPLIERS

Much of the software mentioned in this article is available from Apple dealers. Alternatively you can download it from the Mactel bulletin board on (0602) 817696, which operates at 300 baud. *Inside Macintosh* can be ordered from Apple dealers, price £19.95.

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The disk size I use is:

3" 3 1/2" 5 1/4" 8"

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NOTE: Turbo Editor Toolbox and Turbo Gameworks are available for the IBM PC and true-compatibles using Turbo Pascal 3.0 ONLY.

Amstrad prices are £5 higher
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Elsewhere in Europe, add £1 per item. Outside Europe, £5 per item.

PRACTIBASE

TROUBLE ON THE MENU

By Mike Lewis

The all-conquering dBase II is about to be undercut by a cheap look-alike.

As a data-management program, Practibase does not stand out from the hundred or so competing products in its field. But it retails for less than £100, yet has all the features of dBase II, and more. The designers of Practibase deliberately used dBase as a model, resulting in a near identical command set.

There is one key difference: while dBase works by responding to commands typed by the user, Practibase is menu-driven to the nth degree. The main menu has not fewer than 43 options, many of which lead to several subsidiary menus or option screens. Detailed explanations are displayed at every step, and there is also a comprehensive set of context-dependent help screens.

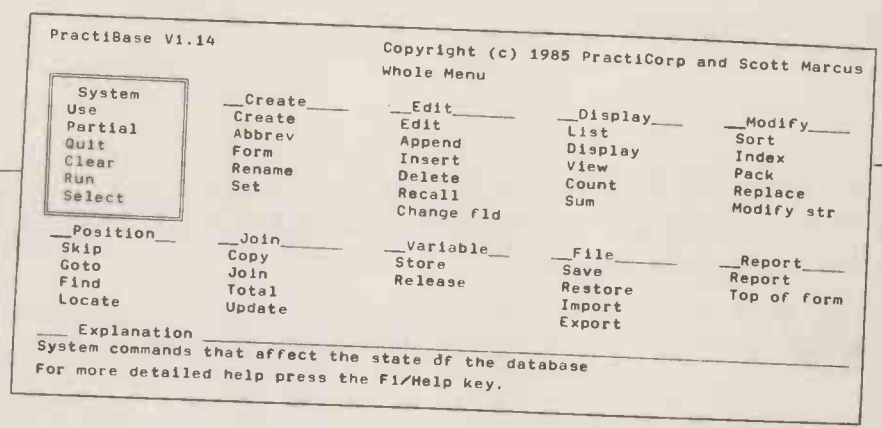
All this is terrific for the first-time user, but it can be very tedious once you know the ropes. Going through several levels of menu can take as many keystrokes as the dBase equivalent, with the added peril that if you make a mistake you have to start the whole thing again.

There is also a sort of command mode, where you can enter a line of normal dBase syntax. This speeds things up considerably, especially for short commands that have no operands. The stupid thing is that this highly desirable feature is barely mentioned in the documentation.

Once you have mastered the menus, you will find virtually all the familiar dBase commands, as well as the same concepts of file pointers, indexes, memory variables and macros. Of the very few commands that have been implemented, I felt the lack of only two: Set Deleted, and the Like and Except options.

SPECIFICATION

Description: menu-driven data-management package
Hardware required: IBM PC, PC/XT or PC/AT with at least 256K RAM and two floppy discs or a hard disc
Price: £85
Copy protection: none
Publisher: Practicorp Inc., Newton Upper Falls, Ma 02164, U.S.A.
U.K. supplier: First Software, Intec 1, Basingstoke, Hampshire RG23 0NE. Telephone: (0256) 463344
Availability: now



The main Practibase menu. To select one of the 43 commands, you first move the large double-sided square to the appropriate area, then move another pointer to the required option. The explanatory message near the foot of the display changes continually to reflect the current selection.

PRACTIBASE				
	PC VERDICT			
	POOR	AVERAGE	GOOD	EXCELLENT
Performance	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ease of use	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Documentation	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Value for money	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

If Practicorp manages to fix the bugs, improve the manual and speed the program up, it will be an excellent product.

On the other hand, Practibase has many extras that dBase lacks. For example, you can attach a formula to a field, this being evaluated when the record is appended or edited and there is a date field type. You can also specify a free-text memo for any record. I also liked the way Practibase can assign a default index to a database and asks you if you want to use it each time that you open the file. You can have up to 60 fields and 2,000 characters per record, compared to 32 and 1,000 respectively. It is also possible to have a third database in use.

Perhaps the biggest point in Practibase's favour is that it can execute programs written in the dBase language. All my dBase utilities ran happily without alteration. The problem was speed: Practibase took on average about four times as long.

Unfortunately, you cannot get Practibase to run a program other than by selecting it, via the Run command, from the main menu. In dBase you can go straight to the program from the DOS command line, and the programmer retains almost complete control over the user interface. This makes dBase a much better proposition for builders of turnkey applications.

Practibase has no built-in text editor, so program development will involve much switching between this package and a separate editor or WP system. Practicorp clearly did not intend its product to be used as a language processor, except perhaps on a very small scale.

Practibase cannot read dBase databases directly, but you can use the Import and Export command to convert from one format to the other. Care is needed, because Practibase does not report an error if you accidentally try to open a dBase file — it simply crashes.

The present release has other bugs too, as I started to discover when I tried invoking the program on my hard-disc machine. After a lot of trial and error I got it going, but the manual was no help at all and there was not even an on-screen error message to point me in the right direction. Another appeared when the system crashed after I changed the default directory path. Practicorp needs to take a hard look at the way the program deals with default drives, paths and configuration details, most of the problems I encountered were in this area.

The manual shows all the signs of having been put together in a hurry. Although it is reasonably well organised and adequately printed, many explanations are skimpy and misleading. In its favour, the manual is light, compact and sensibly bound, and the pages are numbered properly.

CONCLUSIONS

- Practibase is a low-cost data-management package, aimed squarely at the first-time user. It is unashamedly modelled on dBase II.
- If your main concern is developing applications for other people to use, Practibase will have little to offer.
- Practibase is not worth buying just for the features that are extra to dBase II.

TRAVELLING SOFTWARE

BEEF UP YOUR LAP PORTABLE

By Barbara Conway

The Tandy 100 and NEC PC-8201A lap portables are primitive by today's standards, but the right software helps to bring them up to scratch.

With so many new high-specification portable micros the earlier generation of lap portables may be starting to look a little forlorn. After all, who needs a machine with a 40-by-8 LCD display which does not tilt, no peripherals other than the built-in no-frills software, a competent but unexciting keyboard and just 16K of RAM. These days there are so many more sophisticated goodies available.

However, my NEC PC-8201A can be brought very near the standard of the new generation at considerably less cost. A series of products now available in the U.K. for the Kyocera-built machines — in particular, the NEC PC-8201A and Tandy 100 — can enhance virtually all the essential features, even giving a more comprehensive screen display to the outdated lap portables.

Microtime International markets the Travelling Software programs in the U.K. T-Writer is a text formatter, T-Base allows you to define your own database, and Idea is an outline processor. Idea is similar in concept to the American Think Tank ideas processor, and enables you to develop reports, indexes and suchlike, as you can move, delete and subdivide information. All three packages are available separately on cassette, or come together on the Ultimate ROM, a 32K ROM chip that plugs into the back of the NEC or Tandy machines. T-View, available on tape only, allows you to use the NEC or Tandy lap portables with a 60-column screen display, scrolling to 80 columns.

By most standards, T-Writer is a good word processor. Like all the software mentioned here, it is available separately on tape, but the ROM version gives two immediate options. The first of these lets you use the function keys to set fairly simple format guides, such as page size, numbering, margins and headers. Alternatively you can go for sophisticated formatting with Wordstar-style commands.

On the single tape version each of these is a different program. There is a choice between version 1, using function keys only but taking up less memory, and the full-feature version 2. On the ROM, entry into T-Writer gives you the function-key option

but accommodates all dot commands if you have incorporated them into your text.

For very rough notes you can make do with the NEC's built-in text-processing program. But it will not do for any kind of acceptable printout. If you do not want to bother to incorporate dot commands — which involves embedding codes such as Cen for centring in the text — you can get a reasonable result by using the function-key version of the word processor.

The main program comes into its own when it is used to ensure that you do not finish pages near the end of paragraphs with just a few straggling lines starting off the next folio. It selects the exact level of justification you need for text and you can introduce special printer codes for italics, etc. Tabs, multiple-line headings, selective output to screen, printer, modem or RAM, and automatic inclusion of correct date and time are all catered for.

PRINTING LABELS

There is also a facility for printing labels and retrieving information for form letters via the T-Merge facility. The latter is similar to WordStar's Mailmerge program. It also links the WP facilities with those of the equally comprehensive database on the ROM. Manipulation of blocks of text is possible using the built-in text processor and paste facilities. My only serious quarrel with T-Writer is that it lacks a word-count facility, although it is possible to carry a small Basic counting program in RAM.

The T-Base database allows you to set up separate data files which can be related to each other, called into WP files and updated regularly. Files are created using the built-in Text program and then manipulated through the database. The first line details how many fields of information there will be in each file, and their nature. The general rule is that the program can accommodate a file description which runs up to five normal screen lines. Each field description can be up to 39 characters long, and the maximum length is set in the original file.

T-Base can also cope with calculations on mini-spreadsheet lines, making it possible to keep expenses records and even stock lists on a running basis. Data for any file can be



The FB-100 3.5in. portable disc drive.

SPECIFICATION

T-WRITER

Description: cassette-based text formatter using menu-selected or WordStar-style dot commands
Price: £50

T-BASE

Description: cassette-based program; allows you to define your own database and cross-reference files, includes reporting and simple spreadsheet facilities
Price: £85

IDEA

Description: cassette-based outline processor
Price: £75

T-VIEW

Description: cassette-based program to display a 60-column screen, scrolling to 80-column
Price: £40

ULTIMATE ROM

Description: 32K ROM containing T-Writer, T-Base and Idea
Price: £190 for the NEC version, £195 for the Tandy version

All the above are available now from Microtime International Ltd, 106A Bedford Road, Wootton, Bedfordshire MK43 9JB. Telephone: (0234) 767758.

CELDISK 100 DISC DRIVE

Description: Brother FB-100 disc drive with Celdos operating system
Runs on: NEC PC-8201A only
Format: 3.5in.
Capacity: 100K
Price: £225
Supplier: Computer Electronics Ltd, 193 High Street, Egham, Surrey TW20 9ED. Telephone: (0784) 38838



borrowed from up to eight other T-Base files.

Special reports can be created from T-Base files, including calculations. The width and layout of pages can be set. Comprehensive sort and search facilities are also available. As well as linking to T-Writer, files can also be passed directly to the built-in communications program, Telcom, for electronic transfer of data.

While word processors and databases are generally acknowledged to be valuable to most serious users, the likes of the Idea ideas processor are more of an acquired taste. The program itself can be used for anything from keeping address lists and appointment notes to what the manual calls "developing outlines into full-blown articles, papers, presentations, business proposals." Idea lets you set out layers of sub-headings, together with associated notes under the main idea title.

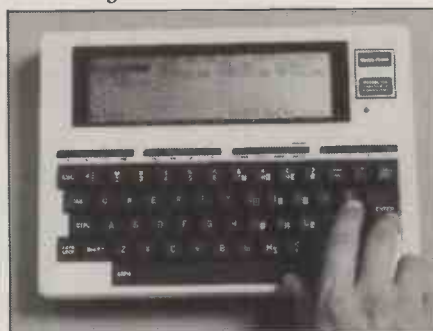
I found Idea almost impossible to use, although I know many other people find programs of this type invaluable for setting out thoughts on major projects and articles. Idea files can be manipulated and lists can be sorted. Idea is a full-feature program, but none of its features appealed to me.

FILES ON VIEW

Considerably more useful is the T-View program, from the same stable but on tape. This package lets you view any files created with Text in a new character set which shows 60 characters to the line, as opposed to the normal 40, and scrolls to show a full 80. Despite the reduction in size, the new characters are perfectly legible.

Text can be entered in Enhanced mode, but not edited. But even handier is the facility to use the 80-column scrolling screen with the inbuilt telecommunications program. This allows you to connect directly to an external database or another computer

Both the NEC PC-8201A (above) and the Tandy 100 (below) can be brought up to date with good software.



and download data from a screen wider than 40 characters. An extra facility called Snoopy mode enables you to identify any special non-printing control codes in a data file you are receiving.

Of course, with all these extensive text, database and downloaded files accumulated through using the new software, it seems unsatisfactory to have to save data to cassette with all the tedium that entails. The obvious answer is a disc drive, which in turn needs a decent disc-operating system.

One of the more popular solutions to this problem for the NEC portable is an adaptation of the Brother FB-100 portable disc drive by Computer Electronics Ltd. This compact unit has a footprint similar to a paperback book and takes 3.5in. discs, formatting to a capacity of around 100K each.

After some primitive early versions, the DOS is now adequate for most portable requirements. Written in machine code, it will load and save files as fast as the RS-232 port connection permits. It will format discs and display a directory noting the remaining sectors available, delete a disc file and kill a RAM file, and rename disc files. The drive works off the same kind of batteries as those used by the micro and performs reliably and

well. The only serious quibble is that it could do with a warning when deleting files.

The merits of having it on ROM are considerable, since it will always be available. The snag is that there are only two available ROM slots on the Kyocera machines, and one of these is occupied by the micro's own OS. At present it could well come to a choice between the three facets of the Ultimate ROM or the DOS on its own.

Microtime International is working on a reconfigured version of the Ultimate ROM without the Idea element, which is more popular in the U.S. Since it is a hefty program it might leave room for both the DOS and T-View on the same ROM with the word processor and database.

If that proves possible, the combination would be exceptionally attractive since almost all users could make effective use of each of the available programs. In the meantime the best solution when travelling might well be to have the DOS in ROM and transfer the tapes of the other programs to disc. This is a fairly straightforward procedure since the latest DOS has no problem with machine-code routines.

MEMORY CLASHES

If you are using the programs on tape, there are bound to be some memory clashes. So keep the necessary reset programs — normally just a couple of lines of Basic — in RAM so that the relevant areas can be cleared as needed. You can also expand the memory of the Kyocera machines, although if you have a disc drive you may not feel the need since the CMOS 8K RAM chips cost up to £52 each. If you are accessing another bank of memory after filling the initial bank of 32K, you lose half the memory of your first new chip. The advantage of having a second bank available is that you can keep extra programs in the second bank and transfer them across as needed.



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△ C/C with Modem.....	395	325
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ATARI 520ST SPECIFICATION

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Port for add'l 128K plug-in ROM cartridges
200K TOS operating system

GRAPHICS
Individually addressable 32K bit-mapped screen with 3 screen graphics modes
320x200 pixels in 16 colours (low resolution)
640x400 pixels in 4 colours (med resolution)
640x400 pixels in monochrome (high res)
16 shades of grey in low res mode
512 colours available in low/medium res
8 levels of each in red, green and blue

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DMA Controller - Graphics Processing Unit
1632 bit Motorola 68000 processor at 8MHz
eight 32 bit data registers
eight 32 bit address registers
16 bit data bus/24 bit address bus
7 levels of interrupts/58 instructions
14 addressing modes/5 data types

DATA STORAGE
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Frequency control from 30Hz to above audible
3 voices (channels) in wave shaping sound in
addition to a noise generator
Separate frequency and volume controls
Dynamic envelope controls
ADSR (Attack, Decay, Sustain, Release)
Noise generator
MIDI interface for external music synthesizers

KEYBOARD
80 pin microprocessor
Standard QWERTY typewriter styling
Ergonomic angle and height
95 keys including 10 function keys
Numeric keypad - 18 keys including ENTER
One touch cursor control keypad

MONITOR
17" screen - high res monochrome monitor
640x400 monochrome resolution
Note: Some of the above specifications are pre-release and may therefore be subject to change

VIDEO PORTS
Display - Low Resolution - 40 columns
Med/High Res - 40/80 plus cols
Medium res RGB (Red/Green/Blue) output
High resolution monochrome (Black & White)

COMMUNICATIONS
Bidirectional centronics parallel interface for printers, or modem capable of input/output
RS232C serial modem/printer interface
VT52 Terminal Emulation Software
Maximum Baud Rate up to 18,200
High speed hard disk interface
Floppy disk controller (Western Digital)
2 joystick ports (one for 2 button mouse)
MIDI interface for external music synthesizers

GEM WIMP ENVIRONMENT
WIMP - Window Icon Mouse Pop-down menu
Two button mouse controller
Icons/Pull down menus
GEM VDI - Virtual Device Interface
GEM AES - Application Environment Services
GEM BBT - Bit Block Transfer
Real time clock & calendar

SOFTWARE
GEM environment
with user friendly Macintosh style operation
TOS - Tramiel Operating System
Atari's own system based on CPM 68K with hierarchical directory & file structure plus a host of MS DOS & UNIX command structures
BOS - Business Operating System
to run any standard BOS business programs
GEM desktop
with GEM PAINT graphics mgmt system and GEM WRITE word processor
Personal BASIC and DR Logo
originally written by Digital Research (DR)
Very much like those on other machines
except for the extensive use of pull down menus, mouse control and windows

VARIOUS
Dimensions: 40mm x 240mm x 60mm
Replaceable external power supplies
Expansion: 2x 1/2" floppy disk drives 500K/1,000K
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Dot matrix & d'Neali printers (black)
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Many others will soon be available, including
Assembler, BCPL, C, Cobol, Compiled Basic,
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June 1985 - Jack Schofield - PRACTICAL COMPUTING

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Keyboard size ins (LxDxH)	13x5 7/8 x 2	17 1/2 x 6 1/2 x 1	18 1/2 x 9 1/2 x 2 1/2
3 1/2" D/Drive (Unformatted)	500K	500K	500K
3 1/2" D/Drive (Formatted)	399K	315K	349K
WIMP (Window, Icon, Mouse)	Apple	ACT - Activity	GEM
Real-time Clock	YES	YES	YES
Polyphonic Sound Generator	YES	NO	YES
RS232C Serial Port	YES	YES	YES
Centronics Parallel Printer Port	NO	YES	YES
Dedicated Floppy Disk Controller	NO	YES	YES
Hard Disk DMA Interface	NO	YES	YES
Full stroke keyboard	YES	YES	YES
Number of keys on keyboard	59	92	95
Numeric Keypad	NO	YES (16 Keys)	YES (18 keys)
Cursor Control Keypad	NO	YES	YES
Function keys	NO	10	10
16-bit processor	68000	Intel 8086	68000
Processor running speed	8MHz	4.77MHz	8MHz
RAM size	512K	256K	512K
Number of graphics modes	1	4	3
Number of colours	Monochrome	16	512
Max Screen Resolution (pixels)	512 x 342	640 x 256	640 x 400
Mouse Included	Single Button	NO - extra £95	Two Button
Replaceable External Power Pack	NO	NO	YES
Cartridge Socket	NO	NO	YES
Joystick Ports	NO	NO	YES (two)
MIDI Synthesiser Interface	NO	NO	YES
Monitor Size	9"	9" - extra £200	12"
RGB Video Output	NO	YES	YES
System Cost with: Mouse - Monochrome Monitor - 512K RAM - 500K Disk Drive			
Price of basic system (exc VAT)	£2595-VAT	£955-VAT	£852-VAT
* Mouse	Included	£95-VAT	Included
* Monochrome Monitor	Included	£200-VAT	Included
* Expansion to 512K RAM	Included	£295-VAT	Included
Price of complete system (exc VAT)	£2595-VAT	£1185-VAT	£852-VAT
PRICE rounded down including VAT	£2,984	£1,362	£749

THE NEW ATARI 520ST

Under the new leadership of Jack Tramiel (former boss and founder of Commodore Business Machines), Atari Corporation have marked their entry into the world of business/personal computers with a machine which leaves the competition standing. Tramiel's slogan 'Power Without the Price' has been implemented in the manufacture of the new 512K Atari 520ST colour computer which offers the user amazing high performance at an incredibly low price. Launched as a work-station, this new system incorporates seven software packages as well as the 520ST computer with 512K RAM, mouse controller, high resolution monochrome monitor (640x400), 95 key keyboard (with 18 key numeric keypad), MIDI interface, GEM and a 500K 3 1/2 inch disk drive, all for the package price of only £651.30 (+VAT = £749). Dubbed the 'Mac beater' and the 'Jackintosh' (after Atari's Chief, Jack Tramiel), Atari's new machine has been directly compared with the Apple Macintosh RRP £2595 (+VAT = £2985) which offers similar features and capabilities but at a much higher price. Favourably reviewed by the UK's highly critical specialist computer press, the 520ST is likely to make a great impact in this country as a sophisticated alternative to an IBM PC, APRICOT or APPLE MACINTOSH. Unlike its overpriced competitors, the Atari 520ST can be linked up to a colour monitor to unleash a choice of up to 512 colours. The addition of colour brings out the full potential of graphics packages such as GEM.

USER FRIENDLY GEM OPERATING SYSTEM

The power of the ST is harnessed and made user friendly by the new operating system 'GEM' from Digital Research. GEM stands for Graphics Environment Manager and allows a user friendly colour or B/W graphics interface which closely resembles that of the Macintosh. This similarity extends to the use of moveable resizable windows, icons to represent objects such as disks and disk drives, and the use of pull down menus and a mouse. The advantage of all this is that the computer becomes extremely easy to use. GEM has now been implemented for the Acorn, ACT, Atari, IBM, ICL, and Olivetti. Software written for GEM on one computer should also run under GEM on another computer. This will enable the market to quickly produce a large library of standard interchangeable software.

FREE SOFTWARE AND FUTURE EXPANSION

The Atari 520ST comes supplied with seven free software packages as listed below:
1) TOS - Tramiel Operating System based on CPM 68K. 2) GEM Graphics Environment Manager by Digital Research (DR) giving a WIMP (Window, Icon, Mouse, Pull down menu) environment. 3) DR GEM Paint for creating graphics masterpieces. 4) DR GEM Write for word processing. 5) Logo learning language to enable you to write your own programs easily using turtle graphics. 6) DR Personal Basic a powerful user friendly version of the Basic programming language. 7) BOS operating system giving you access to dozens of business applications packages already available on the market. Designed with future expansion in mind, the ST also features a host of different interfaces to the outside world and an impressive list of accessories is planned. Atari will soon be releasing a 1000K (1MB) 3 1/2 inch disk drive, and a 15MB hard disk storage system as well as a mass storage compact disc (CD) player capable of storing an entire 20 volume encyclopedia on one disk. A full range of inexpensive printers are planned including dot matrix, daisywheel and thermal colour printers. With its unbeatable graphics, speed and software at a price which is far below that of any comparable personal computer currently on the market, the ST is all set to do battle with the competition. To receive further details of the ST from Silica Shop, just fill in the coupon below with your name and address details and post it to us.

Silica Shop Price: £651.30 + £97.70 VAT = £749.00 This price includes:

- ★ 512K RAM
- ★ MOUSE
- ★ GEM
- ★ B/W MONITOR
- ★ 500K 3.5" DISK DRIVE
- ★ KEYBOARD (95 KEYS)

STARS

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To: Silica Shop Ltd, Dept PC 0286 1-4 The Mews, Hatherley Road, Sidcup, Kent, DA14 4DX

PLEASE SEND ME FREE LITERATURE ON THE NEW ATARI 520ST COMPUTER

Mr/Mrs/Ms: Initials: Surname:

Address:

Postcode:

Do you already own a computer
If so, which one do you own?

"Atari's new corporate image as an aggressive low cost computer maker is likely to mirror that of Commodore where Mr. Tramiel established the maxim that 'Business is War'."
August 21st 1984 FINANCIAL TIMES

"This is the only personal computer I know of that comes with a MIDI interface as standard."
Peter Bright March 1985 PERSONAL COMPUTER WORLD

"The (GEM) version running on the Atari 68000 machines will have the additional advantage of leaving the PC version standing."
April 6th 1985 PERSONAL COMPUTER NEWS

"It would seem that GEM offers the ideal operating system."
March 7th 1985 POPULAR COMPUTING WEEKLY

"I found it (GEM) extremely easy to use and was very impressed with the way in which it disguises the unfriendly hardware and operating systems lurking under the surface."
Peter Bright Feb 1985 PERSONAL COMPUTER WORLD

PRESS COMMENT

"The electronics in the machine are a work of art... the heart of the 520ST is a Motorola 68000, one of the most powerful 16-bit processors around and in many respects it is close to being a 32-bit chip... when the machine appears in the shops, it'll be at the front end of the queue to buy one."
Peter Bright June 1985 PERSONAL COMPUTER WORLD

"This machine is significantly more powerful than an IBM PC... it's possible to design a sure-fire winning machine, this is it."
May 11th 1985 PERSONAL COMPUTER NEWS

"... the use of GEM makes the new range of Atari computers so similar to the Macintosh (with the added attraction of colour), that they are already being called 'Jackintoshes'."
May 2nd 1985 COMPUTING

"The new Atari ST computers truly represent to the consumer what Jack Tramiel is saying - easy-to-use computing power without the price."
March 1985 ANALOG COMPUTING

"It [the ST] uses the most modern technology that is affordable, in a package that gives a professional impression."
May 23rd 1985 POPULAR COMPUTING WEEKLY

"The Atari ST is one of the most elegant designs I have seen... Atari has used an original and elegant method of memory management which should make the ST faster than any other PC on the market - in any price bracket... The £4K dollar question is would I go out and spend money for one? To which the only answer is 'Try and stop me!'"
John Lambert July 1985 ELECTRONICS & COMPUTING

"The 520ST is technically excellent... The 520ST hardware is the new standard by which others will be judged."
July 1985 YOUR COMPUTER

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ATARI WE ARE THE UK'S NO1 ATARI SPECIALISTS ATARI

At Silica we have been successfully dedicated to Atari ever since their products first appeared on the UK market. We can attribute our success largely to the Atari specialisation which we practice and to the user back-up we provide. Rest assured that when you buy a piece of Atari hardware at Silica you will be fully supported. Our mailings giving news of software releases and developments will keep you up to date with the Atari market and our technical support team and sales staff are at the end of the telephone line to deal with your problems and supply you every need. With our specialist bias, we aim to keep stocks of all the available Atari hardware, software, peripherals and accessories. We also stock a wide range of Atari dedicated books and through us, the owners on our list can subscribe to several American Atari dedicated magazines. We can provide a full service to all Atari owners and are now firmly established as the UK's NUMBER ONE Atari specialists. Here are just some of the things we can offer to our customers:

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Circle No. 112

Many individuals and companies in Britain using computers are probably now breaking the law. It is not the Data Protection Act which is causing the trouble — that does not come into effect until May — but the Copyright Act of 1956, which has recently been amended to take in computer software. Changes embodied in the Copyright (Computer Software) Amendment Act passed last year basically have the effect of making it clear that software is subject to the same provisions as a literary work such as a book.

On the face of it this seems a reasonable and welcome move. The law was previously in a rather confused state, and hopefully a clear law will encourage greater investment in developing new software. But, unfortunately, you can have too much of a good thing. The law in Britain now goes far further in preventing copying than in most other major computer-using countries. It effectively outlaws the taking of backup copies of programs except where this is explicitly permitted by the copyright owner.

By contrast, both the U.S. and Australia possess good modern law on computer software which explicitly allows users to make security copies of software they have bought or leased for their own legitimate use. Suggestions along these lines were made while the British Bill was on its way into law. But whether through excessive zeal in cracking down on the pirates or the rush of bringing what started as a private member's Bill to the statute book, they did not make it into the law that Parliament passed.

The problem is that a simple analogy between literary works and computer software only goes so far, because at the end of the day the two sorts of product are not the same. A book does not suddenly fail the way a floppy disc does, and if it did it probably would not matter very much. In a business environment if a program disc fails to load you may well need another copy immediately, or you may be in deep trouble.

SHORT EXTRACTS

The law as it now stands focuses on the copying process itself, and is really quite reasonable for books. You are allowed to make copies of short passages for your personal use as long as these are not, in the words of the Act, "substantial". But treating software in this way effectively rules out making backup copies, which have to be substantial in order to work at all.

What we are left with now is a law which makes the act of copying illegal unless you have the prior approval of the copyright owner. There is no qualification that the copying has to be for commercial gain; whatever the motive, it is still illegal.

Fortunately, some copyright holders willingly give their approval somewhere in their printed documentation, but many do not. Some go to all sorts of lengths to prevent physically the copying of program discs by ordinary means.

The law now strictly forbids unauthorised copying of software, even for the most innocent of purposes. **Ian Stobie** investigates what this means to users anxious to safeguard their software.

WHO PROTECTS THE USER?

From the user's point of view, there are two main types of physical software protection. Some manufacturers provide program discs that will not copy at all with normal utility software. Usually you get two copies of the most important discs, but sometimes only one, and an address to write to for replacement discs if either of these should fail.

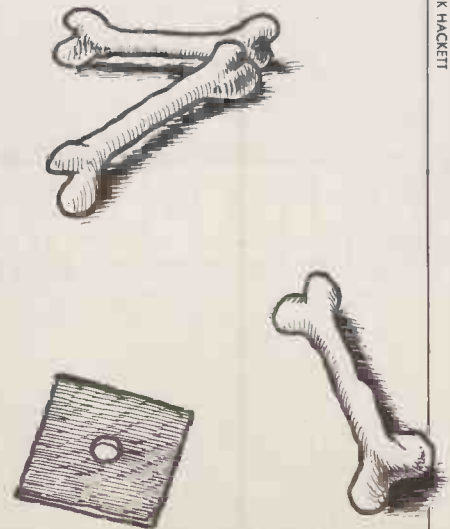
Another approach is to provide the program itself on discs which you can back up, but along with an uncopyable key disc which you have to insert at the start of every session, or sometimes at irregular intervals when prompted by the program, otherwise the software will not run. The key-disc system is preferable to outright copy protection, as the key disc is used less and is less likely to wear out. But your key disc can get lost, which would again render your software unusable.

By now, most experienced computer users have learnt to be wary of protected computer software. They know how hard it can be to install protected programs on hard-disc systems, and the problems you run into with program security. Now there is a legal problem added to this if you attempt to do anything about it.

STAYING LEGAL

So what does this mean for users who wish to stay within the law? You might be tempted simply to ignore the law — after all, laws get broken all the time and this one is going to be extremely hard to enforce. This may be fine for individuals prepared to take a chance, but it is unlikely to appeal to the large corporations within which most personal computing goes on.

When employees copy illegally on their office machine it is the company which stands to end up in the dock. Although morally the law may seem unfair, many companies would be severely embarrassed by a prosecution for what is a form of theft. Neither are the penalties negligible; the Act allows unlimited fines or up to two years imprisonment on indictment.



MARK HACKETT

• INDUSTRY ATTITUDES •

Ashton-Tate Protects some products but not others. The more recent IBM products like Framework II and dBase III are protected, but dBase II is not in any of its versions. Ashton-Tate has taken legal action in the U.K. over copyright on several occasions, but mainly against dealers. The company accepts that copy protection can be inconvenient for both the user and the supplier, but sees copy protection as the best way of preventing casual copying, something which it thinks does cost it revenue.

Autodesk Publishes the best-selling Autocad drafting package, which is not copy protected. It sells at between £1,000 and £2,500 depending on version. It is not only cheap software that is unprotected.

Borland The users' friend. Pioneer of the low-cost, unprotected but high-quality approach to making money out of software. Neither Turbo Pascal, Reflex or the latest offering, Turbo Lightning, reviewed on page 92 of this issue, is copy protected. For some reason Sidekick is available in two versions. For £54 it comes in protected form, but for £30 more you can have it without the protection.

Comsoft Its main database products such as Delta are not protected. Domino, a training/presentation package, is protected, perhaps because it will appeal to the educational sector, which is notorious for illicit copying. Comsoft has spent some time researching ways of protecting its manuals, which are now printed on a tinted paper which will not reproduce on normal office photocopiers.

Digital Research DR languages and operating systems are not protected, but then this type of product rarely is. DR considered copy protection for Gem and the Gem application programs Gem Draw and Gem Write, but decided against it. Apart from anything else it would have added from \$1 to \$3 per disc to manufacturing costs. The company prefers to rely on good manuals and low prices to protect its product.

Living Videotext Example of the present trend away from protection among all but the biggest U.S. software houses. The original Thinktank for the IBM and Mac was protected but the latest product, Ready, is not. Ready benefits from this approach as it makes most sense if you keep it on the same disc as your word processor. We review it on page 94 of this issue.

Lotus The largest micro software company, big bad wolf to some and doyen to those who believe in the protection route to riches. Lotus 1-2-3, Symphony and Jazz are all protected. Recently Lotus has been thinking about site licensing for large users, but has yet to come to any conclusions.

Microsoft All its languages and operating systems such as Windows are not protected, while application packages such as Word, Chart and Excel are. The exception is Multiplan,

which in most of its many versions — including that for the IBM PC — is not protected. Partly to discourage illicit copying, Microsoft offers network users special prices.

Micropro A company that is using copyright law in an unusually intelligent way. No Micropro products are now physically protected. Micropro's original WordStar package was widely copied and pirated. Micropro responded with legal action. Its most celebrated case against a major U.S. user, United Brands, was settled out of court, but brought the message home to other corporate users that copyright laws exist.

In the U.K. Micropro has recently offered unauthorised WordStar users an amnesty in return for a registration fee of only £46. So far it reports a good response to the offer. The company has briefly experimented with copy protection. Its top-of-the-range word processor for the IBM PC, WordStar 2000, was released initially as a protected product, but within three weeks Micropro decided to take the protection off because users were having problems installing the system on some of the clone machines. According to Micropro, removing protection has turned out to be a wise commercial decision, improving WordStar 2000's sales.

Mosaic Directly competing against Lotus with a very good 1-2-3 clone. Uses the absence of copy protection almost as much as the low price to woo users away from Lotus. Mosaic's other main product, the multi-function Integrated Seven, is also not copy protected.

Multimate While it was an independent company Multimate's word processor was not copy protected, and it still gained best-seller status. Ashton-Tate has now taken it over, but has no plans at present to change the Multimate policy on copy protection.

Paperback Software Surprisingly, while the marketing of Adam Osborne's low-cost software range is very innovative, the programs themselves, such as Executive Writer, are still copy protected. But if you are prepared to sign a licence agreement the company will sell you an unprotected backup disc for £8. This gives it a straightforward contract it can enforce legally should you turn out to be a pirate.

Satellite Software Neither Word Perfect, the very highly regarded word processor, or the other packages in the SSI range are copy protected.

Software Publishing The low-cost PFS series, which includes the PFS Write and PFS Plan, are all copy protected. The company argues that the low cost it charges registered users for backups makes user copying unnecessary.

Southdata The company's unusual Superfile database is not copy protected: "We always encourage people to make backup copies — they would be pretty stupid if they did not."

Sometimes the argument is put forward that no one is going to bring a prosecution over small-scale end-user copying. But this assumes the goodwill of the software supplier; if you get into a dispute with them over some unrelated issue, the discovery of a few illegal copies at your site could damage your case.

THE OBVIOUS ANSWER

So what is to be done? The obvious answer is for software houses which presently do not authorise users to take their own backups to do so. All it takes is a sheet of paper with the magic words on it to be included in the U.K. documentation. But the chances are that software houses wedded to the physical-protection approach will not suddenly change their line. For American software houses the issue lacks urgency as U.S. users


are presumed to have the right to take their own backups anyway.

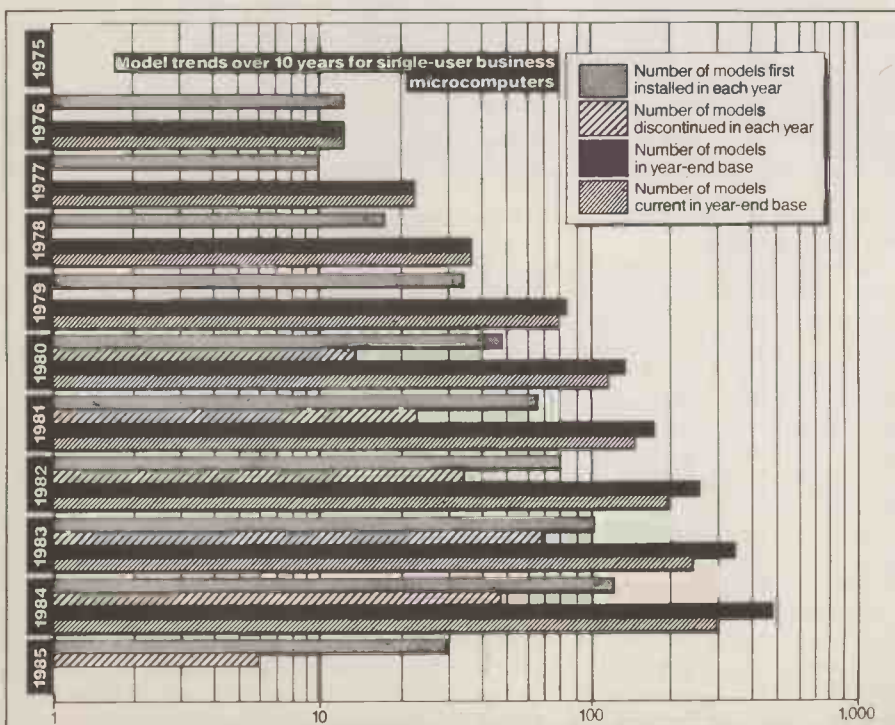
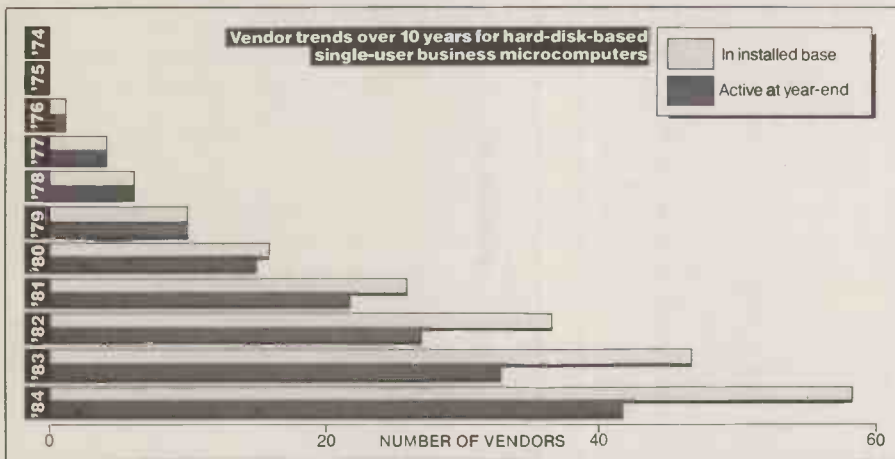
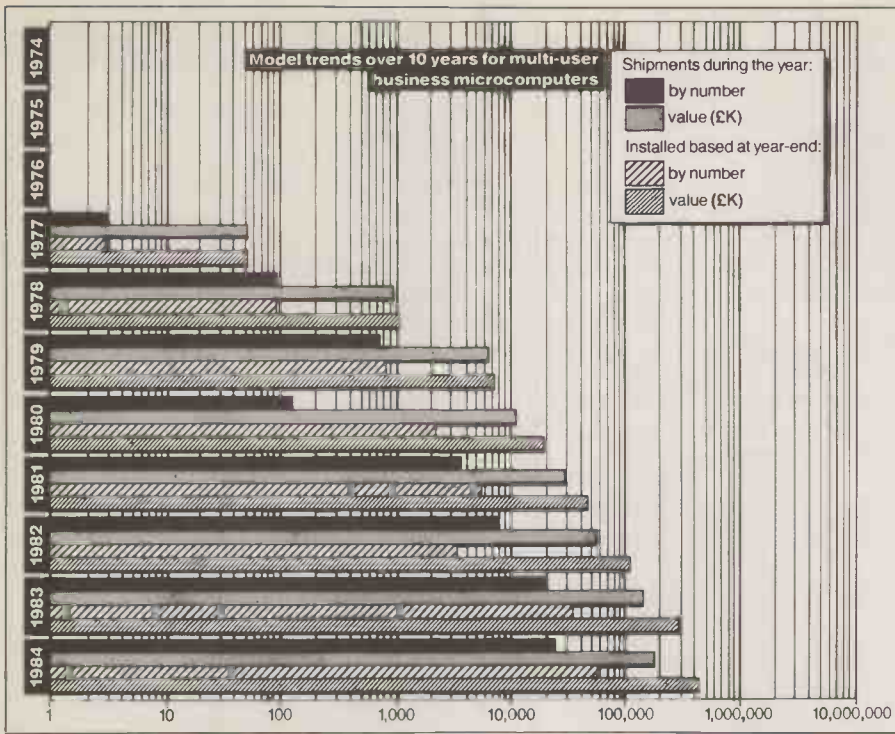
Generally, software companies which use a protection method will sell backup discs to registered users for a reasonable price, say £10. You would be wise to take advantage of this immediately if you have purchased a protected program. But this is not a complete answer to the users' problem. You are limited to the number of backups the software company is prepared to sell you, even if you need more. Also there is always the possibility of the copyright-owning software company going bust, as they are inclined to do from time to time.

One solution is for the user to buy a so-called bit-copy program, designed for cracking protected discs. The problem with this is that it involves you in hard work. First you have to make sure you buy the correct

copier, able to defeat your particular supplier's protection scheme, then you have to figure out how to use it. And, of course, using a bit copier on a protected program in this way without permission is illegal.

Fortunately, there is another way. Plenty of software companies do offer unprotected software, believing that physical protection does neither users or themselves any good. Most of these companies recommend that you make security copies as soon as you open the packet.

In many ways this is how the problem will probably be sorted out. Users will just stop buying protected software when they have the choice. If protecting companies do not respond to the present situation in the U.K. and remove protection, or at least authorise copying, they may well end up losing their customers. 



The business micro market is a fast-changing one. As technology advances so new products are launched making others obsolete. In these circumstances, a reliable market survey is particularly difficult to mount — but well worth doing if it reveals discernible trends.

Pedder Associates (PAL) has recently published the section of its annual census report which covers sales of business micros for 1984. The report takes a look at the business micro market in general and breaks it down into areas to be examined more specifically. It compares the fate of eight, 16-, and 32-bit systems, examines the use of single- and multi-user systems, monitors the rise of the portable and the move towards hard discs, and quantifies the market for IBM PCs and compatibles and Unix-based micros. Finally, it forecasts the future of these areas up to the end of 1986.

The report reveals that at the end of 1984 there were 874,000 business micros installed in the U.K. This installed base is valued at £2.2 billion. During 1984 this base increased by just over 60 percent in units and by 57 percent in value, as users bought 341,000 business micros valued at £831 million. Despite the increase in sales of more expensive multi-user and hard-disc systems, the average cost of a system sale fell from £2,661 in 1983 to £2,437.

THE INEXORABLE RISE OF 16 BITS

Of the business micros installed the majority were eight-bit, floppy-disc based, single-user, desk-top systems which were in consequence neither Unix-based nor IBM compatible. However, closer examination of the figures reveals that eight-bit processor based systems were gradually being eclipsed by 16- and 32-bit systems. Sales of eight-bit systems fell during 1982 and 1984 — though they grew in 1983 — whereas sales of 16- and 32-bit systems soared in the same period.

The report shows the 10 market leaders to be, listed alphabetically, ACT, Apple, Commodore, Hewlett-Packard, IBM, ICL, Olivetti, Sanyo, Sinclair and Tandy. Although IBM entered the business micro market late, the figures confirm its present dominant position in the field. Despite the increase in the size of the market, this appears to have been achieved at the cost of Apple and Commodore. Apple's market share in units in 1981 was 17.4 percent compared to 3.3 percent in 1984; Commodore's was 25.2 percent in 1981 and 12.3 percent in 1984. Meanwhile, IBM's rose from less than 1 percent in 1981 to have accounted for 7.5 percent of installed units by 1984. This figure may seem low, but in that year IBM was the largest single shipper of business micros with a 14.9 percent share of the market.

But while IBM may have the biggest slice of the pie, it is still not as big as that which Commodore had in 1981 with 25.2 percent. The increase in the number of manufacturers of business micros meant there was more competition. What was on offer had

PEDDER ASSOCIATES

Pedder Associates Ltd was formed in 1970 to set up a database of U.K. computer users called the National Computer Index. This first project was completed in association with the National Computing Centre.

In 1973 PAL began its first market census of installed computers in the U.K. It covered computer installations by number and value and included every system known to be in use in the U.K. Since then the census, along with others on different areas of information technology, has become a yearly event.

The current census reports on the U.K. market at 31 December 1984. PAL obtained data on over 800 different micros from 400 manufacturers or main vendors. The data was sought from manufacturers and suppliers by a combination of postal questionnaires and telephone interviews.

The result is a 156-page market survey report of business micro. It comprises current and historical data on models, market-share analyses by supplier and system sub-categories, and 10-year trend analyses. Market projections are provided for 1985 and 1986, and there is discussion of implications for vendors and their products.

The *12th U.K. Annual Census Report: Business Micros* is available at £750 from Pedder Associates Ltd, Parkway House, Sheen Lane, East Sheen, London SW14 8LS. Telephone: 01-878 9111.

THE STATE OF THE NATION

For anyone interested in the British micro market, each year Pedder Associates provides a comprehensive source of data, summarised by **Carol Hammond**.

changed too. ACT came on the scene with its Apricot series to increase its market share from 1.8 percent of units to 6.2 percent. Sinclair came to the fore in 1984 with the QL — in its original form and as the OPD — to grab 4.6 percent, and other than IBM shipped the largest number of units with 11.9 percent. Finally, Epson came from nowhere to muscle into the fray in 1983 with its PX-8 and HX-20 portable micros. However, IBM still took a hefty £184 million share in 1984, with ACT a comparatively feeble second runner cashing in £56 million.

Looking to the types of systems, single-user systems still dominated the market with multi-user on the increase. PAL attributes the slide in multi-user sales in 1984 to the arrival of the IBM PC and PC/XT — both single-user systems — and to the delay in the arrival of the multi-user PC/AT. Secondly, it attributes the popularity of single-user micros to their price. Although the cost of a single-user system has increased, on average multi-user systems still cost three to four times as much. Once again IBM grabs the biggest slice of the cake with the largest market share to the cost of Apple and Commodore.

In the multi-user neck of the woods ICL led the way in 1984 with its ICL PC and DRS-20 series to take a 24.9 percent share of systems shipped. LSI followed with 7.7 percent thanks to its Octopus, then came Olivetti with 6.5 percent — a drop from 18.9 percent the previous year.

The report makes no distinction between true portables and the heavier mains-powered transportable machines: all micros weighing less than 30lb. are classified as "portables". This section of the business micro market is still a volatile one where it is difficult to establish exactly what is going on. It is an area that has sprouted comparatively recently, and one where technology can have a dramatic effect as more computing power is packed into less space. For example, until 1982 and the arrival of the Osborne 1 all single-user business micros were designed for the desk tops of the world. The number of portables available has mushroomed, and in 1984 they constituted 16.9 percent of single-user micros shipped.

However, the initial rapid growth rate has slackened. PAL attributes this rush to those users such as salespeople, desperate to purchase a product that would allow high mobility. Further, the report suggests that the market has been limited by the premium price of portables. The extra cost, of course, reflects the increased sophistication of portables, as they pack in more RAM and come with tilting LCD and plasma screens in an effort to compete with their desk-bound relatives.

LAP PORTABLES

The future of the portable seems a secure one nevertheless. More and more manufacturers are keen to have a portable in their range, and this is one sector IBM has failed to dominate: the IBM Portable PC has not been a success. Future Management was the original market leader in 1982 with the Osborne 1 and 27 percent of units installed; Husky, Sharp and Tandy were the only other contenders. But in 1984 Future Management's share fell to under 10 percent and Epson was in first place at 20.6 percent, with Tandy and Sharp a close second and third.

Epson looked set to hold on to its lead holding 24.2 percent of units shipped in 1984, but Apple had also entered the ring with the IIc and the Mac to take 13.9 percent followed by Commodore and Compaq's top-selling IBM PC compatible, the Compaq PC. How things will shake out is debateable. Epson seems streets ahead, but IBM may take another stab at the market and maybe Apple's go-it-alone approach will suffer another blow.

The number of IBM PC and compatible systems rose from 1.2 percent in 1982 to account for 24.5 percent of business micros in 1984. The quick growth results from IBM's late entry into the personal-computer market and the desire of companies to conform quickly to the IBM PC standard. PAL cites 33 vendors of PC-compatible systems at the end of 1984, which include industry heavyweights like Olivetti with the M-21 and M-24, plus Japanese electronics firms such as Canon. And this does not include the plethora of companies keen to supply add-ons, software, etc., that will enable IBM to sustain its dominance.

Nor does IBM have to worry that companies producing compatibles are taking too large a share of the potential market. It holds a 60.9 percent share of units shipped in 1984; Sanyo, which delivered the second-highest number, was trailing behind with 15.2 percent.

WINCHESTERS FOR MASS STORAGE

The report indicates a move towards hard-disc Winchester-type mass storage in addition to or instead of floppy-disc drives. Most multi-user systems offer a hard-disc option anyway, but about 40 percent of those vendors competing for the hard-disc market were aiming at single-user systems. The IBM PC/AT led the way with the highest number of units in 1984 for a multi-user system.

The notion of Unix as the operating system everyone would love to have is swept aside by the report. Unix-based micros accounted for a puny 0.9 percent of units shipped in 1984, though they did account for 13.8 percent of multi-user shipments, a rise from 2.5 percent in 1981. Altos was the leading manufacturer, supplying 30.3 percent of Unix-based systems shipped in 1984.

According to PAL's survey, the future will probably continue to be dominated by IBM in most areas of business microcomputing. And although the market is getting larger, other companies may well feel the pinch as IBM goes from strength to strength — unless, of course, they join the compatibility bandwagon. Also there is no guarantee that the market will continue to expand, as can be learned from the demise of the once-booming home-computer market before it had reached its supposed prime. But nothing is certain — there is always the possibility of an outsider to contend with. After all, Osborne came in from nowhere to create a new area of computing and the same could happen again.



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SYSTEM ONLY
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If your needs include any of the following then you should be looking seriously at the ATARI 520ST. You could be saving yourself or your company valuable time and expense by using the Atari for fast processing speeds at low unit cost. 68000 processor ● 512K Ram ● half megabyte drive ● monitor ● GEM

- COMMUNICATIONS (VT100, VT102, VT52 – Mini or Mainframe Terminal – Prestel – Electronic Mail) YES
NO
- WORDPROCESSING YES ● DATABASES YES ● SPREADSHEETS YES
NO NO NO
- ACCOUNTING YES ● BUSINESS GRAPHICS YES ● CAD SYSTEM YES ● TIME RECORDING YES
NO NO (colour & B/W) NO NO
- EDUCATIONAL YES ● SMALL BUSINESS YES ● DESIGN YES ● CONTROL YES
NO NO NO NO

System illustrated includes 512K Ram fast 68000 processor, half megabyte 3½" disk drive, high resolution b/w, monitor, GEM mouse and FREE word processing, graphics, basic and logo software. Options include double sided 1 meg. disk drives, 10/20 megabyte hard disks, colour monitors and cdrom players (laser disks).

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INTERVIEW

JOE McNALLY — Managing Director of Compaq
Computer Limited

INTERVIEWED BY GLYN MOODY

Joe McNally began his computing career in 1966 when he joined ICL as a technical advisor. After 18 months as a systems engineer he moved to Honeywell. In 1974 McNally became branch marketing manager and two years later branch manager for south-west England. In 1979 he moved to the meat-trading group FMC-Harris to take over its southern operations as managing director. He joined Compaq in 1984, two months before the official launch in the U.K.



How do you explain the paradox that Compaq is producing roughly the same equipment as IBM for the same price, and yet people buy your equipment in increasing numbers?

WELL, we don't actually produce the same equipment as IBM. Compaq produce a fully functional personal computer which conforms to the industry standard. When Compaq started, the first thing the founders did before they actually built the prototype was go round to the major software companies in the U.S. The thing that amazed them, and which they did not appreciate till they did this exercise, was that every software company was writing software to run on the IBM PC which was announced six or nine months earlier. So at that point they decided whatever product we make it will conform to what is about to become the industry standard. The industry standard is now IBM software, which is controlled by the end-users and not IBM themselves. We do not believe that IBM as a company are any longer in a position to control that standard.

How does the market split in terms of what people buy from you?

WE ARE still very strong in the transportable area which is where we entered the marketplace. But from the U.K. point of view we are now selling more desk-tops than we are portables, and from the U.S. point of view we are probably selling quite significantly more. The most popular product I think we have at the moment is the Deskpro 286, which is going into networking environments.

Do you think that is reflected in the type of user you are getting?

MY OWN personal opinion is that if you are going in for a more sophisticated type of computer such as an AT-type machine inevitably you will involve DP departments, MIS departments. In the past, departmental managers have said, "Well, we need a PC: what's the industry standard? Let's go and buy IBM because it's safe, etc." One of the reasons things are going so well is that more and more computer experts are getting involved in the selection. And because Compaq has such a good specification we're getting more recommendations than we would have done from the departmental-head route.

What developments do you expect to see during 1986 in the PC field?

I THINK that the level of power and versatility of the personal computer in some areas will become much greater. It is my belief that the PC level in some areas will go

well into the mini environment. Certainly, I see the level of processing of the PC becoming much more sophisticated, and I see the networking side becoming much more in fashion. I also believe that there is still the need for the small business stand-alone personal computer with a degree of sophistication in terms of the security of the system rather than the technology, so that the small business user feels quite comfortable committing all his administration systems on one PC. If it screws it up then his security will back up his stuff so that he doesn't lose all his files overnight.

I see one day the need for a lap-top. In terms of Compaq you will not get a lap-top from our organisation during the early part of 1986, maybe not in '86 itself — because we do not believe the technology is there to allow Compaq to offer end-users a fully functional personal computer which conforms to the industry standard, with a screen you can read and with a power supply that runs from a battery for a number of hours.

Does that mean your company is not working independently on an 80386 machine in any form?

NO I'm not saying that at all. The company is working on a number of developments which we believe will equip us to address any change of standard which may be brought about by the industry itself or by IBM. So I'm sure that we're looking at the next generation. Our philosophy is to follow the industry standard, which I think we've proved we can do, and indeed perhaps one day not too far in the future we may actually be in a position to set our own standard in a couple of areas.

How might that come about?

WE HAVE chosen IBM to date to be the company which appears to set the industry standard. What I'm saying is that Compaq could well be reaching the stage where perhaps if we brought out a product which no one else brought out, it may well set its own standard.

So you're almost foreseeing a Compaq compatible?

WELL IBM did. Didn't they bring out a portable, a Compaq clone?

How do you expect Compaq to grow in the next few years?

OUR philosophy is every year to try and grow slightly above what we believe to be the market growth. At the end of December last year we made the list of the Fortune 500. Whether we can continue the same level of growth I would suspect probably not. I can see Compaq in maybe 10 years' time being a billion-dollar company.

PC

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TOP 10

There is still a steady demand for these self-contained micros designed to be packed up and carried from place to place. David Barlow looks at 10 of the leading models.

The market for portables, although relatively static over the past year, now seems to be dividing into two distinct camps: the heavyweights and the lightweights. Unlike true portables, which can be used in almost any environment no matter how remote or hostile, both transportable groups require the relative security of mains power.

Lightweights distinguish themselves by usually tipping the scales at about half the weight of an equivalent heavyweight. This improvement is achieved by ditching the bulky and fragile VDU in favour of a more modern flat-screen display. Probably the best example of a lightweight is the Grid Gridcase, which weighs in at around 12lb.

The Compaq Portable epitomises the heavyweight category. It is a hefty 30lb-plus, so no one is going to want to carry it for more than a couple of hundred yards. But machines in this group offer all the components of the desk-top computer, including the VDU, integrated into one unit. All you have to do is plug it in and switch on. It is therefore not hard to see why the market for the heavyweight transportables is still strong.

If it is real computing power with plenty of mass storage you need there has until recently been no alternative to a heavyweight, as no LCD machine was available

with an integral hard disc. Although the hard-disc Compaq Plus transportable has been around for some time, Olivetti delayed the launch of its hard-disc M-21 until it was satisfied that the delicate mechanics were sufficiently protected against the rigours of being treated like an item of luggage at Heathrow. Now the arrival of the Panasonic — see review on page 50 of this issue — and a Winchester version of the Tava Frontier Flyer may prompt other manufacturers to fit hard discs into their machines.

The big drawback with lightweights is the performance of their displays. For a long time LCD screens similar to those found on most calculators ruled the roost. There was simply no alternative. The legibility of this type of screen varies from one make of machine to another and even between samples of the same machine, but it is rarely acceptable in anything other than perfect

ambient lighting conditions. Even then you have to get the viewing angle just right.


Fortunately there are now other display technologies. One is simply a back-lit version of the conventional LCD. When switched on it gives the screen an eerie blue appearance, but you are then less dependent on external illumination. Another alternative exploits the light emitted by an ionised gas plasma. This produces a very acceptable end result, with a reddish-orange image on a black background.

Back-lit LCDs are reasonably economical in their use of power, and the Zenith Z-171 offers full portability with this type of display. The Datavue 25 portable is also due to receive a back-lit version of its LCD screen in the not too distant future. Several hours of battery operation can be obtained if you use the disc drives sparingly. Plasma technology is much more demanding of its power supply, and the Ericsson Portable remains tied to the nearest mains socket.

The ultimate transportable must be the Compaq Portable 286, which uses the same 80286 chip as IBM's PC/AT. Other items of note in this amazing machine are a 20Mbyte hard disc, 640K RAM, two expansion slots and a real-time clock. Just like its big brother, the Deskpro 286, the Portable's performance leaves the PC/AT for dead. There is also an option to incorporate an integral tape backup unit. Like most transportables, the Compaqs now benefit from the widespread availability of 256K chips which make it possible to expand to a full 640K.

THE OUTSIDER

Few manufacturers are brave enough to launch a non-IBM-compatible machine of any type these days. Hewlett-Packard's Integral is the most notable loner as far as transportables are concerned, though it is clearly aimed more at the engineer or scientist than the business user. Kaypro and the Osborne soldier on with CP/M transportables but provide compensation in the form of large amounts of free software.

Some manufacturers claiming IBM compatibility fit their machines with 3.5in. discs. Clearly they cannot use real IBM 5.25in. disc-based programs unless they have been ported across. However, rumours of a forthcoming IBM lap portable suggest that it too may have 3.5in. discs. 

SUPPLIERS

Apple Apple Computer (U.K.), Eastman Way, Hemel Hempstead, Hertfordshire HP2 7HQ. Telephone: (0442) 60244. Circle no. 361

Compaq Compaq Computer Ltd, Ambassador House, Paradise Road, Richmond, Surrey TW9 1SQ. Telephone: 01-940 8860. Circle no. 362

Ericsson Ericsson Information Systems Ltd, Maidstone Road, Rochester, Kent ME1 3QN. Telephone: (0634) 402080. Circle no. 363

Grid Grid Computer Systems Ltd, Unit House, 33 London Road, Reigate, Surrey RH2 9HD. Telephone: (07372) 41211. Circle no. 364

HP Hewlett-Packard Ltd, PC Group, King Street Lane, Winnersh, Wokingham, Berkshire RG11 5AR. Telephone: (0734) 784774. Circle no. 365

Olivetti British Olivetti Ltd, Olivetti House, 86-88 Upper Richmond Road, London SW15 2UR. Telephone: 01-785 6666. Circle no. 366

Osborne Future Management (Portable Computers) Ltd, 38 Tanners Drive, Blakelands North, Milton Keynes MK14 5LL. Tel: (0908) 615274. Circle no. 367

Panasonic Panasonic Office Automation, Panasonic Industrial U.K. Ltd, 280-290 Bath Road, Slough, Berkshire SL1 6JG. Telephone: (0753) 822516. Circle no. 368

Sharp Sharp Electronics (U.K.) Ltd, Sharp House, Thorp Road, Newton Heath, Manchester M10 9BE. Telephone: 061-205 2333. Circle no. 369

Wren Opus Supplies Ltd, 55 Ormside Way, Holmethorpe Industrial Estate, Redhill, Surrey RH1 2LW. Telephone: (0737) 65080. Circle no. 370



The elegant lines of the Grid (above) are a far cry from the utilitarian Osborne (right) which started it all.





APPLE IIc

£995

As first launched in early 1984 the Apple IIc relied on the use of a monitor, but Apple has since released an 80- by 24-character LCD screen which transforms this attractive unit into a true briefcase machine. The IIc is built around the CMOS version of the 6502 processor coupled to 128K RAM and running the Prodos operating system. Storage is looked after by a miserly 143K 3.5 in. floppy disc. Although there is absolutely no chance of running IBM software, the IIc user still has a huge library of IIc programs to choose from. At present the IIc is on special offer with a 9in. green-screen monitor and lots of software included in the price, though the LCD screen costs an extra £400.

FOR Neat. Runs cheap Apple II software. Quiet.

AGAINST Declining eight-bit software base.

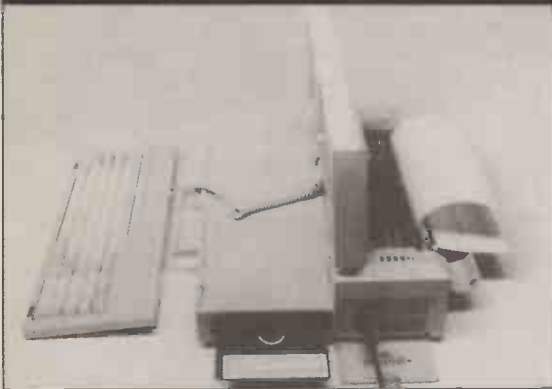


COMPAQ PORTABLE & PORTABLE 286 £1,745

The immensely successful Compaq is supplied with an excellent 9in. green-screen monitor which displays both text and graphics as standard. Basic memory is only 128K, but can be expanded to 640K without using any of the three expansion slots. For mass storage, one or two 360K floppies are provided. The Compaq Plus equipped with a 10Mbyte hard disc only has two vacant expansion slots. The Portable 286, based on a dual-speed 80286 processor, offers vastly superior performance even to IBM's PC/AT. Mass storage options include a 20Mbyte hard disc, 360K and 1.2Mbyte floppies, and tape backup units.

FOR Wide range. Good display. Superb compatibility.

AGAINST Expensive.



ERICSSON PORTABLE

£2,280

Ergonomics is the keynote of Ericsson's Portable. A fully specified machine can combine 640K RAM, an 80-by-25 text/graphics plasma display, IBM-compatible keyboard and dot-matrix printer in a box that measures a mere 15in. by 12in. by 4.5in. and weighs 17lb. The standard 8088-based machine comes with 256K, serial and parallel ports, and a clock-calendar. The plasma display and removable keyboard all contribute to above-average ergonomics. There is only room for one 360K disc drive, but an additional external 360K drive is available as an optional extra. An external expansion unit is available which can house up to two IBM-type boards.

FOR Ergonomics. Plasma display. Compatibility.

AGAINST Expensive. Looks fragile.



GRID GRIDCASE

£2,975

Grid Systems has been in the 16-bit portable business for some time now and has gained a reputation for innovative products. Although the Gridcase retains the outlandish appearance of its forerunners it is a more conventional design than the company has previously launched, with 3.5in. discs replacing expensive bubble memory. There are three display options: conventional LCD, orange back-lit LCD and plasma. IBM compatibility is limited by the use of a 3.5in. drive and an unusual keyboard layout, but some software is available on ROM, leaving the disc drive free for data. Performance is good, as the machines uses the CMOS version of the Intel 8086 processor.

FOR Designer looks. Robust.

AGAINST 3.5in. discs limit IBM compatibility. Expensive.



HEWLETT-PACKARD INTEGRAL

£4,424

Aimed primarily at the engineering and scientific markets, the Integral is an incredibly powerful computer judged even by the standards set by desk-top machines. It uses the Motorola 68000 processor coupled to a standard 512K RAM, expandable to an enormous 5Mbyte. The electro-luminescent display can handle 80-by-25 text and 255-by-512 graphics. Other features include a single 720K 3.5in. disc drive and built-in ink-jet printer. A hard disc is available as an optional extra. The Integral runs an HP implementation of Unix for which there is not a great deal of business-orientated applications software.

FOR Power. Integral printer. Electro-luminescent display.

AGAINST Very expensive. Specialist.



OLIVETTI M-21

£1,800

To all intents and purposes the M-21 is a rebodied version of the highly successful desktop M-24. The 9in. display is one of the best around and includes graphics capabilities as standard. The basic model has two 360K floppy drives, and there is also a 10Mbyte hard-disc version. The M-21 uses the Intel 8086 processor running at 8MHz, and has a performance not too far removed from that of the Compaq Portable 286 but at a substantially lower price. The machine is supplied as standard with serial and parallel ports, and expansion is quite reasonable. The M-21 is heavier than an equivalent Compaq, and has more painfully sharp corners on its otherwise smart dark-grey case.

FOR Fast. Good display. Expansion capabilities.

AGAINST Heavy.



OSBORNE PORTABLE

£745

The original Osborne 1 introduced the transportable concept and proved such good value when launched that it also found its way into many offices for use as a desk-top machine. There are now three versions. The original small-screen Osborne 1 starts at £745 for the 80-column version. Next up is the Osborne Executive, fitted with an improved 7in. screen and 128K of bank-switched RAM costing £1,145. Finally there is the more stylish Osborne Express fitted with higher-capacity drives and 7in. monitor. All Osbornes are bundled with an impressive suite of software, including at least WordStar, Mailmerge, Supercalc, CBasic and MBasic.

FOR Cheap. Bundled software.

AGAINST Small screen. Uses outdated eight-bit CP/M.



PANASONIC JB-3300

£2,195

After a low profile in the business-micro market for some years, Panasonic has launched two machines using the very latest plasma-display technology to overcome many of the traditional objections to LCDs. The more expensive model, weighing in at £3,395, comes with a 10Mbyte Winchester. Otherwise the specification is pretty much a familiar story: an 8088 running at 4.77MHz, 256K RAM, serial and parallel ports and 360K, 5.25in. floppies. Chief interest remains the plasma display, which offers more or less the full display size of a conventional VDU and the same legibility, but with much reduced weight and thickness. As the detailed review on page 50 of this issue reports, the Panasonic JB-3300 has full IBM compatibility and reasonable Benchmarks.

FOR Legible display. Winchester option. Compatibility.

AGAINST Price.



SHARP/PC-7000

£1,795

Sharp's first IBM compatible turns out to be a rather unusual transportable fitted with a back-lit LCD. It is a neat package which weight in at around 12lb., complete with twin 5.25in. floppies, 320K RAM expandable to 704K, and an optional £450 dot-matrix printer. Performance is excellent thanks to an Intel 8086 running at 7.37MHz. The keyboard, which clips over the LCD while on the move, combines the best features of the ordinary IBM PC with those for the PC/AT, although the 10 function keys are in a horizontal row above the QWERTY block. The adjustable back-lit LCD is a vast improvement over the non-illuminated variety but needs replacing from time to time.

FOR Display. IBM compatibility. Speed.

AGAINST Pricey. Need to replace backlight units.



WREN EXECUTIVE

£995

Following the demise of Prism, the interesting Wren Executive is now distributed by Surrey-based Opus. Based on the eight-bit Z-80 processor, the Wren uses the CP/M operating system. The machine features 64K RAM expandable to 256K, a 7in. amber screen and two 200K disc drives; 400K drives are available for an extra £300. One of the Wren's most notable features is the integral modem, provided as standard. The Wren is supplied with as much software as most users are likely to need, including a time manager, address book, filing system, project planner, calculator and the entire Perfect suite of applications software.

FOR Bundled software. Integral modem.

AGAINST Old eight-bit CP/M.

"In 1986 it's going to be very

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MULTI I/O CARD WITH CABLES—(Full length) 6-way!! * Dual floppy interface on 34-way edge connector * Serial port and optional 2nd serial port (bi-directional, async. comms.) RS-232C * Parallel port * Clock/calendar with battery back up * Games port. £165

PSIO-405XT MULTIFUNCTION CARD—(Short 4" x 5") Parallel port (configurable as LPT 1 or 2) * One standard, 2nd optional async. comms. port (configurable as COM-1, 2, 3 or 4) RS232C * Uses 8250B serial comms. chip * Clock/calendar with battery back up * RAMDISK, PRINTSPOOL & CLOCK software. £129

MONOCHROME GRAPHICS CARD—(Full length) IBM/HERCULES compatible * Text mode 80 x 25 * Graphics mode 720 x 348 * Direct drive output * Parallel printer port. £95

MONOCHROME (TEXT) DISPLAY ADAPTER—(Full length) 6845 CRT controller module * 4K static RAM display buffer * Supports 256 character codes * 8K character generator * 80 x 255 screen/9 x 14 character box/7 x 9 characters * Direct drive output. £79

COLOUR GRAPHICS CARD—(Full length) 2 layer construction * A/N and APA modes * 640 x 200 in graphics mode * 16KB on board memory * outputs for direct drive, composite video * light pen interface. £79

MULTI LAYER COLOUR GRAPHICS CARD—(Full length) 4 layer construction * Uses motorola 6845 CRT controller * 16K display buffer * Drive RGB (TTL level), standard composite and RS-170 composite monitors * Light pen interface as standard * Alphanumeric mode 40 x 25 and 80 x 25 * APA (graphic) mode 320 x 200 and 640 x 200. £139

COLOUR/GRAPHICS AND PRINTER ADAPTER—(Full length) Supports direct drive, RGB, composite colour and composite monochrome monitors * Alphanumeric mode 40 x 25 and 80 x 25 * Graphics mode 320 x 200 colour/640 x 200 monochrome * Parallel printer port * Light pen interface * Fully compatible with the IBM. £129

COLOUR/MONOCHROME GRAPHICS DISPLAY CARD—(Short 5" x 4") Capable of driving Direct drive RGB, Direct drive Monochrome and Composite video Mono/Colour monitors * light pen interface * mouse interface * supporting software * for use with PC/XT/AT and compatibles. £149

GAMES ADAPTER—(Short 4" x 5") Allows attachment of two joysticks to the PC/PC-XT * paddles must have a range of 0-100K Ohms * 15 pin female 'D' connector. £24

8255I/O CARD—(4" x 8") A programmable input/output interface for PC/PC-XT. 48 I/O lines * 3 independent 16-bit counters * 16 LEDs for I/O status display. £119

PCP 128 EEPROM/EPROM PROGRAMMER—(4" x 5.5") Half in/half out design allows external EPROM handling * 'Breakaway' design option allows remote handling of EPROMs * Software handling of 2716/2732/2732A/2764/2764a/27128/2816 * Menu driven software 19 features. £149

512K 4 BANK PROMBLASTER EPROM PROGRAMMER/ANALYSER—(4" x 8") 4 ATA TIME! * can program, check and verify four EPROMs simultaneously * internal card, external TEXTTOOLS * up to 8 times faster than our normal card * handles 2716, 2732, 2732A, 2764, 2764A, 27128, 27128A, 27256, 27256A, 27512, 27512A * programming voltage automatically set according to type * no dip switches to set, all settings under software control * software supplied. £259

130W POWER SUPPLY UNIT—Conservatively rated at 130 watts * UL listed * CSA approved * Built-in EMI filter * switchable to 117 VAC for USA/Canada * Input surge protection * overvoltage/overcurrent protection * power good signal * directly replaces IBM original supply * cable loom for 4-drives and mainboard. £89

PC/XT SWING TOP CASE—Similar in looks and styling to the original but with the added convenience of easy access * full mounting hardware and blanking plates supplied. £55

360K HALF HEIGHT FLOPPY DISK DRIVE—Slimline, BRAND NAME, high-tech floppy drive. £84.95

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20MB UPGRADE KIT £499

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10MB UPGRADE KIT £375

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K-150L CHERRY TOP KEYBOARD—84-key * lit CAPS LOCK and NUM LOCK indicators * Uses CHERRY (full travel) mechanical contact switches * lifetime greater than 50 million operations * meets DIN ergonomic requirements. £69

IRWIN-110 10MB TAPE BACK UP—Ease of use and comprehensive software make this system excellent value. £399

IRWIN-225 20MB TAPE BACK UP—As above but greater capacity. £475

4164 DRAM CHIP—150ns Dynamic RAMs at a dynamic price * 9 pieces for a parity checked bank of 64K * PC/XT and compatibles. £1.10 (each)

4128 DRAM CHIP—Upgrade PC/AT and compatibles * 9 pieces for a parity checked bank of 128K. £4.75 (each)

41256 DRAM CHIP—Upgrade PC/XT compatibles, Olivetti, Compaq, etc. * 9 pieces for a parity checked bank of 256K. £3.75 (each)

8087-2 MATHS CO PROCESSOR—Upgrade for Olivetti. £169

8087 MATHS CO PROCESSOR—Upgrade for PC/PC-XT and compatibles. £139

PC/AT PERIPHERALS

SUPER AT-COMPATIBLE MAINBOARD—Complete compatibility with Phoenix BIOS. £925

AT HARD/FLOPPY CONTROLLER CARD—For AT and compatibles. £395

3MB MULTIFUNCTION CARD FOR THE AT—Full parity checked memory * user expandable to 3MB in 128K or 512K increments using 64K or 256K DRAM chips * start address configurations at 256K, 512K or above 1MB * 1 async. comms. interface * 1 parallel printer port * games adapter * optional 2nd comms. port. £449

SERIAL/PARALLEL CARD FOR THE AT—(Short 4" x 5") parallel printer port * async. comms. port. £89

PSIO-405AT MULTIFUNCTION CARD—(Short 4" x 5") similar to PSIO-405XT but for AT and compatibles * parallel printer port * async. comms. port * option for 2nd comms. port * optional games port * uses 16450 serial comms. chip for to match the AT's faster speed * no clock (the AT has one on board). £149

MULTI-ASYNC. CARD FOR THE AT—(Short 4" x 5") Four async. comms. ports switch selectable as COM1 through COM8 * three interrupt channels supported IRQ2, IRQ3 and IRQ4. £195

200W POWER SUPPLY UNIT FOR THE AT—Meets UL/CSA standards * built-in EMI filter * switchables to US/CANADA 115 VAC * input surge current protection * overcurrent/overvoltage protection * power good signal. £189

PC/AT STYLE CASE £125

1.2MB FLOPPY DRIVE—Name brand * Half height floppy. £149

AT-COMPATIBLE KEYBOARD £139

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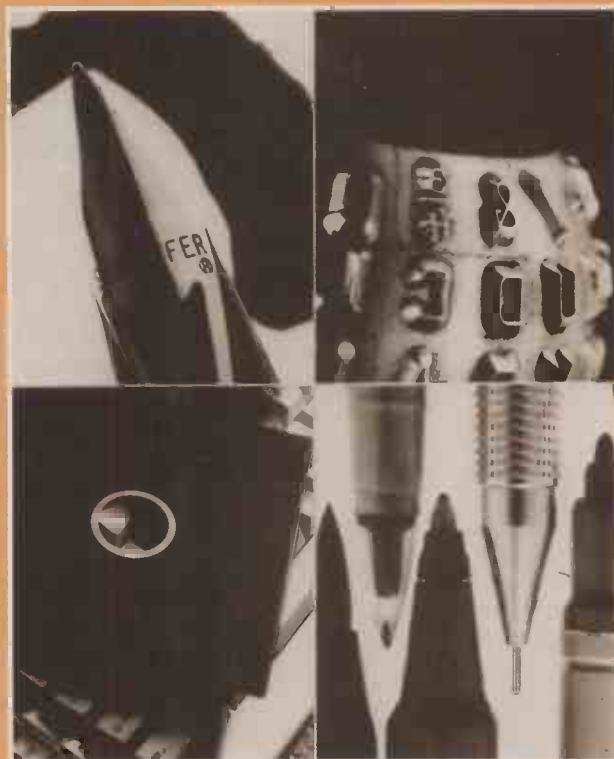
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● Circle No. 273

New ways with words

Word processing has traditionally been the most popular application with business micro users. And it certainly still is with software companies — new WP products seem to come out every day. In this special section we look at the most interesting recent developments.

A full-feature modern word processor such as Multimate or Word Perfect can set you back almost £500. But is it really necessary to go the whole hog? On page **90** Susan Curran checks out what you can get for around £100 or less, and on page **91** Mike Lewis reviews *AI Typist*, one of the new word processors designed specifically for occasional use. It includes a spelling checker which works word by word as you type. Borland's new memory-resident spelling checker, *Turbo Lightning*,



reviewed on page **92**, works the same way and then goes on to do a lot more besides.

On page **94** Glyn Moody investigates outline processors. These packages are also meant to go one better than the traditional WP by actually helping you to get your ideas from rough concept to final draft. But do they really help, or are they inferior to a good conventional word processor, a pencil and the back of an old envelope?

Finally Roger Cullis looks at WP software for scientific work. Many general WP packages claim to be up to this task, so what do you gain by going for one of the more specialised packages? His conclusions are on page **96**.

THE REAL COST OF WP

The number of cheap word processors is on the increase. **Susan Curran** points out that they may turn out not to be the bargains they seem at first.

Word-processing costs are going down, but only to a limited extent. Even the most naive user of software packages will realise that the cover price of a package is a minimal part of the total cost of using it. Most of that cost is eaten up by the time taken in mastering the package.

When you evaluate the cost of a package from this angle, you should set a reasonable value on the learner's time. A couple of hundred pounds then becomes an insignificant proportion of the total cost of getting the package into regular use. There is no advantage in going for a cheap word-processing package unless it offers advantages which expensive packages do not, such as being significantly easier to use. Conversely, if the up-market packages were the easiest to master, they would prove to be the real bargains.

Everybody likes to get a bargain, and it is easy to get the impression that a package such as PFS Write which costs around £115 is unmistakably a better buy than one like Microsoft Word which costs around £400. This is because although everyone appreciates that time is money, it never seems quite as real as the money you pay over the counter.

Most buyers of cheap or expensive packages make their choice with insufficient understanding of the alternatives available and of their various pros and cons. Even regular users of many different packages find it difficult to judge which is the best buy in any individual circumstance.

NECESSARY FEATURES

I hesitate to offer myself as an example, because the work of an author/journalist is different in so many ways to that of a word processor user in an office environment. All my favourite packages come into the expensive category because the expensive packages are the ones that offer full support for both my printers. They cope uncomplainingly with my repeated edits. Also they work smoothly and efficiently both when I do routine work and when I have special requirements. In comparison, all of the cheaper packages I am familiar with seem clumsy and/or limited.

After reviewing a cheap package, I almost invariably turn back with relief to its expensive counterpart. I estimate that I would justify the excess cover price of a more expensive package in two or three months at most, while I would expect to go on using the same package on the same machine for perhaps three years in total.

Most typists spend most of their time simply tapping on the alphanumeric keys.



Several low-price programs are now available for office WP.

The proportion of time spent revising or reformatting text is usually minimal compared to the time spent entering it.

Even less time is spent on special functions such as footnoting, drawing up tables of contents and so on. It follows that the most important feature of any word processor, on a day-to-day basis, is the ease with which it enables typists to enter text, review it and print it out. This makes far more difference to the ease of use of the package than the designer's choice of key assignments.

Good programs respond promptly to each key press, so the text appears on-screen with no visible delay. Good programs scroll text smoothly, both horizontally and vertically. Good programs reproduce the most important features of text layout such as page breaks, tab positions, etc., on-screen, and make secondary features like instructions to the printer and changes in font easily checkable, so there are no nasty surprises when text is printed. Good programs make moving the cursor to any point in a document swift and easy. Good programs are reliable, so text is almost never lost accidentally, and then never more than a few words at a time.

By these criteria there are many bad programs. It is true that some expensive programs are bad but the standard among the cheap ones is lower. Programs like Micropro

Easy, Bonnie Blue and Perfect Writer I and II all have major failings in one or more of these departments.

Of course you need a program that meets all your basic daily requirements. Whatever the price, if it does not one-and-a-half space, does not number pages at the top right, does not meet your house style in any other important respect, and these are features you cannot do without, it will not merit serious consideration.

The question remains whether you want a program with a wide range of other functions, and if so, how much more should you pay for it? Many cheap programs do have a wide range of functions. But functions appear to sell programs, and the cheapies may offer lots of capabilities indifferently executed, rather than a modest range superbly done. For instance, Bonnie Blue and Perfect Writer II both have an impressive range of functions.

LOOKING AHEAD

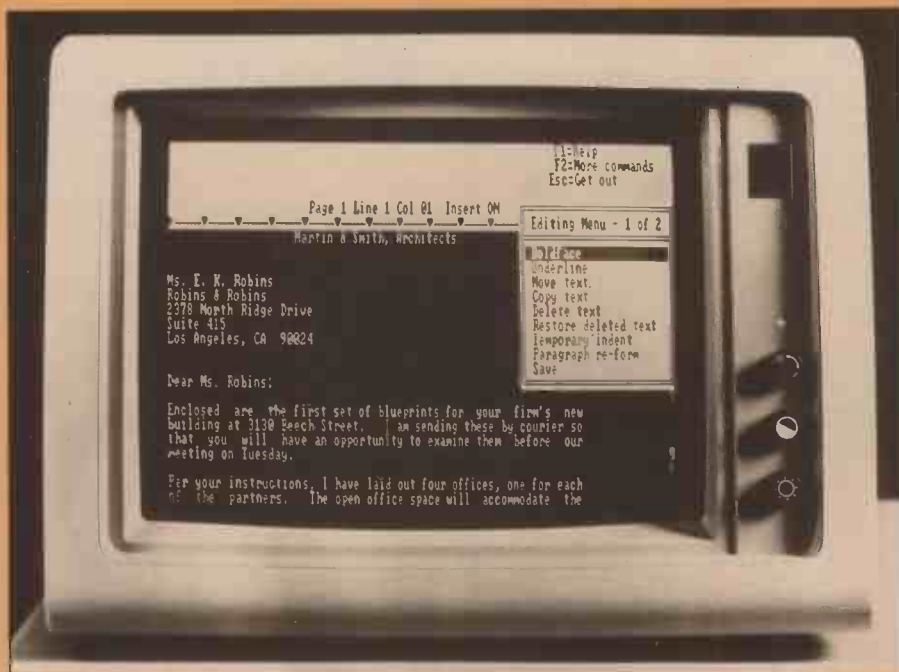
The advantage of a program with many functions is that one day you may need all of them. When you have a requirement for newspaper-style columns, want to move blocks of text from one document to another and access a special printer feature, the program will make it not only possible, but easy.

Functions nominally present on both cheap and expensive word processors are sometimes handled more extensively on the latter. The prime example is mail-merging — sending out form letters — which varies enormously in sophistication and ease of use. For example, Bonnie Blue has it, but not on the same scale as Samna Word III. It is not as easy to maintain data files or select specific addressees for a mailing.

Bear in mind that functions which do not strike you as immediately vital may prove of enduring use to you. It still surprises me how handy I find a spelling checker, after years of using a word processor without one. I also

SUPPLIERS

	Runs on	Price	U.K. supplier	
Bonnie Blue	IBM	£100	Paperlogic	01-935 0480
Displaywrite II	IBM	£275	IBM	01-578 4399
Executive Writer	IBM	£65	Computer Frontier	(0438) 310163
Easy	IBM	£165	Micropro	01-879 1122
Microsoft Word	{ IBM	£400	Microsoft	(0734) 500741
	{ Mac	£190		
Multimate	IBM	£450	Ashton-Tate	(0628) 33123
Perfect Writer II	{ IBM, MS-DOS	£149	Thorn EMI	(0252) 543333
	{ Apple II	£99		
Practiword	IBM	£85	First Software	(0256) 463344
Vizawrite	IBM, MS-DOS	£269	Visa Software	(0634) 813780
Word Perfect	IBM	£425	Sentinel Software	(0932) 231164
WordStar	IBM, MS-DOS, CP/M	£295	Micropro	01-879 1122



Micropro Easy: relatively cheap but with some irritating faults.

get a lot of use out of macro features — the ability to assign a short key combination to reproduce a long phrase.

Programs with fewer functions are a little easier to learn but not much easier. Shortage of options simplifies the task of arranging menus and key assignments. But on any good program, the less heavily used functions will be tucked away so that they do not intrude into basic use. It is no more difficult to build up a basic working competence on Microsoft Word or Word Perfect than it is on PFS Write or Easy.

It is easy to laugh at elaborate IBM-style manuals cased in ring binders, but they do survive tough treatment, are easily updateable and do not fall apart like cheap ones. They are also easier to store than irregular-format manuals. With the honourable exception of Perfect Writer II, cheap programs tend to have comparatively cheap and tatty manuals.

Expensive programs tend to offer more training support than cheapies do too. Disc-based training programs — not to be confused with the statutory couple of sample documents on the program disc — are an excellent way to learn any program. Of the cheapies, only Easy, and to a more limited extent Perfect Writer II, offer one.

Expensive programs also offer wider support for printers and peripheral devices. If you have a printer capable of microspace justification, a special character set you wish to access, a graphics board, a mouse or other special devices, it makes sense to pay extra for a program which can utilise them fully. Basic printer support is not the same as full support for a printer's special features. Allow not only for your present configuration, but also for any extras or replacements that you are likely to buy in the next two or three years.

Of the cheaper programs I was impressed by PFS Write — to be reviewed in *Practical Computing* next month. It is the type of program that only does a little but does it well. Its screen handling is good and its menus are neat. It has a spelling checker, but no mail-merge facilities unless you buy the File program too.

Perfect Writer II, reviewed by *Practical Computing* in June 1984, is over-ambitious but with many good features and some exceptional ones. It does have some glaring faults but with practice you can learn to work around most of them. Its multi-screen capability works well, and its thesaurus is a high-class feature most expensive programs do not offer. It is well produced and a bargain at around £165.

YOUR CHOICE

I have reviewed Bonnie Blue and Micropro Easy in the November and December issues respectively, but I feel that screen-handling faults make them less worthy of serious consideration at the moment. However, Bonnie Blue is a possible choice for those anxious to find a cheap program with mail-merge capability.

Among the programs I have not tested at first-hand, Executive Writer is in much the same price range as those I have mentioned, and Practiword is the nominal bargain of the bunch at £87.

Slightly above this sub-£200 category come programs such as Displaywrite II at around £275 and Vizawrite for £269. These have proper manuals and ambitious features, but both are below the standard of the best packages, as is WordStar, which is reliable but creaky by modern standards.

Finally, if you are convinced enough to buy a more expensive program, among the heavyweights I would recommend Word Perfect, Microsoft Word and Multimate in that order for your consideration.

AI TYPIST

A no-frills, easy-to-use package may be all that occasional WP users need. Mike Lewis tries one out.

The trouble with most WP packages is that they are too sophisticated for quick typing jobs like memos and one-page letters. Often it is not worth the effort of setting up some of these programs just to knock off 100 words or so. What the world badly needs is a simple word processor, free of opening menus, windows, dot commands and format files, and preferably taking no more than an hour to learn.

The same is true of spelling checkers. Most of the time you want only to check the occasional doubtful word, not entire documents, and to fix any mistakes on the spot. The batch-orientated all-or-nothing approach of most spelling programs is too slow and awkward for casual use.

AI Typist, from the Airus Corporation, aims to solve both these problems. Unfortunately, it does not quite hit the mark. It is simple and its spelling checker is completely integrated into the program, flagging mistakes as you type them. But the program will need a lot of polishing before it is likely to find many followers.

The simplicity becomes obvious as soon as you open the package. The manual has only 48 A5 pages, and the whole system fits on one floppy. There is no complicated installation process; you just copy a few files to your work disc.

There is no command mode. The whole program is controlled by the function keys and the cursor pad. Unfortunately, the key assignments leave much to be desired. The unshifted arrow keys move the cursor one character at a time, but to move by word you have to resort to Control-A and Control-F, which are on the far side of the keyboard. There are no keys for top-of-screen or foot-of-screen, but the worst horror is Control-Home, which deletes everything from the cursor to the end of the text.

I have no complaints about the way the program matches the screen display with what will be printed on paper. It makes no

(continued on next page)

SPECIFICATION

Description: simplified word processor with built-in as-you-type spelling checker

Hardware required: IBM PC, PC/XT or PC/AT, 256K RAM

Price: \$99

Copy protection: none

Publisher: Airus Corporation, 11830 SW Kerr Parkway, Lake Oswego, Oregon U.S.A. Telephone: (U.S. area code 503) 684-3000

U.K. supplier: none

(continued from previous page)

attempt to show page breaks, but this is hardly a problem, considering the type of short documents for which AI Typist is intended. Line endings are reflected accurately on the screen, as are words which are emboldened, underlined, or both.

Bold and underscore can only be applied to individual words and you cannot easily underline the spaces between words. The only standard WP features which AI Typist supports are search-and-replace and cut-and-paste. Even these are half-hearted affairs. The most serious shortcoming is that you cannot paste without cutting. You can move a block of text to another part of the document, but you cannot make a copy of it and leave the original in place.

Perhaps the most interesting aspect of AI Typist is its spelling checker. This is scarcely in the same class as Turbo Lightning, reviewed on the opposite page, but it is still a vast improvement over the old-fashioned batch-mode checkers, where the typing, checking and correction are three separate processes.

AI Typist checks every keystroke as you type it, constantly looking up words in the dictionary. The moment you enter a combination of letters that do not form a correct word, you hear a beep which, happily, can be turned off. The offending letters are highlighted with either inverse video or a coloured background.

The program does not offer alternative spellings, but since most flagged words are probably typing errors rather than spelling mistakes, you can put them right then and there. If you prefer fixing your mistakes in a batch, you can disable the checker during typing, then switch it back on while you save and reload the file. The mistakes will now be highlighted, and a function key is available

for moving the cursor to each flagged word in turn.

You would think that looking up words in the dictionary would slow the typing down, but this is not so. Scrolling and large cursor movements tend to be sluggish, but straight typing is not. My main complaint about the spelling checker is that, at 25,000 words, the dictionary is much too small. While I was typing this article, AI Typist incorrectly flagged over two dozen words, including "sophisticated", "hits" and "accurately".

AI TYPYST				
VERDICT				
	POOR	AVERAGE	GOOD	EXCELLENT
Performance	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ease of use	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Documentation	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Value for money	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

An interesting product, but not worth getting too excited about.

CONCLUSIONS

■ The concept of a slimmed-down word processor, sacrificing function in favour of ease of use, is a good one. For producing short one-off documents, where page formatting is not an issue, AI Typist is a better tool than many highly sophisticated WP systems.

■ The program's many weaknesses are matters of detail rather than basic design. The choice of cursor and editing keys is non-standard and far from ergonomic. It is much too easy to delete large chunks of text.

■ The as-you-type spelling checker is far superior to the more familiar batch checkers.

With Turbo Lightning, Borland International has taken an entirely fresh approach to spelling checkers, and one that is likely to change many people's attitude to this type of program. Unlike other checkers, it fits comfortably with the way most of us use dictionaries, and it does not get in the way of the writing process.

Turbo Lightning is, at heart, a sophisticated set of text-handling and searching techniques which will form the foundation of an entire series of word-orientated applications. Furthermore, the Turbo Lightning algorithms and dictionaries will be available to individual programmers through a new Turbo Pascal toolbox. If writing or language are important to you, this is a product to watch.

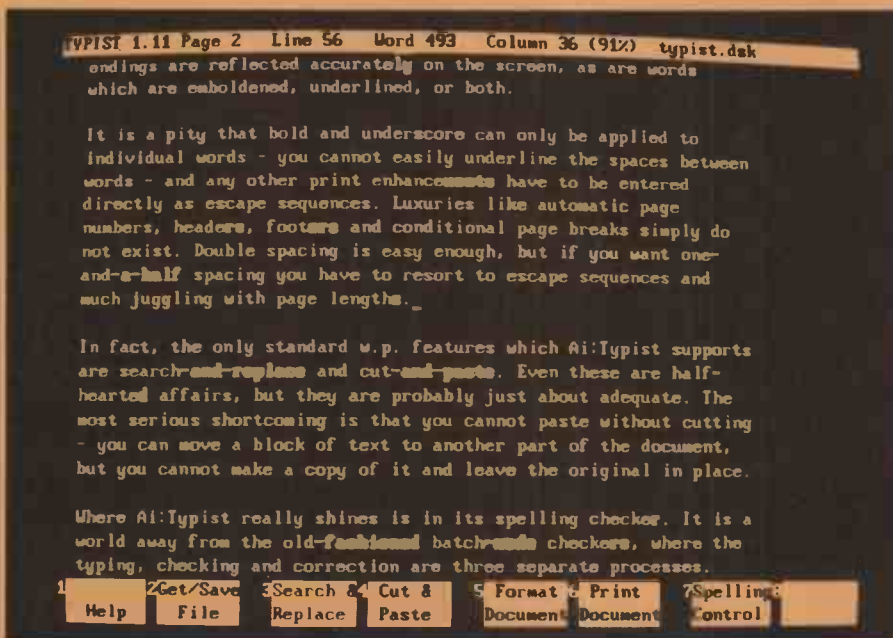
Turbo Lightning is RAM-resident, and works alongside your usual word processor or any other application program. Like its stable-mate, Sidekick, it can be loaded at the start of the day and then forgotten about until it is needed.

SUBSTITUTE WORDS

At its simplest, the program enables you to move the cursor to a suspect word, press a key, and get instant confirmation that it is correctly spelled. If the word is not correct, a window opens and you see a list of possible substitutes. You may then scroll through this list and select a replacement, which is then automatically copied to your text.

The program uses the *Random House Concise Dictionary*, with alternative spellings generated by means of a sound-matching algorithm. The dictionary is, of course, an American one, and no attempt has been made to add British spellings. If you use Turbo Lightning only to look up doubtful words, this may or may not be a problem, depending on the type of words that give you trouble. But when using the as-you-type mode, you could well become a trifle fed up with the inevitable beeping on such non-errors as "colour", "disc", "tyre" and the like.

You can also tell the program to check every word as you type, and to beep if it spots a mistake. Another key can then be used to bring up the list of substitutes. This



AI Typist screen, showing text, status line and function-key labels. The highlighted words are all supposed spelling errors. In fact, all the flagged words are correctly spelled but they do not appear in the program's dictionary.

SPECIFICATION

Description: memory-resident spelling checker and thesaurus which can be used in conjunction with most WP programs
Hardware required: IBM PC, PC/XT and PC/AT; dictionaries and thesaurus need a minimum of 270K disc space and 16K RAM; total program needs at least 78K RAM

Price: £99

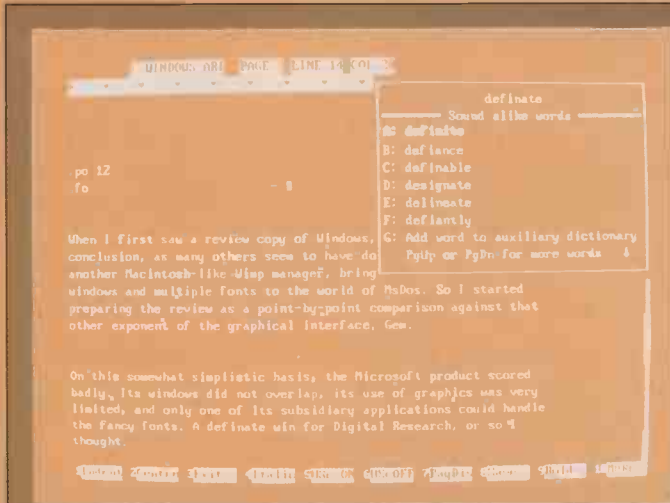
Copy protection: none

Publisher: Borland International, Scotts Valley, California, U.S.A.

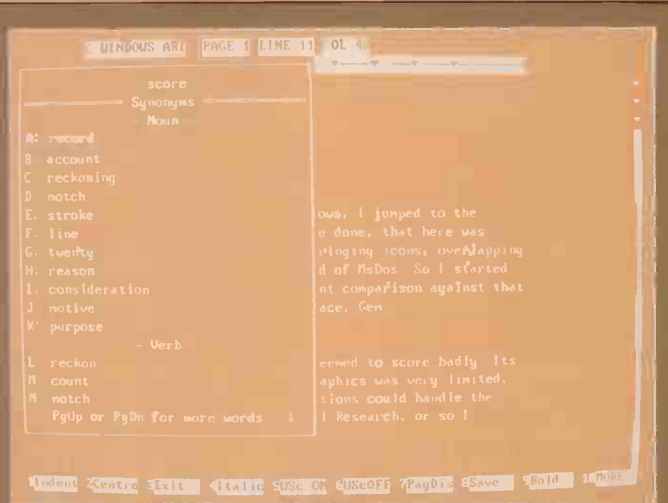
U.K. supplier: Altor Ltd, 11a Anderston Centre, Glasgow. Telephone: 041-226 4211

TURBO LIGHTNING

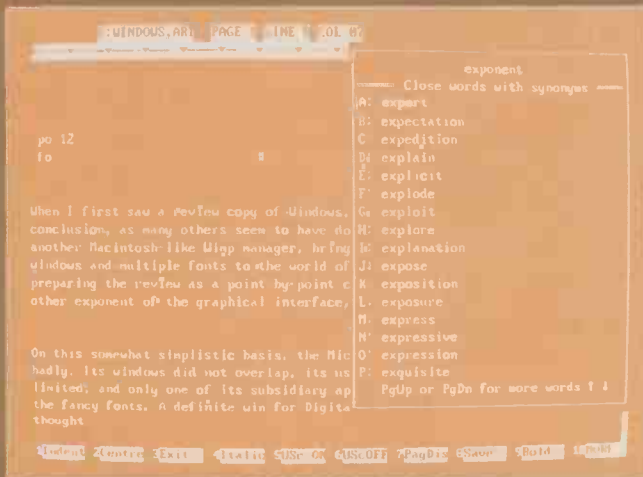
Mike Lewis explains how Borland's program signals a new era for spelling checkers.



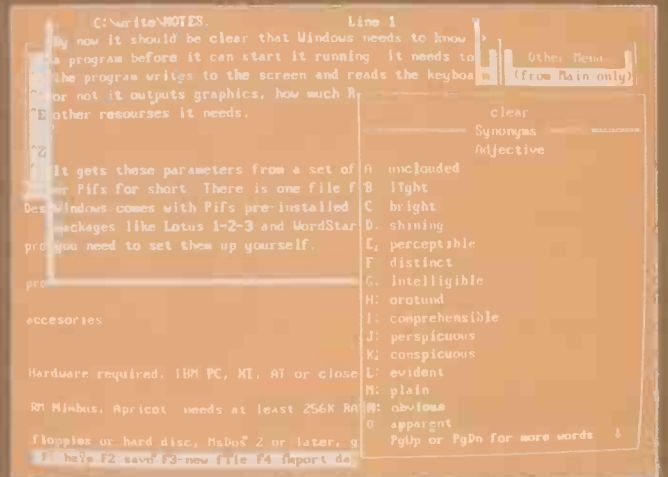
Turbo Lightning working on top of WordStar. The spelling checker has identified the mistake in the final sentence, and offers a list of alternatives. If you press A "definate" will be deleted and "definite" inserted in its place.



Here, the program has been asked for synonyms of the word "score". Turbo Lightning always splits these lists up according to parts of speech.



In this case, a synonym search for the word "exponent" has failed, so the software offers a list of like-sounding words from the thesaurus. Pressing A would display a list of synonyms for "expert".



Turbo Lightning working on top of Sidekick on top of WordStar. Lightning seems to work quite happily with all Borland's co-resident programs.

works well even if you have entered several more words since hearing the beep. A third mode is available for checking every word currently on the screen.

To speed things up, Turbo Lightning uses two separate sets of dictionaries. One of these is held in RAM for use during the as-you-type checking. It contains correct spellings only, with no indications of possible replacements. The larger disc-based dictionaries are consulted when you specifically ask for a word to be checked and when substitute spellings are requested.

You can alter the size of the dictionaries that you wish to install to match your available hardware. With a large RAM and a hard

disc you can have an impressive 150,000 words — far more than most other spelling checkers. If RAM is tight you can opt for a 10,000-word RAM dictionary, keeping a larger file on disc. Other possibilities exist between these extremes.

NO BEEPING

If a mis-spelled word starts with a capital, or is entirely capitalised, the program ensures that the replacement will follow exactly the same pattern. It can even tell when you are typing commands at the DOS prompt, so as to refrain from beeping at you in response to Dir, Del and the like.

As well as running spelling checks, the

program will also search for words with similar meanings, using the *Random House Thesaurus*. The mechanics of this are similar to the spelling checks; once a synonym has been found it can be pasted into the text just like a spelling correction. The two types of searches can be combined in various ways, and you can even chain from one list of synonyms to another.

Operating Turbo Lightning is straightforward. There is a comprehensive set of menus and help screens, or you can bypass them in favour of a number of so-called hot keys. These are normally Alt/function key combinations — Alt/f9, for example,

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(continued from previous page)

checks the word at the current cursor position — but they can be altered to suit particular circumstances and tastes. The advantage of hot keys is that they enable most of the program's functions to be completed in one or two keystrokes.

Another of the package's strong points is speed. There is no noticeable delay during look-ups in the RAM dictionary, and it only takes a second or so to retrieve around a dozen sound-alikes from a hard disc. Using floppies is naturally slower, but not so slow that it would put you off using the product.

Turbo Lightning will work in harmony with Borland's other co-resident programs. Provided you are careful about the order of loading the software there is no problem in using Superkey macros within Lightning, or in doing spelling checks and thesaurus searches from within Sidekick's notepad. I even managed to paste an entire synonym list into the notepad.

LIBRARY OF PRODUCTS

Having developed a set of finely tuned techniques for the text compression and high-speed searching required by Turbo Lightning, Borland intends to make these the basis for a library of related products. The first step will be to issue a Lightning Toolkit, which will give programmers access to the system's inner workings.

This is likely to lead to a series of writing aids, lexicographic tools, and high-quality word games. The potential is huge, especially in the fields of education, publishing and expert systems. Borland aims to follow this up with the publication of major reference works, all in Lightning formats and all searchable by the basic Lightning software. Borland is even talking about word-orientated extensions to operating systems.

TURBO LIGHTNING

PC VERDICT

	POOR	AVERAGE	GOOD	EXCELLENT
Performance	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Ease of use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Documentation	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Value for money	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Throw away your old spelling checker; this one beats the lot.

CONCLUSIONS

■ Turbo Lightning lives up to Borland's reputation. It is fast and straightforward, and meets a real need. With its sub-£100 selling price, its success is virtually certain.

■ It is a vast improvement over the traditional batch-mode spelling checkers, which seem really slow and clumsy by comparison.

■ The comparative slimmness of the thesaurus is the program's only drawback.

JUST A GOOD IDEA?

Glyn Moody analyses the features that make outline processors worth having and tries out Ready, a relatively modest product that could yet find a place inside the world's personal computers.

Outline processors, also known rather more grandly as thought or idea processors, aspire to be the sixth generic software category after spreadsheets, word processors, databases, graphics and comms. In practice, however, they have much in common with word processors, and can be regarded as a specialisation of them with certain features emphasised and developed.

The idea behind outline processors is simple enough, and will be familiar to anyone who has suffered at the hands of teachers attempting to introduce a little structure into essays. As its name suggests, the outline processor starts with the barest outline of a document: this might be an article, or a diary or just a set of notes. Each section heading is then expanded, in any order, by adding further comments or notes. These comments can themselves become headings for further sub-sections, a process which can be carried on as many times as necessary.

The thought processes behind the gradual accretion of information need not be orderly in any way: the use of an outline, together with nested subsidiary outlines, gradually imposes its own form. Similarly a list of things to do can be jotted down in any order, together with annotations, and then sorted later. In constructing a timetable, additional appointments and notes can be inserted at any point. The end result is a tree-like structure.

OVERALL VIEW

Much of this could be achieved on a conventional word processor. In particular, the gradual adding of ideas or appointments at the appropriate place uses only very basic functions. Where the outline processors go further is in their ability to step back from the welter of detail to gain some overall perspective; equally you can zoom in on some particular element and obtain progressively more information on each aspect. These tasks are accomplished by respectively collapsing and expanding outlines.

Even though outline processors have yet to prove themselves as a valid independent generic category, a number of software houses have entered the arena. These include TIP, The Ideas Processor; TEA, a tree editor; and Brainstorm, which was reviewed in July 1984's *Practical Computing*. Framework also incorporates a useful outlining facility. Probably the best-selling product in this area has been Thinktank from Living Videotext. Lately the same company has produced Ready, a

memory-resident version of Thinktank. This product embodies most of the basic concepts which lie behind outline processor software, but it possesses many real advantages over the stand-alone Thinktank which it resembles closely. It is also cheaper: £81 against £161.

As with other memory-resident software, Ready is loaded first and then run before any application packages. It requires a fairly heavy 127K of RAM, so large memory sizes are necessary if you are going to run any kind of serious application. It sits quietly in the background until it is invoked by simultaneously pressing Control and the 5 key on the numeric pad. Having done so you are invited to create a new outline or pull in an old one. At the foot of the screen there are four command and information lines.

NESTED LEVELS

An outline consists of a main heading, followed by one or more sub-headings, each of which can have yet more subsidiary headings. Any heading which has such nested information is prefixed by a +; files which are at the end of their respective branch of the tree have a -. As in structured programming, subsidiary levels are indented to the right; in fact one possible use for an outline processor is to produce a kind of structured pseudo-code before final coding begins.

The left and right cursor keys are used to move through the outline, including all sub-headings which have been expanded; the up and down keys move between headings at the same level. Headings can be inserted, deleted, moved, and edited by invoking the relevant command. Pressing f10 brings up a command menu from which commands are called either by placing the cursor in the relevant place and then pressing Return, or

SPECIFICATION

Description: a memory-resident outline processor which allows information to be nested to great depth and viewed at any level

System requirements: 256K IBM PC; more memory is advisable

Copy protection: none

Price: £81.20

Publisher: Living Videotext Inc., Mountain View, California, U.S.A.

U.K. distributor: Softsel Computer Products, Syon Gate Way, Great West Way, Brentford, Middlesex TW8 9DD. Telephone: 01-568 8866

Availability: now

WORD PROCESSORS

```
Daily Details
+ Phone Calls
+ Action list
+ Appointments
```

```
+ Daily Details
+ Phone Calls
  + Call back
    + Bob Smith 612-0098
    + Jim Brown 565-9811
  + Wait for call
    + Sally Jones 779-1123
    + Jill Rodgers 235-2273
+ Action list
+ Appointments
```

Three successive levels of an outline. A + sign indicates that a heading can be opened out; a - sign denotes the deepest level.

```
Daily Details
+ Phone Calls
  + Call back
    + Bob Smith 612-0098
    + Jim Brown 565-9811
  + Wait for call
+ Action list
  - Place ad for new assistant
  - Make dentist appointment
  + Monthly report
    - Due 8/5/85
  - Fix filing system
  - Ask for a raise
+ Appointments
  + Thursday 8/1
    + 3:00
      + Sales meeting
      - Bring proposal for big sales promotion
  + Friday 8/2
```

by using initial letters, or associated keys mostly near the numeric keypad. For really large and detailed outlines, a particular headline can be hoisted so that it assumes the top position: this is effectively a way of zooming in on a particular sub-section.

Once an outline has been created it can be saved to disc. It can also be ported to another program. Typically Ready might be used to set up a detailed outline of an article which is then ported to a word processor for fleshing out. Programs catered for include WordStar, Framework, 1-2-3, Supercalc, Word, Sidekick and dBase.

Apart from sketching out articles, memos, and straight text files, there are a number of applications to which the memory-resident Ready lends itself particularly well. For example, you can hold a list of people to call as an outline. Those who

are ringing back could form one sub-heading, those whom you must call back another. Under each name there would be information about that person and the nature of the call. If in the course of other work, such as using a spreadsheet, the phone rings with someone returning a call, you can immediately bring up Ready by pressing Control 5 — without losing your spreadsheet work — go to the Waiting For Call section and find the information relating to that caller. This is clearly a great improvement over scraps of paper littering the desk.

But Ready goes further than that. Given a suitable connection, such as the Hayes Smartmodem, it can redial the number for you. Once the number is ringing, you are instructed to pick up the handset. Again, this task can be accessed in the middle of other work without disturbing it. Ready also

allows you to set up often-used outlines and assign them to some of the function keys for quick access.

It is in these ways that the memory-resident Ready scores over its bigger disc-based sibling, Thinktank, which is also much slower. However, Thinktank can deal with outlines of up to 4Mbyte in size against Ready's 32K. It also possesses a useful command called Cloning, which allows you to create copies of headings. If you subsequently change the original, the cloned commands are changed too.

WP FACILITIES

One other advantage of Thinktank is perhaps more important. It has within it a better developed word-processing facility; that on Ready is only rudimentary. Thinktank allows you to structure your text files in a way that is very hard to achieve otherwise. For example, large documents are notoriously difficult to handle, particularly as far as cursor movement is concerned. Breaking large files up into more comfortable small files means that block moves and word searches are far harder. Thinktank gives you the best of both worlds. Products like Thinktank and TEA provide an interesting hybrid form of outline processing and word processing which allows documents to retain an embedded structure which can be pulled out for inspection at any time.

Because of its immediacy of use, Ready seems best placed to become a useful complement to other generic packages. In many respects it is like Sidekick. Both are memory-resident, and they will work together quite happily. In fact this seems the route by which Ready could succeed: it is unlikely to displace the very popular Sidekick, but it could act as a highly intelligent, structured notepad.

READY

VERDICT

	POOR	AVERAGE	GOOD	EXCELLENT
Performance	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Ease of use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Documentation	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Value for money	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Ready does nearly as much as any stand-alone outline processor, but is always available, and cheaper.

CONCLUSIONS

■ Ready is a memory-resident outline processor which acts as a very easy-to-use structured notepad.

■ Although it cannot of itself organise your thoughts for you, it does provide a handy way of sketching out memos and the like.

■ Its chief merit is that it can be called up in the middle of other programs, allowing you to access information in the way you want to, when you want to.

MATHS AND SCIENCE

Roger Cullis looks at two programs which cater for the special needs of some academic and technical work.

One of the virtues of word processing is its flexibility. There is no inherent reason why WP activity need be restricted to alphanumeric characters or even ASCII. With suitable software interfacing, any key on the computer keyboard can be linked to any imaginable character, no matter how complex or obscure.

The only proviso is that you must have a printing device sufficiently flexible to interpret the instructions sent to it. Both the dot-matrix printer and the laser printer are very adaptable in this respect, and even daisywheel printers can be provided with a double or triple print wheel to cater for additional character sets.

Technical writers, scientists and mathematicians all need unusual symbols, and for them a number of extended-capability word-processing packages have recently appeared on the market. They fall into two categories: those which print the additional symbols as alternative ASCII characters, and those which use a scanning method to draw the characters by means of a graphics dump. Both forms of software display the alternative characters on the screen in a WYSIWYG manner. The vertical scale is usually doubled, with half-line increments being displayed as full-line steps.

VUWRITER

Vuwriter is an example of the first type of scientific word processor. Running on the IBM PC it requires at least 256K of RAM and an IBM or Hercules colour-graphics card. Vuwriter is protected by a dongle that plugs into the parallel printer port on the IBM PC with the printer cable itself piggy-backed on to it. Files created with Vuwriter cannot be saved without the dongle in place; other operations remain unaffected.

Vuwriter is a full word-processing package with all of the features you would expect, including mail merge. A spelling checker is available at extra cost. The full version of Vuwriter will drive a wide variety of dot-matrix, daisywheel and laser printers. There is also a version which costs less than half the price and has all the same word-processing features but works only with the Epson FX-80, LX-80 and IBM Graphics Printer.

The software is driven from the function keys. On loading from a start-up disc it displays an initial function-key menu. Documents may be prepared as Vuwriter files or text files; the latter have no special attributes and cannot print the symbols, which are therefore replaced by spaces.

There are two modes of operation: Edit and Command. Edit mode is used to enter, amend or delete text. Command mode

provides all other functions of the word processor, such as file saving or printing. Within each mode, the f7 key is used to load in further selections of commands. The current designations of the function keys are shown as a status line at the foot of the screen display.

Special symbols are held within alternative character sets, which are used by Vuwriter in a particularly convenient way. In Edit mode, they are instantly available by pressing the appropriate function key. For example, to select the Greek letter alpha, you press f4 to call up the Greek character set

VUWRITER

PC VERDICT

	POOR	AVERAGE	GOOD	EXCELLENT
Performance	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Ease of use	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Documentation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Value for money	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Performs well as a general-purpose word processor, with scientific capability as a bonus.

VOLKSWRITER SCIENTIFIC

PC VERDICT

	POOR	AVERAGE	GOOD	EXCELLENT
Performance	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Ease of use	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Documentation	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Value for money	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Gives high-quality print with relatively cheap printers, but lacks some standard WP features.

and the A key to display the alpha symbol. Pressing the function key twice in succession locks the alternative character set in place.

Vuwriter has four alternative character sets: italic, Greek, scientific and teletex. The Greek character set includes a number of accents which are used for French and other scientific and teletex modern languages. The sets are made up of a wide variety of special symbols, including component parts for constructing larger symbols which occupy more than one vertical line of text, such as integral and summation signs or even benzene rings. Placing these components at the appropriate position on the screen takes some practice, especially



SPECIFICATIONS

VUWRITER

Description: comprehensive word processor with full scientific capability, including four alternative fonts

System requirement: IBM PC with 256K RAM and colour-graphics card; ACT Sirius, Apricot, Acorn Cambridge Workstation

Copy protection: protection device plugs into printer port; disc itself may be backed up freely

Prices: £295 for restricted version, £595 for full version; spelling checker £195; font generator £195

Manufacturer: Vuman Ltd, Crawford House, Precinct Centre, Oxford Road, Manchester M13 9QT. Telephone: 061-226 8311

Availability: now

VOLKSWRITER SCIENTIFIC

Description: scientific word processor with letter-quality printout on standard dot-matrix printers

System requirement: IBM PC with 256K RAM and colour-graphics card

Copy protection: none

Price: £495

U.K. distributor: Lifetree (Europe), Unit 15, St. Georges Industrial Estate, Lion Road, Amersham, Buckinghamshire. Telephone: (02403) 28091

Availability: now

when insertions or deletions are being made in other parts of the equation. A font-generator, available as an optional extra, allows you to hand-craft any symbols not provided in the standard Vuwriter character sets.

Vuwriter does not provide a continuous display of the alternative character set. Instead, you use the Help function key to

WORD PROCESSORS

VUWRITER ON A CANON LASER PRINTER

$$L(\beta) = \sum_{i=1}^k z_{(i)} \beta - \sum_{i=1}^k \log \left[\frac{\sum \exp \{z_{(\alpha)} \beta\}}{\epsilon R(t_{(i)})} \right]$$

VUWRITER ON AN EPSON FX-80 DOT-MATRIX

$$\bar{N}_u = \int \left[\frac{\partial \theta}{\partial y} \right] dz \quad | \bar{y} = 0 \text{ or } 1 = \frac{1}{N} \sum_{j=1}^N \frac{\partial \theta}{\partial y} (0, z_j)$$

VOLKSWRITER SCIENTIFIC ON AN EPSON FX-80

$$\nabla \cdot D = \rho \quad \nabla \cdot B = 0 \quad \nabla \times E = - \frac{\partial B}{\partial t} \quad \nabla \times H = \frac{\partial D}{\partial t} + J$$

$$\left\{ \frac{dx}{\ln x} = \ln(\ln x) + \sum_{n=1}^{\infty} \frac{(\ln x)^n}{n n!} \right. \quad \left. \left\{ G_{\alpha\beta} = 8\pi T_{\alpha\beta} \right\} \right.$$



VOLKSWRITER'S MATHS CHARACTER SET

Menu 7. *Mathematical characters.*

to get	type	≡	∕=	Δ	∖K	-	'-	÷	∖;	∂	'6	α	∖%	U	∖U
⇒	'='='>	≈	∖~	⊥	∖N	¬	'.	*	';	'	'9	∞	'%	∩	∖u
⇐	'<'='='	~	'~	∥	'	⊕	∖&	⊗	'&	∇	∖V	∃	'.	∈	∖E
⇔	'<'='='>	≈	∖[≤	∖<	∖I	×	∖X	∖	∖\$	∅	'0	∅	∅	'('
∴	∖:	≥	∖]	≥	∖>	∑	'+	∏	'*	∫	∖#	∫	∖v)	')

obtain a screen display of the keyboard layout and the key assigned to a particular character. Unless the scientific typing facility is in everyday use, you will frequently need to invoke the Help facility to check on character key positions, and this slows you down considerably.

VOLKSWRITER SCIENTIFIC

Volkswriter Scientific runs only on the IBM PC and compatibles. It requires 256K of RAM and a colour-graphics card. The program is designed to be complementary to Volkswriter Deluxe, Lifetree's normal WP package, and most of its standard operations are carried out in a similar manner.

Volkswriter Scientific is menu driven. Menus 1 to 4 deal with function-key allocations, keypad cursor movements, micro-positioning commands and general-purpose characters. Menus 5 to 8 cover the display and construction of special characters.

The screen display is proportionally

spaced. This is particularly valuable in scientific word processing, where there is a much greater variation in character size than with normal typescript. It is also possible to micro-position a character in single-pixel steps. There is a good selection of symbols but, unlike Vuwriter, Volkswriter Scientific has no easy way of defining new ones. On the other hand, it does have a macro facility for grouping up to 26 keystrokes into a single block, invoked by Alt and a letter key. A macro may consist of text, special characters, cursor movements, micro-positioning and type style changes. A file supplied on disc includes a number of useful macros, such as tall brackets, curly braces and an integral sign. There is also an Undo facility which can be used to counteract the effects of over-enthusiastic editing.

As a word processor, Volkswriter Scientific lacks important basic features such as Search and Replace. Margins must be set before you type the text; you cannot reformat it later. Other facilities which are missing include a

spelling checker and mail merge. If you have much straightforward text processing, you will probably prefer to do it with Volkswriter Deluxe, using Volkswriter Scientific to add the formulae afterwards.


Printing is performed in graphics dump mode, which means that near-typeset quality can be achieved. The disadvantage is that the process is very slow and will only work with printers that are fully compatible with the IBM graphics printer.

CONCLUSIONS

■ Vuwriter is a good all-round word processor with scientific capability.

■ The restricted version of Vuwriter is excellent value for money if you have an appropriate printer.

■ Volkswriter Scientific provides a logical upgrade path for existing Volkswriter WP users.

■ Volkswriter Scientific produces a very good end result with low-cost printers, but it is very slow since it uses graphics mode to do so. 

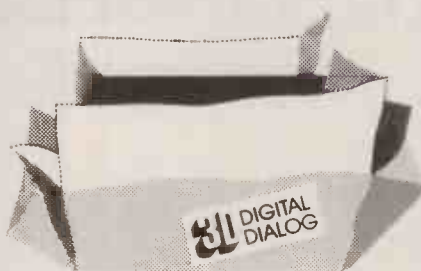


take the wraps off

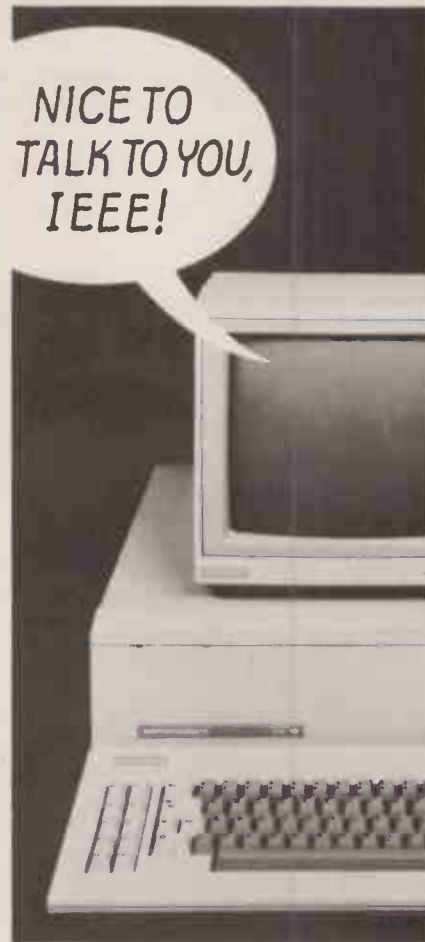
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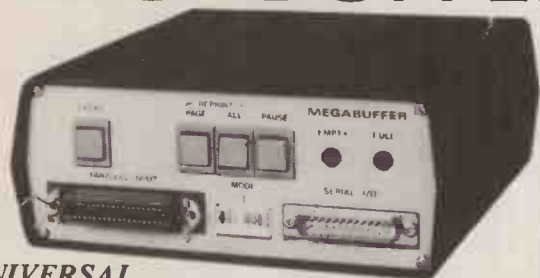


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360 D/S 135 tpi	39.90	37.90	36.90	35.90

EMOREX

	1	2-	5-	10+
J50 S/S 135 tpi	29.90	27.90	26.90	25.90
80 D/S 135 tpi	39.90	37.90	36.90	35.90

AXELL

	1	2-	5-	10+
F1-DD S/Sided	37.90	35.90	34.90	33.90
F2-DD D/Sided	49.90	47.90	46.90	45.90

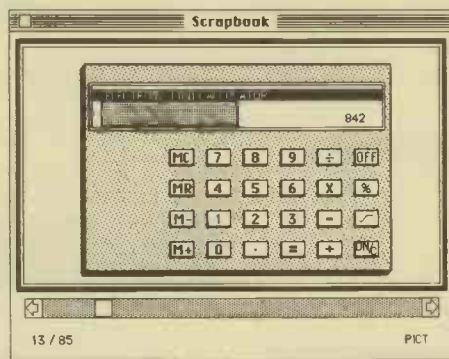
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M5S	Rainbow pack of M5's	18.90
M10	Flip'n'File for 10 microdisks	4.90
M25	Flip'n'File for 25 microdisks	10.90
M50	Flip'n'File for 50 microdisks	19.90
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BUY 2 GET 1 FREE

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SEE 10-8	As above for ten 8" disks	3.50
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JUMBO	Lockable storage for 100+ disks	18.90
EM50	Lockable 50x3 1/2" or 15x3" disks	19.90

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Minimum order value £5.00 please

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ENV	5 1/4" White blank envelopes (100)	5.00
LAB	5 1/4" disk user labels (100)	3.00
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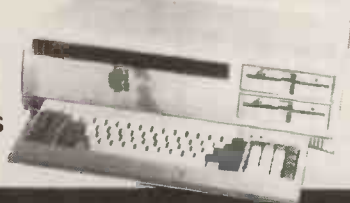
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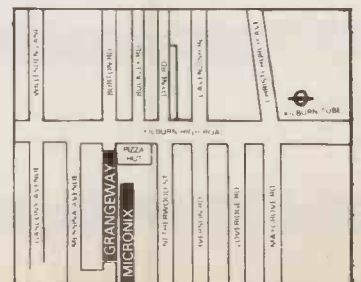
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OPEN FILE

CONTENTS

In Open File we offer programming tips and free software to key in — from demonstration routines to ready-to-use business programs. As well as major feature programs, every month we publish a selection of software written by our readers.

We welcome serious software for any of the micro systems listed opposite, especially short routines and utilities. Programs can be in Basic, Pascal 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 disc of the program, and a printed listing from a fully debugged, working program; hand-written listings cannot be accepted.

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. Make sure all special graphics, inverse-video characters or any other non-standard symbols are listed correctly, or else include Rem statements to explain them.

Each program listing 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 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.

OPEN FILE MONITORS

Amstrad	Ian Stobie
Apple	Bill Hill
BBC	Nicholas McCutcheon
Commodore	Mike Todd
CP/M	Glyn Moody
dBase	Ian Stobie
IBM PC	Glyn Moody
Tandy	John Wellsman
Research Machines	Ian Stobie
Sharp	John Hooper
Sinclair QL	Glyn Moody

TELECOM GOLD

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ECONOMAIL

Jack Schofield explains how you can use electronic mail without breaking the bank

BUSINESS STATISTICS

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HISTOGRAM

The second part of our comprehensive series, with a program to plot your data

dBASE

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FILE HEADER A routine to display the header of dBase II files
SOUNDEX How to retrieve like-sounding names

WORDSTAR

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EPSON PRINTER INSTALLATION

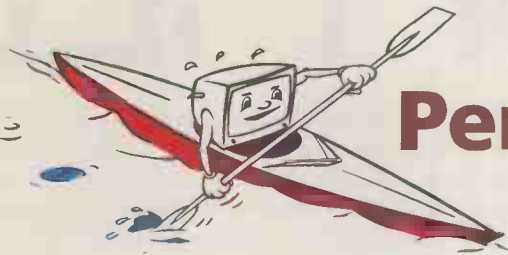
You can access the full set of Epson features direct from WordStar

SHARP

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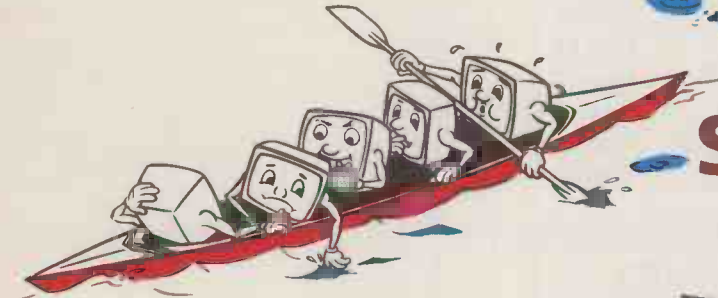
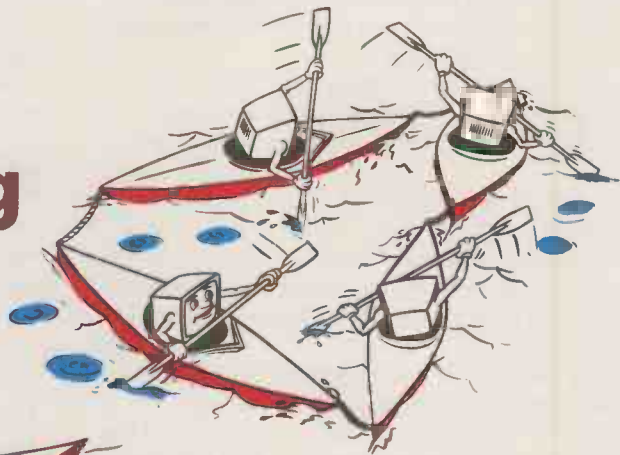
STRING INEQUALITY FUNCTION Adds a useful new command to SP-5025 Basic
700 DELETE There is a bug in the MZ-700's Basic, but you can get round it
SCREEN COLOURS Manipulating colour on the MZ-700
EXTENDED LIST COMMAND A new dimension to the MZ-700's List command

Which Boat Are You In?



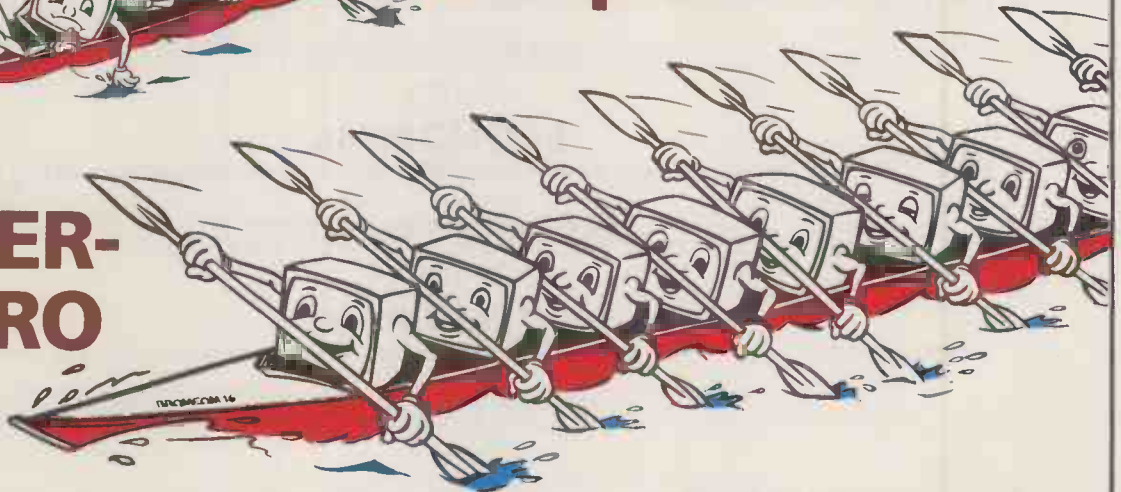
Personal Computer

Networking



Super-Micro

HYPER-MICRO



Full Power for Each

A simple and fair analogy to the choice of multi-station computers, wouldn't you say?

Take a PC as equivalent to a single rowing boat. Just as a PC has one processor and one user, a single rowing boat has one passenger and one rowing power.

Then a network of PCs is a collection of such boats tied together trying to make a common journey; think of their speed in terms of a single boat, their co-ordination is an afterthought, cost per extra passenger is always the same — expensive.

The so-called Super-micro is just a longer boat with, typically four or so passengers, but essentially with still only one paddle to row with. Think of the speed again!

In the Hyper-micro, however, you can have as much 'processing power' as number of users. It is based on the

'one-to-one' relationship between the number of users and processors and on perfect co-ordination amongst the users; just as in our 'Special 16' boat. In addition and unique to the BROMCOM Hyper-micro; each user has four virtual screens running independently or related MS-DOS and CP/M programs simultaneously.

With this superiority, it was only fair to call it the Hyper-micro. Don't you agree?



BROMCOM

Sales and Marketing, Bromcom Ltd
Southbank Technopark, 90 London Road,
London SE1 6LN Tel: 01-928 2900 Telex: 926012

TENS OF thousands of people now use commercial electronic mail. The techniques are simple, but the ultra-slim manuals provided by most systems do not tell you enough about them.

The problem is that email is a new type of service, so the marketing depends on convincing people it is easy to use. And we cannot expect the companies that market email to do much about this. Training takes time and costs money; big manuals are expensive. Less charitably, inefficient users are bound to get bigger bills than efficient ones.

So how can you use an email system more productively? The first step is to configure the system so it does what you want, then evolve a method of working that involves the minimum amount of time on-line. This article deals with Telecom Gold, but around 60 percent of the world's electronic-mail systems run on Prime superminis like Gold's. Think of it as your personal microcomputer, and you will be able to make it do almost anything you want.

One attraction of email is that you can check your mailbox at any time of the day or night. However, the systems may charge more for peak time. On Telecom Gold, peak time is three times the price of off-peak time: 11p per minute compared to 3.5p per minute. You can therefore save a bundle simply by logging on before 8 a.m. and after 7 p.m. from Monday to Friday, or any time at weekends. Telephone charges are also very high in the mornings, so calling off-peak also means a smaller phone bill.

RESPONSE SPEED

A second factor in the cost of on-line time is speed of response. If minicomputers are overloaded money starts to go into waiting for responses to simple commands. This happens on The Source. Telecom Gold now puts fewer users on each Prime than recommended by ITT Dialcom, whose software Gold uses under licence, so response should not be a problem. However, most businesses check their mailboxes on Monday morning and Friday afternoon, so these are good times to avoid. On Telecom Gold, typing SY at the prompt tells you how many other people are logged on at the same time.

A third factor is the baud rate at which you access the system. Telecom Gold, unlike The Source, does not charge extra if you log on at 1,200 baud rather than 300 baud, so use this speed if you can and download your mail in a quarter of the time.

ECONOMAIL

Electronic mail is a wonderful new medium, but it can cost a small fortune to use if you are not careful. **Jack Schofield** explains how to save money by exploiting some of the hidden features of Telecom Gold that make it faster and more effective.

WHO IS LOGGED ON?

```
>SY
20 Users on sys 83
```

Names	use	idle	mem	State
command	object	devs		
JNL020		*03	0 36	R1
SY		3	from	Dial-up via
X.25				

SYSTEM USAGE

```
>USAGE NOV JNL020
```

```
User Name -- JNL020      Date -- NOV 1985
Storage -- 31 Blocks
```

```
Time Usage:  0:08 Con Hrs P   9:40 Con
Hrs NP      0:04 CPU Mins P   6:31 CPU
Mins NP
```

DEFAULT SETTINGS

```
>TERM -DISPLAY
```

```
Type NOT DEFINED, width: 0, length: 0
```

```
Erase = (non-printing char) = :210
```

```
Kill = @ = :300
```

```
Full Duplex
```

```
Xon/Xoff enabled
```

```
Rubouts are translated to erase
```

```
Nulls are ignored by system
```

```
Timeout is 60 minutes.
```

COMMAND FILE CONTENTS

```
>TY C_ID
```

```
DATE
```

```
STORAGE
```

```
MAIL READ UNREAD
```

It does not matter if you cannot read at 1,200 baud, because it is best not to read your mail on-line. Instead log on, download your mail quickly and log off; even at 300 baud a letter usually takes less than a minute to download. You then read it and compose replies off-line. As well as saving connect time this has two extra advantages. First, it saves misreading a letter and firing off a hasty, incorrect and possibly angry reply. Second, the average letter is read three times. If

you read it on-line three times it costs you three times the price.

Typically, six letters take three or four minutes to download, uploading the replies takes roughly the same time. At off-peak rates, downloading six letters and uploading six replies thus costs about 35 pence in on-line time. Reading and replying on-line at peak time, six letters will probably take 20 minutes, and could take an hour. Twenty minutes of peak time costs £2.20. On a monthly

basis, the cost could be under £8 using my system — add £2 for storage and that's the £10 minimum charge. Doing it the easy way would cost you £45.

You can get brief details of your system usage each month by issuing a command of the form.

```
USAGE FEB ABC001
```

using, of course, the appropriate month and your own box number.

You can get more detailed information about the cost of your usage via SBI, or Supplementary Billing Information. The files Info SBI and Info SBI-Guide provide details. To access SI you need a password, which will probably be the numerical part of your contract number — the one on your Telecom Gold invoice that's not your box number. Ignore the letters and have a go, but remember that feeding in the wrong password automatically invalidates you.

SUIT YOURSELF

Telecom Gold is a good email system because it allows you to configure it to suit your own terminal and your own method of working. This is not difficult, so there is no reason to stick with the default settings. You can see what these are by typing

```
TERM - DISPLAY
```

at the system prompt.

The system is further configured by setting up a number of files, of which the main ones are C_ID, Param.Ini and Mail.Ref. The C_ID file is a command file that is uniquely associated with your own identity number or ID, such as ABC123. Whenever you log on to the system, this file is executed automatically. A C_ID file is simply typed in as text, and then saved using the command

```
SA C_ID
```

The contents should include Mail Scan Unread — or even Mail Read Unread — and may also include commands like Date, Storage or Telex Scan.

When you log on, Mail Read Unread will take you into the Mail section of Gold and feed you any unread letters. This is far quicker than typing in the same commands separately at the prompts. Of course Mail Read Unread does not print the whole of each letter on your terminal, unless you have Mail Nomore in your Param.Ini file. What is printed is the header, then it offers the prompt

```
-More-
```

The header includes the ID of the sender, when it was sent, the subject line and, lastly, a number in brackets. This is the number of lines in the letter. So if it's a press release from Sproggins and the

(continued on next page)

length is 568 lines, you can type No at More and Del at Action Required, thus deleting it unread. Or you can press Return and go back to it later.

Whenever you use the mail facility, the system checks to see if you have a Param.Ini file. This sets parameters like what type of terminal you have: there are some options you can select, mostly pre-historic ones like ADM-3. For speed it is best to tell the system you are a hard-copy terminal like a printer, and to do this you include the line

MAIL HARDCOPY
in your Param.Ini file. Then downloading is not interrupted every 23 lines by

—More—

obliging you to press Return to continue. Type CRT if you want the pauses back.

It is also useful to have MAIL LINESIZE 70,80 in Param.Ini. When accepting text, Telecom Gold requires a Carriage Return, CR, every 120 characters. If it doesn't get one, it simply forgets the rest of your message. The Linesize command instructs the system to look for a space anywhere between the 70th and 80th characters — or wherever you specify — and insert a CR for you.

Param.Ini also allows you to set Discon On, which means if you are disconnected accidentally, or forgetfully hang up without signing off, the system does not log you off for a few minutes. This enables you to phone back and resume where you were. I would not recommend this idea, unless you use the editor a lot, or operate a dumb terminal, or tend to get bad lines, in which cases it could be very useful.

A Mail.Ref file acts as your own personal mailbox directory, so you can use names or nicknames to mail your contacts. Thus an entry in Mail.Ref in the form

FRED 81:JOT727

allows you to send a letter about holidays to 81:JOT727 using the line

MAIL FRED SU Holidays
where SU is the system abbreviation for Subject.

A Mail.Ref file saves you the time and effort of remembering or looking up people's numbers, or even their full names. It also allows you to mail lots of people at once. For example, the Mail.Ref line SALES AAA001 AAA002 AAA003 etc. enables you to mail the entire list simply by typing

MAIL SALES SU Bonus Targets
or whatever. As there can be up to 500 people in such a list, this is

WPMAIL

***** Complete sample - WPMAIL *****

Telecom Gold Network: For assistance type 'HELP LOGIN' at the prompt 'PAD>'.
This is Dial-up Pad 1. line 2 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
18.4M(83)
On At 1:19 19/12/85 GMT
Last On At 1:09 19/12/85 GMT

SRI information for November is now available. For details see >INFO SBI

Mail call (4 Read)

>WPMAIL : This is last manual command
: File called WPMAIL uploaded

MAIL JACK SU WPMAIL

Dear Jack,
Ignore this item. Example of WPMAIL.

.S

MAIL BID KNOX LAURIE LEWIS SU XMAS

Merry Christmas from Jack
XXXXXXXXXXXXXXXXXXXXXXXXXXXX

.BC JACK
.S

MAIL 83:NSM001 'Party'

Dear Mike,
Thanks for the nice party.
Best of luck with NS in 86.
Best rgds, Jack

.EX
.S
.END
>MAIL

Send, Read or Scan: SEND
To: JACK SU WPMAIL
Text:
.ESCAPE
.LOAD T\$0000
4 line(s) loaded.

.S

J.SCHOFIELD -- Sent
To: BID KNOX LAURIE LEWIS SU XMAS
Text:
.ESCAPE
.LOAD T\$0001
5 line(s) loaded.

.S

SDL004 -- Sent
TCC051 -- Sent
JRC016 -- Sent
C.BIDMEAD -- Sent

To: 83:NSM001 'PARTY'
Text:
.ESCAPE
.EX
.LOAD T\$0002
6 line(s) loaded.

.S

NSM001 -- Sent Express

To: QUIT

>DELP T\$?
Files Deleted:
T\$0000
T\$0001
T\$0002

>DELETE WPMAIL\$
>MAIL RE UNRE
: Manual control resumed here
: after WPMAIL routine completed

To: J.SCHOFIELD (JNLO20)
From: J.SCHOFIELD (JNLO20)
Posted: Thu 19-Dec-85 1:20 GMT Sys 83
(4)
Subject: WPMAIL

--More--NO
Action Required: DEL

End of Mail.

>OFF
Off At 1:21 19/12/85 GMT
Connect Mins = 3
Compute Secs = 5/4

Mail call (4 Read)
*** Cleared

SYSTEM PARAMETERS

>TY PARAM.INI

MAIL HARDCOPY LINESIZE 70,80
SPELL -NOCR -EX -BIG
ED MODE NUMBER

useful. However, it is kind to put Noshow in the line: for example, SALES NOSHOW AAA001 ABC020 etc otherwise each letter starts with up to 500 lines that say
To: ...
A C__DO file is similar to a C__ID file, and enables you to automate

something you do often. Write the program as a text file, save it using SA C__DO, and execute it using the command

DO

Having downloaded your email to a buffer, logged off and saved it to disc, your next task is to reply. This is done by using a word

processor to prepare an ASCII text file called, preferably, WPMail. Many people use email by preparing their letters off-line, then uploading them one at a time at the Text prompt. This takes time and is inconvenient. WPMail on Telecom Gold allows you to upload all your letters at once and have them sent off automatically.

WPMail must be prepared in a very precise way. Each letter must start

MAIL 81:ABC123 SU WIDGETS
or
MAIL PCOM SU WIDGETS
or
MAIL PCOM 'WIDGETS'

TEXT FILES HELD

MAILSAVE	001	14/12/85	01:38	ASC
D W R				
MAIL.FILE	001	14/12/85	01:36	UFD
D W R				
PARAM.INI	001	14/12/85	01:34	ASC
D W R				
MAIL.REF	001	23/11/85	01:49	ASC
D W R				
C_ID	001	19/11/85	00:43	ASC
D W R				
PERSONAL.DIC	001	18/10/85	00:22	SAM
D W R				
TELEX	001	08/02/85	22:57	UFD
D W R				
NUMB	001	18/01/85	11:22	ASC
D W R				

where the command line contains the word Mail, the box number or Mail.Ref address of the recipient, and the subject either preceded by SU or enclosed in single quotes. After the text of the letter, you must put the command .S for Send on a separate line. Of course, other dot commands can also be included, like

.BC Fred

to send a blind copy to Fred.

The command .End goes at the very end of the string of letters, but make sure your text doesn't contain any other lines that begin with a full stop — WordStar users please note. You should also make sure your text does not contain control or non-alphanumeric characters as, unlike Xmit, WPMail does not try to strip these out, and they could wreck it.

Your WPMail file must also contain a CR every 70 to 80 characters — or before the 120th character, at any rate. Unfortunately QPMail is not part of the Mail system, so any Linesize command in Param.Ini file is not used. You have to insert CRs manually, or use software that inserts them when you upload, like Telecom in the Tandy 100 and similar lap portables.

Finally, check that every Mail command line is absolutely correct. If you feed in just one incorrect box number, the system will respond.

Respecify:

Since WPMail will not have allowed for this the entire process will grind to a halt, and you will have to send the rest of your letters manually. But once you have got it right, WPMail is a real blessing. To send all your letters you simply type

WPMAIL

and upload your WPMail text file. That is all there is to it.

What the system does is take

your incoming file and chop it up into different letters which it saves under the temporary names T\$0001, T\$0002, T\$0003, etc. It also writes a program called WPMail\$, which it uses to mail all your letters very quickly indeed. When that is done, it automatically deletes WPMail\$ and all the T\$000 files, leaving you with a nice clean mailbox. You may find Info WPMail worth reading for further help.

Telecom Gold charges for any files stored on the system at the rate of 20 pence per block per month. A block is 2K. This sounds cheap, but you can still run up huge bills for storage. Users often do not know how many files they have, or how much space they take up.

Typing F provides a list of the text files on a mailbox, tells you how big they are and when they were created. Every file, no matter how small, occupies at least one block; if there are any you don't need, delete them.

Typing

TY <filename>

will display the contents of a file, if you cannot remember what is in it. Another approach is to enter

ED <filename>

to edit a file, then use p5 or p10 to print out the first five or 10 lines. This is also a good way to tackle email you do not think you want to read. Use

SA <filename>

to save it at the Action prompt, then use L in the editor to locate any parts of interest.

Unfortunately Telecom Gold can create files on your behalf: you will not know you have them, and they do not even show up on the directory. For example, the text of each telex you send is filed away, and after a few weeks can easily add up to 100 blocks or more and cost you £20 per month. Unless

you have used the Storage command you may not know you have this amount. And even if you have, you may not realise what is being stored. Filed telexes are not listed when you type L for List or F for Files.

Again, there may be some mail filed away even though you have not filed it yourself. The system automatically puts all items you have read into a file called *Read after 30 days, and all unread items into a file called *Unread. So make sure you do not keep mail hanging about. To get rid of unwanted filed mail and telexes, type the following commands:

```
MAIL DEL FI *READ
MAIL DEL FI *HELD*
TELEX DEL SENT
```

If any of this mail might be important you can use: Mail SC FI to scan it, and

MAIL READ FI <filename>

to read it. Your Mail.File will almost always comprise only one block, because it contains only the index of your mail, not the mail items themselves. This does not matter, as Telecom Gold does not charge for mail until it is filed.

When filing mail, it tends to be cheaper to store it as text files in the system, rather than as filed mail, because the system overhead is smaller. You can convert email to text files by typing

SA <filename>

at the Action prompt. Each item must still take up one block, no matter how small it may be. However, you can put lots of small items into one block of text storage by typing

SA TEXT IN <filename>

at the Action prompt. This command also chops off the headers, which is useful if you just want the text.

After typing F or L, you can delete any .Input. or *Mailsave* files as both these are created by

the system. A file called .Input. is created when you load text into the telex system. A *Mailsave* file is created, for example, if you get disconnected while in Mail. The system is trying to be helpful and save your unfinished letter, but it still costs money to store.

In the end, in spite of creating some extra files such as C_ID and Param.Ini, most people should be able to reduce their storage from between 30 and 100 blocks down to five or 10, saving £5 to £20 per month. Telex users will probably need an extra 10 blocks or so.

One attraction of Telecom Gold is that it is a veritable wonderland of things to explore. These range from telex to terminal-to-terminal Chat facilities; from adventure games to databases like the Infomatics Daily Bulletin and the Official Airline Guide; from useful mathematical and statistical programs to magic tricks. There is also a bulletin board called Noticebd. If you want to save money, avoid them.

Telecom Gold also has a lot of info files; type

INFO INFO

for a list. Many are useful, but most are too big. When you read one, make sure you download it and print it out for future reference.

You may also save money by using at least an eight-character password which comprises a memorable six-letter word and two random letters; for example,

UNITEDBQ

This technique combines the memorable with the almost unhackable. Don't write it down; do change it often using Passwd. If someone else gets the use of your ID they will not be as economical as you have, and you could end up with a very large bill.

PC
NEXT MONTH: Using Telecom Gold for telex.

TEN TIPS FOR ECONOMAIL

1. Avoid peak times; pay 3.5p a minute instead of 11p a minute.
2. Especially avoid Monday mornings and Friday afternoons, when the system response is more likely to be slow.
3. Never reply on-line. Download mail, reply off-line, and upload using WPMail. You can send and receive letters in about a minute each.
4. Delete all letters, files and sent telexes regularly. Keep storage under 10 blocks — or 20 blocks if you use telex.
5. Configure the system with Mail.Ref, C_ID, C_DO, Param.Ini and .RF. files. This makes email semi-automatic and tailored to your particular micro or terminal.
6. There is masses of information in Info files. Download and print them out, rather than reading them on-line.
7. Do not read Noticebd, even though you might miss a bargain or two.
8. If you have to play Pits, use someone else's box and ID.
9. Never hang up without logging off. Check you on-line time and the sign-on and sign-off information, or you might not notice if you have been hacked.
10. Remember to hang up after logging off. If you use PSS you could still be live as far as the pad is concerned, and it will charge you.

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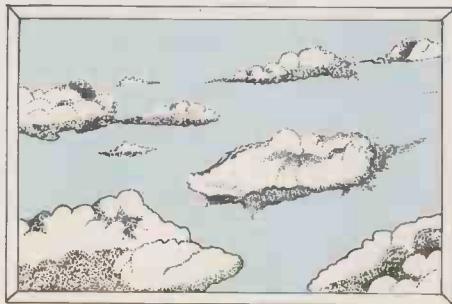


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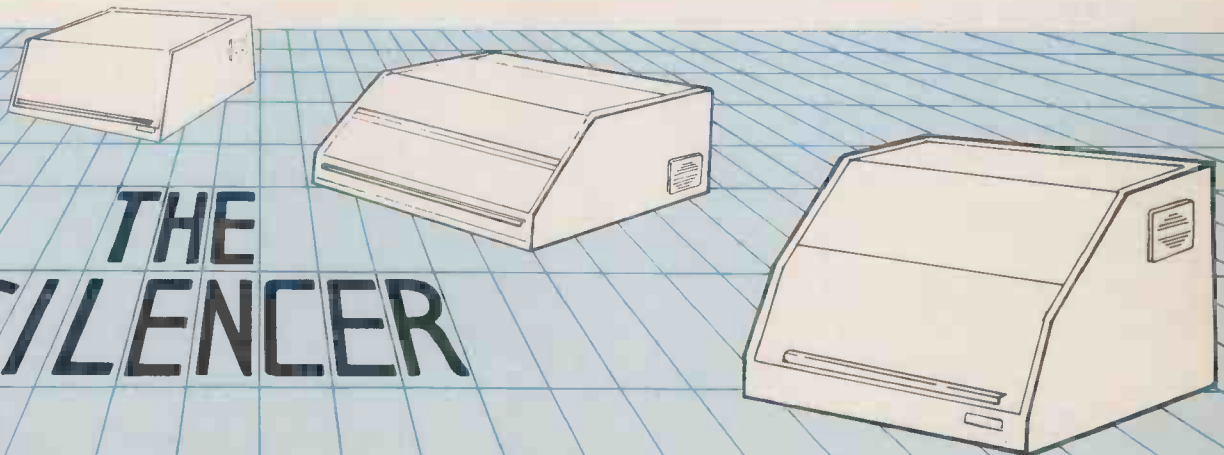


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HISTOGRAM

Owen Bishop and Daniel Bishop continue their series on implementing standard statistical techniques on the BBC Micro.

PRESENTATION GRAPHICS has been one of the main applications which established micros in the business world. While a set of figures may mean very little to the untrained eye, the same data displayed in graphical form gets its message across instantly.

For example, you might have a set of 90 values such as those shown in table 1. To begin to find out what the figures mean, one sensible thing to do is to sort the values into numerical order, which at least makes it obvious which are the lowest and the highest values. In this example the lowest is 100 and the highest is 180.

To simplify the data still further, you could then sort the values into groups or classes. The first class might include all values from 100 to 110. There are only two values in this class, 100 and 106. The next class might be 110 to 120, which contains eight values. Other classes might be 120 to 130, 130 to 140, 140 to 150, 150 to 160, 160 to 170, and 170 to 180, making eight classes in all.

For convenience, the border values between classes have been so that they occur every 10 units, in other words the class interval is 10. The obvious problem then arises of how to classify values that lie on the borders: for example, into which class does the value 140 go? It does not matter what you decide, as long as you are consistent. A reasonable rule is to put borderline cases into the upper of the two classes.

Sorting and classifying are operations that computers perform much more quickly and accurately than people do, especially when a large amount of data is involved. When all this is done, you can prepare a list of the classes and the number of values in each class. Figure 1 shows the results in a particular diagrammatic form, called a histogram.

From the histogram it is easy to pick out some important features. There are relatively few low values. The number of values in each class rises to a peak at the 130 to 140 class, falling again to very few values in the highest class. The class which contains the most values is known as the mode.

The histogram provides an overall view of the shape of the distribution of values, which in this example is more or less

symmetrical. It suggests that the average production rate is between 130 and 140 units per shift, but also shows that there are variations around this figure. The reasons for the variation remain a matter for speculation. They could be due to occasional breakdowns of machinery, sick leave of operators, periods spent waiting for materials to arrive from stock, or perhaps other routine production problems of a minor nature.

Other histogram shapes are possible with other data. Skew distributions have one tail longer than the other. If the histogram of shift data appeared like figure 2a, you might want to enquire why

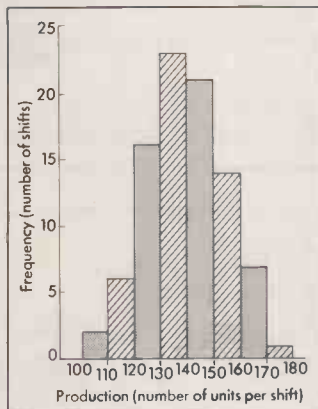


Figure 1.

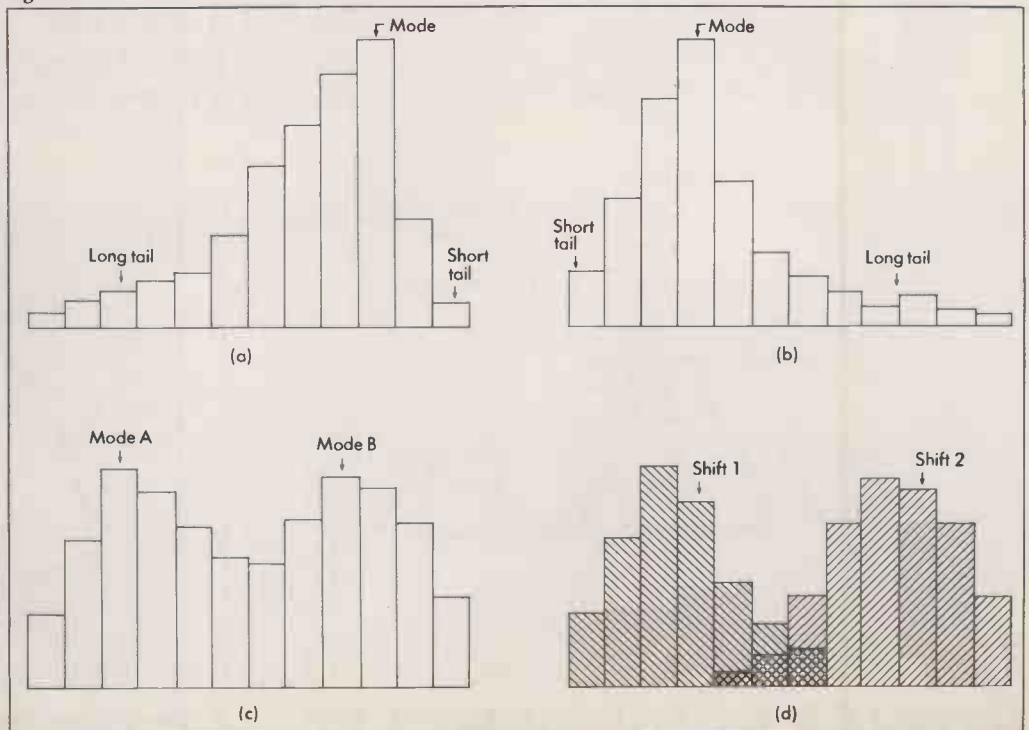


Figure 2. The shape of a histogram may reveal important statistical information.

TABLE 1

132	121	140	129	122	146	130	150	143	144
112	137	122	119	152	148	120	154	139	163
156	132	131	161	151	138	137	111	127	141
100	131	180	148	106	147	135	126	145	152
134	128	140	123	133	146	145	121	137	164
165	134	142	124	161	153	149	155	157	117
136	143	113	134	140	126	144	131	127	147
155	125	139	143	158	159	139	142	154	169
122	136	122	148	133	165	135	112	158	137

production on some shifts was so much less than that of the majority. Conversely, if it is like figure 2b you might wonder why all shift figures are not as good as those few exceptionally good ones.

Figure 2c has two modes: it is a bimodal distribution. Such a result suggests that the data actually consists of two distinct sets, each having different features, but mixed together and presented as one set. If a histogram of this shape had been obtained from shift production values, and supposing there were two shifts each day, the bimodal distribution might result from differences in production rate in the two shifts. This hypothesis would be confirmed if separating out the values for the two shifts and making separate histograms of them revealed two symmetrical distributions with different modes, as in figure 2d.

As a preliminary to using the Histo program you should use the Datamak program, described on page 106 of last month's issue, to prepare the data file. If you want to produce a histogram of the whole of a set of data, enter all the

data in a one-column table; for the data in table 1 you will need a table of one column and 90 rows. Histo can also work on individual columns from a table which contains more than one column. You could use this feature if you have two or more sets of data to contrast. If, for example, you have separate data for two daily shifts, set up a two-column table, with data from one shift in column 1 and data from the other shift in column 2. The program then presents histograms for either column as required.

After loading Histo, place the data disc in the drive. Run Histo, and type in the name under which the data was saved. The data is loaded and displayed in the same format as in Datamak. If the whole table is not visible on the screen, use the cursor keys to bring other sections into view. For example, to view sections to the right of the presently displayed section, move the cursor to the right edge of the screen.

When you are ready to display the histogram, press the space bar.

(continued on page 110)

HISTOGRAM

```

10 REM- HISTOGRAM
20 REM- A Statistical Utility Program
30 REM- -----
40 REM- by Owen and Daniel Bishop
50 REM- -----
60 REM- Version 1.0 - 4/10/85
70 REM- For the BBC Micro Model B
80 REM- -----
90 *FX4,1
100 *TV 255,1
110 L$=STRING$(10,CHR$32)
120 MODE7:PROCcol:PRINT"HISTOGRAM"
130 PROCbtm:PROCcol:PRINT "Enter name
of file to be loaded":PROCalpha("max 7
letters): ",7)
140 ON ERROR PROCferror:VDU31,15,0:PR
OCcls:GOTO 130
150 FILE$=QR$:A=OPENIN FILE$
160 VDU31,15,0:PRINT FILE$
170 INPUT#A,DF$:VDU31,24,0:PRINT"DATE:
";DF$
180 INPUT#A,NC,NR:VDU31,0,1:PROCcol:PR
INT"COLS: ";NC;SPC(2);"ROWS: ";NR
190 DIM SC(NC,NR),CL$(NC),RL$(NR),H(NR
,3),DP(12)
200 INPUT#A,CW,LC
210 IF LC=0 THEN 230
220 FOR J=1 TO NC:INPUT#A,CL$(J):NEXT
230 INPUT#A,LR
240 IF LR=0 THEN 260
250 FOR J=1 TO NR:INPUT#A,RL$(J):NEXT
260 FOR J=1 TO NR:FOR K=1 TO NC:INPUT#
A,SC(K,J):NEXT:NEXT
270 FOR J=1 TO NC:INPUT#A,DP(J):NEXT:I
NPUT#A,DP$
280 CLOSE#0:ON ERROR OFF
290 QR=0:FOR J=1 TO NC:IF DP(J)>QR THE
N QR=DP(J):NEXT
300 SW=36-7*LR:CC=INT(SW/CW):IF NC<CC
THEN CC=NC
310 CS=0:RS=0:HB=4+7*LR
320 IF LR=0 AND NR>=100 THEN HB=5
330 RB=NR+4:IF NR>16 THEN RB=24
340 VDU31,0,2:PROCcls
350 PROCbtm
360 RD=16:IF NR<RD THEN RD=NR-RS
370 CD=CC:IF NC<CD THEN CD=NC-CS
380 PROCcolumns:PROCrows:PROCdata
390 *FX21,0
400 VDU31,39,21:K$=GET$
410 IF K$=CHR$139 AND RS>0 THEN RS=RS-
16:GOTO360
420 IF K$=CHR$136 AND CS>0 THEN CS=CS-
CC:GOTO 360
430 IF K$=CHR$137 AND CS+CD<NC THEN CS
=CS+CD:GOTO 360
440 IF K$=CHR$138 AND RS+RD<NR THEN RS
=RS+RD:GOTO 360
450 IF K$="R" THEN RUN
460 IF K$<>CHR$32 THEN VDU7:GOTO 390
470 PROCbtm
480 PROCcol:PRINT"The data must be cla
ssed first"
490 PROCnum("How many classes? (2-14)"
,1,2,1,14)
500 IF K$="P" THEN PROCprintout:GOTO 9
00
510 T=QN
520 IF NC=1 THEN EC=1:GOTO 540
530 PROCnum("which column? (1-"+STR$(N
C)+") ",1,1,1,NC):EC=QN
540 PROCbtm:PROCcol:PRINT"Calculating
- please wait!"
550 PROCq
560 R4=(SC(0,NT)-SC(0,1))/T:R6=1
570 FOR J=1 TO NT
580 IF SC(0,J)<SC(0,1)+R4*R6 THEN 610
590 IF R6=T THEN 610
600 R6=R6+1:GOTO 580
610 H(J,0)=R6:H(J,2)=SC(0,1)+R4*R6:H(J
,1)=H(J,2)-R4
620 NEXT
630 R7=0:R5=1
640 FOR J=1 TO NT
650 IF H(J-1,0)=H(J,0) THEN R5=R5+1:GO
TO 710
660 IF R5>=R7 THEN R7=R5
670 FOR K=J-R5 TO J-1
680 H(K,3)=R5
690 NEXT
700 R5=1
710 NEXT
720 FOR K=NT-R5+1 TO NT
730 H(K,3)=R5
740 NEXT
750 IF R5>R7 THEN R7=R5
760 MODE4:VDU19,1,2,0,0,0,23,1,0;0;0;

```

```

770 S=INT(160/R7):J=1:PROCbar
780 FOR J=2 TO NT
790 IF H(J,0)=H(J-1,0) THEN 810
800 PROCbar
810 NEXT
820 FOR J%=46 TO 1233 STEP 91.4:PLOT70
,J%,590:NEXT:FOR J%=0 TO 1189 STEP 91.4:
FOR K%=160 TO 1023 STEP 86.4:PLOT70,J%,K
%:NEXT:NEXT:MOVE0,160:DRAW0,1023:DRAW127
9,1023:DRAW1279,160:DRAW0,160
830 VDU31,0,28:PRINT"Column ";EC;SPC(2
);"Mode=";R7;SPC(2);"Class interval=";FN
qr(R4)
840 PRINT"Range is ";FNqr(H(1,1));" to
";FNqr(H(NT,2))
850 *FX21,0
860 REPEAT:A$=GET$:UNTIL A$=CHR$32 OR
A$="R"
870 IF A$="R" THEN RUN
880 MODE7:PROCcol:PRINT"HISTOGRAM"TAB(
15)FILE$TAB(25)"DATE: ";DF$:PROCcol:PRINT
"COLS: ";NC;SPC(2);"ROWS: ";NR
890 PROCfreqdist
900 *FX21,0
910 K$=GET$
920 IF K$=CHR$32 THEN VDU31,0,2:PROCcl
s:GOTO 380
930 IF K$="P" THEN PROCprintout:GOTO 9
00
940 IF K$="R" THEN RUN
950 VDU7:GOTO900
960 DEF PROCprintout
970 ON ERROR PROCperror
980 VDU2,21
990 PRINT"FILE: ";FILE$""DATE: ";DF$
1000 PROCfreqdist
1010 VDU6,3
1020 ON ERROR OFF
1030 ENDPROC
1040 DEF PROCfreqdist:LOCAL J:PRINT"Fr
equency distribution: column ";EC
1050 PRINT"" Class ____ From ____ To ____
- Freq _CF_"
1060 A$=102000A+(DP(EC)*%100):@%A:A$=S
TR$(FNqr(H(1,1))):IF RIGHT$(A$,1)=". " TH
EN A$=LEFT$(A$,LEN(A$)-1)
1070 B$=STR$(FNqr(H(1,2))):IF RIGHT$(B$
,1)=". " THEN B$=LEFT$(B$,LEN(B$)-1)
1080 PRINT" 1"TAB(7);RIGHT$(L$+A$,10);T
AB(18);RIGHT$(L$+B$,10);:@%=&90A:PRINT;T
AB(29);H(1,3)TAB(34);H(1,3):CT=H(1,3)
1090 FOR J=2 TO NT
1100 IF H(J,0)=H(J-1,0) THEN 1150
1110 CT=CT+H(J,3):PRINTTAB(1);H(J,0);
1120 @%A:A$=STR$(FNqr(H(J,1))):IF RIGH
T$(A$,1)=". " THEN A$=LEFT$(A$,LEN(A$)-1)
1130 B$=STR$(FNqr(H(J,2))):IF RIGHT$(B$
,1)=". " THEN B$=LEFT$(B$,LEN(B$)-1)
1140 PRINT;TAB(7);RIGHT$(L$+A$,10);TAB(
18);RIGHT$(L$+B$,10);:@%=&90A:PRINT;TAB(
29);H(J,3)TAB(34);CT
1150 NEXT
1160 ENDPROC
1170 DEF FNx(N)=INT(N*4.58)
1180 DEF FNy(N)=INT((159-N)*5.43+160)
1190 DEF FNqr(N)=INT((N+.5/10^QR)*10^QR
)/10^QR
1200 DEF PROCbar:LOCAL X,Y
1210 X=FNx(H(J,0)*20-20)
1220 Y=159-H(J,3)*5:IF Y=-1 THEN Y=0
1230 Y=FNy(Y)
1240 IF INT(H(J,0)/2)>H(J,0)/2 THEN PR
OCstripes:ENDPROC
1250 MOVE X+91,Y:MOVE X+91,160:PLOT85,X
,160:MOVE X,Y:PLOT85,X+91,Y
1260 ENDPROC
1270 DEF PROCstripes:LOCAL J%:FOR J%=Y
TO 160 STEP -8:MOVE X,J%:DRAW X+91,J%:NE
XT:MOVE X,Y:DRAW X,160:MOVE X+91,Y:DRAW
X+91,160:ENDPROC
1280 DEF PROCq:LOCAL J
1290 NT=0:FOR J=1 TO NR
1300 IF SC(EC,J)=1E-29 THEN 1330
1310 NT=NT+1
1320 SC(0,NT)=SC(EC,J)
1330 NEXT
1340 PROCquicksort(1,NT)
1350 ENDPROC
1360 DEF PROCquicksort(P%,R%)
1370 LOCAL I%,J%,W,X
1380 I%=P%:J%=R%:X=SC(0,(P%+R%)/DIV2)
1390 REPEAT
1400 IF SC(0,I%)<X I%=I%+1:GOTO 1400
1410 IF X<SC(0,J%) J%=J%-1:GOTO 1410
1420 IF I%<J% W=SC(0,I%):SC(0,I%)=SC(0
,J%):SC(0,J%)=W:I%=I%+1:J%=J%-1

```

(listing continued on next page)

HISTOGRAM

(listing continued from previous page)

```

1430 UNTIL IX>JX
1440 IF P%<J% PROCquickSort (P%,J%)
1450 IF IX<R% PROCquickSort (IX,R%)
1460 ENDPROC
1470 DEF PROCdata:LOCAL J,K:VDU23,1,0;0
;0;0;:FOR J=5 TO 20:VDU31,HB-1,J-1:PROCC
11:NEXT
1480 FOR J=1+CS TO CD+CS:HH=HB-1+(J-CS-
1)*CW
1490 FOR K=1+RS TO RD+RS
1500 IF SC(J,K)=1E-29 THEN 1520 ELSE @%
=%0102000A+(DP(J)*%100);A$=STR$(SC(J,K))
:IF RIGHT$(A$,1)=". "THEN A$=LEFT$(A$,LEN
(A$)-1)
1510 VDU31,HH-1,3+K-RS:PRINT RIGHT$(L$+
A$,CW):@%=%90A
1520 NEXT:NEXT
1530 VDU23,1,1;0;0;0;
1540 ENDPROC
1550 DEF PROCcolumns:LOCAL J:VDU23,1,0;
0;0;0;:VDU31,0,2:PROCC1:VDU31,0,3:PROCC
11
1560 VDU31,0,2:FOR J=1 TO CD
1570 VDU31,(HB-1+(J-1)*CW),2:PRINT;J+CS
;
1580 NEXT
1590 IF LC=0 THEN VDU23,1,1;0;0;0;:ENDP
ROC
1600 VDU31,0,3:FOR J=1 TO CD
1610 VDU31,(HB-1+(J-1)*CW),3:PRINTCL$(J
+CS);
1620 NEXT:VDU23,1,1;0;0;0;:ENDPROC
1630 DEF PROCrows:LOCAL K:VDU23,1,0;0;0;
;0;:FOR K=5 TO 20:VDU31,0,K-1:PROCC11:NE
XT
1640 FOR K=1 TO RD:VDU31,0,K+3:PRINT;K+
RS:NEXT
1650 IF LR=0 THEN VDU23,1,1;0;0;0;:ENDP
ROC
1660 FOR K=1 TO RD:VDU31,3,3+K:PRINT RL
$(K+RS)
1670 NEXT:VDU23,1,1;0;0;0;:ENDPROC
1680 DEF PROCnum(Q$,Q1,Q2,Q3,Q4)
1690 *FX21,0
1700 PROCcol:PRINT Q$;:INPUT""QR$
1710 QN=VAL(QN$)
1720 IF QN=0 AND QN$<>"0" THEN 1750
1730 IF QN<>INT(QN) THEN 1750
1740 IF (Q3=0 OR QN<=Q4) AND (Q1=0 OR Q
N>=Q2) THEN ENDPROC
1750 PROCline
1760 GOTO 1690
1770 ENDPROC
1780 DEF PROCalpha(Q$,Q1)
1790 *FX21,0

```

```

1800 PROCcol:PRINT Q$;:INPUT""QR$
1810 IF LEN(QR$)<=01 OR Q1=0 THEN ENDPR
OC
1820 PROCline:GOTO 1790
1830 DEF PROCline:VDU11:PROCC11:VDU7:EN
DPROC
1840 DEF PROCbtm:VDU31,0,20:PROCC1s:VDU
31,0,20:ENDPROC
1850 DEF PROCcol
1860 PRINT CHR$130;
1870 ENDPROC
1880 DEF PROC1s
1890 LOCAL CRS%,V,H
1900 V=VPOS:H=POS
1910 CRS%=999-H-(40*V)
1920 VDU23,1,0;0;0;0;
1930 REPEAT:IF CRS%<255 THEN 1950
1940 CRS%=CRS%-255:PRINTSTRING$(255,CHR
$32);
1950 UNTIL CRS%<255
1960 PRINTSTRING$(CRS%,CHR$32);
1970 VDU31,H,V
1980 VDU23,1,1;0;0;0;
1990 ENDPROC
2000 DEF PROCc11
2010 LOCAL V,H
2020 V=VPOS:H=POS
2030 PRINT STRING$(40-H,CHR$32);
2040 VDU31,H,V
2050 ENDPROC
2060 DEF PROCferror
2070 ON ERROR OFF
2080 CLOSE#0
2090 VDU7
2100 IF ERR>44 OR ERR=6 THEN 2140
2110 CLS:VDU11:REPORT:PRINT " at line "
;ERL
2120 *FX4,0
2130 END
2140 PROCbtm:IF ERR=222 THEN PRINT"No s
uch file";:PROCcol ELSE VDU11:REPORT:PRO
Ccol
2150 PRINT" error. ":PROCC1:PRINT"Pres
s SPACEBAR, when you are ready "
2160 *FX21,0
2170 REPEAT:A=GET:UNTIL A=32
2180 VDU11,11:PROCC1s
2190 ENDPROC
2200 DEF PROCpterror
2210 ON ERROR OFF
2220 VDU 6,3,7
2230 CLS:VDU11:REPORT:PRINT " at line "
;ERL
2240 *FX4,0
2250 END

```

(continued from page 108)

Then you are asked how many classes the data is to be divided into; in other words, how many columns shall the histogram have? Obviously it needs at least two, and the maximum number allowed is 14. Key in the number and press Return. The computer then calculates the class interval automatically.

The most suitable number of classes can be found by trial and error; if you are not yet certain how many classes you need, try a number between 5 and 8. You return to this part of the program later and may select a different number of classes next time. But remember that if the number of classes is small it may be difficult to see the exact shape of the histogram clearly. However, if the amount of data is small and you choose to have many classes, several classes may contain only one or two values, or perhaps none at all, giving the histogram a ragged appearance with no clear tails and mode.

If your table has more than one

column, you are next asked to select which column is to be used for the histogram. There is then a short delay while the computer sorts and classifies the data. Immediately this is finished the screen clears and the histogram is displayed.

The display includes a gridded area on the screen, marked by dots. The grid has 14 columns, one for each of the 14 possible columns of the histogram. The grid has 10 rows to help compare the heights of columns. The scale on which the histogram is plotted is automatically scaled by the computer, so that the modal column almost reaches the top of the grid. The grid is not graduated with scales or values. The data given at the bottom of the screen shows the following: column number, number of values in the modal class, class interval, and lowest and highest values in the data.

When you press the space bar again, the screen clears and a frequency distribution table is displayed, as shown in table 2. This lists the classes, their lower and


TABLE 2

Frequency distribution: column 1

Class	From	To	Freq	CF
1	100	110	2	2
2	110	120	6	8
3	120	130	16	24
4	130	140	23	47
5	140	150	21	68
6	150	160	14	82
7	160	170	7	89
8	170	180	1	90

upper limits, the number of values in that class and the cumulative frequency; the cumulative frequency is the total number of values occurring in a given class and in all classes below it. This table can be used to make statements such as "Production was less than 140 units per shift in 47 shifts out of 90." Classes with zero frequency are not listed in the table.

If you want a printout of the frequency distribution, press P. When you have finished, press the space bar to return to the data

table. You can then re-examine the data, select another column — if there is more than one — or elect to have the data divided into a different number of classes to produce another histogram and its frequency-distribution table. 

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ASPECT is available from Microft Technology Limited, The Old Powerhouse, Kew Gardens Station, Kew, Surrey TW9 3PS, or from many dealers. For further information telephone 01-948 8255.

*This allows up to 5 terminals on the network. A further £100 + VAT is payable for each additional terminal.

The logo for ASPECT, featuring the word "ASPECT" in a bold, sans-serif font. The letters are white and set against a dark, rectangular background that has a slight gradient and a drop shadow effect, making it stand out.

The database management system.

ASPECT is a Trade Mark of Microft Technology Limited and is a British Product.

dBASE FILE HEADER

FILE HEADER

```

1 -----
2 This program will display the header of
3 a dBASE II (U2.4) database file.
4
5 Terry Ebdon      26-Nov-1985
6 -----
7
800 FALSE%      = 0
820 TRUE%       = -1

1000 ON ERROR GOTO 29000
1020 INPUT "Name of DBASE file "; DB-FILE$
1030 IF LEN( DB-FILE$ ) = 0
    THEN
        SYSTEM
1040 IF INSTR(1, DB-FILE$, ".") = 0 THEN DB-FILE$ = DB-FILE$ + ".DBF"
1050 RESET
1060 OPEN "I", #1, DB-FILE$
2000 DUMMY$ = INPUT$( 1, 1 )
2020 GOSUB 10000
2040 GOSUB 10800      ' Date of last update
2060 GOSUB 10200      ' Display record size
2080 GOSUB 10400      ' Display List of fields in header
3000 CLOSE 1
3020 SYSTEM

10000 'Display record count
10020 RECORD.COUNT% = INPUT$( 2, 1 )
10040 PRINT USING "Number of records: #####; CUI( RECORD-COUNT% )
10060 RETURN

10200 '**** Display Record Size ****
10220 PRINT USING "Size of records: #####; CUI( INPUT$( 2, 1 ) )
10240 RETURN

10400 '**** Display all fields ****
10420 FIELD.NUM% = 1
10440 DONE% = FALSE%
10450 NEXT-BYTE% = INPUT$( 1, 1 )
10460 WHILE DONE% <> TRUE%
10480 PRINT USING "### "; FIELD.NUM%
10490 PRINT NEXT-BYTE% + INPUT$( 10, 1 ); TAB( 22 );
10500 PRINT INPUT$( 1, 1 );
10520 PRINT USING " ###; ASC( INPUT$( 1, 1 ) );
10540 DUMMY$ = INPUT$( 2, 1 )
10560 PRINT USING " ###; ASC( INPUT$( 1, 1 ) )
10580 NEXT-BYTE% = INPUT$( 1, 1 )
10600 IF ASC( NEXT-BYTE% ) = 13 THEN DONE% = TRUE%
10620 FIELD.NUM% = FIELD.NUM% + 1
10630 IF FIELD.NUM% > 30 THEN DONE% = TRUE%
10640 WEND
10700 RETURN

10800 '**** Date of last update ****
10820 D1% = ASC( INPUT$( 1, 1 ) )
10840 D2% = ASC( INPUT$( 1, 1 ) )
10860 D3% = ASC( INPUT$( 1, 1 ) )
10880 PRINT USING "Date of last update: ##/##/##"; D1%, D2%, D3%
10900 RETURN

29000 '**** Error Handling ****
29010 PRINT
29020 IF ERL = 1080
    THEN
        PRINT "File could not be opened"; CHR$(7)
        : PRINT
        : RESUME 1020
29040 IF ERR = 62
    THEN
        PRINT "*** Header record too short."; CHR$(7)
        : PRINT "*** This is not a valid dBASE II file!"
        : PRINT
        : RESUME 1020

65529 END

```

OUR FIRST dBase Open File, in last December's issue, generated a good response in the form of more contributions. Obviously a lot of *Practical Computing* readers are active dBase users.

Our first program this month follows on from Kevin Powis's routine in the December issue, which allowed you to read unmodified dBase files from Basic, provided you already know the record length. Terry Ebdon's offering lets you find that out, together with all the field names and field sizes. His listing is again in MBasic. Note that the record length is actually always one greater than the sum of the field sizes, as dBase uses one byte as a market to denote deleted records.

SOUNDEX

SOUNDEX is an algorithm which lets you group names phonetically rather than in alphabetic order. This can be very convenient in a database application if you want to retrieve like-sounding names quickly. Philip Osisiogu's routine, written in dBase II code, is inspired by Mike Lewis's Software Workshop column in the May 1985 issue, which dealt with the technique. It uses similar variable names to the Basic routine given in the original Software Workshop article, so regular readers might find it interesting to compare the dBase and Basic implementations of the same idea.

SOUNDEX

```

* -----
* PROCEDURE: SOUNDEX.CMD
* INPUT....: FULL      [holds the name to be coded ]
* OUTPUT....: PKEY     [holds the phonetic key   ]
* REQUIRES.: No other routine.
* VARIABLES: CHAR      [holds character under test ]
*           : CODELIST [holds group codes       ]
*           : CODE      [code for chr under test  ]
*           : J         [position of CHAR in FULL ]
*           : SPACES    [holds a string of blanks ]
* -----
* TEST-DATA: Names      Key
*           : Carr, Carrier, Curry      C6
*           : Schofield, Skophill       S214
* -----
* WRITTEN BY.....: P.T.Osisiogu; Liverpool L28 OQE.
* DATE.....: 27 November, 1985.
* -----
SET TALK OFF
STORE " " TO SPACES
* [ Each digit represents a SOUNDEX GROUP and positions match ]
* [ those in the legal character list ]
STORE "012301200224550126230102020000" TO CODELIST
* -----
STORE T TO CODEING
DO WHILE CODEING
    ERASE
    ACCEPT "NAME " TO FULL
    IF FULL=$(SPACES,1,1)
        STORE F TO CODEING
        LOOP
    ENDIF
* -----
* [ Store 1st character of name as 1st character in code then ]
* [ point to 2nd character of name ]
STORE $(!(FULL),1,1) TO PKEY
STORE 2 TO J
* -----
DO WHILE (J<=LEN(FULL) .AND. LEN(PKEY)<=4)
    STORE $(!(FULL),J,1) TO CHAR
* -----
* [ The character to be coded (in CHAR) has its position ]
* [ checked in the legal character list. That position is ]
* [ used to pick out the code group from the CODELIST. The ]
* [ result is stored in the variable CODE. ]
STORE $(CODELIST,@(CHAR,
"ABCDEFGHIJKLMNORSTUVWXYZ-*. " ),1) TO CODE
* -----
IF $(PKEY,LEN(PKEY),1)>CODE .AND. CODE<>"0"
    STORE !(PKEY+CODE) TO PKEY
ENDIF
STORE J+1 TO J
* -----
ENDDO
* -----
* [ Check if less than 4 characters 'space fill' otherwise ]
* [ truncate to exactly four characters. ]
IF LEN(PKEY) < 4
    STORE PKEY+(SPACES,1,(4-LEN(PKEY))) TO PKEY
ELSE
    STORE $(PKEY,1,4) TO PKEY
ENDIF
* -----
? PKEY
WAIT
ENDDO
SET TALK ON
RETURN
* END-PROCEDURE: SOUNDEX.CMD =====

```

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WORDSTAR can use print enhancements such as bold, underlining, subscripts and superscripts, and can produce microjustified print-out. The Install program makes it easy to implement these features on most daisywheel printers simply by choosing the right printer from a list. In contrast, support for print enhancements on dot-matrix printers is poor or non-existent, since the Install program does not include a list of dot-matrix printers.

Up to and including version 3.0, WordStar classifies dot-matrix printers as Teletype, Backspacing Teletype, or Half Linefeed printers. Since Teletypes move a whole character at a time rather than in 1/120ths of an inch, they cannot produce bold, and cannot implement microjustification. Similarly Teletypes can only move the paper vertically in whole lines, so subscripts and superscripts are crudely implemented by printing on the line above or the line below. WordStar version 3.3 does include the Epson MX-80 in the printer-installation menu, but omits the popular FX-80.

FANCY FEATURES

Yet many of the more sophisticated dot-matrix printers, including the Epson range, are capable of producing bold letters, underlining and giving properly subscripted and superscripted text. In addition they can give fancy features such as enlarged characters, smaller characters, italics, or proportional spacing. Since the WordStar installation menu does not implement these features for you automatically, you have to patch it for yourself if you wish to use them.

By default, the Epsoms print characters on a single pass so as to print as fast as is possible. However, by printing each line twice, better-looking printout can be obtained. To do this automatically you should patch the Printer Initialisation string PSInit to the character sequence that will put the Epson in the correct mode, and also patch the Printer Termination, PSFini, to return the Epson to normal printing.

To patch WordStar version 3.0 or earlier you reinstall WS.Com and make no changes at all. Eventually you are asked if changes are complete, to which you should answer N to get into the patcher. In WordStar 3.3 the procedure is different, since the patcher in the installation program has theoretically been withdrawn. To access it you type + from the main menu.

In either version of the patcher you must first specify the address at which you are going to make

EPSON PRINTER INSTALLATION

John Lee and Timothy Lee explain how you can access the full range of Epson print enhancements direct from WordStar.

TABLE 1. EPSON FX-80 CONTROL CODES

Print Feature	Character Sequence	Hexadecimal Equivalent
start Emphasized	<ESC> E	1B 45
stop Emphasized	<ESC> F	1B 46
start Double Character Printing	<ESC> G	1B 47
stop Double Character Printing	<ESC> H	1B 48
start Enlarged (Double width)	<S0>	0E
stop Enlarged (Double width)	<C4>	14
start condensed text	<SI>	0F
end condensed text	<C2>	12
start superscripting	<ESC> S <NUL>	1B 53 00
start subscripting	<ESC> S <SOH>	1B 53 01
stop sub/superscripting	<ESC> T	1B 54
start Italic text	<ESC> 4	1B 34
stop Italic text	<ESC> 5	1B 35
use Elite spacing	<ESC> M	1B 40
use Pica spacing	<ESC> P	1B 50
set vertical spacing	<ESC> A nn	1B 41 m

Angle brackets are used around ASCII control codes; for example, ESC means the ASCII Escape code, 1B. The vertical spacing is defined by a two-digit number, nn, corresponding to the line spacing in 1/72nds of an inch; for normal spacing nn is set to 12.

TABLE 2

Address	Characters	Hexadecimal
PSINIT:	<ESC> E <CR>	3 1B 45 0D
PSFINI:	<ESC> F	2 1B 46

TABLE 3

Address	Character Sequence	Hexadecimal
PSINIT:	<ESC> E <ESC> G <CR>	5 1B 45 1B 47 0D
PSFINI:	<ESC> F <ESC> H	4 1B 46 1B 48

TABLE 4

WordStar Control Character	Meaning	Address in WS.COM	Maximum Length of character sequence.
^Y	change to red	RIBBON:	4 bytes
	change to black	RIBOFF:	4 bytes
^A	Alternate pitch	PALT:	4 bytes
^N	Normal pitch	PSTD:	4 bytes
^Q	User defined #1	USR1:	4 bytes
^W	User defined #2	USR2:	4 bytes
^E	User defined #3	USR3:	4 bytes
^R	User defined #4	USR4:	4 bytes
done at start of print	Printer Initialisation	PSINIT:	16 bytes should end in <CR>
done at end of print	Printer Termination	PSFINI:	16 bytes

changes, or zero to quit. The addresses that you may want to patch are listed in table 2. For WordStar up to version 3.0 you should type in the addresses as PSINIT:

and so on, but for version 3.3 the colon comes before the name.

You are then asked to type in a value to replace the value currently at the address specified. For versions up to 3.0 you should type in the hexadecimal equivalent of the first byte of the character sequence, 1B, followed by Return; for version 3.3 you should type a comma then the hexadecimal

,1B

You are then asked for a new address for the next patch. If you only press Return the patcher moves on to the next byte after the one just patched, which is very useful for entering character strings. When you have finished one character string, type a new address name, or zero to finish.

To make WordStar use Emphasised mode you should set the values shown in table 2. Note the 0D at the end of PSInit. This is a Carriage Return to ensure that the printer starts printing in the first column. The 3 or 2 at the beginning of the hexadecimal character sequences gives the

length of the sequence; that is, the number of bytes that follow. Alternatively, for enhanced printing on an FX-80 you might set both Emphasised and Double Character printing. The appropriate values are shown in table 3.

You may also wish to change the line spacing for the printout to get double spacing or one-and-a-half spacing, rather than the standard six lines per inch. This can be accomplished by putting a Set Vertical Spacing command, such as

1B 41 18

for three lines per inch, or

1B 41 12


for four lines per inch into the printer initialisation sequence. If this is done it is advisable to restore the standard six lines per inch after the printout has finished. This can be done using the Set Vertical Spacing command

1B 41 0C

in the termination sequence.

WordStar contains seven print enhancements that send command sequences to the printer. These are ^Y, ^A, which is usually used for change to alternate pitch, and ^N, which is usually used for change back to normal pitch, along with four user-definable commands ^Q, ^W, ^E and ^R. Each time that WordStar finds one of these control characters in the file being printed it substitutes the predetermined sequence of characters that make the printer obey a command. The ^Y command, normally used to change ribbon colour, is slightly different from the rest in it generates two sequences of characters, the first to make the printer change to a red ribbon and the second to make the printer change back to a black ribbon. However, you could redefine it to toggle between italic and normal type, instead of between the red and black ribbons.

You must patch WordStar to incorporate the character sequences for the functions you wish to use. These character sequences are stored as consecutive bytes, starting at a known position, with the first byte indicating how many subsequent bytes there are in the sequence.

The addresses at which the various character sequences are held in WS.Com are shown in table 4, together with the maximum length of the command sequence that can be installed. 

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PC/3

STRING INEQUALITY FUNCTION

STRING INEQUALITY. LISTING 1

```
1000 PRINT "Press Spacebar to continue."
1010 GET K$:IF K$="" THEN 1010:REM K$=null
1020 IF K$=" " THEN RETURN:REM K$=space
1030 GOTO 1010
```

STRING INEQUALITY. LISTING 2

```
1000 PRINT "Press Spacebar to continue."
1010 GET K$:IF (K$=" ")<>-1 THEN 1010:REM K$<space
1020 RETURN

2000 PRINT "Answer Y(es) or N(o)"
2010 GET K$:IF (K$="Y")+<K$="N">-1 THEN 2010
2020 RETURN
```

JACK LEVETT suggests the following method of simulating a string inequality check properly, thus overcoming this Basic's sad inability to do it directly.

Because SP-5025 naturally allows a string equality check, something like

```
100 IF NAME$="FRED" THEN
  [do something]
```

is acceptable. Moreover, because the logical expression

```
NAME$="FRED"
```

has a zero value if false and a -1 value if true, it is possible, instead of a string check in line 100, to use a numeric check, thus:

```
200 IF (NAME$="FRED")=-1
  THEN [do something]
```

Since the Basic allows numeric

inequality checks, it also accepts the opposite of the line 200 statement, thus:

```
300 IF (NAME$="FRED")<>-1
  THEN [do something else]
```

which is clearly comparable to

```
300 IF (NAME$="FRED")=0
  THEN [do something else]
```

Since both of these are in effect the same as the disallowed

```
300 IF NAME$<>"FRED" THEN
  [do something else]
```

a string inequality check has been achieved after all.

A typical situation is one in which the program is expecting a single key entry. The user has to press the space bar, say. The wrong way to handle it is shown in listing 1, and the right ways in listing 2.

700 DELETE

SBasic running on the MZ-700 includes the command Delete, which is used to delete a block of program lines from the listing. However, you should beware of employing the command in the middle of a programming session that has included painstaking data input. In fact it should be avoided at any time when variables must have their values preserved, because after Delete all variables and arrays are zeroed or nulled, just as they are when the CLR command is given.

So if you want to remove lines but retain your variables, you must use the slow but safe method of taking out each line one at a time by entering the line number followed directly by Carriage Return.

SCREEN COLOURS

THE SHARP MZ-700 has a rudimentary windowing facility. Using the Console command, you can define a window within which all future screen operations such as printing, clear screen and Color instructions, take place.

The Color command, using the format

```
COLOR,,F,B
```

sets up the new foreground and background colours. These are not actually implemented until a screen write is performed. Printing and Poking to the screen are slow, and if the colours of the whole screen are to be changed instantly this can only be done via the interpreter CLS routine or by some purpose-built machine-code sequence.

Regrettably, the CLS routine clears the screen of its contents, as well as colouring it. A machine-code sequence is beyond most of

us, and there is no Basic Change Colour routine that resets the colours while leaving the display otherwise untouched.

However, according to Pete Farne all is not lost. As pointed out by G P Ridley in his book *Peeking and Poking the Sharp MZ-700*, and as mentioned by Sharpsoft in the first edition of its *MZ-700 User Notes*, it is possible with a USR call to jump into Basic's CLS routine at a place effectively after the screen has been cleared but before the colours have been changed.

Geoff Ridley recommends a USR(\$072D). Sharpsoft suggests a Poke \$0730,\$18,\$02 to disable the Clear part, followed by a USR(\$0724) to change colours and a Poke \$0730,\$36,\$00 to re-enable. Both of these work. The Ridley version is simpler, but location \$072D, which should hold \$F3, the Disable Interrupts, is zeroed in addition.

Unfortunately, neither suggestion is any use when a console-defined window has been set up, for the window CLS routine is a different piece of interpreter code, selected if the Console flag, at \$004E, has been set. The relevant code runs from \$0757 to \$078C, with a couple of calls to routines at \$0704, \$06F9 and \$05AE which do clever things with the window parameters that are stored at \$0056/\$57/\$5B and /5C.

The display zeroing has as its core a LD(HL), #00 at \$765/66 and — unlike the identical instruction at \$0730/31, where this will not work — can be avoided simply by a Poke converting the LD(HL), op code \$36, into a NOP, op code \$00. Thus Poke \$0765,\$00 will do the trick. Now a window can have its colour changed with a

```
COLOR,,F,B:CLS
```

command without wiping the display. The CLS clear is then re-

SCREEN COLOURS

```
100 CONSOLE:COLOR,,7,1:CLS
110 FOR K=1 TO 20
120 PRINT TAB(12);"A TEST PATTERN"
130 NEXT K
140 FOR BB=0 TO 7
150 CONSOLE:COLOR,,7,BB
160 REM CHANGE WHOLE SCREEN
170 USR($72D):POKE $72D,$F3
180 FOR B=0 TO 7
190 CONSOLE 5,18,5,15
200 F=7*-(B<5):COLOR,,F,B
210 REM NOW CHANGE WINDOW COLOUR
220 POKE $765,$00:CLS:POKE $765,$36
230 FOR DELAY=1 TO 400:NEXT
240 NEXT B
250 NEXT BB
260 COLOR,,7,1:CONSOLE:CLS
270 END
```

enabled by a Poke \$0765,\$36. The accompanying listing is a short program demonstrating this both with and without windows.

Finally, if you want to perform a screen-colour change without putting the cursor into the home position, which is what the CLS routine normally does, just Poke in a RET, op code \$C9, after the change part of the routine but before the cursor is repositioned. Without a window this is Poke \$0746,\$C9 instead of \$21. With a window it is Poke \$0701,\$C9 instead of \$C3.

EXTENDED LIST COMMAND

THE MZ-700's Basic is full of surprises. One of the more interesting, pointed out by Martin Playle in a recent edition of Sharpsoft's quarterly User Notes, concerns an extension of the List command.

Like all SBasic keywords, List has an abbreviated form, the letter L followed by a full stop. However, an odd thing happens if the L is followed by two full stops, equivalent to the extended command

```
LIST.
```

For example, if a listing is stopped using Shift/Break, and the extended command

```
L..
```

plus a Carriage Return is entered, then the last line listed is repeated.

S Wilbourne has pointed out that if an SBasic program stops with an error message, then

```
L..
```


will often call up the offending line. In each case

```
L...-
```

will list up to the relevant line, while

```
L...-
```

will list from that line onwards.

Finally, as a bonus it appears that all this is also true for the equivalent List/P commands. 

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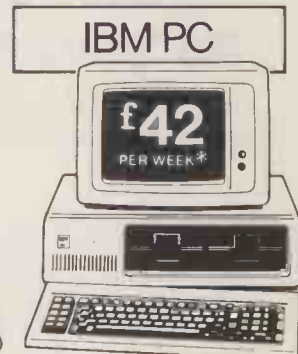
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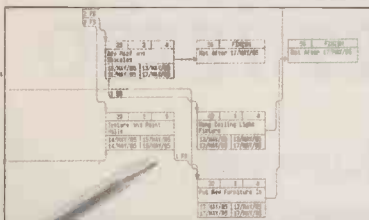
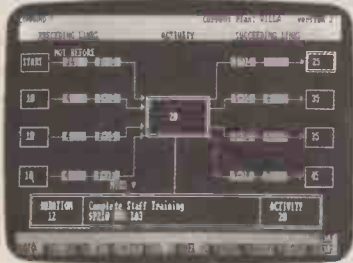
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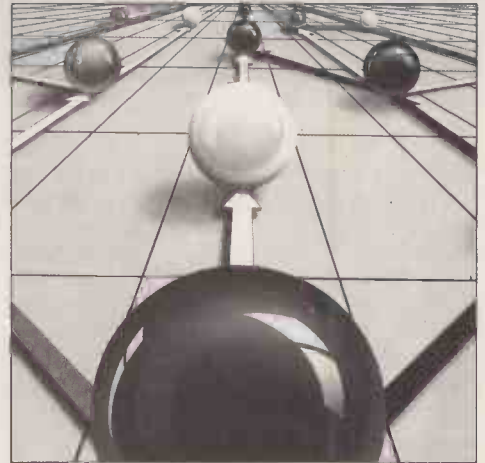
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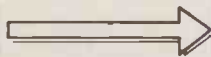
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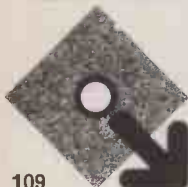
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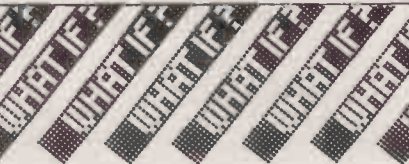
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