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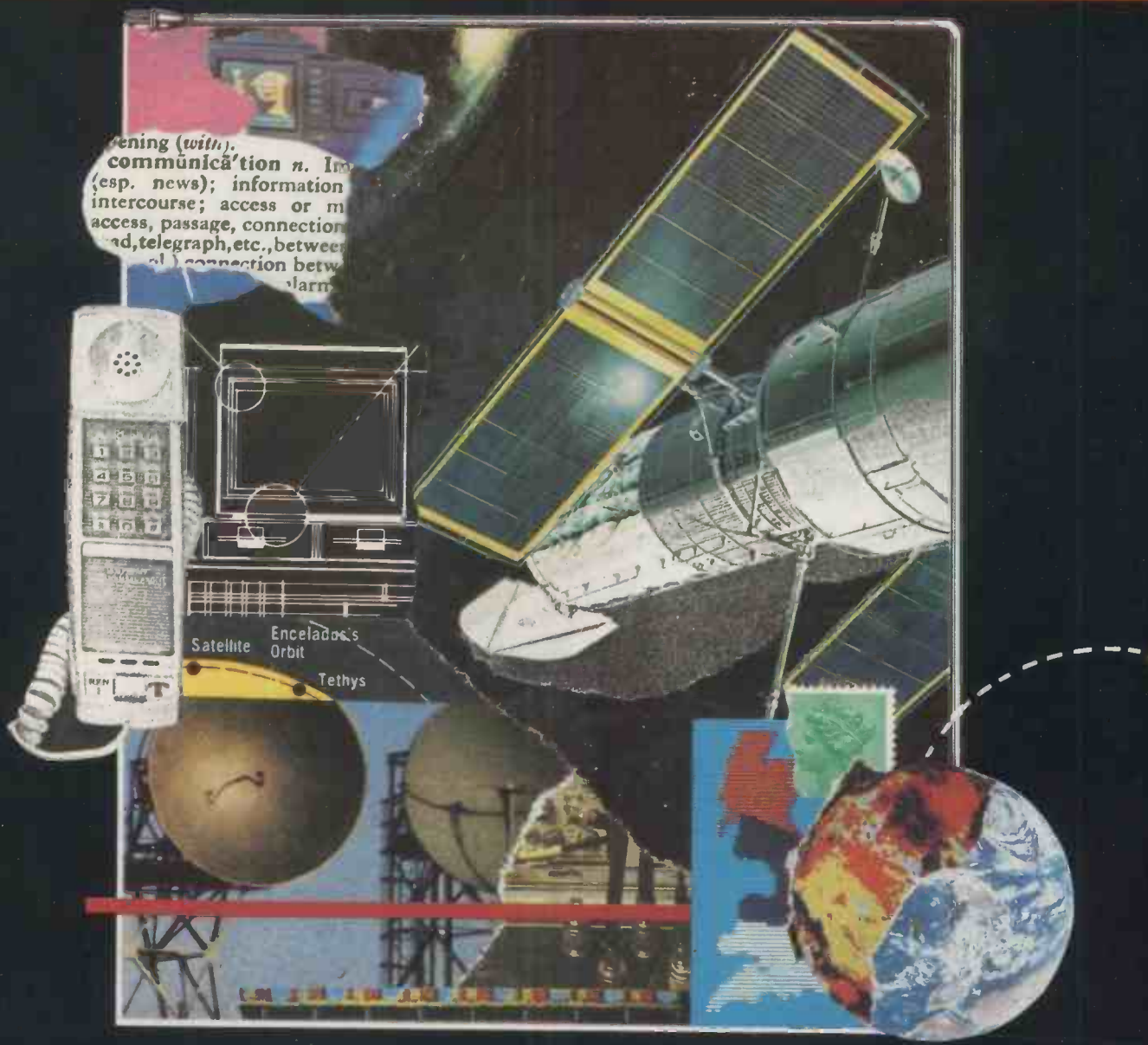

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PRACTICAL COMPUTING

DECEMBER 1985 CONTENTS

COVER FEATURE

COMMS

Our special feature looks at one of the fastest-growing areas of micros: communications. We explain the different ways you can hook up your computer to other computers, ranging from the one on the next desk to mainframes across the world. After an introduction, *Ian Stobie* provides a comprehensive guide to comms on the Mac on page 102. The Chit-Chat package is investigated by *Mike Lewis* on page 104, and on page 105 *Kathryn Custance* explores the world of business viewdata. Finally, on page 107, *Jack Schofield* looks at the competing electronic mail systems **101**

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HP Vectra A touch above the AT — page 68.

Logistix Into the fourth dimension — page 78.

NEWS

Atari's 520ST takes the PC of the Year title.

OPEN FILE

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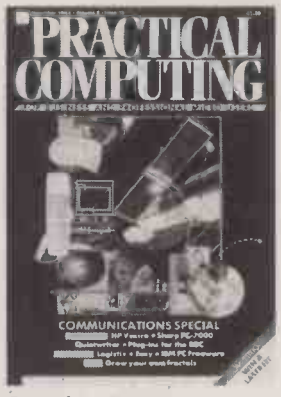

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THE CURSE OF THE CALC

The success of the micro is intimately bound up with the rise of the spreadsheet. The appearance of VisiCalc turned the Apple II from a hobbyist's plaything into an indispensable financial tool. The number of Apples sold as a direct result of VisiCalc can never be known, but it is certainly more than a windfall or three.

Later, the marketing impetus behind Lotus 1-2-3 not only sold programs but converted people to the new 16-bit machines. It may have even been instrumental in the success of the IBM PC itself. And today, the leading-edge products like Jazz, Excel and Logistix still have at their core the basic spreadsheet function.

The continuing popularity of calcs is understandable. For the hard-pressed manager, constantly required to draw up budgets and forecasts, they are a godsend. Apart from the huge time savings — a weekend's pencilling-in and erasing of figures can be accomplished in 20 minutes with a calc — they are also easy to use. They mimic very closely the way in which an ordinary paper budget sheet is constructed. Little effort is required, and no fundamental changes in working patterns. And therein lies the danger.

Calcs are just too easy to use. Once you have tried one, you will never want to use anything else. Which is fine when you are dealing with budgets and forecasts, but foolish or even plain dangerous anywhere else.

In a recent survey carried out in the U.S. by Software Access International, 60 percent of spreadsheet users set up database applications on their calcs. There were also 12 percent who used spreadsheets for generating production reports. Spreadsheets have become a victim of their own success, and have passed from being the spearhead of the business software invasion to a kind of programming dumdum bullet.

It is true that many simple database operations like sorting can be performed easily on the more advanced spreadsheets. You can even produce crude text documents from a calc. There is no galactic law which says "Thou shalt not pervert spreadsheets into unnatural uses." But what is worrying is that such activities suggest that the introduction of micros into business has failed.

Executives may have embraced the spreadsheet, but only as an automated extension to pencil, paper and rubber. They have not actually emigrated to the land of micros: simply made a brief excursion there, returning with intoxicating duty-free goods like VisiCalc and Lotus.

The implications of this are serious. It means that both the hardware and software industries are living in cloud-cuckoo-land. Despite the reassuring number of micros now being installed on desk tops across the world, and the millions of packages which have been bought to run on them, neither are being used to anything like their full extent.

As a result, the user probably cares very little whether his or her micro has eight, 16 or 32 bits; or whether the processor runs at 4.77MHz or 12MHz. It seems that microcomputing power has become one of those non-optional extras like sunroofs on cars: you get it whether you want it or not. Similarly, the software houses' pell-mell rush to find the fabled Fifth Canonical Application — along with the spreadsheet, word processor, database and comms, — becomes totally misguided. People are not even using what they've got, let alone wanting extra features.

So what can be done? At the very best, clinging to the calc is a matter of user-friendliness. Managers are reluctant to struggle with true databases or full word processors because they are too complicated. Software writers would do better to make their future products 10 percent easier to use rather than 10 percent more powerful. Ultimately that Holy Grail of computing, Artificial Intelligence, may well provide the solution to such problems. Once any program can ask you what you want, listen to your answer and understand, rather than wait dumbly to be led every step of the way, even the most Luddite of executives is going to feel at home.

The worst case is more problematic. If managers' conversion to the micro creed really is only superficial, and their use of software tools more token than total, the industry has a job on its hands and one which it thought it had despatched long ago. That is, to convince professionals that micros are more than just glorified calculators, and that potentially they could do for every aspect of business what the spreadsheet has done for budgets. If business computing is to flourish, we must outgrow the cult of the calc.

5 YEARS AGO...

The U.K. representative on the Council of Europe's Committee of Ministers has undertaken to sign the European convention on data protection on January 28. It commits the U.K. to pass laws which enshrine a set of general principles, which include the right of a subject to look at files which may be held on him, to correct any mistakes in such files and — more importantly — to know if such a file exists.

Industrialists are concerned that the lack of data privacy in the U.K. has earned the country the reputation of being a "dirty data" haven. Our European partners are prohibited by law from trading with U.K. firms which are thereby losing business.

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Political BBS

A NEW bulletin board will be on-line from 1 October 1985, operating from 12 noon to 7p.m. from Monday through to Friday. For those who wish to make contact the parameters are
WORD:8
STOP: 1
PARITY: N
BAUD: 300

The board will be entirely devoted to political matters; democratic and open to all to state their opinions, pass on news, send messages to nominated or all users. Personal communication between the users and the system operator can take place if he is available.

For those who have never contacted a bulletin board before, all you require is a micro with an RS-232 fitted, a modem to connect the telephone line, the necessary software and the phone number (0604) 718391. From then on the system computer will guide you through with menus and prompts. Remember the board will inevitably become just what you the user makes of it.

H FRUISH,
Northampton.

Samna Word III

I AM sufficiently disturbed by the review of Samna in the October edition of *Practical Computing* to put finger to keyboard. I reviewed Samna for a series of articles in *PC User* earlier this year and found it a very impressive word processor, so much so that I now use it for all my non-scientific work.

I am writing, not simply because the review you published does not present a fair picture of what is an excellent word processor for a creative writer, but also because your reviewer actually gets it completely wrong on a number of important points.

First, any of a large number of installed printers can be easily selected from the default menu. I am currently switching between four printers — Epson FX, LX, LQ and Toshiba 2100G — all of which are installed and selectable in about 20 seconds or so from within the program.

Second, the extension to the print selection menu allows you to select draft or enhanced print quality at the time of printing.

Third, I have rarely seen better tutorial support. If your reviewer had bothered to look at the booklet which is prominently titled *Samna: Read Me First* she would have found an exemplary bit of first-time user support which documents fully the setup procedures and provides a guide to all the comprehensive tutorials.

It is also clear that your reviewer has failed to appreciate that Samna keeps only a page of text in memory at a time. All additions and edits are saved at the time they are entered. Thus there is no need to do the regular security saves to which she refers. In fact, Samna is the most secure processor I have ever used — with power failures and the usual gremlins I have never lost more than a line in over nine months.

Your reviewer has failed to highlight some of the strengths of Samna: its ability to index documents to allow retrieval items previously written; the use of windows to allow two documents to be seen and edited together; the provision of true background printing; very good repagination; and really excellent printer control.

I know that depending on one's previous experience, the style of a word processor may be unfamiliar and thus a little intimidating. But given that, to not to appreciate the excellent use of the PC's function keys to provide a well structured and well thought-out environment for the user is rather sad.

DR GEOFFREY EINON,
London NW4.

SUSAN CURRAN REPLIES:
Inevitably, a reviewer testing many different word processors cannot become as familiar with them all as someone who uses one program continuously for months or years. Hopefully my good basis for comparison is more than compensation for this. Of course, I work as extensively as possible with every program I review, check out tutorial features thoroughly, and read the manual from cover to cover.

For the Samna review as well as systematically testing the major program features, over a period of two months I wrote many letters, technical reports and around 100 pages of a novel using the program.

I no longer have the manual, so I cannot check all these points. Nor could I mention every program feature in a short review. I am sure some of Dr Einon's comments are valid.

I spent many hours trying to switch between my two printers — an Epson FX-80 and a Tandy daisywheel — with total lack of success. Checking now, I can find no assistance in the default menu or its Help: maybe Dr Einon has a different version. I read *Read -Me First* then spent hours trying to access the tutorial documents in many different ways, without success. Like everyone I have occasional blindspots, but I have used many, many programs without difficulty. So when I fail, I do tend to blame the program and/or the manual, and to assume that some other users will also have problems.

Since writing the review I have used Samna to revise some earlier work. I find I can make a cup of tea in the time it takes to reformat a 10-page chapter, changing margins and switching from single to double spacing. Other programs do this instantaneously. I consider the program so cumbersome that rather than continue to edit files with it, I have transferred all my files to my preferred IBM word processor — Word Perfect — and in the process some became hopelessly corrupted. As far as I can judge the corruption was Samna's fault: it did not impress me.

I am glad that I do not have to work regularly with this program. But if the program pleases Dr Einon I am happy to see his opinion printed too.

Turbo Pascal

FURTHER to my review on Turbo Pascal — see *PC* November, page 94 — I would report that there is not in fact a bug in the Toolbox database routines. The problem was occasioned by opening all the data files with the same length record due to my misinterpretation of the manual. The constant Maxdatarecsize should be set to the largest of the record sizes, but each data file should be opened using the function

SizeOf(Record)

However, it is important to ensure that version 1.01 of the Toolbox is used as there are known errors in index file handling in version 1.00.

(continued on next page)

ELECTROSTATIC DISCHARGE

WITH reference to Brian Hamer's letter — see Feedback, October — yes, electrostatic discharge is a problem with modern micros and with the later electronic devices generally. So much so that, some years ago, ICL issued an anti-static handling kit to its service engineers, to the great benefit of equipment reliability thereafter.

As to its being humidity-related, while high levels of humidity would produce enough ionic activity to reduce the peak voltages attained, it should be borne in mind that, on the microelectronic level, a static charge of as little as 30V could cause flashover and subsequent damage. This is because, with track separation of the order of a couple of microns, 30V represents a field strength of hundreds of thousands of volts per centimetre.

Even using a conducting earthed wriststrap does not eliminate the problem, but it does minimise its effects to acceptable levels.

I did not see the *Tomorrow's World* programme but I'm glad that awareness of the problem is spreading. If ESD is not already a matter of concern to personal computer users, it should be.

JACK MAGUIRE,
ICL Customer Engineer,
Maghull,
Lancashire.

(continued from previous page)
Specifically, if the index file is closed and reopened after each update — as it should be for maximum data security — subsequent updates may not be correctly transferred to disc. The updates in version 1.01 correct this. Alternatively, your dealer should have a list of corrections for end-user updating of version 1.00.

DR BARRY CLARK,
Glasgow.

K-sample Test

ONE of the entertaining aspects of the computer press is the articles which appear giving solutions to problems which have already been solved, often in much more sophisticated ways. Owen Bishop's program K-sample Test — see *PC* October, page 116 — is just such an instance.

The problem which he seeks to solve is one which has appeared in a wide range of forms in experimental psychology for many years. The standard way of approaching it is to use the Kruskal-Wallis one-way analysis of variance. This provides an analytical approach, avoiding the uncertainties of a Monte Carlo simulation. A full description is in Siegel's, *Non Parametric Statistics for the Behavioural Sciences,* published by MacGraw-Hill, 1956.

I find it surprising that Mr Bishop has apparently not heard of this test, more so since the reference list appears to include a book on statistics written by him. Just to rub salt in the wound, an application of the Kruskal-Wallis test to the data in his table shows a statistically significant difference at the two percent level. Despite Mr Bishop's assertion to the contrary, there appears to be evidence that WYTO is rated as better.

Perhaps this does no more than show that Monte Carlo simulations are difficult to handle. If the problem is one of sampling from 3.57E + 19 tables, most statisticians would not be happy with only a few hundred trials — a few million might be adequate.

P R WILKINS,
Camberley,
Surrey.

OWEN BISHOP REPLIES: Do not jump to conclusions, Mr Wilkins. A copy of Siegel's authoritative book on the non-parametric tests has been in the bookshelf on my desk for over a decade, when not actually on the desk being used for reference. Consequently, I am fully aware of the Kruskal-Wallis test. Nevertheless, I did not select it as a topic for the article.

Regular readers of this occasional series will know that, ever since it began in 1979, a recurring theme is that of employing micros to do what micros can do particularly well. Most of the tests previously described have set the machine to performing a simple but boringly repetitive task at high speed. The Monte Carlo approach to the k-sample test is a clear example of this, which was the primary reason for selecting it for the series.

Another reason is that the test is elegantly robust. Its principle is so simple that it is easily explained in terms that the average reader can understand within the compass of a page or two of this magazine. The basis of the Kruskal-Wallis test would have to be taken on trust by readers unless they were prepared to work their way through the original papers published in 1952.

A third reason for deciding not to describe the Kruskal-Wallis test is that it requires the user to refer to tables after performing the computation. Such tables could not conveniently be reprinted in an article. Incidentally, the tables estimate the probability only within a few tabulated ranges. The Monte Carlo method gives a point estimate with any required degree of precision. Although I have devised a algorithm for calculating p for any given value of chi-squared, it is not worthwhile to produce one equivalent to Seigel's Table 0, which is in any case limited to only three samples.

Monte Carlo methods have become feasible only with the proliferation of micros and one may wonder if tests such as the Kruskal-Wallis test would ever have been invented had micros been commonly available at the time. True, 200 runs do not give a very precise result, serving only to demonstrate the technique, but the user is free to increase the number of runs to a million or more if required.

The discrepancy between the results of the two analyses might be explained by the different effect of ties, of which there were many in the data. Or maybe either myself or Mr Wilkins made an error in keying in data. This point could be investigated further but I doubt if it would reveal anything of consequence.

Greek-text program

AS A teacher of Greek, I was delighted to see the foreign-text programs in your August issue which turned an Epson FX-80 printer into a Russian, Turkish or Greek typewriter. I typed in the Greek version without alteration on my Olivetti M-24 for use with a Canon PW-1080A printer. Compatibility is here at last. When I had the program up and running, I deleted lines 980 to End which print a test alphabet. I substituted

980 SYSTEM

as the last line of the program, and saved it as Greek.Bas.

I use WordStar which has four empty commands at the user's disposal. I programmed Ctrl-PQ to set alternate mode and Ctrl-PW to cancel alternate mode. The codes are

SET: <1B> <4> hex

or

<27> <52> decimal

and

CANCEL: <1B> <5> hex

or

<27> <53> decimal

The programming must be done through WordStar's Install.

In a normal working session, therefore, Ctrl-PQ launches my text into italics and Ctrl-PW returns it to normal, but if I turn on the printer and run Greek.Bas before starting work, Ctrl-PQ and Ctrl-PW set and cancel the Greek alphabet instead. This facility to switch back and forth from English to Greek makes my computer extremely useful in preparing students' exercises.

I then set up the following simple batch file

```
GREEK.BAT
GWBASIC GREEK.BAS
WS %1
```

The batch file is typed in using the command

COPY CON GREEK.BAT

with Ctrl-Z to end.

When I want to use the Greek alphabet in a working session, I respond to the system prompt with Greek instead of WS for WordStar. The computer loads and runs Greek.Bas, and then hands me over to WordStar. The parameter %1 allows me to name an old or new file and go straight to it without stopping for the WordStar opening menu.

On an IBM computer instead of a clone, the second line of the batch file would

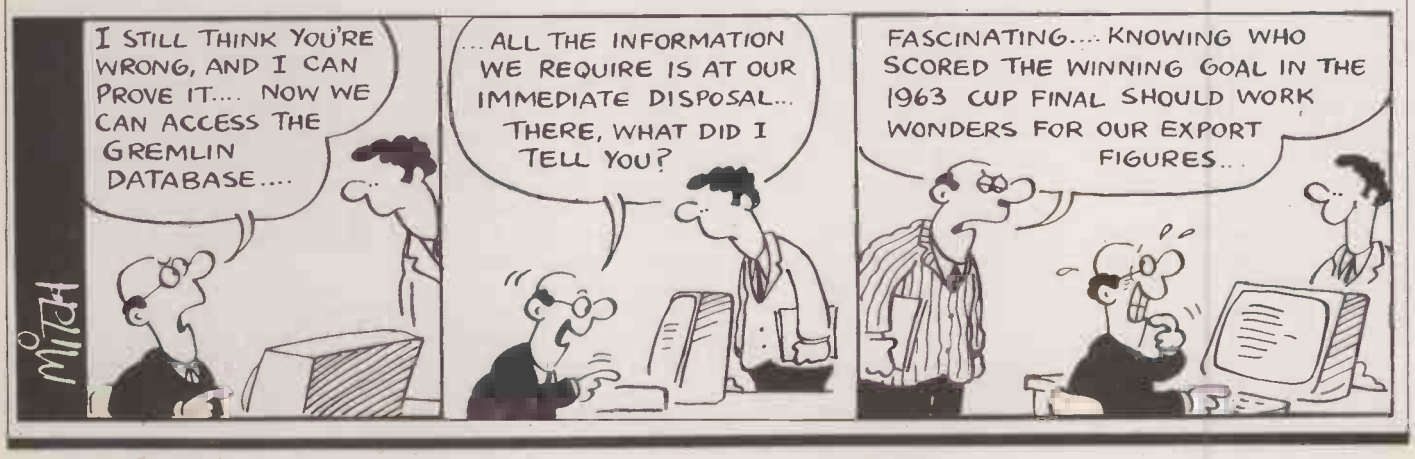
BASICA GREEK.BAS

JEAN MILES,
Birmingham.

(continued on page 13)

Lasermail

THE telephone number published for Specsoft's Lasermail system — *PC* October page 17 — is incorrect. The correct number is (0903) 212552.



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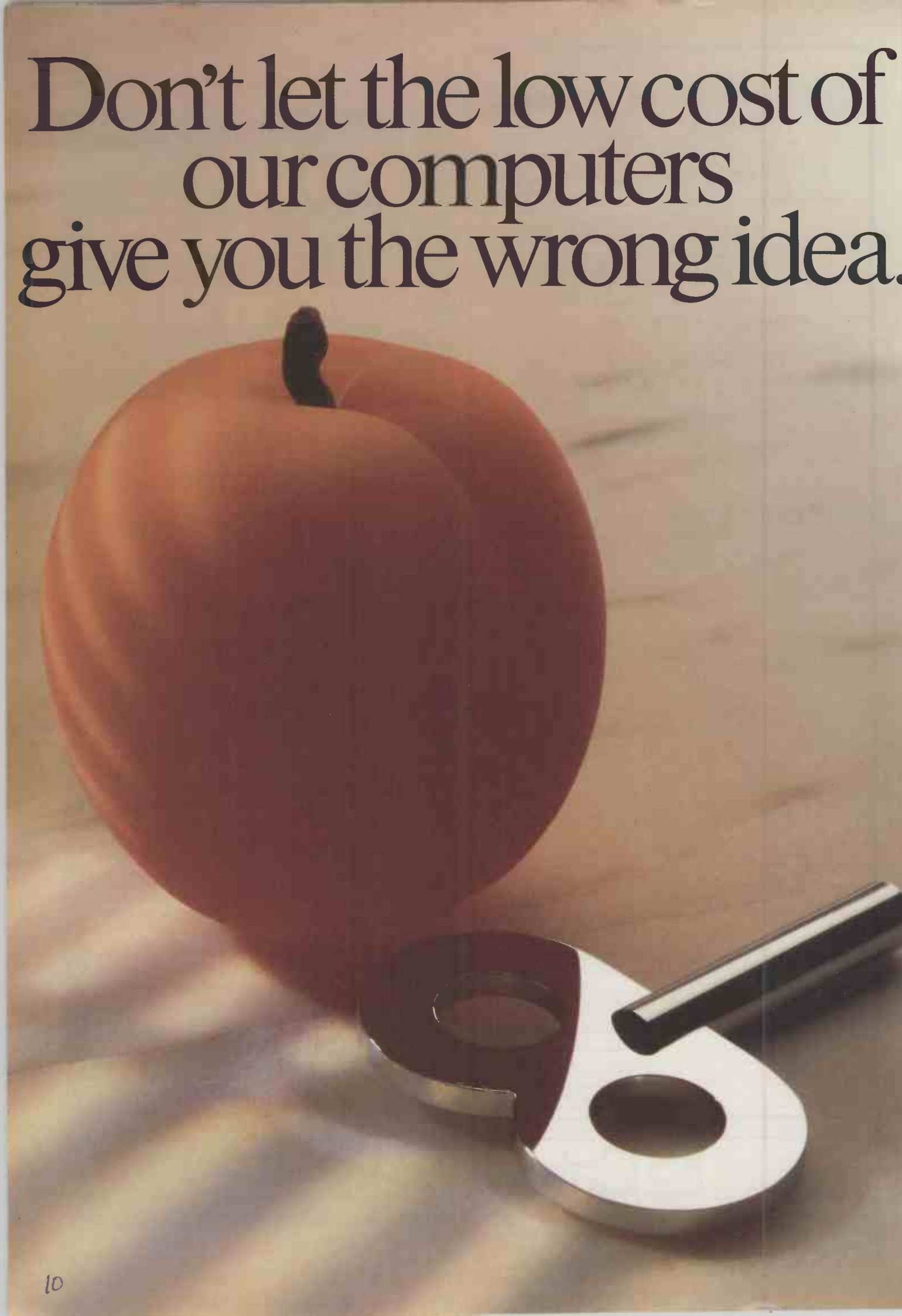

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Activity's icon or picture-based commands enable you to get started easily and handle all the basic functions.

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BASIC BENCHMARKS

WITH reference to the letter from Mr Harris in the October issue of *Practical Computing*, regarding the speed of his Vic-20 bubble sort, I enclose a listing of the program as used on my Amstrad CPC-664 — see list 1. As you will see the only difference is in the way that the time is calculated. The outcome of this is 131 seconds.

Perhaps it is a good opportunity to express my disgust at the way that Amstrad have treated their customers who have just purchased the CPC-664, only to find that it has been superseded by the CPC-6128 some four months, at the very most, after it became available and that the new machine is also some £50 cheaper.

Before I purchased a 664 I took the trouble to contact Amstrad to enquire whether there was any chance of a machine with a larger memory in the near future, to be told, "Categorically, not before the spring of 1986 at the earliest". Not eight weeks later, the new 6128 is available in the shops. When I contacted them about this, the reaction I received was, effectively, "Hard luck, someone had to buy the things."

DAVID FOSTER,
Kendal,
Cumbria.

I HAVE tried Mr Harris's Vic bubble sort on my Amstrad CPC-464 and obtained a time of 142 seconds.

A M TUCKER,
Dorchester,
Dorset.

I ENTERED A Harris's program into my BBC Micro which ran the routine in 73.77 seconds, thus trouncing the IBM PC/XT at a fraction of the cost. Further, using integer variables, the humble BBC ran the routine in 42.89 seconds.

IAN B BROWN,
Motherwell,
Lanarkshire.

MY LISTING (listing 3) shows the BBC Micro to its best advantage and the original code runs in 42.87 seconds using integer variables. If the timing loop is restricted to the sort itself, this drops to 39.07 seconds. Eliminating the unnecessary trip to the top in each bubble — as in the listing — reduces this to 28.36 seconds. The switch to a Repeat-Until construction is to make it nicer, not faster.

JOHN COLE,
Atherton,
Manchester.

THE BUBBLE SORT runs in 48 seconds on BBC B with 6502 second processor or 27 seconds using integer variables. H J Gawlik states he was not after speed: has anyone tried this on the 32016 co-processor?

G LANGLEY,
Canterbury,
Kent.

THE LETTER from A Harris inspired me to check out the bubble sort on my Canon MSX. Entering the program as listed in the October issue, except for a slight difference in the timing commands — see listing 2 — I was disappointed to achieve a time of 171.58 seconds. I then remembered that the MSX automatically calculates to 14-digit accuracy. Converting all variables to single precision using DefSNGA-Z gave a time of 160 seconds.

I then decided to go all the way by converting to integers and tidying up line 5 using the swap command as listed, thus reducing the time to 87.12 seconds. A further second is clipped by combining lines 4 and 5 under one line number.

Timings include printing to the screen. This is rather dubious practice as 0.5 seconds can be added by forgetting to clear the screen before running and even more variation depending on screen mode and width setting. The time without printing is only 76 seconds.

KARL WILSON,
Whitehaven,
Cumbria.

WITH reference to the letter in the October issue from Mr Harris on bubble sorts. As written, this program runs in 74 seconds on my BBC B, over twice as fast as your IBM PC. The times given include printing out the unsorted and sorted arrays. The bubble sort alone takes 70 seconds on the BBC B and this can be reduced to 43 seconds by making N an integer.

P J VINCENT,
Sutton Coldfield.

WHY pay IBM prices? After I had changed Dim(M) to Dim(100) my Osborne Executive ran H J Gawlik's bubble sort in 128 seconds in MBasic, but only took four seconds with Borland Pascal. With range checks and user interrupts enabled, Borland Pascal only took 12 seconds.

DAVID IBBETSON,
Stanmore,
Middlesex. PC

LISTING 1. AMSTRAD

```
1 start=TIME:m=100:f=0:n=0:x=0:DIM u(100)
2 FOR n=1 TO m
3 u(n)=m-n:PRINT n,u(n):NEXT
4 f=0:FOR n=1 TO m-1
5 IF u(n+1)<u(n) THEN x=u(n):u(n)=u(n+1):u(n+1)=x:f=1
6 NEXT:IF f>0 THEN 4
7 FOR n=1 TO m:PRINT n,u(n):NEXT
8 PRINT INT((TIME-start)/300);" secs"
    RESULT   131 SECONDS
```

LISTING 2. MSX

```
1 DEFINTA-Z:M=100:F=0:N=0:X=0:DIMU(M):TIME=0
2 FOR N=1 TO M
3 U(N)=M-N:PRINTN,U(N):NEXT
4 F=0:FORN=1TOM-1
5 IFU(N+1)<U(N)THENSWAPU(N),U(N+1):F=1
6 NEXT:IF F>0 THEN 4
7 FOR N=1 TO M:PRINT N,U(N):NEXT
8 PRINT "time= ";TIME/50
```

LISTING 3. BBC

```
10M%=100:H%=M%:DIMU%(M%):FORN%=1TOM%:U%(N%)=M%-N%:PRINTN%
U%(N%):NEXT:TIME=0
20REPEAT:H%=H%-1:F%=1:FORN%=1TOH%:IFU%(N%+1)<U%(N%)THENX%=U%(N%):U%(N%
)=U%(N%+1):U%(N%+1)=X%:F%=0
30NEXT:UNTILF%:T%=TIME:FORN%=1TOM%:PRINTN% U%(N%):NEXT:PRINT"TIME =
";T%/100
>RUN
```

APRICOT'S HIGH-FLYING XEN

THE XEN is Apricot's new top-of-the-range model, offering an 80286 but only limited IBM compatibility. The entry-level system comes with 512K RAM, two 3.5in. 720K floppies, serial and parallel ports, keyboard, screen, MS-DOS 3.1 and Windows, and costs £2,490. A 20Mbyte hard-disc version with 1Mbyte of RAM but no monitor costs £3,095.

The Xen has six internal expansion slots, of which four are available for existing Apricot add-on cards. The keyboard has the small LCD microscreen as on the Apricot PC models, but it is now back-lit for greater readability. A range of screens is available, including a paper-white phosphor display with 800 by 400 pixels, and a high-resolution colour display with 640 by 350 pixels. The Xen will also drive existing Apricot 12in. high-resolution green phosphor monitors. An unusual feature is the use of an external power-supply unit which sits on the floor.

Add-ons include an expansion box which enables two IBM PC or PC/AT expansion cards to be interfaced to the Xen, and a 5.25in. 320K floppy disc. Both of these products allow for some measure of IBM compatibility, though this is only at the data-interchange level as far as software is concerned.

Future options include an 80287 maths co-processor and Xenix, allowing up to 16 terminals to be connected. Details on 021-454 9091.

The Xen comes with an 80286 processor, MS-DOS and Windows.

ICE cube

ICE has announced the Macrocube, a 10Mbyte hard disc with built-in Appletalk interface and software. The cost is £1,745. A 21Mbyte version with a 22.5Mbyte tape streamer costs £3,605. More on (07842) 51255.

Worm disc

THE ISI Model 525 WC is a 5.25in. Worm (write once, read many times) optical disc. It can store 100Mbyte, has a data-transfer speed of 2.5 megabits per second, and costs under £2,000. More information from CPU Peripherals on (04862) 23411.

New Apple add-ons and price reductions

APPLE has announced that the 512K Macintosh is being reduced to £1,995, and the 128K version to £1,695. The Laserwriter price has been cut by £1,000 to £5,995. There is also a special offer whereby for £995 you get an Apple IIc, monitor, external disc drive and Appleworks.

New products include the Hard Disc 20 for the Mac, which will cost about £1,500, and Imagewriter II costing about £500. Products for the Apple II include a high-resolution colour monitor for the IIc, and Unidisc, a 3.5in. 800K floppy for the IIe. No prices were available at the time of writing, for details ring (0442) 60244.

Triple-standard modem

TANDATA has launched the Tm-602, which can handle the three most commonly used comms speeds V-21, V-22 and V-23. It also has autodial and auto-answer, plus auto log-on to most databases. The cost is £465.

Tandata has also reduced the prices on several of its modems. The Tm-110 for the BBC Micro now costs £99, and the Tm-512 multi-baud-rate, autodial and auto-answer costs £245. Details on (06845) 68421.

Radiation screen

AS THE fur continues to fly in the debate on VDU safety, a new filter screen has been launched. The manufacturer claims that Ultraguard cuts out 99 percent of ultraviolet radiation and 70 percent of X-rays. The cost is £97. There is also an even more ultra Ultraguard which costs £237. Details on 01-226 1852.

HARDWARE SHORTS

- Grid has cut the prices of its Gridcase. The plasma version costs £3,695, and the LCD version £2,520. More on (07372) 41211.
- The M-24R is a multi-user version of the Olivetti M-24 running under BOS from Raindrop Computers. Cost starts from £5,500. Details on 01-734 1091.
- Future Computers has cut the price of the FX-30/20 256K machine to £3,450. More on 01-686 2233.
- Protek has launched a programming unit for its passive dongle. The cost is £650. Tel: 01-245 6844.
- DEC has reduced the price of the 10Mbyte hard-disc Rainbow to £3,900. A new 20Mbyte version costs £4,400.
- Commodore is offering the Commodore 128 computer with a 0.5Mbyte 5.25in. 1570 disc drive for £449.99 including VAT.
- Sinclair has declared that it may introduce the Spanish 128K Spectrum in the U.K. next spring.
- GEC has produced two low-cost modems suitable for both ASCII communications and viewdata services. The Datachat 1223 costs £78.22 plus VAT and conforms to the V-23 standard providing 1,200/75 and 75/1,200 bits per second operation. The £124.69 Datachat 1223A has additional auto-answering facilities. Tel: (0203) 446331. PC

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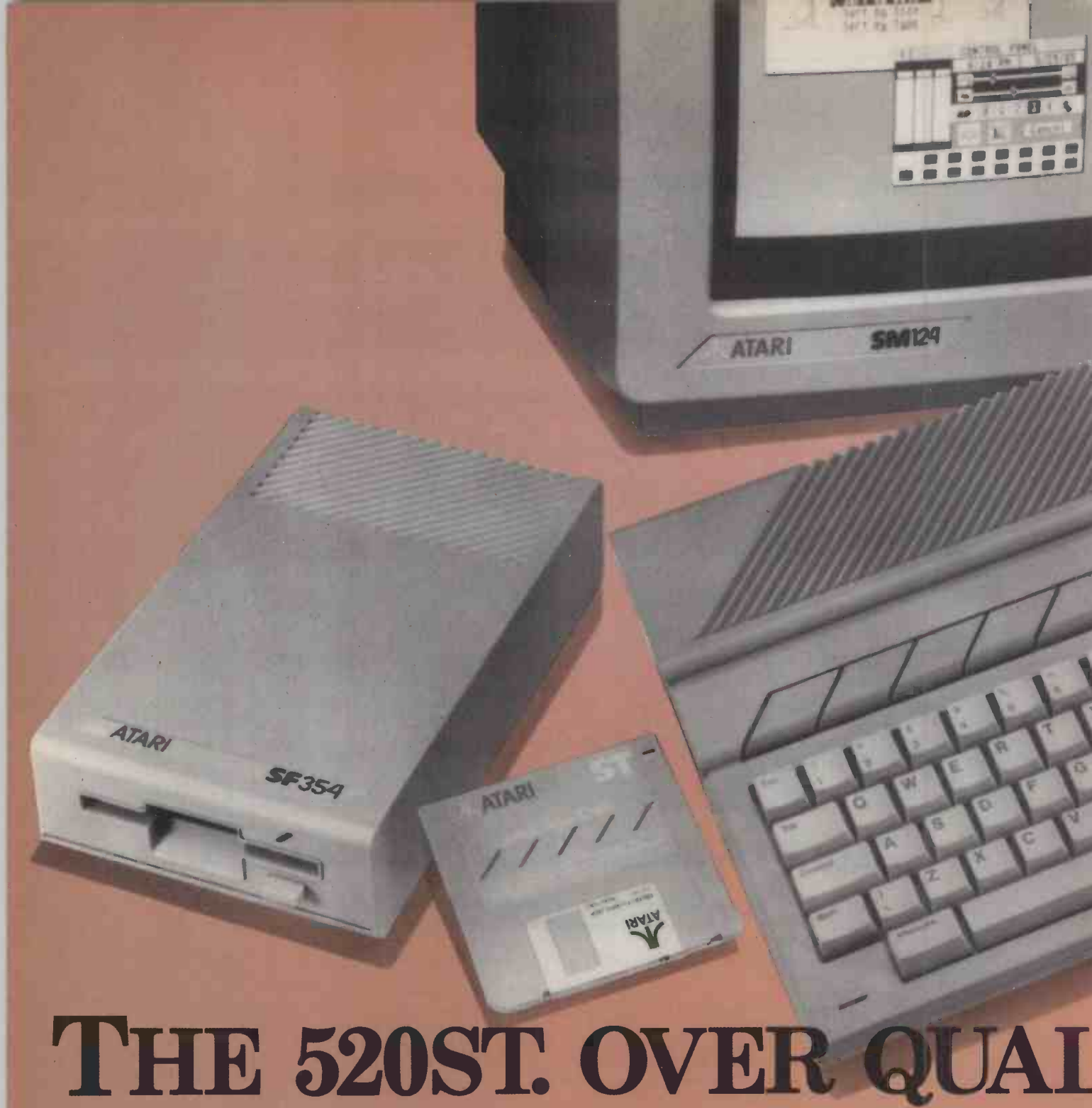

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Farnham Computers.
SURREY GUILDFORD
Laskys.
SURREY KINGSTON
Laskys.
SURREY LEATHERHEAD
Evergreen Ltd.
SUSSEX BRIGHTON
Brighton Computer Exchange.
SUSSEX BRIGHTON
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SUSSEX BRIGHTON
Laskys.
SUSSEX CRAWLEY
Laskys.
SUSSEX WORTHING
Data Direct.
TAYSIDE DUNDEE
Cursor Keys.
TAYSIDE DUNDEE
Micromania.
TAYSIDE PERTH
VICS.
TYNE AND WEAR GATESHEAD
Currie & Maughn.
TYNE AND WEAR
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WARWICKS LEAMINGTON SPA
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WARWICKS NUNEATON
Micro City.
WARWICKS NUNEATON
Warwick Computers.
W. MIDLANDS BIRMINGHAM
Lewis's Ltd (Sound & Vision).
W. MIDLANDS BIRMINGHAM
Software Express.
W. MIDLANDS BIRMINGHAM
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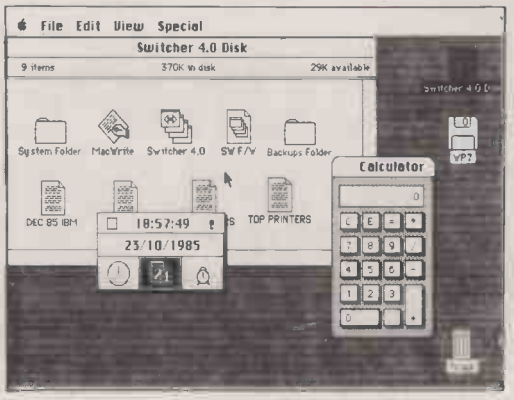
DR HITS TROUBLE OVER GEM

APPLE has forced Digital Research to make substantial changes to Gem, the operating system front end which brings Macintosh-like features to machines as diverse as the Apricot, Atari ST and IBM PC. Apple claims that Gem violates its copyright. Digital Research denies this, but to avoid litigation has agreed to pay Apple an undisclosed sum and to produce new versions of the software.

Gem is visually the most Mac-like of the competing operating-system extensions for the IBM PC, such as Windows, Topview and Taxi. It is also in many ways more of a commercial threat to Apple: it runs on a wider range of machines, including the Atari ST which many observers see as a major threat to the Mac, if it works.

The specific programs to be modified are Gem Desktop, the actual operating environment from which users run programs, and two applications, Gem Paint and Gem Draw. They all use windows, pull-down menus and icons in a way familiar to any Mac user, and are designed to work with a mouse. Digital Research has agreed to produce new versions that differ substantially in both appearance and operation, and to remove comparisons with the Macintosh from its advertising.

For Digital Research the worry must be that this climb-down will damage the credibility of Gem among independent software developers, making it less likely that they will develop programs to run under it. Apple thus gains a breathing space from its own troubles, and throws a spanner into Atari's works as it struggles to get the ST out for Christmas.



Apple objects to the way Gem (above) uses windows, icons and other features similar to those of the Mac (left).

Switcher goes retail

APPLE has released a £19.95 version of its Switcher operating-system extension. Switcher lets you load several programs simultaneously into the 512K Mac, and then switch instantly between them.

Switcher is also being bundled free by other software publishers along with their own packages. Microsoft, for instance, is including it with Excel. Switcher allows you to create what are, in effect, integrated packages, involving applications of your own choice. It also lets you switch quickly and facilitates data transfer.

We have been using Switcher for some time at *Practical Computing*, and rate it a major step forward for software integration on the Mac. In practice you usually cannot get more than two or three applications loaded at the same time, but it still adds to convenience. We usually use it to run Macwrite alongside a comms package, a spreadsheet or Mac's Finder. You can even load in two copies of Macwrite together, allowing you to work on two documents at once.

Switcher has been circulating for some time with Apple's blessing in the software-development community. The big advantage of the new version is that it comes with an instruction manual. Contact Apple Computer (U.K.) Ltd, Eastman Way, Hemel Hempstead, Hertfordshire HP2 7HQ. Telephone: (0442) 60244.

Jazz, 1-2-3 and dBase go on BBSs

BOTH Lotus and Ashton-Tate plan to launch bulletin boards in the near future for their end-users. Bulletin boards still have something of a radio-ham feel to them, but this could now change with such major software companies adopting them as a cost-effective way of providing support.

The Lotus plan is the furthest advanced: it is scheduled to go live in December. Called World of Lotus, the bulletin board will actually be run on Telecom Gold. This avoids the usual problem with amateur boards, that their telephone numbers are permanently tied up at peak times.

As well as the usual bulletin-board staples of news and message switching between BBS members, the Lotus service will have a database of answers to the most common queries received about Lotus products like 1-2-3 and Jazz. Lotus also intends to use the bulletin board for software distribution — not of major packages, but things like drivers for new peripherals and user-written application templates for 1-2-3. Pricing for the Lotus bulletin board has not yet been worked out, but this sort of software at least should be free.

Ashton-Tate's bulletin board, called Service Line, will also use Telecom Gold. It will cover the same mixture of news and technical notes, and may also offer facilities for the exchange of dBase and Framework programs. So far, Ashton-Tate has decided the service will be free, but not who will be eligible for it; it might only be available to larger corporate users, for example. Service Line should be operational by the end of the year.

Contact Lotus Development (U.K.) Ltd, Consort House, Victoria Street, Windsor, Berkshire SL4 1EX. Tel: (0753) 840281. Ashton-Tate (U.K.) Ltd, 1 Bath Road, Maidenhead, Berkshire SL6 4UH. Tel: (0628) 33123.

Amstrad accounts

SAGESOFT is bringing out cheap accounting and payroll packages to run on the Amstrad PCW-8256 word processor and the CPC-6128. The programs are new versions of Sagesoft's established CP/M accounting software. The accounts package is an integrated ledger system, covering sales, purchase and nominal ledgers. It costs £99.99 including VAT, while the Payroll package costs £69.99.

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

SOFTWARE SHORTS

Hisoft C++ is a full-spec C compiler for Z-80 based CP/M systems. Costing £39.95 including VAT, it is available in most disc formats. Contact Hisoft (0582) 696421.

Inter-Sheet is a spreadsheet program for the BBC computer, Inter-Chart is a business-graphics program. Both will work on their own, but their real claim to fame is that you can move data between them. Intersheet costs £49 plus VAT and Interchart £32; both are supplied on ROM. Telephone: (0442) 63933.

Macspell + is a spelling checker which works with Macwrite and the Macintosh version of Microsoft Word. It has a 75,000-word spelling dictionary — unfortunately American rather than English, and also offers thesaurus facilities. The price is £89 plus VAT from P&P Micro Distributors Ltd. Telephone: (0706) 217744.

DMS-80 is an established database program running on MS-DOS and CP/M machines. A cheap version for the new Amstrad PC-8256 and CPC-6128 is now available, price £100 including VAT. Contact Optronics Ltd on 01-892 8455.

SPRITE

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This year, we've gone even further ahead of the opposition. Now there are 3 Sprites, covering the market from single user PC-DOS workstation to full-blown Xenix system; and now SPRITE is actually even faster, with an 8Mhz 286-chip

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*IBM PC-AT is a registered trademark of International Business Machines.

Microsoft to sell Rbase 5000

MICROSOFT has taken over the marketing of Microrim's Rbase 5000 in the U.K. and Europe. Rbase is an applications-development language of the dBase II type, designed for developing custom database applications. It was reviewed in our November issue.

The new marketing deal gives Microsoft locally a plausible offering in all the major application areas, and should also help Rbase itself to take off. However, the Rbase 5000 price seems to have gone up £100: Microsoft is quoting £695 plus VAT.

Contact Microsoft Ltd, Excel House, 49 De Montfort Road, Reading, Berkshire RG1 8LP. Telephone: (0734) 500741.

PC Direct

AS ITS NAME might suggest, PC Direct sells directly to the public, omitting the dealer. The result, the company claims, is prices some 40 percent below its rivals. For example, a colour-graphics card costs £95 plus VAT, an XT upgrade kit £1,330 and a 60Mbyte Winchester £2,250. This service is aimed at more experienced users, rather than first-time buyers; clearly, support will be at a fairly low level.

PC Direct is also promising a very low-cost AT compatible. PC Direct is a division of Keen Ltd, headed by Tim Keen, late of Keen Computers. Details on (02814) 2417.

Low-cost spreadsheet

TWIN is a £145 clone of Lotus's top-selling integrated spreadsheet, 1-2-3. It is claimed to be fully compatible with the more expensive package and able to use existing 1-2-3 files without modification.

Twin has more chart types than 1-2-3: 15 including three-dimensional bar charts. Other benefits are the absence of physical copy protection, and site licensing agreements for larger users.

Contact Future Management, 38 Tanners Drive, Blakelands North, Milton Keynes MK14 5LL. Telephone: (0908) 615274.

IBM LAUNCHES BIGGER LAN

IBM HAS ANNOUNCED a token-ring network, designed for larger installations. In this respect it slots in above the existing PC Network which is intended for more local applications. The new LAN provides data transmission at speeds up to 4Mbit per second, and can support up to 260 devices using IBM's special cabling, or 72 users with ordinary telephone cable.

U.K. pricing has not been announced yet, but in the U.S. an eight-station system costs about $830, excluding cabling and PCs. Details from IBM dealers.

Reflex price drops by three-quarters

REFLEX, the innovative database package we reviewed favourably in our November issue, has fallen dramatically in price from £423 plus VAT to £99. Reflex is aimed at people who actively analyse data, and has integrated charting, spreadsheet and report-writing facilities. Borland has renamed it Reflex: The Analyst, but has otherwise left the package unchanged.

In our review verdict we gave Reflex three Good ratings and an Excellent for ease of use. We should now upgrade this, giving it an Excellent for value for money too.

What has happened since our review appeared is that Borland International, of Turbo Pascal and Sidekick fame, has bought the company responsible for Reflex. Borland operates a cheap software policy. It also steers clear of inconvenient software-protection schemes, relying on low pricing and good documentation to prevent piracy. This, together with the quality of the software – we gave its Turbo Pascal three Excellents and a Good — certainly makes Borland sound like the user's friend.

Meanwhile, Lotus must be experiencing some anxiety over persistent rumours that Borland is working on a cheap 1-2-3 clone.

Contact P&P Micro Distributors Ltd, Carrs Industrial Estate, Haslingden, Rossendale, Lancs BB4 5HU. Tel: (0706) 217744.

Revamp of 1-2-3

THE ENHANCED version of Lotus 1-2-3 has finally arrived. Release 2 of the best-selling integrated spreadsheet allows worksheets up to 256 columns by 8,192 rows, and has better memory management. There is generally a closer resemblance to the spreadsheet in Lotus Symphony, with extra functions like better string manipulation and multiple regression analysis.

Release 2 works with 8087 and 80287 maths co-processors, and you can now use up to 4Mbyte RAM by adding memory boards built to the Intel/Lotus/Microsoft specification.

Lotus 1-2-3 Release 2 costs £395 plus VAT and requires 256K to run. Existing users can upgrade for £120. Contact Lotus Development (U.K.) Ltd, Consort House, Victoria Street, Windsor, Berkshire SL4 1EX. Tel: (0753) 840281.

IBM SHORTS

- Olivetti has launched its oddly named 10-Net for compatibles, which is theoretically unlimited in size. Cost is £595 plus VAT per network node. Details on 01-785 6666.
- The Hercules colour card has been reduced from £237 to £195. Details available from First Software on (0256) 463344.
- Two programs from the United States Department of Commerce, Office of Productivity, Technology and Innovation — no less! — are availble from Microinfo. They are both cash-flow sensitivity analyses: one for Lotus, and one for Symphony. Both cost £92 plus VAT. More on (0420) 86848.
- Arithmetic co-processors for the IBM PC and PC/AT are available from First Software. The 8087 costs £155 plus VAT, and the 80287 costs £285. More information on (0256) 463344.
- Data General has cut the price of its portable The One. The single-drive system with 256K RAM has been reduced from £2,456 plus VAT to £1,799, and the 512K double-drive version from £3,850 to £2,620.
- Recall is a data-retrieval package designed to extract text from completely unstructured data and organise it into a database. You can use it on existing WordStar or ASCII word-processing files. The price is £195 plus VAT. Details from P&P on (0706) 217744.
- Microsoft is now shipping Xenix System V for the PC/AT and close 286-based compatibles. This increases Xenix's compatibility with Unix, allowing programs developed for Unix System V to run on the PC. Details from Microsoft Ltd, Excel House, 49 De Montfort Road, Reading, Berkshire RG1 8LP. Telephone: (0734) 500741.
- Control Data has launched six new PC-based training packages dealing with different financial skills. Titles include Cash Flow, Pricing for Profit, and Financial Statements. Each course includes a text and associated disc, and costs £95 plus VAT. Contact Softsel on 01-568 8866.

(More news on next page)

IBM SHORTS

● Top Class is an authoring system for computer-based tutorials. It costs £290, and is available from P&P. Telephone (0706) 217744.

● Intuit is an integrated package offering word processing, a spreadsheet and file management. The system costs £145 plus VAT from Tashkl Computer Systems. Tel: 01-904 4467.

● PC Slave enables IBM micros to drive up to 32 slave machines as a multi-user system. The cost for terminal and plug-in board is about £1,400 plus VAT. Details on (0932) 231100.

● Ergo-word is the word processor from Ericsson. It runs on compatibles and costs £199 plus VAT. More on 01-606 0425.

● Two telex packages for the IBM PC have been launched. PC Telex costs £1,495 plus VAT from Dataline. Tel: (04427) 74006. Total Telex is produced by Integrated Business Communications for £1,945; more on (07535) 54272.

dBase III compiler and utilities

CLIPPER is a new compiler for dBase III. It comes from a company called XAT, formed by ex-Ashton-Tate employees. Clipper allows the creation of independently executing dBase systems that run up to 20 times as fast. Contact Softsel on 01-568 8866.

dBf:Dif is a conversion utility which changes dBase III files to DIF format, allowing you to use the data in VisiCalc, 1-2-3, Supercalc and other common packages. The price is £9.99 plus VAT from The Software Construction Company Ltd, 1 Stafford House, Churchfields, Broxbourne, Hertfordshire EN10 7JS. Telephone: (0992) 440994.

Expressbase III is a utility aimed at heavy dBase III programmers. It speeds up program development by letting you use a kind of shorthand notation, and include code from libraries. The dBase II version got a favourable review from Mike Lewis in our April 1985 issue. The new Expressbase III costs £125 plus VAT from Salamanca Software Ltd, 64 More Close, St. Paul's Court, London W14 9BN. Telephone: 01-741 8632.

A pair of cards

QUBIE has launched two new cards. One is a reduced-size colour graphics card for the PC and AT. By reducing the chip count power consumption has been halved. The cost is £159 plus VAT, or £179 with a parallel port.

The other card is a multi-function device for the IBM PC/AT which offers between 128K and 4Mbyte of memory, one to four serial ports, and a parallel port. Prices start at £395 for the 128K version and go up to £1,690 for 4Mbyte.

Details on both these products from Qubie on 01-871 2855.

Digital photocopier

THE SPECTRAFAX digital photocopier is a digitising scanner built around the PC bus. Artwork can be scanned and stored in digitised images on a PC, and manipulated, stored or printed out. Both mono and colour versions are available. The mono model costs £2,795 plus VAT, and the colour versions £3,795.

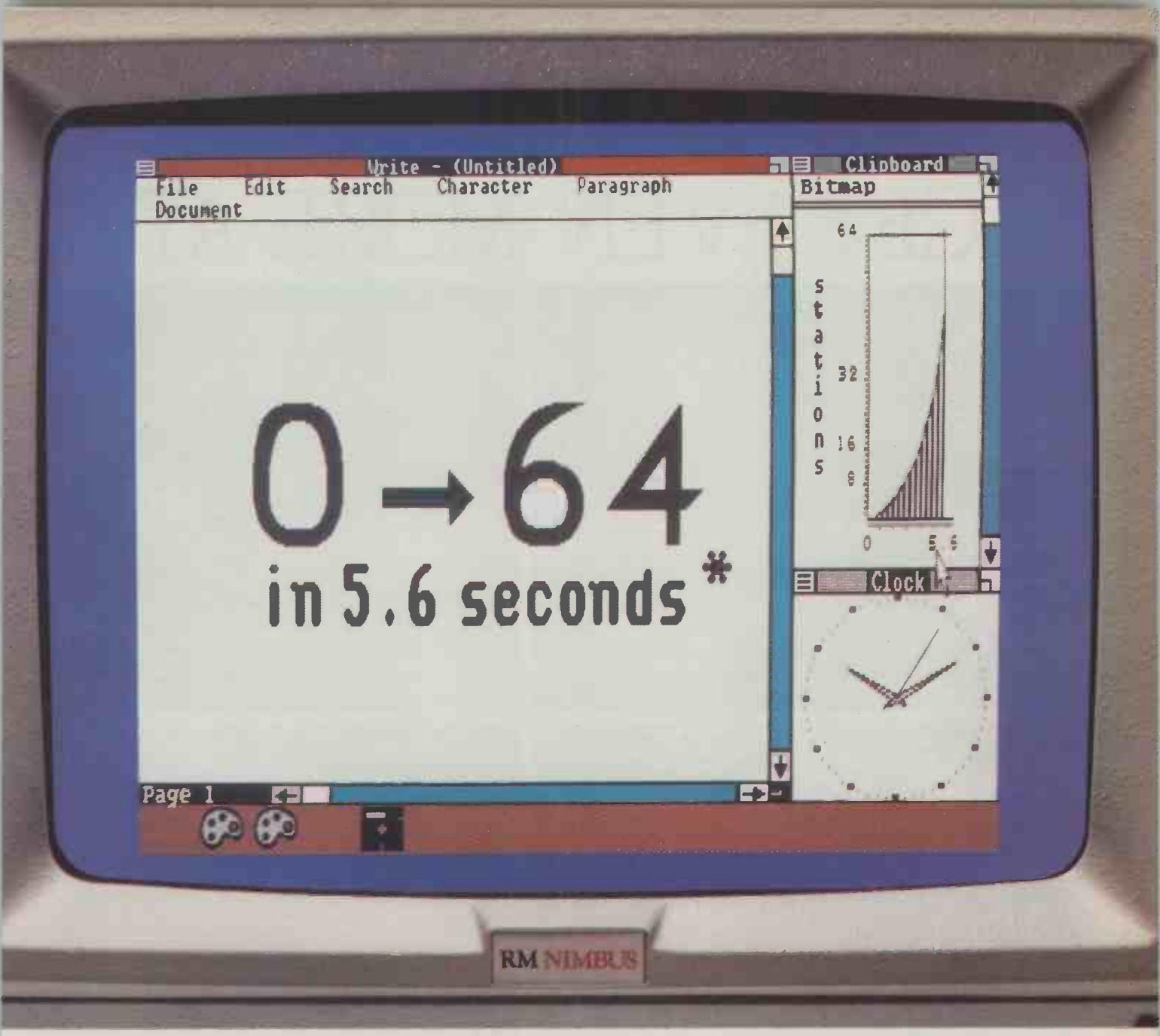
Two add-on boards are available. One, costing £1,099, turns the unit in to a standard facsimile terminal. The other is an optical character-recognition unit, and costs £895. It enables documents scanned by the unit to be read straight into a word-processing or database program.

The Spectrafax Digital Photocopier is available from P&P Micro Distributors. Tel: (0706) 217744.

IBM goes Arabic

IBM HAS PRODUCED a keyboard and associated software which will provide a bilingual Arabic/English IBM PC.

The cost is £185, but the Enhanced Graphics Adaptor and memory card with 128K and DOS 2.1 are also required. Details from IBM dealers. PC



RM NIMBUS NETWORK ACTION STATIONS

Local Area Networks for micro-computers have promised much in the short time since they were introduced. Shared software and peripherals. Communal access to a large central memory store. More work stations for less money.

But promises don't make working systems.

The truth is, it takes a special breed of computer to run a 64 station network. Extra-fast running speeds. Additional memory to hold the network operating software. Special network interfaces.

Unlike other 'networkable' systems, Nimbus was designed from the start for networking. With its 80186, 8MHz microprocessor and minimum 512K RAM, Nimbus gives you fast processing, stunning graphics and the capacity to handle the Microsoft Networks** operating system with plenty in hand. And the Nimbus Network becomes more economical the more you demand of it - right up to 64 stations.

Ask to see the Nimbus Network in action. And like thousands of our users, you'll agree that Nimbus is the natural choice.

For further information contact Research Machines, Mill Street, Oxford OX2 OBW. Tel: Oxford (0865) 248489 or Sheila Lester on (0865) 249866.

*Time taken to send 700 word report to 64 stations on the Nimbus Network

**Microsoft Networks is a trade mark

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The first delightful discovery is that both the CPC 6128 and the CPC 464 are complete and ready to use as soon as you get them home.

The CPC 464 comes with built-in datacorder, and the CPC 6128 with built-in disc drive. And both have either a full colour monitor or a green screen.

But Amstrad owners can become even more attached to their computers with the simple addition of the peripherals featured here.

They'll make your Amstrad faster, harder working and more entertaining.

And they're very easy to attach. Simply plug in, and away you go, there's no need for extra interfaces.

You may of course wish to get into some even more serious computing, for which you will need the Amstrad RS 232C specialist interface. This opens the door to modems, networks, and serial printing.

But whichever additions to your Amstrad you care to make you'll find their low prices an additional pleasure.

PC/P/3

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● Circle No. 153

Online Aid

JUMPING on the Band Aid bandwagon is Online Aid, which aims to tap the computer industry for money in the way previous schemes have appealed to the public at large.

Various publishing houses have set up sales teams to encourage companies to sponsor free Online Aid ads in certain magazines. Members of the public are being encouraged to send in money, and there is also a need for hardware and software gifts.

Prestel Telex Link

PRESTEL users can now send and receive telex messages to and from anywhere in the world with Telex Link.

Messages are transmitted like other messages on Prestel. The user is kept informed of progress by messages sent by Telex Link back through the Prestel Mailbox facility. The user is charged once a successful delivery has been made. Incoming telexes appear in users' mailboxes.

It costs 50p to send about 100 words in the U.K., £1.00 to Europe and £2.00 to North America. Details on 01-822 1122.

Telemessage service

MICROLINK is daring to take on the might of British Telecom in launching its own telemessaging service. This is the high-tech equivalent of sending a telegram: messages are sent over Telecom Gold to a distant printer, then it is delivered in a distinctive yellow and blue envelope. Costs work out at about £1.95 for up to 350 words, and £20.75 for similar messages to the U.S. Details on 061-429 8451.

BBC's Owltel

BBC PUBLICATIONS has launched its own viewdata service, using the same protocols as Prestel. The service is free, and contains information on BBC software and computer books, plus news about computer literacy. Free telesoftware and prize quizzes are planned for the future. Currently there are about 200 pages but this is expected to treble or quadruple. Owltel is on 01-927 5820. For more information on the service ring 01-927 4682.

COMPUTER OF THE YEAR AWARDS

THEY'RE OUT: the winners of the pan-European Computer of the Year Awards for 1985 have been announced by by the co-ordinating German micro magazine, *Chip*.

The degree of agreement between this list and our own published last month is quite heartening, especially given the often wide variations in availability of micros across Europe. *Practical Computing* is grateful to *Chip* for organising the awards.

AWARD WINNERS

Computer of the Year	
Personal Computer	Atari 520ST
Portable Computer	Compaq Portable 286
Hand-held Computer	Epson PX-4
Home Computer	Amstrad CPC range
Software of the Year	
Commercial	Framework
Scientific/Technical	Scientex
Tools	Turbo Pascal
Entertainment	Impossible Mission

Data registration: it's time to act

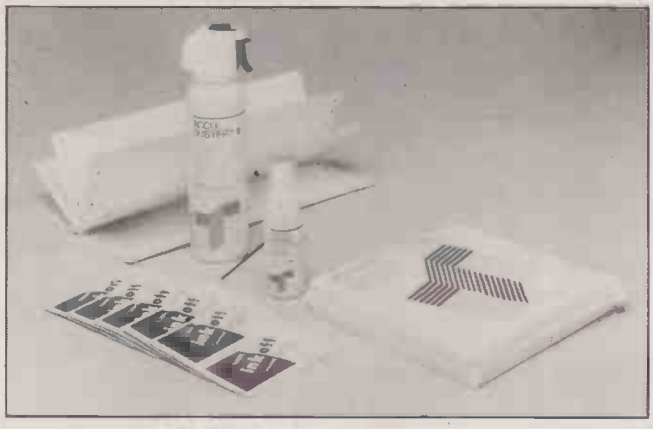
FOR THOSE readers who have been away in Timbuktu for the last year or so, a reminder that the process of registration under the Data Protection Act has begun.

Registration costs £22 and must be completed by 11 May 1986. Registration packs containing the two parts of the application form and a booklet are available from the Data Protection Registrar. Springfield House, Water Lane, Wilmslow. Cheshire SK9 5AX. Telephone: (0625) 535777.

Microcomputer Index

THE 1984 cumulative edition of the *Microcomputer Index* is a massive tome of some 530 pages and 6,500 citations. It provides an invaluable reference work for anyone working in the micro field, or researching related subjects. Although heavily slanted towards the main U.S. titles like *Byte*, *InfoWorld* and *PC* magazine, it does include a select few from this side of the pond, among them *Practical Computing*.

The cost is $50 plus $10 for postage outside the U.S. from Microcomputer Index Company, PO Box 50545, Palo Alto. Ca 94303. Telephone: (U.S. area code 415) 961-2881.



Dirty dots deterred

A cleaning kit designed specifically for dirty dot-matrix print heads has been developed by Data Efficiency. A non-porous material is used to prevent the alcohol-based solution from reaching the platen and rollers. The complete kit costs £25. More information on (0442) 60155.

Tenders on-line

WORLD TENDERS DAILY is an on-line information service designed to alert British firms to new business and export opportunities, and to provide market intelligence. It guarantees subscribers same-day details on over £35 million worth of newly announced tender openings for goods and services throughout the European Community and its associated states in Africa, the Pacific, and the Caribbean, as well as in Japan.

The service can be accessed via Prestel, telex, Telecom Gold or snail mail. Annual subscription costs £260. Details on 01-437 2761.

Worldwide data protection

A NEWSLETTER covering the law relating to international data protection has been launched by Business International U.K. Ltd. Called *International Laws and Companies*, it appears monthly. The subscription is SFr.500. Details are available on 01-741 4661.

CAL

THE *Journal of Computer Assisted Learning* is published by Basil Blackwell. It covers areas such as artificial intelligence and expert systems plus aspects of CAL. It appears three times a year and the subscription is £37.50. More on (0865) 240201. PC

take the wraps off

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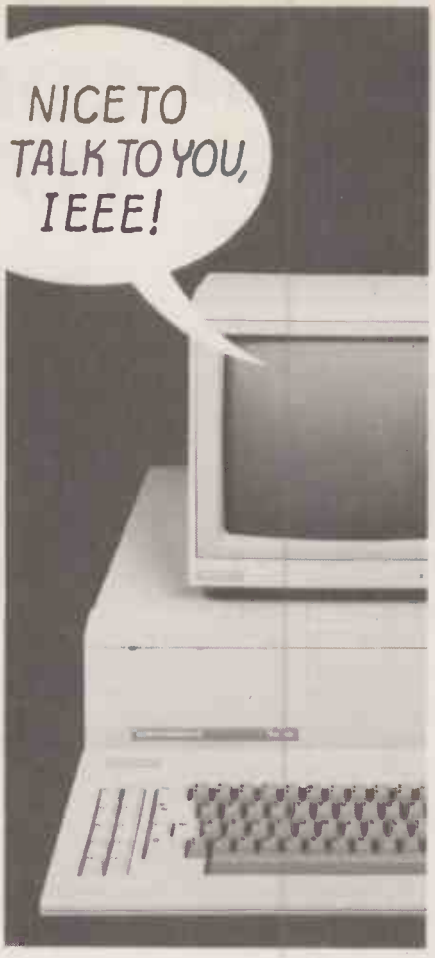

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● Circle No. 155

BY MIKE LEWIS

THOUGHTS ON SORTS

What is a perfectly ordered sort, and do you really need it? You might save a lot of time by making do with second best.

Even the most competent programmers sometimes have blind spots about sorting. The problem is not so much selecting the right algorithm, although that can be difficult enough. It is in the actual cutting of the code that the trouble so often starts. What sounds simple on paper can be remarkably tricky to translate into a program, and even when the routine is working correctly, getting it to run efficiently is often another matter altogether.

Many programmers end up using the same sorting algorithm all the time, one which they have come to know well and which they feel at home with. This is sensible. Your chosen method might not be the optimum solution in all cases, but at least you know it will do the job. That said, there are many ways of fine tuning a sort without having to change the underlying method.

SHORT KEYS

One obvious way to improve a sort is to reduce the length of the keys. This not only leads to faster comparisons and exchanges, but using shorter keys also means you can hold more of them in RAM; this could in turn mean the difference between sorting a file internally, which is fast, and externally, which is not.

Suppose, for example, that you are asked to print a list of customers in descending order of turnover. You know that even the best customer's sales would never exceed £25,000. Since these figures are calculated to the nearest penny, you decide to hold them as 32-bit floating-point numbers, and sort them accordingly. So far so good. But if the sales manager is happy to have a report expressed in whole pounds, you could easily transform the keys to 16-bit integers. Halving the key length in this way could make substantial inroads into the sorting time.

RADIX SORTING

The actual time saved depends heavily on the sorting method used and the language in which the program is written. Radix sorting, where each bit or character is sorted separately, is the most sensitive to the length of the key. Also, you will get greater savings with compiled languages than with interpreted ones, because more of the time is spent on the actual sort rather than on interpreting the code.

There are many other, less obvious ways of shortening keys. Bit packing is one. If the keys are made up entirely of capital letters, converting each letter to a five-bit number will lead to a reduction of up to 37.5 percent. Many similar possibilities exist.

Of course, the work involved in reducing the keys also takes time, which could well wipe out any gain achieved by faster sorting. For ad hoc sorts, complex compression schemes are probably counter-productive. But if you have a fairly stable file which needs frequent sorting on the same field, it might be worth generating the compressed sort keys as new records are added, and holding them in a separate field for this purpose alone.

One form of key reduction which always saves more time than it costs is the truncating of individuals' surnames. When setting up files of personal data, programmers typically allocate somewhere between 12 and 20 characters for surnames. If there is a requirement to sort by name, the entire field is usually taken as the key.

NAMES DATABASE

Yet less than half the population of Britain have more than six letters in their surnames, and only about 15 percent have more than eight. So it might be tempting to sort on the first few characters only, even though this would obviously lead to a certain number of sequence errors. The question is: what proportion of errors will you get?

To find out, I experimented with a live database of 2,400 names. Sorting on the first four characters of the surnames gave rise to 432 sequence errors, which is a highly unacceptable error rate of 18 percent. But even quite small increases in the key resulted in big improvements in the rate, reaching just 1.2 percent with an eight-letter key. Of course, a smaller file gives even better results because the names are more widely spaced. The results of my experiments are summarised in the box below left.

The acceptability or otherwise of these sequence errors depends on

(continued on next page)

EXPERIMENTS WITH SURNAMES

When sorting surnames, what are the effects of sacrificing accuracy for speed? This table shows the number of sequence errors you might expect (with percentage figures in brackets), if you limit the sort to the first n characters of the key, for n ranging from four to eight. The figures were derived from a live file of 2,400 records. A sequence error was defined as a key which is less than the one immediately before it. Only surnames were sorted; forenames and initials were ignored. The figures for 1,200 and 600 records were obtained from sub-files, consisting of every second and every fourth record respectively from the original file.

In the original file the longest name was 13 characters; the mean average was 6.9 characters. A total of 561 names exceeded six characters, and 171 exceeded eight characters.

File size:	600	1,200	2,400
4 characters	10(1.7)	67(5.6)	432(18)
5 characters	7(1.2)	33(2.7)	230(9.6)
6 characters	3(0.5)	20(1.7)	129(5.4)
7 characters	2(0.3)	15(1.2)	86(3.6)
8 characters	1(0.2)	7(0.6)	29(1.2)

HOW INDEXES ARE SORTED

Indexes and lexicographers use two different systems for putting words and phrases into alphabetical order. The differences between them are only apparent when multi-word phrases are being sorted.

In word-for-word sorting, each word is treated as a separate entity — in effect as a separate key — with the first word having the highest priority. Thus, in the example below, all names beginning in "New" come first and are, within themselves, sorted on the second word. Since the end-of-word marker, the space character, comes first in the collating sequence, the results are similar to an ASCII sort. Differences between word-for-word and ASCII are due to the fact that indexers disregard most punctuation marks and computers do not.

In the letter-for-letter method, only the actual letters of the words make up the keys. The spaces between words are ignored along with the punctuation marks. So, in this example, Newhaven and New Haven end up next to each other, with Newhaven in the lead because England collates before U.S.A.

ASCII	Word-for-Word	Letter-for-Letter
New Castle (Pa.)	New Castle (Pa.)	Newark (N.J.)
New Haven (U.S.A.)	New Haven (U.S.A.)	Newcastle (N.S.W.)
New Portsmouth	New Portsmouth	Newcastle (Pa.)
New Testament	New Testament	Newcastle-under-Lyme
New York	New York	Newcastle upon Tyne
Newark (N.J.)	Newark (N.J.)	Newcastle, William
Newcastle (N.S.W.)	Newcastle (N.S.W.)	Newhaven (England)
Newcastle upon Tyne	Newcastle-under-Lyme	New Haven (U.S.A.)
Newcastle, William	Newcastle upon Tyne	Newport Bay
Newcastle-under-Lyme	Newcastle, William	Newport (I. of W.)
Newhaven (England)	Newhaven (England)	New Portsmouth
Newport (I. of W.)	Newport Bay	New Testament
Newport Bay	Newport (I. of W.)	New York

(continued from previous page)
the job in hand. If you are producing a rival to the *Dictionary of National Biography*, not even one name should be out of order. But an internal phone list might be another matter. Bear in mind that the figures here apply to names of British individuals. The results might be quite different for company names, or for other nationalities.

Another well-known method of speeding up a sort is to confine the process to keys and pointers, rather than entire records. This involves building a RAM table of the keys, along with the record numbers or byte addresses of their associated records, then sorting this table and using the record numbers to access the file.

TABLE ADJUSTMENTS

If the sorted file is used a lot, it might pay you to write the table to disc for subsequent use. You could even go one better and use the table as the primary means of accessing the file. Adding and deleting records would involve adjustments to the table, but this overhead would probably be worthwhile as long as it remains small enough to be held in RAM during the processing.

One aspect of sorting which is not often discussed is the nature of the final sequence, the order in which the sorted keys actually appear. Programmers usually think in terms of the collating sequence of the character set. Digits come before letters, for example, because that is how they are defined in ASCII.

SIMPLE APPROACH

But lexicographers and professional indexers often smile at what they see as our simplistic approach. If you studied the sequence of entries in an encyclopaedia — or, for that matter, a telephone directory — you would see one of two methods used. They are called word-for-word and letter-for-letter, and neither can be achieved by a straightforward ASCII sort. As their names suggest, one is essentially a sort of individual words, the other of letters. An example appears in the box on the previous page.

It is possible to program either of these sorts by applying a simple adjustment to the keys. For both methods, you must first remove all punctuation and other special characters, and also convert lower-case letters to capitals. For letter-by-letter, it is also necessary to remove spaces. Hyphens are usually treated as word separators, and so are converted to spaces for word-by-word sorting.

Given this algorithm for transforming the keys, there are two different ways of applying it. The more obvious, and usually the more efficient, is to convert all of the keys at the beginning, sort them along with pointers to the original records, and finally use the pointers to access the original list ready for output.

An alternative approach is to defer the conversion until each individual comparison is made. The sort subroutine receives the list of keys in their original format and, after sorting, hands back the list in the same format. It is at the point where two strings are compared that it takes account of the type of sequencing to be used: word-for-word or letter-for-letter in this case.

MODULAR PRINCIPLES

Although probably slower, the second approach lends itself better to the principles of modular programming because it allows the type of sorting to be kept separate from the method of sorting. So your choice of, say, word-for-word vs. letter-for-letter can be made compeletely independently of your decision to use a Shell sort rather than radix sorting. All you need is an appropriate comparison function that can be called from whatever sorting procedure you decide to implement.

In some languages — an example is C — you can even arrange for the comparison function to be a parameter of the sort. Most C compilers include an implementation of the Quicksort algorithm, usually called Qsort, whose arguments are the list of keys, the number of keys, the key length, and the address of a function which compares two keys; it is the function itself which forms the parameter, not simply the value which it returns. This provides a neat method of performing non-ASCII sorts without having to know anything about the underlying technique.

In practice, producing a true lexicographic sort is a much more complicated business. Even the key transformations discussed here would still produce the sort of anomalies that make professional indexers shudder: Louis IX appearing before Louis VIII, for instance. This is one of the reasons that, for all the sophisticated algorithms, computer-generated indexes are rarely of the same high standard as those that are compiled by humans. PC

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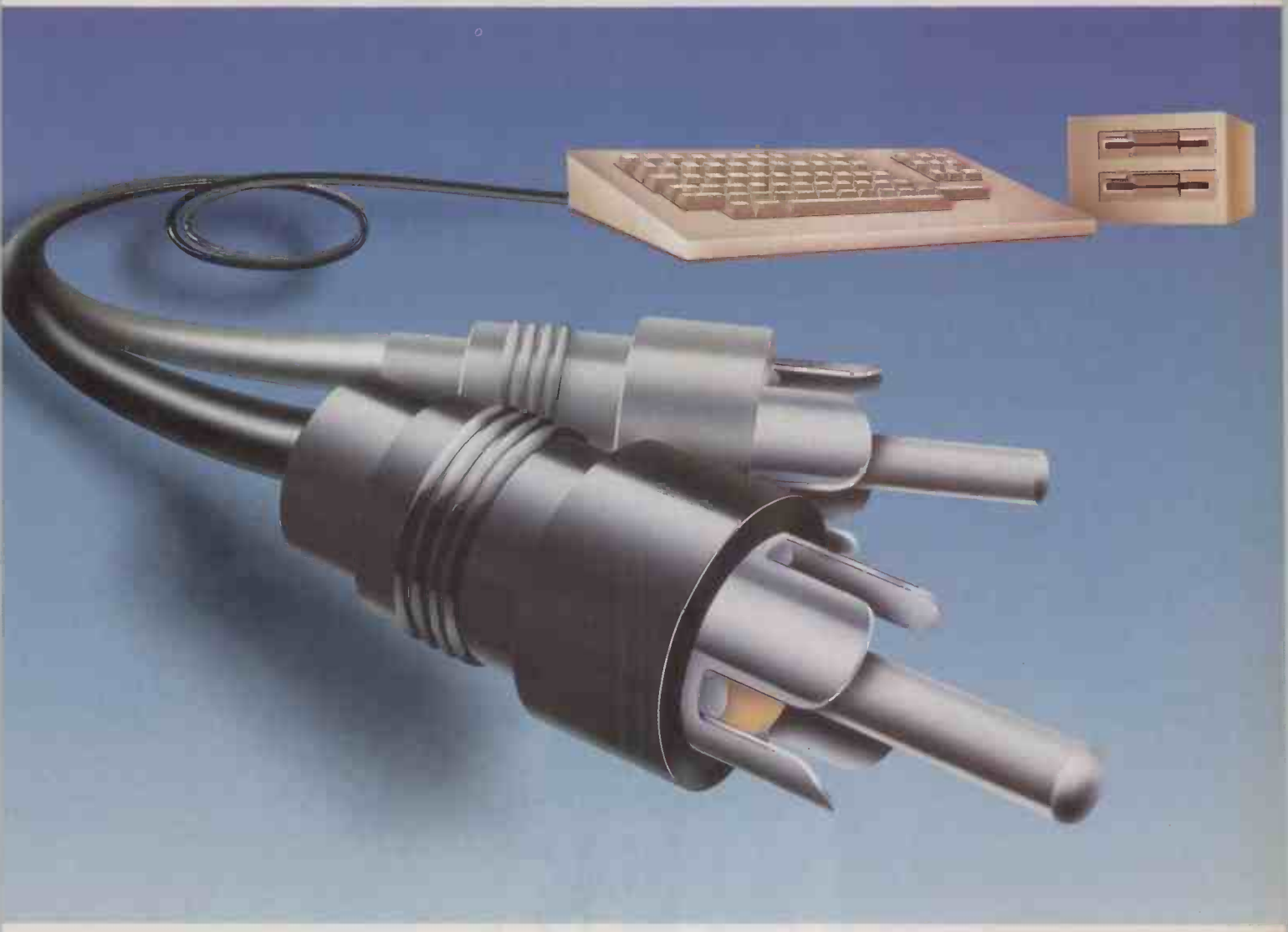

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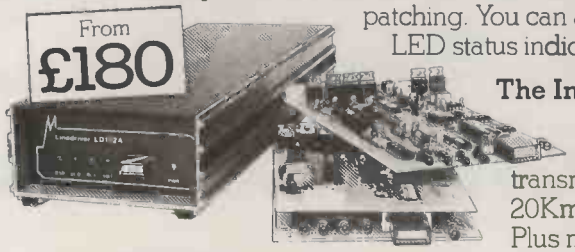

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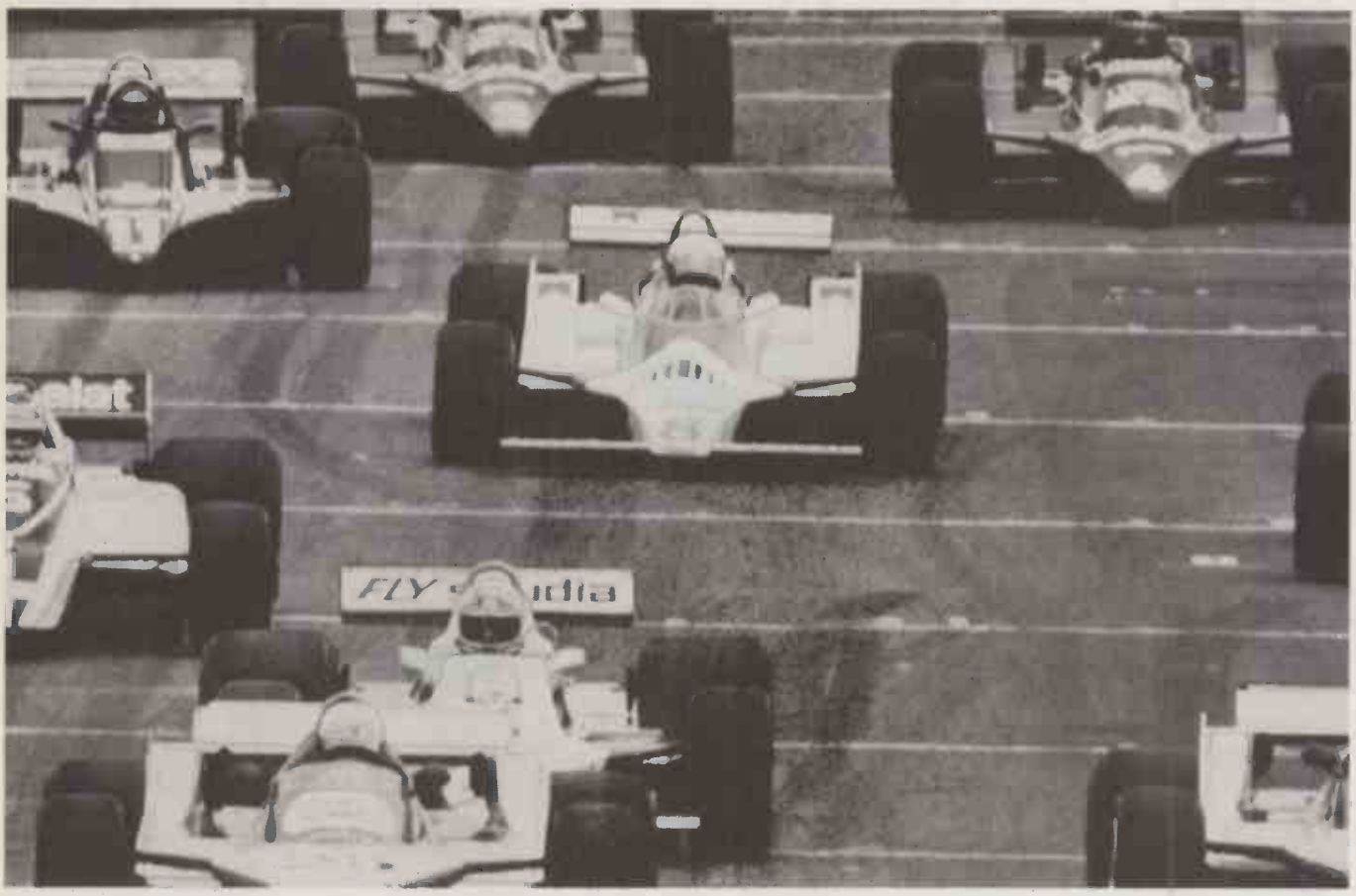

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BY RAY COLES

TAKING RISCS

The old Reduced Instruction Set Computer chip is making a comeback.

Take a look at the instruction set of any of the new generation of 16- and 32-bit microprocessors and you are bound to be impressed by the sheer variety and power of the facilities on offer.

Not only are there instructions ready to perform directly just about every operation you can dream up, but you can also count on the flexibility of five or six alternative data types and a range of addressing modes which will keep ordinary mortals awake at night trying to figure out just what they can all be used for.

Comparing these complex beasts with their humble eight-bit predecessors is like comparing the flight-deck instruments of a jumbo jet with the dashboard of a Tiger Moth. But do not let this worry you, because the complexity is intended to make life much easier for the poor old programmer in the long run.

In the good old days, when string-and-dope Z-80s and 6502s were the norm, most programmers would happily don their leather flying helmets to perform some improvised assembly-language aerobatics whenever the urge for speed became too strong to resist. One look at the long sleek shape of the 68020 or the Z-80000, however, and thoughts of being an enthusiastic assembly-language amateur desert all but the toughest hackers. The new generation of processors has been designed for the operating-system and compiler-writer brigade, the professional jet-jockeys of the software world.

The advantage to be gained by the average programmer in the street is that from now on he or she can hang up the goggles and sheepskin programming jacket, and luxuriate in the pressurised luxury of a powerful high-level language. They are secure in the knowledge that, despite the comfort, the speed will be beyond anything that could be achieved in that seat-of-the-pants era of accumulator registers and eight-bit arithmetic units.

The chip designers have designed their instruction sets so that high-level language compilers will produce fast and efficient code. The ultimate goal is apparently a one-to-one correspondence between an assembly-language instruction and a high-level language statement.

The microprocessor which comes closest to achieving this ideal relationship is probably the Intel iAPX-432, the world's first 32-bit device. It was intended to be programmed by the user directly in Ada, a real-time military systems language. Intel has spent considerable sums on the 432 and has used it as a trailblazer for future designs. You may not have heard of it, despite the fact that it is now several years old, because the 432 is not intended to be a commercial processor in the conventional sense.

Apart from its high-level instruction set, the 432 has many other innovations. These include an ingenious multi-processor architecture which can make the addition of extra 432 processors to a system transparent to the programmer, and an unusual degree of fault tolerance.

TOO SLOW

Military and academic interest in the 432 has been high, but sales of the product have not taken off as they have with most other Intel devices. One criticism of the concept is that the resulting systems are often too slow, and that the costly overheads are too high a price for most ordinary applications to bear.

The Intel iAPX-432 is a classic example of the so-called Complex Instruction Set Computer (CISC) approach, and most of the better known 16- and 32-bit devices also fall into this general category.

It may come as no surprise to hear that there is an alternative approach. For its innovative new Transputer, British chip designer Inmos has selected this alternative approach, which is termed Reduced Instruction Set Computer (RISC). As its name suggests, this approach involves stripping all the bells and whistles out of the instruction set, to leave a very simple but very fast processor kernel.

With a RISC design there are no Block Move instructions, no fancy addressing modes, and only one data type. The instruction set is simple in the extreme, and could bring tears of nostalgia to those reared on the 6502, which would look quite complex by comparison. However, the rejuvenation of aged eight-bit assembly-language programmers is not part of the plan, so don't reach for the flying helmet just yet. The concept is aimed at the compiler writer too, just like the CISC machine. But with RISC the compiler writers will have to work harder for their money, since each CISC instruction equivalent will require several lines of the RISC code. The theory is that by defining a basic processor architecture and a simple set of instructions — mostly using implied addressing and executing in a single clock cycle — it is possible to build other desirable facilities such as a large, fast memory array on to the same chip. Although it may use the same number of individual gates, the chip layout is considerably simplified compared with a CISC design because most of the on-chip facilities are built up from a small number of simple structures such as memory cells. The result is a much shorter design cycle and a very fast processor.

One recent convert to the RISC approach is Acorn Computers. It has found that the inherent simplicity of the technique has allowed it to design its own microprocessor chip using semi-custom gate array technology from VLSI Inc.

The new device, called the Acorn RISC Machine (ARM), is available in demonstrator form. It has been designed, says Acorn, for optimal support of high-level language and real-time operations in personal computers. The first prototypes have a performance of over three million instructions per second and Acorn claims that this outperforms all currently available microprocesors. On standard Benchmark tests the ARM has run interpreted Basic programs over 10 times faster than the IBM PC/AT, which uses the Intel 80286, and has in turn compiled code over twice as fast as a Vax 11/780.

FIFTH GENERATION

Meanwhile, still in Britain, Inmos has relaunched its RISC machine, the Transputer, now in its T-414 version which includes 2K of fast RAM and four serial links. The Inmos Transputer concept goes beyond the simple philosophy of RISC. It includes all the architectural hooks for building giant processor arrays suitable for the new fifth-generation machines. Used alone, a single Transputer chip will probably perform in a similar way to the Acorn ARM, but when used with other devices in pipelines and systolic arrays it promises a performance which will outstrip anything currently available.

The scale of the two operations is quite different. Acorn is looking for a go-faster add-on for conventional machines. Inmos has produced a more futuristic design complete with its own special programming language, Occam, for handling the concurrency that is inherent in the multi-processor systems of the next generation. What is significant is that both companies have decided that the RISC is worth taking.

MIKE GORNALL

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SYSOP: Tony Game
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SYSOP: Mike Jones
SPEED: 300/300 baud
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(0392) 53116 (A)
SYSOP: Boyd Hitchcock
SPEED: 300/300 baud and 1,200/75 baud
TIMES: 24 hours
FEATURES: Download Area, Messaging, Upload Area

CBBS Surrey
(04862) 25174 (A)
SYSOP: Mike Parker
SPEED: 300/300 baud
TIMES: 24 hours
FEATURES: Download Area, Messaging, Upload Area

City Fido
01-301 4110 (A)
SYSOP: Gully Foyle
SPEED: 300/300 baud
TIMES: 24 hours
FEATURES: Download Area, Messaging

Clinical Notes Online
(0524) 60399 (A)
SYSOP: Miles Buckingham
SPEED: 300/300 baud
TIMES: 24 hours
FEATURES: Medical Notes, Messaging

Communitel
01-968 7402 (V)
SYSOP: Bill Olivier
SPEED: 1,200/75 baud
TIMES: 24 hours
FEATURES: Astrology, Notting Dale Itec, Other Systems, Press Reviews

Communitree
(0874) 711147 (A)
SPEED: 300/300 baud
TIMES: 21.00–09.00
FEATURES: Alternative Medicine, Alternative Technology, Comments, Conference Tree, Co-ops, Crafts, Education, Events Diary, Forth, Futures, Networking, New Economics, New Village Community, Organic Food and Growing, Other Treats, Peace Network, Play for Life, Poetry, Touch and Go, System

Compulink Fido
(06286) 63571 (A)
SYSOP: Frank Thornley
SPEED: 300/300 baud
TIMES: 24 hours
FEATURES: Adventure, Atari, BBC Acorn, Computer Widows, CP/M, Doctor Solomon, General, IBM, Lotus 1-2-3 and dBase, NEC 8201, Newsletter

Cyberzone
01-638 2034(A)
SYSOP: Brian Saunders
SPEED: 300/300 baud
TIMES: 24 hours

Cymrutel Wales
(0492) 49149 (V)
SYSOP: Ian Woodroffe
SPEED: 1,200/75 baud
TIMES: 24 hours
FEATURES: Accommodation, Cooking, Developments, Hardware and Software Reviews, Jobs, Ladies Area, Special Offers, Tourist Information, Welsh Language Area, What's New

Dark Crystal
01-954 9847 (A)
SYSOP: Phil Dark
SPEED: 300/300 baud and 1,200/75 baud
TIMES: 24 hours

Distel
01-679 1888 (A)
SYSOP: Display Electronics Ltd
SPEED: 300/300 baud
TIMES: 24 hours
FEATURES: Product Information

Distel
01-679 6183 (A)
SYSOP: Display Electronics Ltd
SPEED: 300/300 baud, 1,200/75 baud and 1,200/1,200 baud
TIMES: 24 hours
FEATURES: Product Information

Estelle
(0279) 443511 (A)
SYSOP: STC plc
SPEED: 300/300 baud
TIMES: 08.00–19.00
FEATURES: Catalogue Services, Enquiries, Order Progress, Orders, Product and Supplier News, Stop Press

Estelle
(0279) 441188 (A and V)
SYSOP: STC plc
SPEED: 1,200/75 baud
TIMES: 08.00–19.00 weekdays
FEATURES: Catalogue Services, Enquiries, Order Progress, Orders, Product and Supplier News, Stop Press

Estelle
(0279) 441222 (A)
SYSOP: STC plc
SPEED: 1,200/1,200 baud
TIMES: 08.00–19.00 weekdays
FEATURES: Catalogue Services, Enquiries, Order Progress, Orders, Product and Supplier News, Stop Press

Fastnet — Fido
051-260 5607 (A)
SYSOP: Brian Williams
SPEED: 300/300 baud
TIMES: 22.00–08.00
FEATURES: Messaging

Forum-80 Hull
(0482) 859169 (A)
SYSOP: Fred Brown
SPEED: 300/300 baud
TIMES: 19.00–22.00 Tuesdays and Thursdays, 13.00–22.00 Sundays
FEATURES: Download Area, Messaging, Upload Area

Forum-80
(0926) 39871 (A)
SYSOP: M J Randle
SPEED: 300/300 baud
TIMES: 23.00–00.00
FEATURES: National Association of Tandy User Groups, Messaging, News

Gosport Apricot BB
(0705) 524805 (A)
SYSOP: Stephen Cole
SPEED: 300/300 baud and 1,200/75 baud
TIMES: 24 hours

Gnome at Home
01-888 8894 (V)
SYSOP: Micrognome
SPEED: 1,200/75 baud
TIMES: 24 hours
FEATURES: Messaging, Viewdata Editing

Hackney BB
01-985 3322 (V)
SPEED: 1,200/75 baud
TIMES: 24 hours

Hamnet
(0482) 497150 (A)
SYSOP: John Lawrence
SPEED: 300/300 baud
TIMES: 24 hours
FEATURES: Download Area, Messaging, Upload Area

Health Data
01-986 4360 (V)
SYSOP: Dr Dobbing
SPEED: 1,200/75 baud
TIMES: 24 hours

ITCU Exchange and Mart
01-960 4742
SYSOP: Peter Troughton
SPEED: 1,200/75 baud
TIMES: 24 hours

JBBS
(0534) 31407 (A)
SPEED: 300/300 baud and 1,200/75 baud
TIMES: 24 hours

LBBS
*(0524) 822336 (A)
SYSOP: John O'Connor
SPEED: 300/300 baud
TIMES: 24 hours
FEATURES: Adventure, Apricot/Sirius, BBC, CP/M, Download Area, Hacking, Jokes, Messaging, Sales, Upload Area

Livingston BBS
(0506) 38526 (A)
SYSOP: Ray Agostino and Mark Simkin
SPEED: 300/300 baud
TIMES: 24 hours
FEATURES: Messaging

London BB
01-455 6607 (A)
SYSOP: Daniel Wilder
SPEED: 300/300 baud and 1,200/75 baud
TIMES: 24 hours

BY BEN KNOX

BULLETIN BOARD SERVICES

Mailbox 83
(0384) 635336 (A)
SYSOP: Jim Roden
SPEED: 300/300 baud
TIMES: 24 hours
FEATURES: Apple II, Atari, BBC, Dragon, IBM PC, Osborne, TRS-80, Vic-20

Mailbox 80
(0514) 288924 (A)
SYSOP: Peter Toothill
SPEED: 300/300 baud
TIMES: 24 hours
FEATURES: Adventure, Apple, Atari, BBC, CP/M, Dragon/TRS-80 Colour, IBM PC, Micro-Wave, Modems, TRS-80

Marctel
01-346 7150 (A)
SYSOP: Marcus Anselm
SPEED: 300/300 baud
TIMES: 20.00–21.00 weekdays, 12.00–16.00 Saturdays, 13.00–16.00 Sundays
FEATURES: Messaging

MBBS
01-648 0018 (A)
SYSOP: Martin Newham
SPEED: 300/300 baud and 1,200/75 baud
TIMES: 24 hours
FEATURES: Download Area, Messaging

Metrotel
01-941 4285 (V)
SYSOP: Graham Hawker
SPEED: 1,200/75 baud
TIMES: 24 hours

MG-NET
01-399 2136 (A)
SYSOP: Peter Goldman
SPEED: 300/300 baud
TIMES: 17.00–22.00 Sundays
FEATURES: Download Area, Messaging

Microlive
01-579 2288 (A)
SPEED: 300/300 baud
TIMES: 24 hours
FEATURES: BBC *Microlive* programme

Microweb
061-456 4157 (A)
SYSOP: Mike Bibby
SPEED: 300/300 baud
TIMES: 24 hours
FEATURES: BBC, Download Area, News, Problems

MOBBS
061-736 8449 (A)
SYSOP: Ken Farnen
SPEED: 300/300 baud and 1,200/75 baud
TIMES: 24 hours
FEATURES: Acorn, Adventures, Apple, Atari, Commodore, CP/M, For Sale/Wanted, Gossip, Hardware, Help, Jokes, Languages, Modems, Spectrum, Tandy

Morecambe OBBS
(0524) 426132 (A)
SYSOP: Roy Heald
SPEED: 300/300 baud and 1,200/75 baud
TIMES: 24 hours

NBBS East
(0692) 630186 (A)
SYSOP: Jonathan Freeman
SPEED: 300/300 baud
TIMES: 24 hours
FEATURES: Download Area, Messaging, Upload Area

NBBS Essex
(0277) 228867 (A)
SYSOP: Jason Tanner
SPEED: 300/300 baud and 1,200/75 baud
TIMES: 24 hours
FEATURES: Messaging

NBBS London
01-883 5290 (A)
SYSOP: Ben Osler
SPEED: 300/300 baud and 1,200/75 baud
TIMES: 21.00–08.00 weekdays, 24 hours weekends

NBBS Lutterworth
(04555) 4798 (A)
SYSOP: R Carrington-Jones
SPEED: 300/300 baud
TIMES: 24 hours

NBBS Wallington
01-669 7249 (A)
SYSOP: Ford Prefect
SPEED: 300/300 baud and 1,200/75 baud
TIMES: 23.00–16.00 weekdays

NKABBS
*(0795) 842324 (A)
SYSOP: Dave Frost
SPEED: 300/300 baud
TIMES: 21.00–00.00
FEATURES: Applications Software, Communications, Download Area, Graphics, Messaging, Music, Upload Area, Utilities

OBBS 1
061-427 1596 (A)
SYSOP: Robert O'Donnell
SPEED: 300/300 baud
TIMES: 22.00–17.00 weekdays, 22.00–10.00 weekends
FEATURES: Adventure, Apple, BBC, Download Area, Games, Graphics, Hackers, Jokes, Problems

OBBS 2
(0244) 549336 (A)
SYSOP: Paul Roberts
SPEED: 300/300 baud
TIMES: 24 hours
FEATURES: Adventure, Apple, BBC, Download Area, Games, Graphics, Hackers, Jokes, Problems

Octopus
(0272) 421196 (A)
SYSOP: Peter Evans
SPEED: 300/300 baud
TIMES: 24 hours
FEATURES: CP/M, News, Merchandise, Topical Interest

OSI Lives
*01-429 3047 (A)
SYSOP: Frank Leonhardt
SPEED: 300/300 baud
TIMES: 24 hours
FEATURES: Messaging

Owltel
01-927 4682 (V)
SPEED: 1,200/75 baud
TIMES: 24 hours

PIP
(0742) 667983 (A)
SYSOP: Quentin Reidford
SPEED: 300/300 baud
TIMES: 24 hours
FEATURES: Adventure Clues, Apple, Apple Mac, BBC, CP/M, DOS, Fantasy Area, IBM PC, Modem Spot, MUD, Oric, Sales and Wants

React
(0376) 518818 (A)
SYSOP: George Lloyd
SPEED: 300/300 baud
TIMES: 24 hours
FEATURES: Adverts, Dragon, Noticeboard

RSGB
(0707) 57477 (V)
SPEED: 1,200/75 baud
TIMES: 24 hours

SABBS
(0698) 884804 (A)
SYSOP: Nick Rosser
SPEED: 300/300 baud
TIMES: 24 hours
FEATURES: Atari, BBC, Download Area, News

SBBS
(0923) 676644 (A)
SYSOP: Simon Talbot
SPEED: 300/300 baud
TIMES: 21.00–08.00
FEATURES: Apple, BBC, Commodore, Download Area, Graffiti, Hackers Club, Help Hotline Sales and Wants, The Music Man, Upload Area

Southern BB
(0243) 511077 (A)
SYSOP: Jonathan Sanders
SPEED: 300/300 baud
TIMES: 24 hours
FEATURES: Atari, BBC, Bulletins, Communications, Download Area, For Sale, Games, Hackers, Zork

Stoke Itec
(0782) 265078 (A)
SYSOP: Ian Hickman
SPEED: 300/300 baud
TIMES: 24 hours
FEATURES: CP/M

Swafax
(0622) 850440 (V)
SYSOP: Vic Young
SPEED: 1,200/75 baud
TIMES: 24 hours

System Aid
01-571 0026 (V)
SPEED: 1,200/75 baud
TIMES: 24 hours

TBBS
01-348 9400 (A)
SYSOP: John Newgas
SPEED: 300/300 baud
TIMES: 24 hours
FEATURES: BBC, C/Forth/Pascal, Chain Letters, Computer Trade Gossip, CP/M, Diplomacy, Graffiti, Hackers Club, Magazine Section, Politics, Portable Spot Radio Comms, Sales and Wants, Surveys, The Swamp, Toy Shoppe

TBBS
(0258) 54494 (A)
SYSOP: Leo Knaggs
SPEED: 300/300 baud
TIMES: 24 hours
FEATURES: Apple, Atari, BBC, Commodore 64, Modems/Communication, Newbrain, Sales and Wants, TRS-80, Unspecified

TBBS — Capital
01-262 1629 (A)
SPEED: 300/300 baud
TIMES: 24 hours

TBBS — Rovoreed
01-542 4977 (A)
SPEED: 300/300 baud
TIMES: 19.00–07.00

Techno-line
01-452 1500 (V)
SPEED: 300/300 baud and 1,200/75 baud
TIMES: 24 hours
FEATURES: Technomatics products

The London Underground
01-863 0198 (A)
SYSOP: Brian Robinson
SPEED: 300/300 baud and 1,200/75 baud
TIMES: 24 hours
FEATURES: Communications Corner, International News, Messaging, Muddy Patch

TUG
01-205 9930 (A)
SYSOP: Steve Froeschke
SPEED: 300/300 baud
TIMES: 24 hours
FEATURES: Tandy User Group membership list, Messaging

WABBS
*(0903) 42013 (A)
SYSOP: Richard Harvey
SPEED: 300/300 baud
TIMES: 24 hours
FEATURES: Atari, Communications, Download Section, Games, General, Graphics, Upload Area, Utilities

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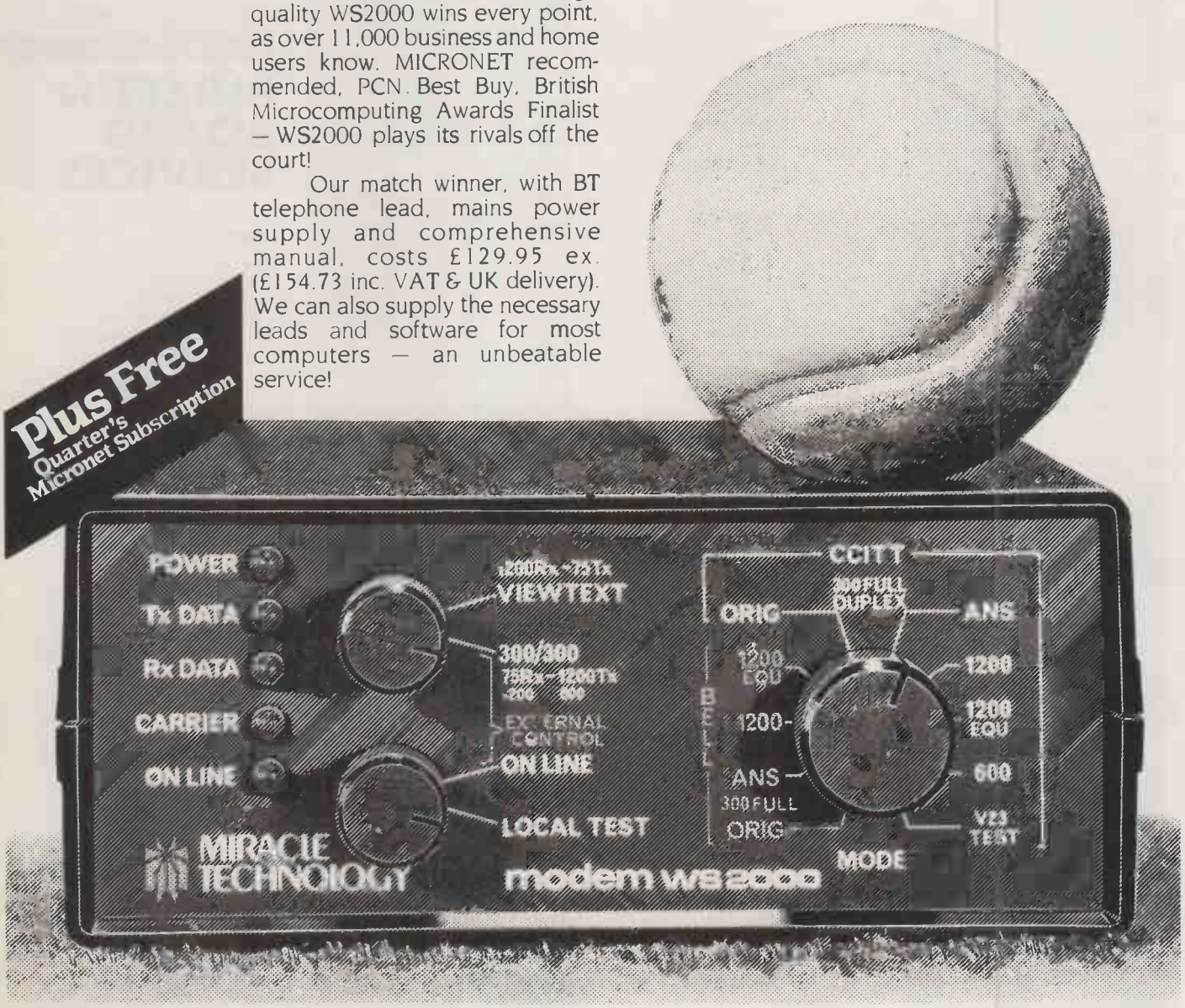

BY DAVID LEVY

WORD GAMES

Old favourites like Hangman can easily be adapted to play on your micro.

Until comparatively recently, word games appear to have been largely ignored by the strategy games fraternity. The reason probably lies in the amount of memory required to store even a modest-sized dictionary. Since this is the year of the 128K computer, the time has come to explore some of the possibilities that exist for programming word games. Once you have programmed one word game you will need very little extra effort to program a whole host of them. To start with you need a dictionary in your program, and a routine which will investigate whether or not a particular sequence of letters forms a word that is in the dictionary.

The best-known word game is Keyword. Each player tries to find as many different words as possible, made up of the letters of some particular target word. There are usually one or two restrictions, such as plurals being disallowed and all words needing to be of four letters or more, but these are optional and for the computerised version of the game you should allow words of any length.

Humans can compete against each other by trying to find the most words within a specified period of time. Various methods of scoring exist. You can count one point for every correct word and −1 for every illegal word, just to deter people from guessing. Another scoring system gives n points for making an n-letter word, and the game is more fun if you deduct n points for an illegal string of n letters.

When playing such a game against a computer, which can find every word in its dictionary, most humans would never make an even score with the program. So it is worth providing your program with various levels of difficulty, so that human players can enjoy the game without being decimated every time by the electronic opponent. Level 1 might allow the computer to make words of two letters or less. Level 2 might restrict it to words of three letters or less, and so on.

Another possibility is when the program plays on its weakest level, to allow it only words that do not use the letters from, say, n to z, the next weakest level could prohibit the use of letters o to z, the next level omits p to z, and so on. Many other ways exist to handicap the program; just use your imagination to find one that suits you.

INTELLIGENT GUESS

Hangman is quite popular with children. One way to make the game interesting is for the user and the program to take turns in choosing the target word, which of course must be in the computer's dictionary. When the computer is trying to guess the word it can behave quite intelligently by using the following fairly simple algorithm.

The frequency distribution of letters in the English language serves as a good starting point. One source lists the letters in the descending order of frequency shown in figure 2. Assuming that the target word has been randomly chosen, the player should start by guessing E and continue in order T, A, O and so on. Once one or more letters of the target word have been identified, the algorithm becomes slightly more complex.

The subsequent guesses are based on a combination of letter frequencies and the knowledge that certain letters and words cannot possibly be correct, such as the letters that have already failed and any words which do no fit the matched letters found so far. Humans can do this to a certain extent, but a computer program can be far more methodical in its guesses.

By way of example, consider the target word SECRET. The program's first guess is E, since this letter heads the frequency table, and the user would indicate that there was a match in the second and fifth letters

— E — — E —

Next the program searches through the dictionary for all six-letter words containing the letter E as the second and fifth letters. Whenever it finds such a word, it looks at each of the other letters in the word and adds 1 to a corresponding variable which is stored in a 26-element array. Having searched through the dictionary it will then have its own frequency table giving the relative frequencies of occurrence of each of the hitherto untried letters in the alphabet, but only for words which could match

— E — — E —

The program then guesses at the untried letter with the highest frequency. The algorithm continues in this way until the correct word is found or until the program runs out of guesses and the condemned man falls through the trap door.

A possible refinement on this method would be to add 1 to the letter count for every feasible word in the dictionary that contains the letter in question. In this case a letter does not get a higher count if it occurs twice or more in the same word. The advantage with this idea is that the program would eliminate impossible words more quickly, whereas the original algorithm would benefit whenever there was more than one occurrence of a letter in the target word.

Jotto is a two-player game. Each player writes down a word of the

(continued on next page)

STORING THE DICTIONARY

The average length of English words is approximately 4.5 letters per word. Five bits are required to identify each letter. It should follow that an average of approximately 22.5 bits per word are required for storage. However there are methods for storing a dictionary much more compactly than 22.5 bits per word. You can use a tree structure, in which the first letter of the word is the root node on the tree. Each node on the tree may have one or more successor nodes. A successor node has a null flag if the string of letters above it forms a legal word. A successor node represents a letter if the string of letters from the root to this point represents the first part of at least one legal word.

Figure 1 is an example of a very small dictionary stored in this way. The tree contains the strings: C A R null, C A R T null, C O N null, and C O N E null. So the words in the dictionary are CAR, CART, CON and CONE.

A more compact method for storing larger dictionaries consists of creating a number corresponding to each word in the dictionary. The number is computed by multiplying the index for each letter by 26^n, where w is the number of letters in the word, and n is the position in the word where that lettter appears. These products are then added to find the number corresponding to that word. Thus ARE would convert to

$(1 \times 26^2) + (18 \times 26^1) + (5 \times 26^0) = 676 + 468 + 5 = 1149$

The trick is to store only the first number in every group of words and then the difference between that number and the next number in the group. For example, if the word after ARE is ART, and if ARE were the first word in the group, we would store 1,149 and 20, since the number computed for ART is 1,169. The differences are much smaller than the numbers themselves, and it is therefore much more economical to store the differences.

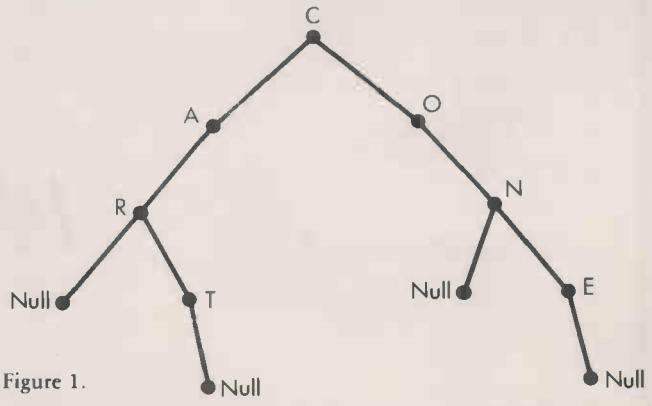

Figure 1.

In order to keep to tolerable search times it is necessary to partition the dictionary into groups of words, possibly 10 to 20 words per group. A detailed analysis of this method reveals that for a large dictionary of more than 100,000 words, it is possible to achieve a compaction of eight bits per word or better.

(continued from previous page)

same length, say five letters. The object is to be the first to deduce the opponent's word from information acquired during play.

Each player in turn indicates a five-letter test word. The opponent then states how many of the letters in the test word appear in his own word, regardless of position. For example, if HOUSE is my word and you test with CLONE the answer would be 2 because O and E are in both words. The winner is the first player to indicate a test word which turns out to be the opponent's word.

Although the game can be played with any number of letters in the word, experienced players have discovered that five is the best number for an enjoyable game. Allow various options in your program, including four- and three-letter words to make the game easier for young children.

The algorithm for this game is based on the use of simultaneous equations. From the example given we can say that counting 1 for each letter which is in my test word and in your word, and 0 for letters in my test word which are not in your word gives

C+L+O+N+E=2

Each time the program tries a test word it has another equation of this form. Whenever the number of such equations becomes greater than or equal to the number of different letters used in all of the test words, the program can solve the simultaneous equations to determine whether each of the tested letters is 1 and appears in the target word, or is 0 and does not appear in the target word.

NARROWS SEARCH

The process can be speeded up by noting that whenever the sum of the 1s and 0s is itself 0, all of the letters in that test word must be 0s. By substituting any known letter values whenever these letters appear in subsequent test words, the program can narrow down the search more quickly.

The choice of test words can be made on a probabilistic basis. From the knowledge that

C+L+O+N+E=2

and with no other information about which letters have the value 1 and which have 0, the program can compute average estimates of 0.4 for each of the values of the five letters C, L, O, N and E. The program then computes a score for each letter by multiplying these average estimates by the frequencies given in figure 2. An average is then taken of the scores

E	0.131	D	0.038	W	0.015
T	0.105	L	0.034	B	0.014
A	0.082	F	0.029	V	0.009
O	0.080	C	0.028	K	0.004
N	0.071	M	0.025	X	0.002
R	0.068	U	0.025	J	0.001
I	0.063	G	0.020	Q	0.001
S	0.061	Y	0.020	Z	0.001
H	0.053	P	0.020		

Figure 2. Letter frequency.

for each letter over the number of test words in which that letter has so far appeared. At the start of the process none of the letters has been tested and so the percentage frequencies are used as initial values for these scores. Once a letter has been tested, its percentage frequency is replaced with its computed average score.

for each letter over the number of test words in which that letter has

After the calculations have been performed, following the application of each test word, the program must decide which test word to try next. It works through the dictionary to find every word of appropriate length which does not contain any letters scoring 0. It then adds the letter scores for each letter in the word. Whichever word has the highest total at the end of this search is used as the next test word.

Eventually the program should find that it has five letters with scores of 1, in which case it merely needs to try all combinations of those five letters which form legal words. If not, it will have found the true values, 1 or 0, for every one of the 26 letters of the alphabet. In the second case it is possible that only four different letters or fewer are used in the target word. Again the program will try all legal combinations of these letters.

SECURITY

Double Jeopardy is a variation on Jotto. When indicating a test word each player must also indicate how many matches it makes with his own keyword. This game is more interesting and demanding than Jotto because the quest for information is tempered with concern for your own security.

A program can play Double Jeopardy by using an algorithm similar to the one described for Jotto, but having computed the score for each possible test word it must then take into account the amount of information being given away about its own word. The program could compute the following for each possible test word

score for test word/(number of matches with own word + 1)

and apply the test word that has the highest quotient. PC

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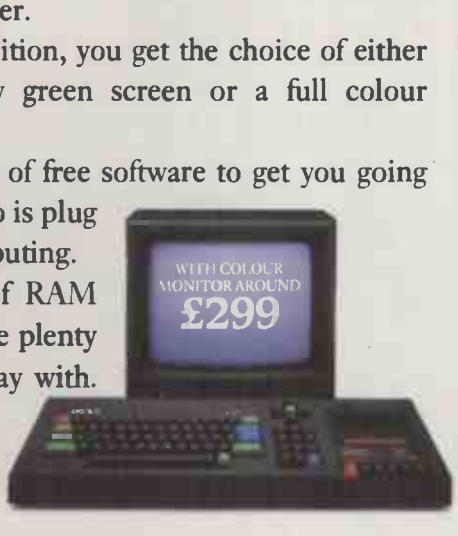

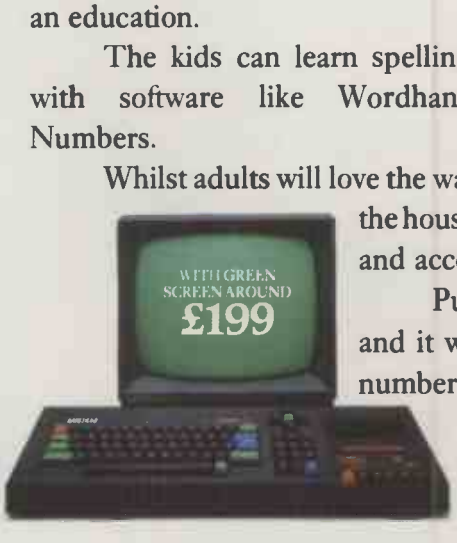

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Q I find that printing with WordStar using MS-DOS 2.1 on my Hitachi MBE-16002 is a great deal slower than when using MS-DOS 1.25. Is there anything I can do to speed it up, as DOS 2.1 has other advantages I am reluctant to abandon?

JOHN C IMBER

A We have absolutely no idea why printing with MS-DOS 2.1 is slower than with version 1.25, but you could get round the problem by using some of the memory as a print spool buffer. This means that when you tell the computer to print, it actually sends the output to the memory allocated as the buffer, which is quite quick since it is a memory-to-memory transfer. Once the data has been transferred to the buffer, the computer thinks it has finished printing and you can use the machine for another job, even though it may take quite some time for the information from the buffer to get to the printer.

You will need a suitable program to organise the memory as a printer buffer. If you buy an additional memory card, you will probably be provided with this software free; Magic Memories and Qubie boards are two that include it. For software only, the IBM-PC Users Group software catalogue suggests that disc 2 has two spoolers, and disc 38 has another. For information write to Ian Fraser, IBM PC Users Group, PO Box 593, London SW1V 2PG. The cost is £5 per disc, but you must first join the group.

Q I have recently upgraded my BBC Micro with the Z-80 second processor. I am most impressed with the software and utilities that are supplied with this add-on. I have tried to use the CP/M editor to write a short program, but I have not been able to get any of the editing commands to work except I to insert, and Control-Z to quit. Is the editor supplied by Acorn a full working version?

I then resorted to writing my program using Memoplan. This worked OK as long as none of the lines exceeded about 75 characters. As soon as a line gets too long it wordwraps, but when I run the program it is treated as a direct command and fails.

I am delighted to say that I have the SList CP/M utility published in your April 1985 issue working. I had to remove all references to Hilight and Unhilight as suggested. This success will now lead me to try the file-transfer utility from the January issue.

BRIAN DANDRIDGE

A The CP/M editor Ed is the worst editor we have ever seen. Unless you have some text in the file, you cannot move the imaginary pointer to the line in the file, nor can you move the imaginary pointer for the character on the chosen line. Yes, the editor you have is a full working version, but we have not used it willingly for over six years.

Your decision to use an editor to produce a Basic program is a sound one. We much prefer to use an editor to type a program into a file rather than typing it in under Basic, since it is easier to alter just part of the line, or the line number, or to move a section of code to another part of the program.

Your problem is that you are using a word processor as the editor, and when a line is full it automatically inserts a Carriage Return and a Linefeed at the end of the line, and moves the last incomplete word on to the next line. This is fine when you are typing text for a letter, or a report, but it is absolutely wrong when you are typing a line of a program. When you try to load the program under Basic, and before you get a chance to run it, you get the error Direct Statement in File from the Carriage Return and Linefeed inserted by the word processor. If you then try listing the program, it will stop at the line it objects to.

The first thing to do is to put the file right so that the program will work without having to retype it. It appears that the part of the program after the offending Carriage Return has been lost, but this is not so. The whole program is present in the disc file, but Basic has only read and understood the first part. If you leave Basic and return to the operating system — by typing System — you can use CP/M to play with the disc file.

The usual letters and numbers can be represented using only seven bits, so the eighth bit is not normally used. However, it may be used by a word processor or editor. For example, under WordStar any characters that you type in have the eighth bit set to zero, but any characters inserted by WordStar — such as Linefeeds or spaces to right-justify margins — have the eighth bit set to 1. To make your file work under Basic, you want to eliminate or unset any eighth bit that has been set.

You can do this quite easily using Pip to copy your program. It is possible to specify parameters to Pip to make it do some special tricks as well as simply copying a file. In this case we want the Z parameter, which has the effect of setting the eighth bit to zero. Thus if your file was called Mygame.Bas, the command you require is

```
PIP NEWGAME.BAS=MYGAME
  BAS[Z]
```

This copies the existing file Mygame.Bas into a new file called Newgame.Bas, which is identical to the original except that any high bits that were set in the original file will not be set in the new file. Provided that you have no other syntax errors in your program, the new file should run under Basic without any problem. You can erase the file Mygame.Bas under CP/M with the command

```
ERA MYGAME.BAS
```

Alternatively you can copy the original file into a new file, ignoring the eighth bit as before; if the old and new files have the same name, the new file will overwrite and thus replace the old file. The command to do this is

```
PIP MYGAME.BAS=MYGAME.
  BAS[Z]
```

It is obviously best to avoid getting extra Carriage Returns in the file on future occasions. To edit text documents such as letters where you want wordwrap you use WordStar's D editing mode, but for editing programs where you do not want wordwrap you use the N editing mode. If your word processor does not have an option of this kind, you can probably prevent wordwrap by resetting the right margin to a larger number than the maximum number of characters on a line of your program — perhaps 80 or 100.

(continued on page 52)

COLOUR MONITORS

Q I have been using a Sord M-23P under CP/M, which has a 640-by-200 graphics display with eight colours. I was hoping to upgrade it using a suitable graphics controller, but I am somewhat confused about the compatibility of the RGB monitor. Am I right in assuming that the monitor itself limits the attainable resolution? If so, how do the cards that claim to double the IBM screen resolution to 640 by 400 work? If I want to upgrade, will I have to buy another monitor?

B NICHOLSON

A You are correct in assuming that the resolution of the monitor must match that of the video board. For example, an ordinary domestic colour TV will show a 40-column text display quite well, but 80-column text is fuzzy to unreadable.

The phosphor on a colour tube is made up of groups of three dots or stripes of the primary colours red, green and blue. The maximum resolution of the tube is determined by how big each group of three colours is. The striped tubes have the worst resolution, and those based on dots come in two sizes, where the diameter of a group of three is 0.48mm. or 0.31mm. respectively. The graphics board in the computer determines how many pixels are produced and will be shown on the screen, and plainly the two should match.

If the board produces more dots than the screen can show, the capabilities of the board are wasted. The medium-resolution monitors used for the usual IBM display of 640 by 200 will not display the 640 by 400 resolution properly. Conversely, if you have a high-resolution screen but the board only produces a small number of dots you will get a poor picture.

IBM has recently released an Enhanced Graphics Adaptor made up of a higher-resolution graphics board and high-resolution monitor. It replaces the original graphics board and monitor with the IBM PC, but is expensive.

There are a number of colour video boards for the IBM PC that produce more dots on the screen and give 640-by-400 displays. Xdata has a superb video board costing over £600 plus VAT, and you must also get a high-resolution monitor, which costs over £650. It does get very expensive, but a graph or a picture displayed on this equipment is beautiful, and makes the standard IBM 640-by-200 look crude. Princeton Graphics is a U.S. firm which does the same thing.

? • ! • ? • ! • ? • ! • ? • ! • ? • ! • ? • ! • ? • ! • ? • ! • ? • !

This is the size of paper taken by Epson's new P-80 printer.

ASK PC

(continued from page 50)

Q **I am currently developing a program using Microsoft Basica on an IBM compatible with 256K of memory. The program performs several index sorts on numeric and alphanumeric arrays. However, as my database has grown, the 60K of memory available to Basic has been swallowed up by these arrays. Is there any way of extending the amount of memory that Basic can utilise, so that I can extend the size of arrays within my program? I have already erased all the dummy variables, and chained different sections of the program, but the quantity of the data to be stored in these arrays has become greater than Basic can handle.**

R D G HANLON

A Your problem is not a new one. Computing jobs grow bigger, and eventually grow too big for the computer. The CP/M-80 machines only have 64K of memory, and this has to hold the operating system, the Basic interpreter and the user's Basic program. You are better off than this with your 256K of memory: about 64K is used by the MS-DOS operating system and Basica occupies most of another 64K, but that still leaves about 128K free. Unfortunately, Microsoft Basica can only access 64K of memory; that limits the maximum size of a Basic program, and since there are some overheads this limit is usually about 62K.

Our first suggestion is to use a different programming language. Fortran, Pascal, Modula-2 and C can all use as much memory as you can provide, thus removing the 64K limit imposed by Basica. Generally, if you need a program bigger than 64K you would be well advised to use a better language than Basic, though in your case the code in the program is probably small; it is the arrays that are very big.

Another solution is to find a version of Basic that can access more than 64K. The only one we know of for certain is Better Basic, though we have not actually used it. It can use all the 640K memory which can be fitted in an IBM PC and it compiles each line as you type it in, so programs run faster than on an interpreter. It costs $199 from Summit Software Technology Inc., PO Box 99, Babson Park, Wellesley, Ma 02157, U.S.A. Summit sells a sample disc as a demonstration for $10.

If you really do want to use Microsoft Basica, then the space occupied by large numeric arrays might be reduced if the numbers can be declared as integers with a Defint statement at the beginning of the program. Integers can be stored in two bytes, while single-precision real numbers require five bytes. If you can use integers you will be able to increase the maximum size of the arrays. If your numbers are not integers, you could convert them to integers, perhaps preserving two decimal figures by multiplying the numbers by 100, adding 0.5, and taking the integer part. For example

```
10 DEFINT I(1000)
50 I(J) = INT(X*100+0.5)
```

Remember that the value of integers that can be stored must be in the range +32,767 to −32,768.

Another way of handling a lot of numbers is to do a preliminary sort to split the list into two or more sub-lists. At its simplest, you could read the data values one by one, and write the values into two or more different disc files. For example, if some of the numbers are positive and some negative, the positive ones could be written to one disc file and the negative ones to another. If necessary, you could split the list into more files. Then you could read the first file and sort the numbers into the required order, and write it back on to disc. Then read, sort and write back to disc the contents of the second file, and so on. Eventually you read and print the numbers of file 1, then file 2, and so on.

All this reading and writing to disc will slow the process up considerably, particularly if you are using floppies. However, one of the advantages of the IBM PC and its clones is that you can add extra memory, and use some of it as a silicon disc. If the files of numbers are copied into the silicon disc, then reading and writing numbers and files will be enormously speeded up compared with using floppy discs, and quite a lot faster than with a hard disc.

In a similar way, sorting a large number of character strings into order, as in a telephone directory, can be achieved more efficiently using a Bucket Sort. This comprises a preliminary pass through the data, looking at the first letter only. All the fields beginning with A or a are sent to a temporary file, all the B or b fields to another, and so on. You can then sort the 26 small files one after another, and finally merge them or print them in sequence.

Q **I have a new Tandy 1000 computer, and wish to get a high-resolution monitor to connect to it. Obviously there must be some relation between the resolution available from the computer and the resolution power of the monitor in order to have compatibility. I would be glad to know the key factors in determining compatibility.**

MICHAEL FORDE

A The Tandy 1000 is an IBM PC look-alike, but unlike the IBM it has colour graphics built-in, and does not require an extra colour video card. Whether you use colour or not, the screen resolution for text is 80 characters per line, and 25 lines or 640 by 200 dots in high-resolution graphics. Tandy sells its own colour monitor for £399 plus VAT, but any colour monitor which is IBM compatible will do. You may find the British-made Microvitec as good and cheaper.

If you buy something other than the Tandy monitor, do be careful, since many so-called medium-resolution monitors are fine if you use the 40-character display, but almost unreadable if you use the 80-character width. Insist on seeing the display in 80-column mode before buying.

The resolving power of a monochrome monitor is measured by its quoted bandwidth — that is, the maximum frequency of signal that can be displayed. The graphics display is made up of, say, y lines of x dots. Each line of x dots from the graphics display is transmitted one after another to the monitor, until a complete picture is built up, and the entire process is repeated 50 times every second. Thus the time available to transmit one line is 1/(50y) seconds.

Now suppose the bandwidth of a monitor is quoted as bHz. In the time available to transmit one line, there are only b/(50y) oscillations. In this time we wish to display a line of x dots.

Ideally, we would like to get a sharp transition between the pixels that are off and the pixels that are on, which means we would like a square waveform to be produced, though to make square waves you need components of infinitely high frequencies. However, a perfect square wave is not necessary, and each pixel on the screen looks fully illuminated if the number of cycles (c) in a single line is twice the number of dots to be displayed. Thus c must be greater than 2x, and hence b must be greater than 100xy.

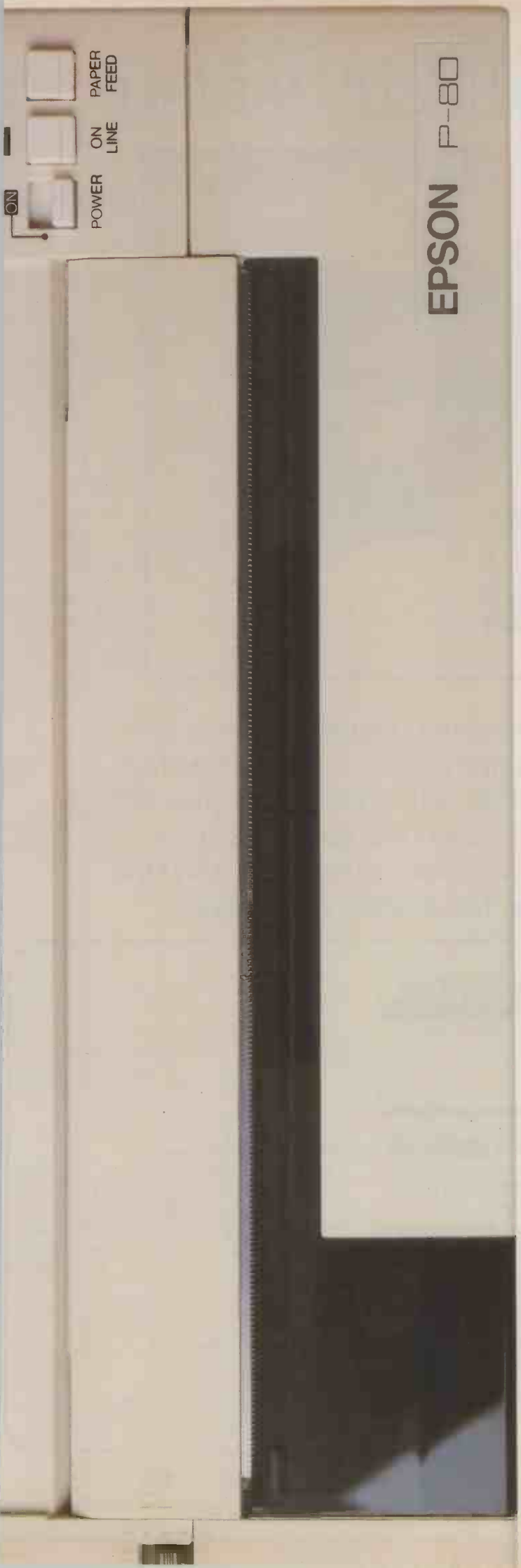
For example, on a 640 by 240 monochrome display, b should be at least 100 times 640 times 240Hz, or 15.4MHz. In high-density displays it is usual to interlace the lines on the screen — that is only transmit the odd lines in one 1/50 second, and the even lines in the next 1/50 second. Using this technique a 1,000 by 500 picture needs a bandwidth of about 25MHz, rather than the 50MHz that would be needed for a non-interlaced picture.

Colour systems are conceptually more difficult. A colour screen has three sets of dots for the primary colours red, green and blue. The way in which these are arranged is important. Cheap monitors have vertical bars of the three primary colours across the screen. This means that if you try to display a character in white, then on the screen you will get a red character, a green character and a blue character all slightly displaced. The smaller the displacement of the vertical stripes the sharper the picture will be.

Our experience is that striped screens are only acceptable for TV sets and for 40-column displays on a monitor. On better monitors the screen is covered with a lot of triads. Each triad is a triangular lattice of three dots: one red, one green and one blue — and these give better quality. Clearly the smaller the dots the better, and the more expensive.

Thus the relevant criteria for colour monitors are the dot diameter and the arrangement of the dots. With a triangular lattice monitor, best results are obtained if there are as many triads horizontally and vertically as there are pixels, but we successfully use a 750- by 500-triad monitor with a 1,000- by 500-pixel display. PC

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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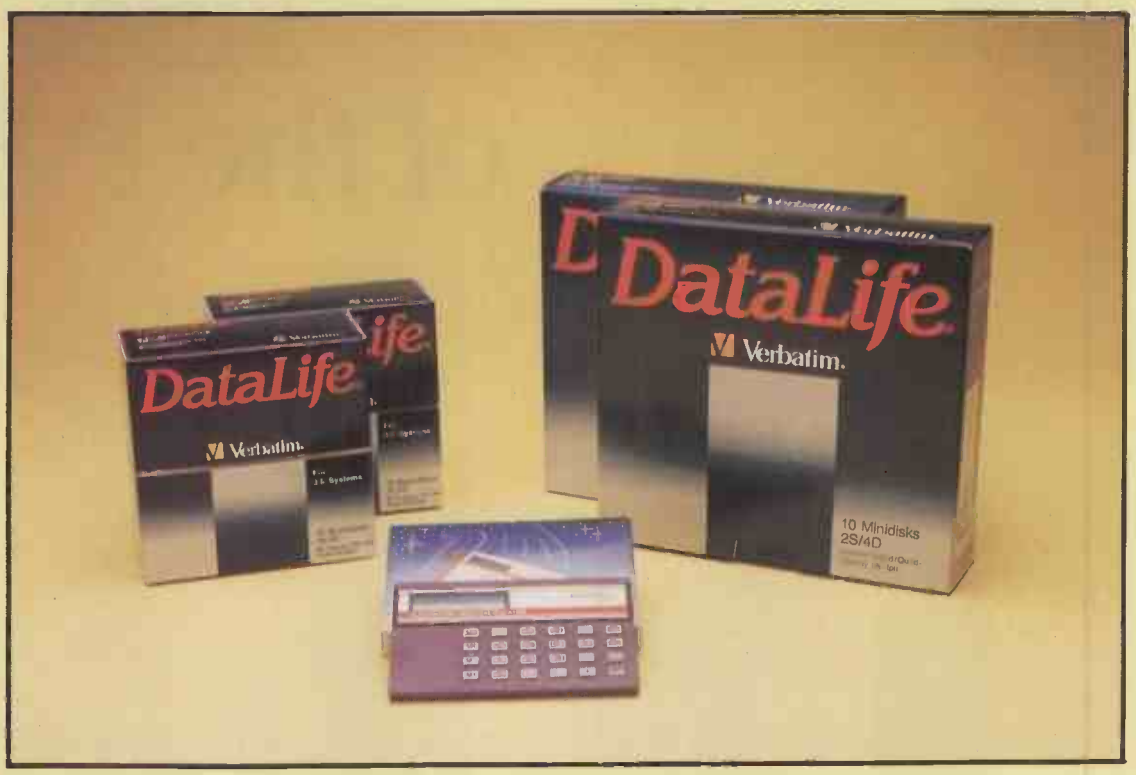

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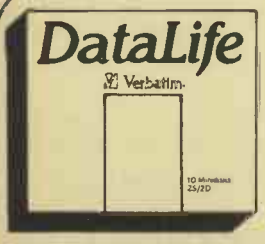

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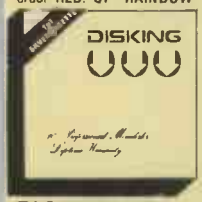

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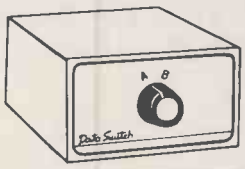

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Plan your life and produce your own in-house magazine. We look at two of the hottest areas in applications software: project planners on the IBM PC and page-makers on the Macintosh.

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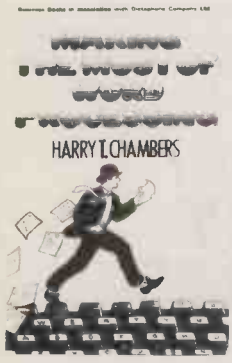
BOOK REVIEWS

WORDS ON WORDS

Susan Curran assesses some of the literature to help you get to grips with word processing.

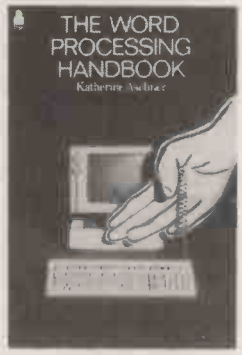
FIRST, some introductory books aimed at potential or novice users of word processing. Some of these are specifically aimed at business and corporate users, some at authors and journalists.

To the business users first. Harry T Chambers' *Making the Most of Word Processing* relies heavily on help provided by the Dictaphone Company, whose expertise is entirely in centralised WP systems with dictated and recorded input. The book is aimed at executives in charge of setting up or running this type of system.



Chambers' emphasis is on issues such as planning the system structure: that is, the arrangement of authors/typists and machines, calculating cost benefits, pacifying staff and ensuring that ergonomics are correct. He devotes little space to the differences between systems, and reveals no personal acquaintance with keyboards. Largely because of this, the book, although published in 1982, has barely dated. This is a solid no-nonsense approach which gives short shrift to the idea that WP will bring about revolutionary changes in managerial work styles. It is professionally written and can be recommended to office managers.

Word Processing by Richard Morgan and Brian Wood is not dissimilar, but it is aimed less exclusively at managers, and should also be appropriate reading for word-processor operators and their immediate supervisors. Morgan and Wood concentrate less exclusively on large concerns. They do not discuss brand-name equipment at all, but this book, written in 1981, still shows its age in parts: for example, in its discussion of the capacities and problems of floppy-disc handling. But overall it is well written and helpful.

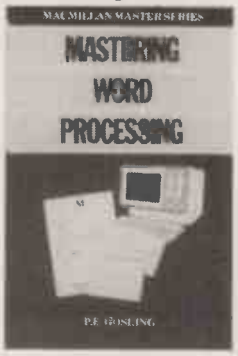


Much the same is true of Katherine Aschner's *The Word Processing Handbook*, which is a solid, sensible and bargain-priced introduction for business users. It has handy short chapters on photocomposition and electronic mail, and a good index.

Word Processing for Small Businesses sounds admirably aimed at many *PC* readers, but it is disappointing. Steven F Jong seems to have little idea of small businessmen and women's interests and requirements, and he rabbits on about models of chips, computer languages and operating systems until even technically-minded readers will be baffled. There is information, but no serious discussion of small business needs, and the over-technical reviews of hardware and software include many outdated and U.S.-orientated products.

Francis Samish's *Choosing a Word Processor* is chatty, and a little short on the disciplined approach and hard information. It mentions products rather than giving in-depth reviews. However, it is an adequate introduction to the whole subject.

Arnold Rosen's *Getting the Most out of Your Word Processor* concentrates mainly on business applications, but with a nod sideways at authors. It is written in American-manual style, starting with a cheery "Congratulations!" and with many exclamation marks thereafter. The choppy text contains a lot of practical information, and the illustrations are excellent. A good general-purpose book for beginners.



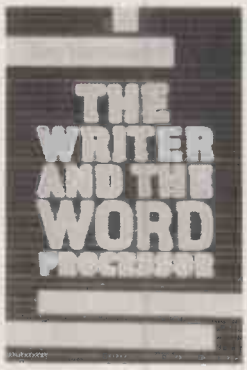
Mastering Word Processing by P E Gosling takes a rather different approach. Gosling introduces five different WP packages for micros, describing the type of commands, the screen displays, the work that can be done, etc. The idea is presumably to show the differences between the programs. All five programs chosen are at the lower end of the market ones such as Wordcraft 80, WordStar 3.0, Applewriter, T/Maker and View, and the choice seems rather unbalanced. The book should have pointed out that none of these packages are really new-generation business-orientated programs. Age is no excuse: this was only published a few months ago.

I found Gosling's approach rather confusing, particularly in its didactic "now type this passage" style. This is hardly appropriate when even the most dedicated reader would not have access to all these programs on different machines. The book gives some idea of what WP is about, but it is more likely to daunt than to encourage would-be users.

While books on business WP are generally written by those with a fair amount of experience, the reverse seems to be true of books designed for authors and journalists. Here, the standard of knowledge is often lamentable.

William Zinsser is sadly typical. His sole experience of WP — if we are to believe *Writing with a Word Processor* — consists of walking into an IBM dealer and ordering the system they suggest: in this case a Displaywriter, which is hardly the obvious choice for a journalist. He apparently made no effort to evaluate alternative machines, and he relates his subsequent experiences in a "silly non-mechanical me" style. Zinsser writes elegantly, but his tale is hardly worth relating, and his insights are generally either trite or unique to his particular system. It is difficult to recommend this book as a serious guide for writers who are actual or intending users of WP. It might appeal to some as expensive light reading.

Shirley Biagi too seems to have been a naive user when she began writing *A Writer's Guide to Word Processors*, but she did at least bolster her personal experiences by canvassing a variety of other writers about theirs. A pity she did not speak to some WP professionals, as they might have cleared up some serious confusions in this book, particularly about floppy and hard discs. Biagi's product information is noticeably outdated, and her resource information is exclusively U.S. orientated. Both Zinsser and Biaggi taken an American attitude to finance, and they make no real attempt to discuss cheap systems.



A much better buy is Ray Hammond's *The Writer and the Word Processor*, which combines some sensible introductory comments about WP for writers with a chapter of interviews with big-name authors who have taken the plunge. Again, I wish Hammond had annotated these so that it is clear where the authors' grumbles are unique to their particular

BOOK REVIEWS

systems. However, this is a well-written and helpful book from someone who genuinely does know about both writing and word processing. It is also good value at £2.95.

Hammond is particularly good on peripheral issues such as on-line research to public and private databases, electronic mail, liaison with publishers and typesetters, and rights in electronic media. This is a U.K.-orientated book, though the background information is world-wide in scope.

Now for books on specific programs. These are a curious breed: I sometimes suspect they are bought mainly by bootleggers who do not have access to the original manual. Randall McMullan's *Working with Easy Script* deals with the popular Com-

modore 64 program, and is basically a manual rewrite. I've used his similar *WordStar Prompt* for some time, and found it very helpful. The Easy Script manual is not nearly as bad as the original WordStar manual, and the program is not as powerful. As a result, many legitimate Easy Script users might think this book an unjustified indulgence at £5.95. Still, it is good of its kind.

WordStar in Action, also by McMullan, extends his earlier WordStar book, and costs a shocking £10.95. It is a clear and well laid-out introduction cum reference book. However, at the price I would have expected to find advanced features — such as how to patch the program to make it support additional print features, or change the defaults — covered as well. But it is worth it for despairing, failed users of WordStar.

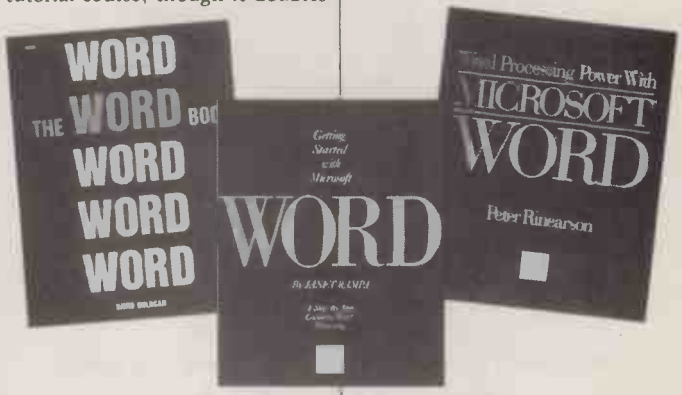
The Illustrated MS-DOS/WordStar Handbook is a similar publication, both in content and in layout, though it does also cover basic MS-DOS commands like Del and ChkDsk. There seems to be little to choose between the two volumes, except for the price. How can Prentice-Hall get away with charging over £15 for very ordinary paperbacks like this?

At £14 for 166 uninspired pages, *Easywriter Simplified for the IBM Personal Computer* is even more overpriced. The book is competent but basic, on the lines of "here is the Shift key; here is the Control key". Again, really only useful for Easywriter users badly out of their depth.

Easywriter Simplified is based on version 1.1 of the program; *Easywriter II System Made Easy-er*

covers version 2. I am not sure why this modest difference induced Prentice-Hall to publish both books, and if I were the author of either I would be justifiably angry with them. The latter is even slimmer, marginally cheaper, and seems to contain slightly more information.

Finally, three books on the subject of Microsoft Word, all of which are larger and plusher than any of the other books I review. They are also predictably even more expensive. *The Word Book* by David Bolocan is basically a tutorial course, though it doubles



as a reference book. It covers all aspects of all the current versions of Word, though it gives relatively little space to the complex features like style sheets. If you found it difficult to learn the program with Microsoft's tutorial program, which I thought was very good, then this could be the book for you.

Similar territory is covered by *Getting Started with Microsoft Word*, but this skips some of the advanced material, and has nothing at all on style sheets, or on editing documents produced on other word processors. The elementary territory it covers clearly and elegantly.

Word Processing Power with Microsoft Word by Peter Rinearson is a denser book, and the only one of the three that I felt I would find of continuing use. For a non-elementary book it does waste a great deal of space on basic summaries of commands, but it also contains useful hints and facts that I have not found in the Word manual. There is not as much on the complex features as I would have liked but what exists is clear and helpful. A worthwhile acquisition for affluent Word users. PC

WORDS ON WORDS

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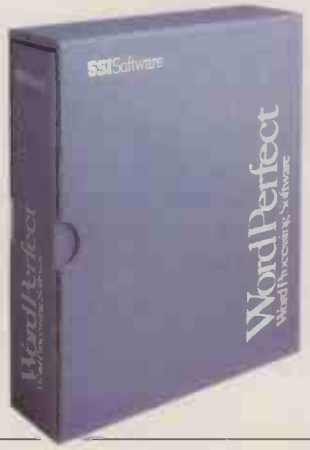

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HP VECTRA
A TOUCH BETTER THAN IBM

By Glyn Moody

Hewlett-Packard has finally joined the bandwagon of IBM compatibility with this 80286 PC/AT-alike.

With the Vectra, Hewlett-Packard has finally bitten the bullet and joined the dreaded IBM-clone club. This has meant ditching its favourite 3.5in. discs and using the less trendy 5.25in. size. However, some of the Hewlett-Packard originality remains: one of the hardware options is the infrared touch-screen first used on the HP-150 and reviewed in the May 1984 issue of *Practical Computing*.

But on the whole the line-up is thoroughly familiar: an 80286 — though running at a turbo 8MHz against the AT's 6MHz — 360K or 1.2Mbyte floppies, and a 20Mbyte Winchester. HP's equivalent to the PC/AT comes with 256K RAM, a single 1.2Mbyte floppy, video card, screen, keyboard, security lock and serial port; the cost is £3,588, against £4,165 for the nearest IBM. The model reviewed here had an additional 360K floppy and a 20Mbyte Winchester, and costs about £5,500. All prices include a 12-month maintenance contracts.

UNEQUAL PAIR

Like the AT, the Vectra has a large system unit. I find the IBM styling more attractive: the HP format is rather box-like. The disc drives are at the front. On the review machine the lower one had a capacity of 1.2Mbyte, and was marked with an asterisk to distinguish it from its smaller sibling. Unusually, the hard disc is placed underneath the floppies. Behind this stacked arrangement is a fairly hefty power supply, cooled by a reasonably quiet fan with a vent at the back.

Next to this there are various sockets for power in, power out to the monitor, and the keyboard. Communications ports and video signals emerge from sockets at the back of expansion cards, which are located on the right-hand side of the machine as viewed from the back. Opening up the machine is simple, and reveals a large amount of space to allow for the addition of IBM PC and AT cards.

The monitor provided with the review machine had tilt and swivel. The image was steady, though the phosphor was a sickly green. A second lead connects to the video output from one of the cards. There are also two sockets for keyboard in and out. These are used in conjunction with the touch-screen facility.

Normally the keyboard connects directly to the main systems box. The keys have a characteristic HP feel about them, with a very definite point at which they give. They rattle very little, and I found the keyboard very pleasant to use. In addition to all the standard IBM PC/AT keys, HP has added two further sets, so the overall dimensions are greater than on the IBM. The first is a separate cursor pad, with Home, End, Page Up and Page Down. The second set are a group of eight keys which come into play in the absence of the touchscreen.

The touch-screen works by means of a grid of infrared beams in front of the screen. Pointing at the screen breaks the beams and allows the computer to calculate the position on the screen. Use is made of the touch-screen facility by setting up options on the screen which are selected by pointing.

HP VECTRA

PC VERDICT

	POOR	AVERAGE	GOOD	EXCELLENT
Performance	☐	☐	☐	■
Ease of use	☐	☐	■	☐
Documentation	☐	☐	■	☐
Value for money	☐	☐	■	☐

Emerges as one of the leading alternatives to the IBM PC/AT.

With a conventional screen the auxiliary function keys are used. The only application currently available which can use the touch-screen facilities is HP's Personal Applications Manager (Pam). It is a friendlier front end to MS-DOS, and allows you to carry out various basic operations by pointing, or in the case of the entry-level Vectra, using the top row of function keys. The touch-screen option comes as a bezel which fits around the screen and can be installed by the end-user for only £292.

On powering-up the machine, self-test routines are followed by the basic Pam screen. From here you can run any installed applications, or DOS commands can be invoked using the touch-screen or the function keys, DOS commands can also be entered directly. As an alternative to either touch-screen or keyboard input, a mouse may be connected to the back of the keyboard and used to select options from Pam or other mouse-driven programs such as Gem. The mouse emulates the Microsoft product and is a stylish dome with two buttons at the front.

The Benchmarks show the HP Vectra to be fleet of foot. As you might expect from a rigorous company like Hewlett-Packard, having once started down the road of IBM compatibility it has been nothing if not thorough. So not only can the Vectra run Lotus 1-2-3 but it can also manage Flight Simulator in its original PC version, something the AT itself cannot do. This is done using the 360K floppy drive, which is one benefit of having a mixture of drive capacities.

Bundled software for the Vectra is thin on the ground. The entry-level system comes with MS-DOS and Pam but with other models you have to pay extra. Hewlett-Packard is also offering a version of Samna Word under the name Advancewrite. The three manuals provided with the review machine were only in the form of proofs. They handled setting up the Vectra, using the Vectra and MS-DOS. All were commendably full.

MORE OF THE SAME?

The problem of offering yet another AT-alike is that any machine which fails to come up with something out of the ordinary is out of the race. The HP Vectra has speed, full compatibility, the touch-screen option and HP's reputation for sturdy kit. Judging by the HP-150, the touch-screen concept has not taken off in a big way, so it effects on sales of the Vectra will probably be marginal. For the business user, the reliability factor and the free 12-month maintenance agreement could well be more crucial.

The other attraction of the machine is that it will fit in with any HP kit already installed. In particular, HP has announced that 3.5in. disc drives which are compatible with the HP-150 series will be available both as internal and external options in the new year.

Hewlett-Packard concedes that its new baby is not going to dent Big Blue's figures. More optimistically, it does see the Vectra giving Compaq's AT-alike a run for its money. This seems unlikely, since Compaq has firmly established itself as the IBM alternative *par excellence*: moreover, the Deskpro 286 is a superb machine in its own right. However, the undoubted virtues of the Vectra, combined with HP's good name and marketing clout should ensure a tolerable success.

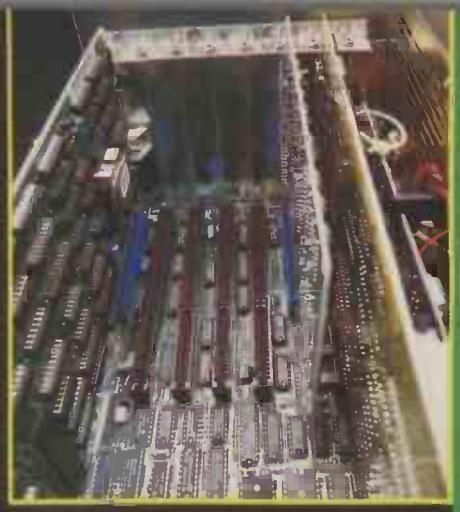
CONCLUSIONS

- The HP Vectra is a well-built system which offers full IBM PC/AT compatibility.
- The optional touch-screen facility offers an interesting way of handling MS-DOS.
- The pricing structure is complicated, but seems to work out cheaper than the equivalent IBM kit; the 12 months' maintenance bundled in is an attractive feature.
- All the elements of the machine are large: you must resign yourself to giving it large areas of desk space.

BASIC BENCHMARKS

The figures below show the time in seconds taken to run a series of standard benchmarks. Details and listings were given in the January 1984 issue of *Practical Computing*. The Vectra emerges as one of the fastest machines we have tested and in the AT stakes it is second only to the Compaq Deskpro 286.

	BM1	BM2	BM3	BM4	BM5	BM6	BM7	BM8	Av.
HP Vectra — 80286	0.3	1.4	3.0	3.1	3.4	6.6	10.2	9.6	4.7
Compaq Deskpro 286 — 80286	0.3	1.2	2.8	2.9	3.2	5.7	9.1	9.2	4.3
Kaypro 286i — 80286	0.4	1.7	3.8	4.0	4.3	7.9	12.3	12.5	5.9
IBM PC/AT — 80286	0.5	1.9	4.6	4.7	5.2	9.1	14.6	13.5	6.8



There are three ways you can operate the Vectra's DOS and applications: using the keyboard, the touch-screen or the mouse.

SPECIFICATION

CPU: 80286 running at 8MHz
RAM: 256K expandable to 640K on-board or 3.64Mbyte with expansion boards
ROM: 64K
Dimensions: main unit 424mm. (16.7in.) × 391mm. (15.4in.) × 160mm. (6.3in.)
Weight: main unit 11.8kg. (26lb.), keyboard 1.9kg. (4.2lb.)
Display: 80 columns by 25 lines, 640 by 400 pixels maximum resolution; colour option available
Keyboard: full QWERTY 10 function keys, further eight command keys, numeric keypad, separate cursor pad
Mass storage: 360K 5.25in. floppy on entry-level machine; upgrades include 1.2Mbyte floppies and 20Mbyte or 40Mbyte Winchester
Interfaces: Hewlett-Packard's Human Interface Loop (HP-HIL) for printers, keyboards, mice, etc.
Software in price: MS-DOS 3.1, Personal Applications Manager with entry-level system only
Software options: Advancewrite word processor
Hardware optons: serial/Centronics interface, dual serial interface, colour board, numeric co-processor, touch-screen bezel, 3.5in. disc drive
Price: entry-level system £3,294 with one 360K floppy, 256K RAM, MS-DOS, Pam; with 1.2Mbyte floppy, serial board, security lock but no software £3,588; 20Mbyte Winchester version £5,262; mouse £129, numeric co-processor £319, touch-screen bezel £292; Advancewrite cost varies from £270 to £550 according to facilities
Manufacturer: Hewlett-Packard; at present made in U.S., later models to be manufactured in France
U.K. distributor: Hewlett-Packard Ltd, Eskdale Road, Winnersh, Wokingham, Berkshire RG11 5DZ. Telephone: (0734) 696622

BAGSHAW BENCHMARKS

	BM0	BM1	BM2	BM3	BM4	BM5	BM6	BM7	BM8	BM9	BM10	BM11	BM12	BM13	Total
HP Vectra — 360K floppy	10.3	3.5	3.7	11.8	12.1	23.2	4.1	23.6	12	7.7	15.1	83.2	48.1	22.1	280.5
Compaq Deskpro 286 — 360K floppy	10.5	4	4	12.5	15	16.4	5	17.5	5.3	8	13.4	75	45.5	18.2	250.3
Kaypro 286i — 360K floppy	12	12	11	23	11	24	4	26	14	8	16	89	57	21	328

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BASIC BENCHMARKS

The following figures give the time taken in seconds to run a series of standard Benchmarks. Details in *Practical Computing* January 1985.

	BM1	BM2	BM3	BM4	BM5	BM6	BM7	BM8	Av.
Sharp PC-7000 — 8086	0.8	3.3	7.5	7.7	8.4	15.3	23.9	25.4	11.5
Datavue 25 — 80C88	1.2	4.7	10.0	10.5	11.2	20.1	31.6	33.7	15.4
Olivetti M-24 — 8086	0.5	2.0	4.6	4.7	5.2	9.4	14.8	16.1	7.2
IBM PC — 8088	1.3	4.8	11.8	12.2	13.4	23.6	37.6	36.6	17.7

Two thoroughly IBM-compatible, portable machines which offer something extra as well.

SHARP PC-7000 & DATAVUE 25

PORTABILITY PLUS

By Glyn Moody

Judging by the steady stream of transportable and lap-top IBMulators, micro manufacturers are convinced there is a market out there. But fashions change. In July's *Practical Computing* we looked at three such machines, all of which used the flip-top screen design. Now pop-out seems all the rage. Recently two machines in this format have been launched: the Sharp PC-7000 and Interquadram Datavue 25. Both, in their different ways, offer significant advances over earlier technology.

Of late Sharp's profile in the business micro market has been distinctly low. It is therefore no mean achievement that in its latest offering it has managed to make yet another transportable IBMulator interesting. This is largely due to the machine's beautiful back-lit LCD, and a portable printer which clips on to the micro when in transit.

Otherwise the story is familiar. You get an 8086 running at a healthy 7.37MHz, 320K of RAM which is upgradable to 704K, an 80-column by 25-line LCD, two 360K floppies, an AT-alike keyboard, and serial and parallel ports, all in a package weighing about 18lb. The printer uses special paper or a thermal-transfer ribbon and has three modes. Prices had not been finalised at the time of writing, but should work out at about £2,500 for micro and printer together.

The Sharp PC-7000 comes with a back-lit LCD and a portable printer.

Clearly, a lot of thought has gone into the design of the PC-7000. The chief fruit of this is one of the best LCDs around. Hitherto I have been scathing of this glorified digital-watch technology. But Sharp's backlighting technique seems to be the breakthrough we scoffers have been waiting for.

On the review model, the LCD looked deceptively like a standard mild grey-blue monochrome VDU. You can even use it in the dark. A green version is also available. The manual states that back-lighting units need to be replaced eventually; the manufacturer suggests that the likely lifetime is about "a year's steady use". Replacement cost will be of the order of £50.

After you have removed the keyboard unit, pressing a small switch swings out the LCD. Above this is a knob for adjusting the brightness. Like many other LCDs, the system closes down after a preset period of inactivity. A small sign indicates this as "system standby". Pressing any key reactivates the unit.

A sensible feature is the placing of the disc-accessing indicators on this same front panel. This saves you having to crane your

SHARP PC-7000

PC VERDICT

	POOR	AVERAGE	GOOD	EXCELLENT
Performance	☐	☐	☐	■
Ease of use	☐	☐	■	☐
Documentation	☐	☐	■	☐
Value for money	☐	☐	☐	■

☐ At last, an LCD that won't make you blind, plus a neat and versatile portable printer.

BAGSHAW BENCHMARKS

The standard Disc Benchmarks — see July issue, page 99 — were run on the Datavue 25 and Sharp PC-7000, and two other comparable machines.

	BM0	BM1	BM2	BM3	BM4	BM5	BM6	BM7	BM8	BM9	BM10	BM11	BM12	BM13	Total
Datavue	26	20	22	16	19	22	10	57	19	9	15	308	159	41	741
Sharp PC-7000	22	17	13	23	24	37	9	65	21	12	21	401	216	40	918
Compaq	24	11	16	24	24	36	8	67	16	7	13	319	125	49	739
IBM PC	21	10	21	21	20	30	8	65	17	7	15	311	145	51	742

neck round the side to find out if disc activity is taking place. The drives themselves use double-press buttons for opening and closing the doors: one press locks the disc in, and a second press ejects it.

At the back there are serial and parallel ports, mains input and colour monitor output, which requires an extra board. On the left-hand side, viewed from the front, there is the on/off switch and a vent for the built-in fan. This is unobtrusive and seems to expel only moderate amounts of heat, even after several hours' continuous use. The carrying handle on the top of the unit can be set in two positions: one is designed for the micro alone, and the other is placed over the centre of gravity of the combined micro and printer.

The coiled keyboard lead is stowed neatly away in a small compartment with a sprung, hinged flap underneath the LCD. Small legs can be pulled out underneath the keyboard to give three different raking angles. The keyboard has slightly light feel to it, but is perfectly adequate for touch-typing. It is based on that of the IBM PC/AT rather than the less ergonomic PC. The main differences are the ranging of the function keys along the top instead of to the left, and replacement of the IBM's mysterious System Request key by one called Set Up.

Pressing Set Up calls up a screenful of the system default settings. You can change these at any time, even while the machine is running other software. From here you can change the battery-backed clock, the screen and communications, and swap between the native 7.33MHz processor speed and the clone 4.77MHz which some IBM programs require.

You can also adjust certain printer parameters from the Set Up screen: for example, you can change from Elite 12 to Courier 10. There are three printing modes: draft, near letter quality (NLQ) and very near letter quality (VNLQ). Any pair — draft/NLQ, draft/VNLQ or NLQ/VNLQ — can be selected from the Set Up screen, but to toggle between the two members of the pair you have to change a DIP switch on the printer. With so much software switching available it seems a shame that Sharp could not have gone the whole hog.

The printer is very compact, and can be hooked on to the back of the micro for easy carrying. It is also very quiet. Using heat-sensitive paper or ordinary paper with a thermal-transfer ribbon produces only a gentle gnat-like whine instead of the usual impact dot-matrix clatter. You switch between operating with heat-sensitive or ordinary paper simply by removing or inserting the small ribbon cartridge. The printer has been designed and built entirely by Sharp, which claims speeds of about 25cps for VNLQ, 50cps for NLQ and 75cps for draft mode.

A particularly nice feature of the printer is that the darkness of the print can be adjusted while it is being produced. As far as control codes are concerned, the printer unit uses standard Epson FX-80 formats. As well as manual input of paper, there is an auto-feed mechanism for single sheets. In addition to Elite and Courier, two further typefaces can be added by slotting a small founts module into the base of the printer. These are then accessed from the Set Up screen as before.

The PC-7000 is a joy to use. It offers all the advantages of an LCD transportable — notably in terms of saving desk space — with none of its visual disadvantages. It ran Lotus 1-2-3, including graphics, Microsoft's Flight Simulator and Borland's Sidekick all without problem, which augurs well for its ability to run other IBM programs.

The manuals which came with the review machine were page proofs only but they were comprehensive, even if they sometimes lacked a sense of the relative importance of things. Likely add-ons include an expansion plinth, which will accept IBM cards and offer the option of a 10Mbyte Winchester.

I remain slightly doubtful of the existence of a market for transportable IBMulators, but the PC-7000 has its own particular virtues. The quality of its display means that unlike most other LCD models, it can be used quite easily as a standard desk-top machine. Its other big plus is the matching

(continued on page 73)

DATAVUE 25

PC VERDICT

	POOR	AVERAGE	GOOD	EXCELLENT
Performance	☐	☐	■	☐
Ease of use	☐	☐	■	☐
Documentation	☐	☐	■	☐
Value for money	☐	☐	■	☐

☐A truly portable, truly compatible IBMulator.

The battery-powered Datavue has a pop-out LCD and detached keyboard.

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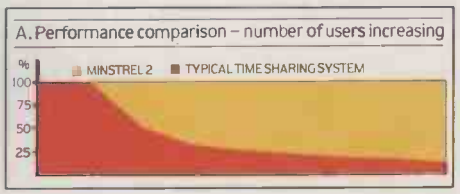
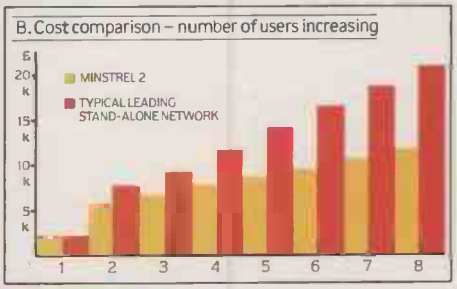


Costs rise and performance suffers when a number of terminals share a common processor. Graph B shows a network of leading stand-alone computers when compared with Minstrel 2. Graph A shows the effect on performance of timesharing compared with Minstrel 2.



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Telephone: 01-209 0911
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HM Systems

SHARP PC-7000

CPU: 8086 running at 7.37MHz or 4.77MHz
RAM: 320K expandable to 704K
ROM: 16K of BIOS and self-checking
Display: back-lit LCD 25 lines by 80 columns, 640 by 200 bit-mapped pixels
Keyboard: IBM PC/AT layout
Mass storage: two 5.25in. 360K floppies
Interfaces: RS-232, Centronics, colour-monitor output
Software in price: MS-DOS
Hardware options: dot-matrix printer, expansion plinth including hard disc, colour card
Dimensions: 410mm. (16.6in.) x 160mm. (6.3in.) x 215mm. (8.4in.); with printer, the dimensions are 410mm. (16.6in.) x 220mm. (8.7in.) x 215mm. (8.4in.)
Weight: 8.5kg. (18.8lb.) including keyboard; printer weighs 5.2kg. (11.4lb.)
Price: likely to be about £2,500 for micro and printer
Manufacturer: Sharp Business Systems Division, Sharp House, Thorp Road, Newton Heath, Manchester M10 9BE. Telephone: 061-205 2333
Availability: January 1986

DATAVUE 25

CPU: 80C88 running at 4.77MHz
RAM: 640K
ROM: 16K diagnostic and I/O routines
Display: LCD with 25 lines by 80 columns, 640 by 200 pixels
Keyboard: QWERTY, 10 function keys, numeric keypad
Mass storage: one 5.25in. 360K floppy; internal RAM disc
Interfaces: RS-232, Centronics
Software in price: MS-DOS
Hardware expansion: second disc drive
Dimensions: 330mm. (13in.) x 153mm. (16.1in.) x 265mm. (10.4in.)
Weight: 5.5kg. (12.1lb.); 6.3kg. (14lb.) including battery
Price: £1,659 plus VAT; second disc drive £396; modem board £587, includes Crosstalk; battery pack £51
Manufacturer: Satech of Japan; designed by International Interfaces
Distributor: Interquadram Ltd, 653 Ajax Avenue, Slough, Berkshire SL1 4BG. Telephone: (0753) 34421
Availability: now

The difference between VNLQ and NLQ is slight. VNLQ has slightly thinner stems.

ELITE
brown fox jumps over the lazy dog **VNLQ**
the quick brown fox jumps over the lazy dog **NLQ**
the quick brown fox jumps over the lazy dog **Draft**

COURIER
brown fox jumps over the lazy dog **VNLQ**
the quick brown fox jumps over the lazy dog **NLQ**
the quick brown fox jumps over the lazy dog **Draft**

(continued from page 71)

printer. Together, they provide a complete and just about luggable office for anyone who expects to take work home in a rather more literal sense than usual.

Its pricing is competitive too. Perhaps its most direct rival is the Frontier Flyer, which has two floppies and costs £2,500. For about the same price the Sharp gives you a professional printer too. If you want a back-lit LCD the nearest equivalent is the Gridcase for £2,670 — but you only get one 3.5in. floppy. Either way, the PC-7000 looks good value.

It is in the one area where the Sharp might be judged to have fallen down — on true portability — that the Datavue 25 from Interquadram scores. In this respect, it complements the particular virtues of the PC-7000.

The Datavue 25 offers IBM compatibility, a pop-out LCD and detached keyboard. It has only one 360K floppy, partly for reasons of power; a second floppy can be added subsequently, and will clip on the back of the main unit. Including the optional battery, which gives two to four hours use, depending on the level of disc accessing, the whole unit weighs a very manageable 14lb. This places it firmly in the portable class: where the PC-7000 could be comfortably carried to a car but no further, the Datavue is a practical proposition for travelling with.

Inevitably the overall design of the two machines is very similar. After all, there are only a limited number of viable juxtapositions of the constituent parts. The keyboard is released by a catch at the top, and reveals the LCD, also released by a catch. Very sensibly, since the Datavue lacks back-lighting, you can angle the LCD until it is almost horizontal. This is where most other vertical unit lap portables are found wanting: too often the only possible viewing angle is obtained by grovelling on the floor, which is hardly in line with the high-tech executive image.

The disc drive is on the right-hand side, along with the Reset button. Discs are inserted back-to-front, which can be confusing until you are used to it. At the back there are serial and parallel ports, together with closed ports for a second floppy and an expansion bus. On the left-hand side of the unit there is a small cavity containing memory cards. Below there is another, larger compartment for a modem — not yet BT-approved — and a slot for the power supply. Interquadram has designed its battery and power unit to the same format, so either may slip in to the compartment. It is also possible to charge the battery and run the machine from the power supply simultaneously. This is the recommended mode of operation: its big advantage is that in the event of a power failure, the battery provides full backup for several hours.

The keyboard is much smaller than that on the PC-7000, which would be good were it not for the fact that the resulting layout is very crowded and rather confusing. Placing the numeric keypad above the right of the keyboard has created ranks of keys six-deep. The overall feel of the keys is slightly more positive than on the Sharp. There is also a pair of moulded pips on the index finger keys, which helps touch-typists. The keyboard is normally connected to the main unit by an infrared link, but a lead is available for those who prefer conventional technology.

Although the lack of a second integral disc drive is a limitation, there is partial compensation in the ability to partition some of the RAM as a silicon disc. This is more useful with the larger-memory machines which Interquadram is offering. After you power-up, the opening screen lets you set the split of RAM before you load the operating system.

The Datavue matches the PC-7000 for IBM compatibility, running Lotus 1-2-3 with graphics, Flight Simulator, Sidekick and a number of other IBM PC discs. The manuals provided are functional rather than glamorous, but they are adequate.

The Datavue emerges as a well-built, well-thought-out product which does everything it promises. As such, it probably comes closest to the ideal of a true take-anywhere IBM PC. The question remains whether people really need this sort of mobility. Apart from convenience, and safety if power supplies are insecure or particularly dirty, it seems unlikely that battery operation will offer any decisive advantage over the mains. If, however, you find that you do require such a feature, the Datavue 25 will fit the bill quite well.

CONCLUSIONS

- The Sharp PC-7000 and its clip-on dot-matrix printer make up a viable office micro system which is also fully transportable.
- The Datavue 25 is a true portable, and can be used away from the mains for several hours. It is ideally suited for environments where power supplies are unreliable.
- The PC-7000 uses a state-of-the-art back-lit LCD, which overcomes many of the drawbacks of conventional LCDs.
- The Datavue 25 has a sizable RAM which can be partitioned into a fast silicon disc.
- The use of non-standard technologies like thermal paper and back-lighting may mean that running costs for the PC-7000 are higher than on most machines.
- The Datavue 25 has a rather crowded keyboard. Its lack of a second physical disc drive can be a drawback.
- Both machines offer an excellent degree of IBM compatibility. PC

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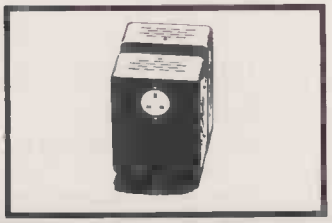

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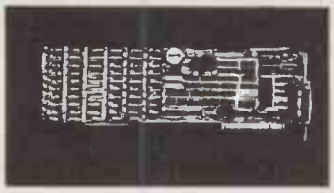

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QTY	MODEL	PRICE
	VAT 15%	
	CARRIAGE	
	TOTAL	

IBM QUIETWRITER
HUSH-HUSH QUALITY

By Ian Stobie

Thermal-transfer technology is the basis of this letter-quality office printer.

Laser printers are undoubtedly creating a lot of excitement in the printer market at the moment, but they are still relatively expensive. Daisywheel printers deliver high-quality printed output more cheaply, but they are slow and dreadfully noisy. What many people want is something in-between: a quiet, moderately fast letter-quality printer for not much more than £1,000.

Thermal-transfer printers mark the paper with ink transferred under the influence of heat from a special ribbon pressed up against it by a moving print head. In a normal thermal-transfer printer the print head itself consists of a row of tiny heating elements. As the print head moves across the paper the elements heat up as required to transfer dots of ink to the paper.

The IBM printer uses the same principle, but with one important difference. Its ribbon contains not just one dye but also a continuous layer of aluminium. The head consists of 40 tiny electrodes which heat up a small area of aluminium inside the ribbon when they fire. It is this heat which transfers the dye to the paper.

This approach overcomes some of the problems usually associated with thermal-transfer printing. Uneven tension on the ribbon, dirt on the ribbon and so on have much less effect. We found the Quietwriter much less sensitive to the type of paper fed into it than other thermal printers we have tried: results were almost as good on rough-textured letterheads as smooth office bond.

Output quality is not quite as good as a daisywheel when examined closely, but it is arguably better than a laser printer's and easily good enough for business correspondence. The large number of elements in the print head means that no separate dots are apparent on the printed page.

At 40 to 60 characters per second, the Quietwriter is as fast as a mid-range daisywheel, which is likely to cost the same or slightly more. The exact speed depends on the pitch: at 15 characters per inch the Quietwriter goes faster than at 10 characters per inch. Best of all, the machine is extremely quiet.

Running costs are similar to those of a daisywheel. The Quietwriter's special ribbon is one-shot, and has to be replaced regularly at a cost of £8.50. According to IBM each one lasts for 160,000 characters, which is the equivalent of about 60 or 70 densely typed A4 pages.

Inside the machine are two sockets for exchangeable fount cartridges; you can get at them easily just by lifting the lid. IBM supplies two cartridges with the machine; you choose from the available range, which currently includes Courier in 10 pitch, Prestige Elite in 12 pitch and Prestige in 15 pitch. Each cartridge offers the full 252-character IBM PC character set, and you can combine on the same page characters from the two cartridges you have plugged in.

The Quietwriter is clearly intended for use with the IBM PC and closely compatible machines. It is equipped with an IBM-style parallel printer interface, not a standard RS-232 port, and this will limit its appeal outside the IBM compatible universe.

Any piece of office equipment, however technically superior, needs to be backed up by good customer support, and this aspect of a product is always hard for a magazine to judge. We tend to deal with specialised public-relations or marketing staff rather than typical dealers or sales people. Usually this means we get especially good treatment, but if IBM is following this policy we shudder to think what the average consumer has to put up with. Our Quietwriter arrived without a manual, with a chipped and damaged casing, covered in coffee stains and three months after we had first been promised it. When we got it printing it worked fine, but after a page and a half the ribbon snapped — maybe because, in the absence of a manual, we had installed it wrongly, maybe for some other reason.

However, the Quietwriter seems to be a good product, well matched to the needs of many office computer users. It is certainly worth considering if you are in the market for a letter-quality printer. To be on the safe side though, we would recommend you go to one of IBM's independent dealers rather than attempt to deal directly with the world's biggest computer company.

IBM QUIETWRITER

PC VERDICT

	POOR	AVERAGE	GOOD	EXCELLENT
Performance	☐	☐	☐	■
Ease of use	☐	☐	■	☐
Documentation	☐	☐	☐	☐
Value for money	☐	☐	■	☐

A technically excellent product which risks being let down by poor support.

CONCLUSIONS

■IBM's Quietwriter offers similar performance to a daisywheel printer, but without the unbearable racket. The output quality is not quite up to daisywheel standard, but the difference is slight.

■Compared to an ink-jet printer, which is equally silent, the Quietwriter scores by its good printing performance on ordinary office stationery.

■The Quietwriter does not offer the same speed as a laser printer or the same typographic flexibility, but it is a good deal cheaper. For the low- to medium-volume user interested mainly in producing text it is probably the more cost-effective solution. PC

SPECIFICATION

Description: thermal-transfer printer using 40-element electric print head and special resistive ribbon
Speed: 40cps to 60cps
Founts: Courier 10, Prestige Elite 12, Prestige 15 or Boldface, supplied as plug-in fount cartridges
Paper feed: friction feed is standard
Paper: A4 single sheet stationery
Price: £1,316 plus VAT; ribbons £8.50
Options: additional fount cartridges £40 each, pin-feed unit £72; cut-sheet feeder £312
Interface: IBM-style parallel interface
Manufacturer: made in Holland for IBM
Supplier: IBM U.K. Ltd, PO Box 32, Alencon Link, Basingstoke, Hampshire RG21 1EJ. Telephone: 01-578 4399 for dealer list

REVIEW

BBC PLUG-INS
LIFE IN THE OLD DOG YET

By Roger Cullis

The 128K version of the model B+ micro, along with an improved disc-operating system and graphics software, keeps Acorn's system abreast of current standards.

Acorn has launched four new products which demonstrate that, despite the traumas of the recent months, it is committed to continued enhancement of the performance of its principal revenue earner, the BBC Micro. The new add-ons are a 64K RAM pack to convert the B+ into a 128K model, the long-awaited graphics extension ROM, the advanced disc filing system, and a double-density disc interface.

When the model B+ was launched, there were some unexplained features. Only 12 logical sideways ROMs were implemented, whereas its predecessor supported 16, and there was provision for a connector on the right-hand side of the motherboard. Now all is explained with the announcement of the 128K version of the computer. A small daughter board occupies the connector position and adds four 16K banks of RAM which are mapped into the vacant sideways memory pages. A disc-based utility configures the RAM as contiguous memory, with Page at &10000 and Himem at &1FFFF, giving a full 64K for Basic programs. On boot, the shadow mode is forced on and a relocated version of Basic 2 is loaded at &3000.

MORE MEMORY

For existing B+ owners who want to stay ahead, the daughter board will be available separately as a dealer-fitted upgrade. It will provide a low-cost alternative to the 6502 second processor, giving even more memory space since none of the extra 64K is needed for second-processor operating system, zero page, stack or Tube communications buffer. The price to be paid is a reduction in operating speed: preliminary Benchmark tests show that 128K BBC Basic runs at not much more than half the speed of the 64K version which is, in turn, only two-thirds of the speed of the 6502 second-processor version.

The Graphics Extension ROM (GXR) is a 16K EPROM which extends the graphics routines already provided in the operating system of the BBC Micro. It makes direct calls to the existing routines, and for this reason separate versions are required for the model B and the model B+, although they both implement the same commands. Half of the ROM is devoted to extra shapes, patterns and colours using previously unassigned Plot, VDU and GCol commands. The remainder is used to implement sprites, which can be saved to tape or disc and used later within programs. The GXR may be accessed from any language which supports graphics features and is compatible with all current Acorn second processors.

SPRITE GRAPHICS

The default mode of the GXR varies with the position of the sideways ROM socket in which it is fitted. If an odd-numbered socket is used, then the graphics extension ROM is active on switch-on or hard break, while use of an even-numbered socket has the opposite effect. GXR uses three pages of low memory for parameter storage, with Page increased by &300. Two of these pages are used for the flood-fill routines, which may be turned off leaving the rest of the graphics routines active; in this state the value of Page is increased by only &100.

The GXR provides additional commands for directly constructing some of the most commonly used shapes. The codes for these are in the form of Plot commands, grouped in blocks of eight following the protocol of the Plot commands in the operating system. Individual Plot codes are provided to draw rectangles, parallelograms, circles and ellipses, both in outline and filled, arcs, sectors and segments.

On the BBC Micro there are eight plain colours and eight flashing colours. The GXR allows the colours to be interwoven to give a tremendous range of colour patterns. The GXR provides four default patterns which depend on which display mode is active. Defining a mode 0 pattern is equivalent to setting up a user-defined character.

Another feature of the GXR is the ability to fill the inside of any closed region, however awkward the shape. The method used is to flood fill it. It is possible to start off at any point in its interior and fill the whole shape in one pass. The graphics extension ROM contains two different flood-fill options: Flood to Non-Background can be used on shapes which are in the current background colour and bordered by non-background colours, while Flood Until Foreground achieves a complementary effect. Flood fills may be performed with either pure colours or colour patterns. The GXR also enables you to pick up a rectangular area of the screen, and either make a copy of it elsewhere or move it to another position.

The GXR comes with a detailed manual and cassette containing a number of utility programs. One of these is Paint, which uses icons selected by means of the cursor and Shift keys. The screen is divided into two parts: the control panel down the left-hand side and the canvas on the right. A control panel is divided into three columns. In the middle column you select whether you want to draw a particular shape, move part of the picture, print text, or whatever. The remaining two columns allow you to specify other details, such as what colour you wish to use.

Another feature which brings the BBC Micro up to date is the implementation of sprite graphics. The definitions of sprites used in a program are stored in memory at a known location, so space must be reserved in a manner analogous to the Dimensioning of arrays. This memory is allocated in units of

SPECIFICATIONS

BBC MODEL B+ 128K
Description: 6512-based micro with 128K RAM
Price: £499 including VAT

64K–128K UPGRADE
Description: RAM upgrade for BBC model B+ 64K
Price: £39.95 plus fitting

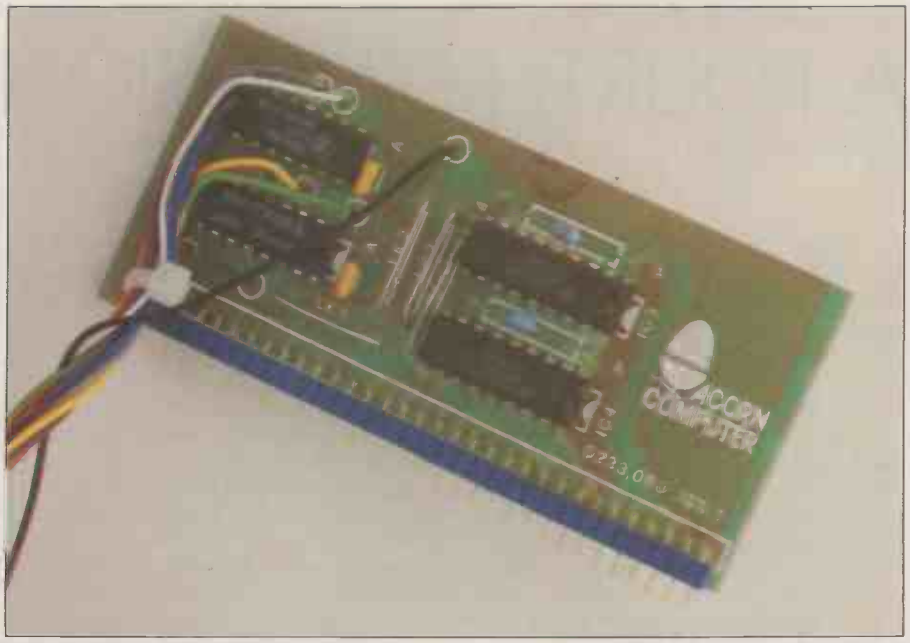
GXR
Description: graphics extension ROM for BBC model B and B+, providing colour fill, enhanced shape drawing and sprites
Price: £29.90

ADFS
Description: Advanced Disc Filing System ROM
Price: £29.90

DDDFS
Description: improved disc-interface board; provides double-density operation in conjunction with ADFS ROM
Price: £49.90

Availability: all the above products are available now from Acorn Computers Ltd, Cambridge Technopark, 645 Newmarket Road, Cambridge CB5 8PD. Telephone: (0223) 214411

1. The GXR title.
2. Castle uses many features of the GX ROM.
3. Flood fills can be used for colours and patterns.
4. Patterns may be defined.
5. GXR contains a selection of ellipse and circle drawing routines.
6. The colour range can be extended by mixing colours from the palette.



The daughter board adds 64K of RAM to the BBC B+, but it slugs the operating speed.

one page, located below the bottom of user program area. Sprites may be designed using a sprite editor which displays two versions of the sprite. One is actual size, and the other a much enlarged version to illustrate the modifications as they are carried out.

What the B+ User Guide describes as "the disc-filing system for all future file operations" has now been implemented for floppy discs on the BBC Micro. Previously it was only used for Winchesters and for the Electron disc-filing system. The reason for the delay in implementing the Advanced Disc Filing System (ADFS) was the need for a disc controller which could handle the modified frequency-modulation system used in double-density recording. With the advent of the new version 1.3 of ADFS, floppies can be intermingled with hard discs.

With the ADFS comes an hierarchical file structure and out goes the old limitation of 31 files per disc. The arrangement of files is based on a root directory which can hold 47 objects, each of which may be further directories or actual files.

DISC CONTROLLER

The old Intel 8921 floppy-disc controller chip has finally come to the end of the line with the announcement of the 1770 disc filing system (DDDFS) for the model B. Based on the Western Digital 1770 chip it supersedes the previous Acorn DFS and is considerably cheaper than the interface it replaces. The new interface comprises a small printed-circuit board bearing three capacitors and four chips, a sideways DFS ROM, a couple of wire links, two further integrated circuits, the DFS User Guide and a manual of fitting instructions.

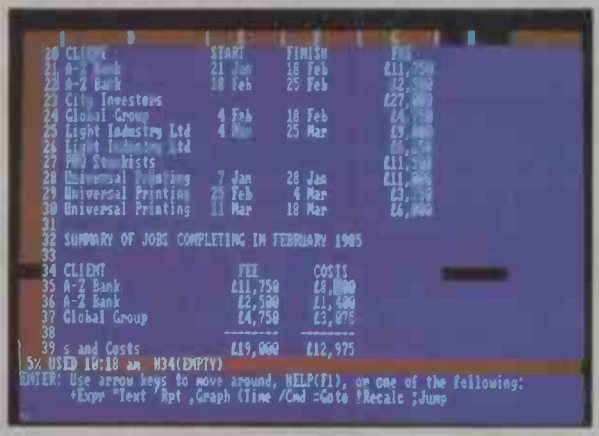
The PCB plugs into the 8721 socket; for Issue 4 and Issue 7 motherboards, installation is quite straightforward but earlier circuits require modification which is best left to a dealer. The ROM is identical with that of the model B+ DFS. The 1770 DFS operates only in single-density mode and may not run all protected software which makes use of direct I/O calls. For double-density operation it is necessary to install the ADFS ROM.

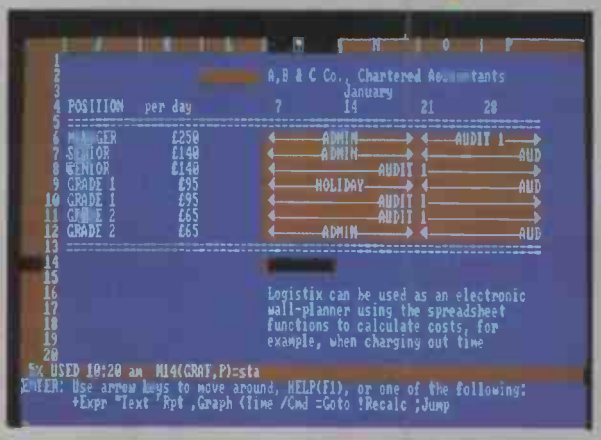
The launch of the DDDFS removes one of the obstacles to a 16-bit business upgrade for the BBC Micro. With a suitably modified DFS ROM it will be possible to make existing model B machines read and write in MS-DOS format. Acorn already has the capability in the 80286 version of the ABC, so perhaps we may see its response to the challenge of the Apricots and the Research Machines Nimbus in the near future.

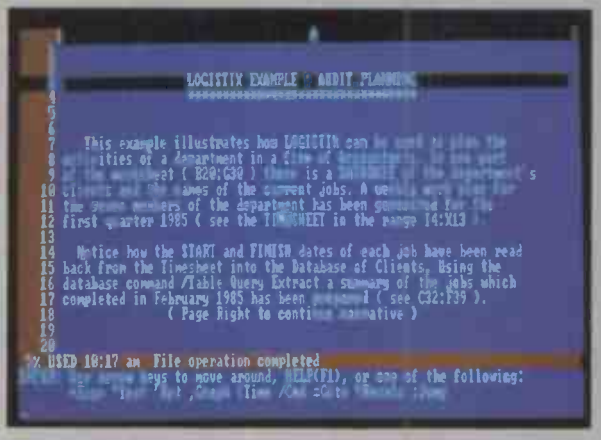
CONCLUSIONS

- Each one of these is an upgrade I would happily install.
- The GXR includes some quite remarkable features. It is an important extension to the operating system.
- The 64K version of the model B+ will probably quietly disappear; the minimal extra cost for 128K will deter nobody.
- ADFS and DDDFS will justify their price by savings in floppy discs. PC

Time-management data displayed in standard spreadsheet form (top left). From it, Logistix will assemble a roster (top right) or perform critical-path analysis (bottom left). A single cell can be expanded to full-screen width for text (bottom right).







SPECIFICATION

Description: a super-spreadsheet which includes a sort of automated wall planner, presentation graphics and simple data-handling facilities
Hardware required: 384K IBM PC or compatible, Apricot, Philips Yes, NEC APC-III, Sharp MZ-5600, ICL Quattro; others to be announced
Spreadsheet: 2,048 rows by 1,024 columns; reads Lotus 1-2-3 and Supercalc files
Time management: calendar functions, critical-path analysis, Gantt charts; handles units from half-hours to years
Graphics: bar, pie, line, area, scatter and percent charts; wide range of founts and styles
Database: tabular handling of 64 fields with up to 1,023 records with query and sorting facilities; reads dBase files
Text: up to 254 characters per cell
Features: sideways printing; applications library for vertical markets to follow
Publisher: Grafox Ltd, 65 Banbury Road, Oxford OX2 6PE. Telephone: (0865) 516281
Price: £395 plus VAT
Available: now

With time management and presentation-quality graphics this British spreadsheet breaks new ground.

LOGISTIX
A FOURTH DIMENSION

By Jack Schofield

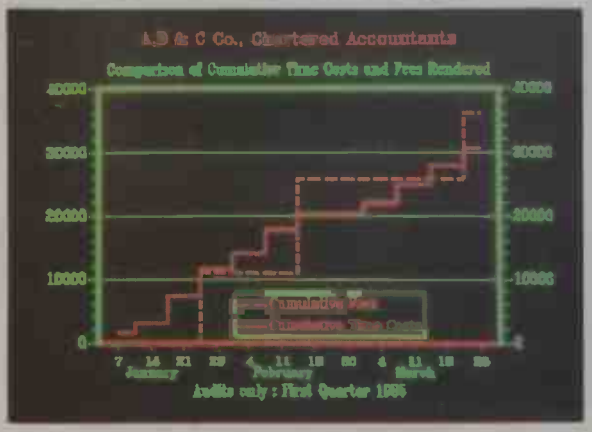
Logistix, from the British company Grafox, offers similar facilities to Lotus 1-2-3. It is a spreadsheet with limited data- and text-handling facilities, and it draws graphs. It adds greater ease of use, far better graphics, a more attractive screen display and built-in sideways printing. Its novelty lies in an ability to handle a fourth dimension: time.

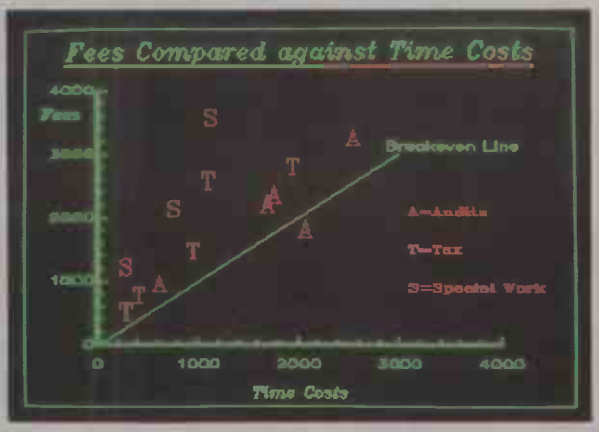
Logistix's time management covers resource allocation, task scheduling, project planning with critical-path analysis, and the drawing of Gantt charts. These facilities are integrated within the spreadsheet.

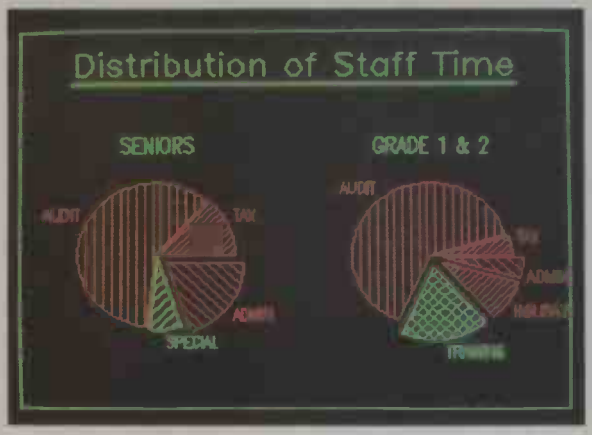
But Logistix is not a heavyweight project-management package, such as you might select if building a motorway or a nuclear power station. Rather it is like an automated wall planner, eminently suitable for use by anyone with an ongoing series of overlapping projects, especially those involving small teams of people. Accountants, auditors, advertising executives, pop-group managers, publishing directors and similar professionals should find it suitable.

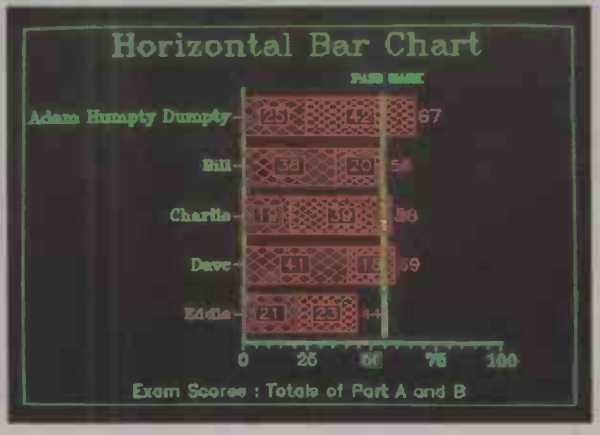
Logistix is available for a number of high-performance micros, including the Apricot, Olivetti M-24, ICL Quattro, Philips Yes, Sharp MZ-5600 and NEC APC-III. The Olivetti version can utilise the machine's enhanced graphics. For this review it was run on a slower system with lower-quality

Presentation options include horizontal and vertical bar charts, Gantt charts, scattergrams and line graphs, with numerous sub-types and graphic styles. Overall Logistix's graphics outperform Lotus 1-2-3 and Supercalc 3.









graphics: an IBM PC/XT with colour monitor and 512K of RAM. A minimum of 384K is required by the PC version, which can also be run on a monochrome system.

The IBM package comes with four discs in a smart, colourful three-ring manual. There are two program discs, containing about 600K of code. Most of this is written in Lattice C, optimised for speed with hand-crafted assembler. A third disc is a backup of the copy-protected A program disc. The fourth disc includes Firstime, and about 200K of example data. Firstime simplifies installation on a hard disc so that you can run it without having to put the program disc in drive A. Like Framework, it can only be installed once, but if necessary it can be reinstalled on another hard disc.

It boots up after typing

```
lgx
```

and presents a colour screen with the usual spreadsheet borders. The command line is at the bottom, as on Supercalc and Multiplan. The spreadsheet offers 1,024 columns by 2,048 rows. As in VisiCalc, the columns start with A to Z then continue with AA, AB, and so on.

I found the default colours unattractive, but they were easily changed. Also, each work file can be saved with its own colour scheme. This provides the option of having a red background for accounts work, blue for databases, black for project planning, etc.

In use the program is most like Supercalc 3, which in turn is like VisiCalc. There are 26 commands and the command line is summoned by entering a slash symbol, /. The next command must be a letter, where B is Blank, C is Calendar, D is delete, E is edit, F is Format, and so on. You can scroll along the letters to get a help line for each one, as with Lotus 1-2-3, then make the final selection by hitting Return.

Those who use a lot of different spreadsheets inevitably get confused by using /TL in Multiplan for Transfer and Load, and /SL in VisiCalc, for Storage and Load. Mercifully /L for Load and /S for Save are on the command line in Logistix. But it takes a while to find /O for Output, and hence /OP for output to printer. Equally obscure at first are /Z for Zap to clear a worksheet of data, and the mysterious /K: as C is used not for Clear or Copy but for Calendar functions, /K is used for critical-path analysis.

For copying we go back to VisiCalc for /R for Replicate. This offers the further choice of Regular or Orthogonal copying. The Orthogonal option takes a row and copies it into a column — a neat enhancement that accountants, in particular, will appreciate.

Some selections end up with menus where you can scroll up and down the options, then use the space-bar to step through a list of choices, such as possible colours for protected cells, date formats and printer drivers. Help is available from most menus, or by hitting f1. There is even a menu of the Help files available. All this makes the package relatively easy to learn and use.

Other standard function-key assignments, provided on a keypad overlay, are: f2 for Files, for the disc directory; f3 for Recalc, though the traditional ! works as well; f4 for View, which handles graphs, graph printing and colour options; f9 for Page Left; and f10 for Page Right.

The advantage is that four blank keys are left, where you can easily install your own macro commands. This makes it possible to automate the replication of blocks, the saving of backup copies, etc., which is very useful. More complex operations are possible, and Grafox uses macros to run whole demonstration programs.

In Logistix, macros are called Autos and are entered using /A. A macro can be up to 254 characters long, can be edited, and can use standard commands and functions. It can also use any of 22 codes available, such as

(continued on page 81)

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(continued from page 79)

>INP for wait until data is input from keyboard; >MCR for move cursor right; >REPnfor repeat previous key n times; and >WAIn for wait n seconds. In both cases, n is from one to 99. Autos can be loaded from library files, and do not take up any room in the spreadsheet proper.

A Timesheet is a spreadsheet and works in the same way. The difference is that the columns have been linked to a calendar, which can be called up separately. That is, each column can stand for a time unit, which can be half an hour, an hour, a day, a week, a month, a quarter, a half-year or a year. If you select days, you can have a five-day, six-day or seven-day week, depending on whether you include Saturdays and Sundays.

Suppose under /C you have chosen a start date, a five-day week, days as the unit of time, and dd/mm/yy as the format for column headings. You can then return to the spreadsheet, select your first column, and type into a cell

+DOMOY(COL)

which is short for "day of month of year". The required date appears in the form 1/11/85.

You can then Replicate this across the sheet to cover the next 12 months, say. The first column to be inserted will, of course, read 4/11/85. Because 1 November is a Friday, the next working day is the following Monday. Individual days and time periods can be toggled on and off using the Calendar function to cater for holidays, etc.

Jobs can then be inserted across the sheet, job dependencies specified, and the critical path worked out. Time functions include Start, End, Length, After and Float. You can thus explore options like, "How long can I put off this review without making the publication of the issue late?".

CHARGING

Time can be integrated into the database and spreadsheet calculations to provide the facilities for job costing, etc. Companies that charge out their employees' time, such as solicitors, accountants and consultants, would find this useful. The time facilities are a valuable enhancement to the standard package. However, I found them difficult to use because the syntax is tricky and some of the concepts involved were new to me.

Syntactical confusion is not helped by the fact that column B, say, is sometimes referred to in time commands as column 2. For example,

<"Review",2,3,4

specifies a job called Review which takes two weeks, and which starts in column 3 on row 4.

Logistix provides a huge list of functions, probably more than any other spreadsheet. They can be divided into eight sections, from the mathematical to the special. Mathematical functions include Sin, Cos, Tan and their hyperbolic and arc versions, Deg and Rad, Pi, Abs, Int, Round, Exp, E, Ln, Log, Sqrt and Rand. There are logical functions such as And, Or, Not, If, False and True. Statistical functions are Sum, Count, Average, Max and Min, and these have equivalents in the database section.

Financial functions are: IRR, approximate internal rate of return; NPV, net present value of cashflows; FV, future value of an annuity; PV, present value of an annuity; PMT, the repayment per period of a given principal. Special functions include Choose, Lookup, and various time commands. For example, Today and Teltim will put the current date and time into specified cells.

As well as being a powerful spreadsheet/timesheet, Logistix offers database and graphics facilities. Many people use spreadsheets for storing tabular records, because setting up is trivial compared to, say, dBase II. But the facilities are far too primitive for this to be called a database. However, Logistix enables tabular files to be built with up to 64 fields and up to 2,047 records. The field names must occupy the first row.

LOGISTIX

PC VERDICT

	POOR	AVERAGE	GOOD	EXCELLENT
Performance	☐	☐	■	☐
Ease of use	☐	☐	☐	■
Documentation	☐	☐	☐	■
Value for money	☐	☐	■	☐

The spreadsheet for those with scheduling/time-management problems, but most people could manage with something cheaper.

To the standard spreadsheet commands, Logistix adds Table commands, accessed via /T. The optiols are Query, Arrange, Fill, What-If?, Load and Help. The Query options Find, Extract and Unique enable you to locate or extract all records of a certain type, or unique records, and copy selected fields to another part of the worksheet. Table Arrange provides sorting. What-If? allows a range of What-If? calculations to be tackled automatically. Load enables selected data to be loaded from a dBase II or III file.

The graphics facilities of Logistix are far superior to those of Lotus 1-2-3 or Supercalc 3 Release 2. You can produce pie charts, Gantt charts, scattergrams and virtually any combination graphs with lines, bars, steps, ticks, and so on. With the /View Windows comand, four different graphs can be put on one screen or page.

The options include three types of bar chart, stacked, clustered and percentage, which can be either horizontal or vertical, providing six options in all. There is the choice of solid and empty segments or eight types of cross-hatching; nine type styles in 10 character sizes; plus 10 types of line — nine of them are dotted — in 10 thicknesses.

Finally, you can write free text into any spreadsheet cell, and it will be displayed over existing columns unless they already have their own contents. However, only 254 characters can be inserted into each cell. This makes it simple to put headings and comments into a spreadsheet. You can set column A to 66 or 80 characters wide and use Logistix to bash out a letter. But you do not get wordwrap, and no one would claim it was a word processor.

BREAKTHROUGH?

There are three ways to look at Logistix. At one level, it is really a selection of spreadsheet facilities, which draws on previous examples going back to VisiCalc. It could also be classified as an integrated software package. At another level, it could possibly be a breakthrough product, which sells micros to new market areas, much as VisiCalc and Lotus 1-2-3 did in their day.

As a spreadsheet it does not offer major advantages over Lotus 1-2-3 and Supercalc 3. It will probably not lure away existing users of these spreadsheets, even though they can load their formulae and data into Logistix. Some will change, but power spreadsheets are too expensive and take too long to learn for them to be cast away lightly. It would be more useful to have the facility to suck up files from the simpler spreadsheets, where users need to upgrade for extra features.

As integrated software it is not a competitor for Framework, Knowledgeman II or Open Access. It is really an extended spreadsheet like Lotus 1-2-3. Its appeal will be to numbers workers rather than to data or text handlers.

As a breakthrough product, the time-management facilities offer the chance to find a new market where Logistix can be sold as a management tool and decision aid. Grafox's ideas include providing an applications library: targets are bankers, auditors, teachers, investors, hoteliers, maintenance persons, installation engineers and marketing managers.

Unfortunately, reaching new markets requires massive advertising and committed dealers. Logistix might get this in Europe, but tackling the U.S. on this basis is so expensive as to be out of the question. This is a shame. Unlike most British software, Logistix is well produced and slickly packaged. It should do quite well, but in the hands of a company like Software Products or Microsoft it would sell like hot cakes.

CONCLUSIONS

■ Logistix appeals as a powerful spreadsheet or simple time-planning package. For those with applications that combine the two, such as auditing firms, hotels and advertising agencies, the package could prove ideal.

■ This is the only IBM PC spreadsheet that really delivers presentation-quality graphics.

■ The database facilities are adequate, but some users would appreciate enhanced text-handling facilities.

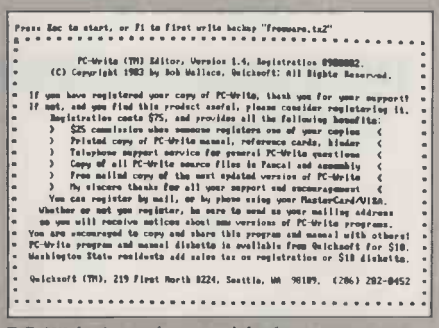
■ The use of colour is excellent and makes Logistix a particularly attractive choice for colour systems.

■ Logistix needs a powerful micro, and on the ordinary 4.77MHz IBM PC runs a touch slowly. The system of choice would be an Olivetti M-24SP with enhanced graphics, RM Nimbus, Apricot Xen or similar. PC

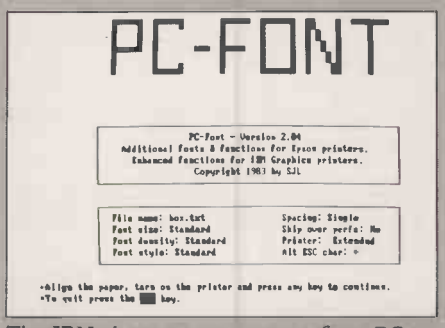
While industry giants fret about software piracy, many programmers are happy for others to copy their programs. We look at some on offer to IBM users.

FREEWARE SATISFACTION GUARANTEED

By Marcus Rowland



PC-Write's author positively encourages you to pass on copies of the program.



The IBM character set emerges from PC-Font in Epson-compatible form.

SPECIFICATION

WORDFLEX
Description: word processor
Hardware required: minimum system 128K, colour or monochrome
Address: Nemco, 9 Walnut Street, Rutherford, NJ 07070. Telephone: (U.S. area code 201) 933-4933
PC-SIG: vol. 68

PC-WRITE
Description: word processor
Hardware required: minimum system 128K, colour or monochrome
Registration fee: disc only, $10, full registration $75
Address: Quicksoft, 219 First N. 224, Seattle, Wa 98109. Telephone: (U.S. area code 206) 282-0452
PC-SIG: vol. 78
PCBBUK: vol. 63

PC-DIAL
Description: communications package
Hardware required: minimum system 64K, 96K with PC-DOS 2.0 or later, colour or monochrome
Registration fee: $25
Address: Buttonware, PO Box 5786, Bellevue, Wa 98006. Telephone: (U.S. area code 206) 746-4296
PC-SIG: vol. 78

PC-FONT
Description: printer utility
Hardware required: minimum system 96K, Epson printer or compatible
Registration fee: $20
Address: SJL, 4473 Marlborough 5, San Diego, Ca 92116
PC-SIG: vol. 225

SCREENWRIGHT
Description: text-formatting utility
Registration fee: $10 per script printed
Address: Paul D Nadler, 123 Oak Street, Woodmere, NY 11598
PC-SIG: vol. 244

WORD PROCESSING FOR KIDS
Description: word processor for children
Hardware required: colour only
Registration fee: $10
Address: Sideney D Nolte, 13858 Peyton Drive, Dallas, Texas 75240
PC-SIG: vol. 94

PLANETS
Description: scientific package to track planetary orbits
Hardware required: minimum memory 64K, colour only
Registration fee: none
Address: Larry Puhl, 6 Plum Court, Sleepy Hollow, Ill 60118
PC-SIG: vol. 298

When I decided to abandon my old TRS-80 computer for the delights of IBM, I was pleasantly surprised to learn that there are thousands of cheap and free programs available for MS-DOS and CP/M machines. Most of these programs are distributed by special interest groups (SIGs), organisations devoted to improving the standards of software and fighting the sillier aspects of commercial software distribution and protection.

While some user groups, such as the British PCUG, will only allow members to use their libraries, a growing number have open-access policies whereby anyone who is interested can buy copies of their programs at a nominal cost. Currently the most important open-access MS-DOS libraries are the American PC-SIG and PC-Blue collections, and Britain's PC Bulletin Board U.K. (PCBBUK) library.

Most of this software is public domain, but one of the ideas to come from such organisations is that of freeware. Programmers allow free access to their ideas, usually by distributing the program through one of the SIGs. Anyone who is interested can copy the program. If they like the package, they pay a small fee to register ownership with the programmer. Most freeware is American, and registration costs range from $10 to $75. The programmer supplies information on the product, and the better authors include documentation with their programs in the form of ASCII files or compressed text on the disc.

One of the word-processing packages that stands out is Wordflex, which is produced by a company called Nemco. It allows access to all free memory, either as one file or in up to five separate buffers. Text can be transferred from one file buffer to another, allowing some extremely complex editing procedures. However, buffers do not disappear if they are emptied, reducing the program's flexibility. The screen is black, text is printed green with markers for special formats and blocks. Bold and underlined text are available, but other attempts to insert control characters either failed or produced flawed copy. A yellow strip at the top displays status messages. The disc contains a 28-page manual and a five-part tutorial, but omits the Help file which should be present.

KEY COMBINATIONS

Unfortunately, Wordflex is awkward to use. Insertion must be toggled on and off whenever existing text is edited; when insertion is complete the f6 key makes the changes permanent. It does not seem to be possible to scroll up or down until text is fixed. Many common commands require combinations of two or three keys, while infrequently-used functions, such as the buffer controls, have their own function keys.

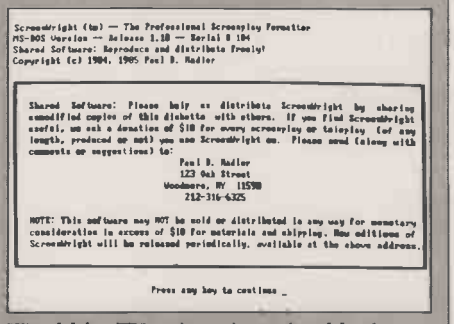
PC-Write, by Bob Wallace of Quicksoft has a maximum file size of 62K, the equivalent of about 45 double-spaced pages, but is extremely fast and user-friendly. Features include a 98-page manual, a comprehensive Help screen, the ability to tailor display colours and default

margins and tabs to suit the user, and dozens of other nice touches that are sometimes missing from programs costing hundreds of pounds.

It is supplied with two sample screen formats: a blue screen with white text and a green status line, and a red screen with green text which is intended for monochrome displays. The status line always shows which key to use to break out of a procedure or call up the Help screen. In normal editing mode you see something like

F1 Help. JustOff. 88% Free. 99% Point. Editing "B:FREEWARE.TXT"

indicating that key f1 should be pressed for Help, justification is off, 88 percent of the 62K text space is free, the cursor is close to the end of the document, and changes have been made since the file was last saved. Files are backed-up automatically on loading, and saved on exiting.



Would-be TV scriptwriters should take a look at Screenwright.

The screen can be windowed, and the cursor moved between two windows. Files can be loaded from disc and inserted as though they were normal blocks. Blocks can be saved to disc without saving the entire document. There are 56 main editing and formatting commands, mostly achieved through the function keys and other special keys. For example, Scroll Lock toggles between Insert and Overwrite modes, f8 changes the case of the letter under the cursor, cursor-pad key 5 selects Control for use with the next key pressed, and Control-P inserts a page break.

The program's main faults are its restricted memory, lack of a word-count facility, and its use of a separate printer module. It is necessary to save a file to disc and exit PC-Write in order to print it. Text is not shown as it will appear on the page. However, the module will print to disc, and it is then possible to load the print file back into PC-Write to see how it will appear on the page.

PC-Write is a good example of the benefits of registering freeware programs. The version I use is the 1983 issue of the program; the 1984 version adds on-screen displays of underlined and bold type, and other improved features. By the time I register my disc the author may have expanded the available memory, integrated the printer routine into the editor, or added other enhancements. Such upgrades are provided on registration, along with Pascal and assembly source code for the program, a reference card, and a bound copy of the instructions. Another bonus is a payment of $25 whenever someone registers a copy of your registered disc; the author thus encourages users to give away copies. The current version is reported to add mail merge and some other features.

The PC-SIG distribution disc containing PC-Write also holds **PC-Dial,** by Jim Button, a communications package with options for tailored screen colours, pre-selected baud rate and other procedures. It does not support dual-rate modems.

PC-Font, by SJL, converts ASCII files containing the IBM's special character set into standard Epson graphics commands, allowing a printer to reproduce almost anything that will appear on the screen. It can even manage a few symbols which real IBM printers will not handle. The procedure is simple and no special control codes are needed, but it is a little slow. Extensions to the command invoking the program allow the user to select an alternative Escape character, and to select initial line spacing, fount, and printing density. These extensions can be confusing if a complicated sequence is required.

Since the program works sequentially, there is no limit on document size. Printing is slow if there are a lot of graphics characters, and the program reinitialised the printer whenever it was invoked. For my printer, this meant I could not start to print one document until the previous one has been printed out, despite the buffer board it contains. Presumably this is done in case the printer has been set for conflicting codes, but the program would be improved by an option to avoid initialisation. The program also clears the DOS command line as it ends, so that it is not possible to invoke the program repeatedly or simply edit the command line for different file names.

SCRIPT WRITER

A specialised printing utility which might appeal to some is Screenwright, by Paul D Nadler. This program converts ASCII files containing embedded control codes into the layout used for TV scripts. The format can be altered, so the program should be compatible with most types of dramatic production. It is also available for CP/M. It has one oddity; instead of asking for a fixed registration fee, the author asks for $10 every time a script formatted by this program is submitted, irrespective of success or failure.

Word Processing for Kids, by S D Nolte could be described as the most limited text editor ever produced. The only conventional commands are cursor movement, insertion, and deletion, plus saving, loading, and printing documents. However, it plays a tune when it is booted, toggles between 40-column text and a special jumbo size of 20 letters wide in eight rows, allows a choice of screen colour, and is menu driven throughout. The Help and menu screens make good use of pictures, and I have seen the program used successfully by a bright seven-year-old.

For some reason this program is completely incompatible with my buffer board, and will not print out unless I connect the computer to the unbuffered printer socket. Text prints in double width in the 20-column mode, normal width in the 40-column mode. I have produced small notices by combining this program with the PC-DOS 2.1 Graphics command, to dump letters 11mm. high. The 10-page instruction book is written for a reading age of eight or 10, but assumes that an adult sets up the computer.

SCIENTIFIC SOFTWARE

Only one scientific package stands out: **Planets,** by Larry Puhl. It is a compiled Pascal program with source code which tracks planetary orbits throughout the solar system. It runs in real time, using the system clock to update every time a map is drawn. Options available include orbital maps for the inner and outer planets, extensive data on any one planet, and change of date. The graphics are as good as the colour board allows, and can be dumped to the printer using Graphics. Unfortunately, this tends to show the limited resolution of the display, and it might be better if the program included some facility to drive a plotter, or to drive the printer directly in Graphics mode. The screens of planetary information cannot be dumped to anything other than an IBM printer, since they are produced in screen mode 0 and contain some of the special IBM characters.

There are approximately 400 discs available from the PC-Blue and PC-SIG libraries, of which I have seen approximately 50 or 60. PCBBUK add another 84 discs, but most duplicate the software in the U.S. libraries. Their main contribution seems to be a range of programs for bulletin-board and modem operation. Although there seems to be a lot of duplication between discs in these three libraries, the total number of programs must be in the thousands. PC

U.K. DISTRIBUTORS

Spectronics Ltd Main U.K. distributor, charges £2 per volume to copy discs to formatted discs supplied by customer, reduction to £1.50 per volume for 10 or more volumes. The company will send a free synopsis list for an sae or detailed catalogues on disc at its normal rates. Check before placing an order if you have an unusual disc format. Contact Spectronics Ltd, 138 Hoylte Road, East Grinstead, Sussex RH19 3EA. Telephone: (0342) 313883

Compulink Commercial user group offering similar service as Spectronics for MS-DOS machines, charges a membership fee and runs a bulletin board. Contact Compulink User Group, PO Box 263, Slough SL1 5JJ. Telephone: (04867) 6535

PCBBUK Primarily an alliance between Spectronics and Compulink, but the organisers hope to attract British software and emphasise British computers. Contact Ron Smith at Spectronics

COMPETITION

Win an HP laser printer

Faster and quieter than daisywheels, laser printers look set to take over the top end of the PC printer market. Now you can win one in the *Practical Computing* Hewlett-Packard Laserjet competition!

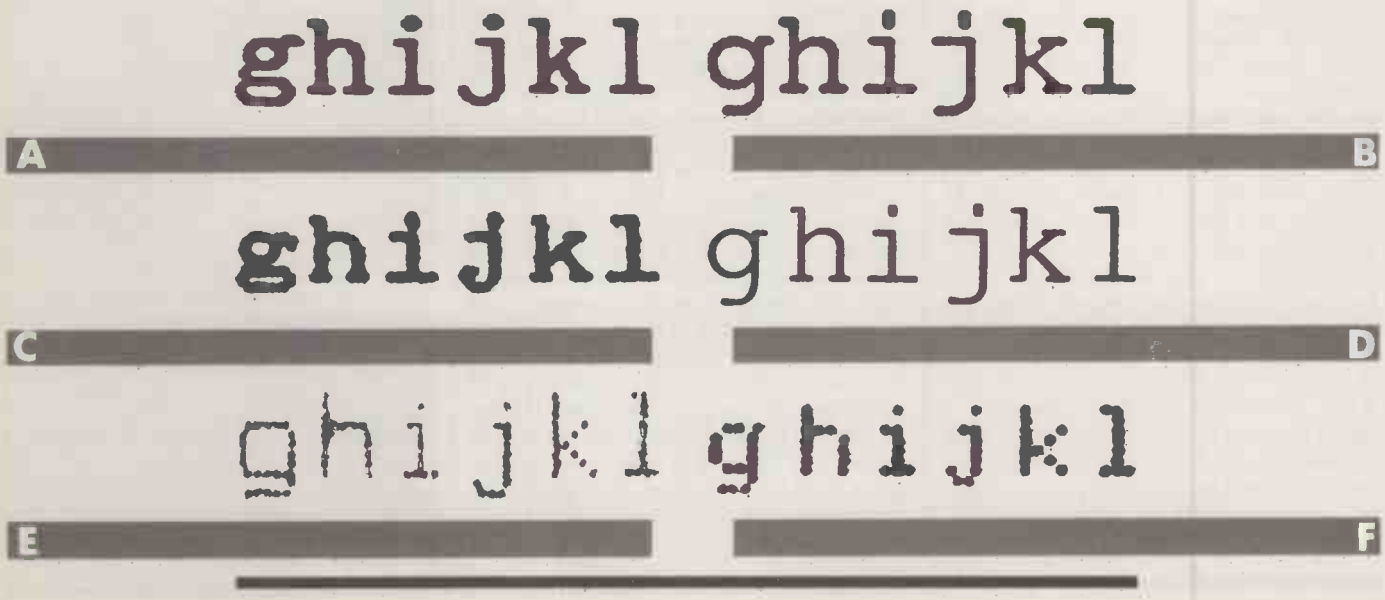
Laser printers give high-quality results on a par with daisywheel printers, but they have several big advantages. Based around similar technology to modern office photocopiers, they are far quieter than a daisywheel in operation. Laser printers are also quicker, printing a whole page at a time. The HP Laserjet produces eight pages a minute, which is about the equivalent of 300cps — three times the speed of the very fastest daisywheel and around 10 times as fast as an average one.

At a price of £2,664 plus VAT, the Hewlett-Packard Laserjet is probably the best-value laser printer available on the U.K. market. It offers great print-time flexibility, allowing you to mix a variety of type styles and graphics on the same page. It will work with any machine with an RS-232 port. You can use the Laserjet to emulate an ordinary daisywheel printer, and this allows you to run most of your existing software. But increasingly, the more important business packages such as Lotus 1-2-3, Framework and Microsoft Word will support the full range of features offered by the printer.

The running costs of the Laserjet compare favourably with a daisywheel printer. The Laserjet prints on to ordinary photocopier paper, and can also be used to produce overhead transparency slides. HP's machine uses the popular Canon printing mechanism, which has a throwaway print drum you discard after 3,000 or so printed pages. The cost per page works out around 4p, taking both paper and replacement of the drum into account.

Here is how you enter the competition. First match the six output samples reproduced on this page to the type of printer which produced them. For example, if you think sample A was produced by an ink-jet printer, put an A in the box next to "Ink-jet printer". Then complete the tie-breaker, and finally fill in the rest of the form and send it to us to arrive not later than 31 December 1985.

The winning entry will be the one which in the judge's opinion provides the correct answers and the most original and witty suggestion for the tie-breaker. Thanks to Hewlett-Packard Ltd for putting up the excellent prize.



COMPETITION

The £3,000 prize: HP's Laserjet printer

Speed: eight pages per minute **Print quality:** 300 dots per inch resolution **Noise:** less than 55db(A) **Printer facilities:** built-in Courier fount, optional plug-in fount cartridges, landscape and portrait-orientated printing, 59K buffer, whole-page graphics at 75 dots per inch, part-page graphics up to 300 dots per inch **Paper type:** ordinary A4 photocopier paper or pre-printed letterheads; also envelopes and overhead transparency film via manual feed **Interface:** RS-232C, connects to most micros **Usual price:** £2,664 plus VAT

Rules

1. The competition is open to oll reoders of *Practical Computing* normally resident in the U.K., except for employees of Business Press International Ltd or Hewlett-Packard Ltd or their families.

2. Each entry must be written in ink an the official entry form printed here, or a photocopy. Only one entry per person is permitted.

3. Completed entry forms should be posted to the address shown on the entry form, to arrive not later than 31 December 1985. Envelopes should be clearly marked "Laser Competition" in the top left-hand corner.

4. The editor of *Practical Computing* is the sole judge of the competition. No correspondence can be entered into regarding the results, and it is a condition of entry that the decision of the judge is final.

5. The winner will be notified by post and the result of the competition announced in the first available issue of *Practical Computing*. All entries become the property of Business Press Internationol Ltd, and may be reproduced without payment.

6. The prize is a Hewlett-Packard Loserjet printer. No cash substitute will be offered. The prize will be awarded to the individual named on the winning entry form.

Entry Form for Practical Computing HP Laserjet Competition

Tie-breaker

The word "laser" is actually an acronym for Light Amplification by Stimulated Emission of Radiation. This is frankly a bit dull. Imagine you have been commissioned to think up a catchy new acronym for the word "laser" to be used in promoting the Laserjet. Write your suggestion below. Don't worry about absolute, literal accuracy.

L.....

A.....

S.....

E.....

R.....

I think the output samples were produced on the different sorts of printers as follows (place one letter A-F in each box)

- ☐ **Laser**
- ☐ **Ink-jet**
- ☐ **Thermal transfer**
- ☐ **Standard-mode impact dot-matrix**
- ☐ **NLQ-mode impact dot-matrix**
- ☐ **Daisywheel**

NAME .....

ADDRESS .....

.....

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Return this entry form to **Practical Computing, Room L307, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS.** Write "Loser Competition" on the top left-hand corner of the envelope.

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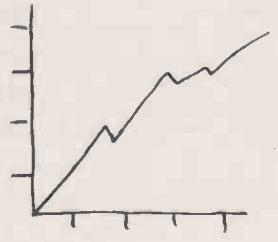

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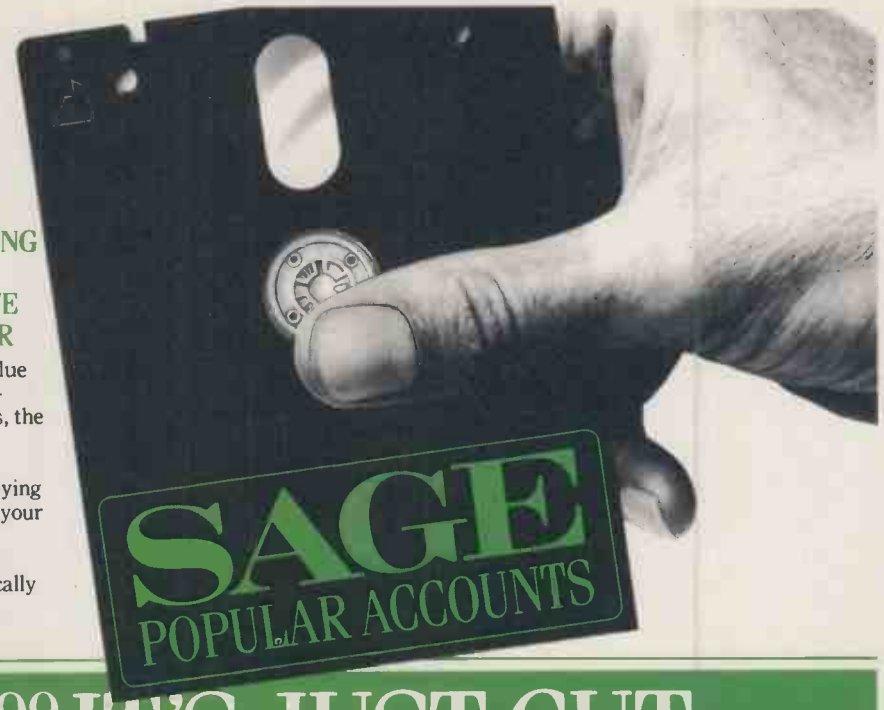

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BETTER SAGE THAN SORRY

EASY
HOW EASY?

By Susan Curran

```
        This  is a paragraph that was indented
five spaces with justification turned on.
        This paragraph was also indented five
spaces with justification turned on.
        The above paragraphs weren't edited at
all,  but for test purposes I edited this one
and  reformatted it after  typing.  Still  the
indent moved to eight spaces.
```

Tabbed indents behave unpredictably when reformatted.

As the market for full-feature word processors has become supersaturated so firms are looking for a new kind of user. Easy is Micropro's stab at the low priced less-feature section.

Micropro's Easy is intended to be a cheap, simple, accessible word processor for first-time and occasional users. Consequently I expected it to be simple to install and run. Perhaps it normally is, but I had great trouble installing both of the versions I received on my IBM PC/XT. The manual contained no data on the complex directory structure that the program requires, so I had to turn to Micropro to find out what had gone wrong. The default installation process skips printer installation, but there is a copious optional routine which provides for more than 120 printers.

The tutorial disc leads beginners slowly but painlessly through the basics of editing. The manual is well adapted to beginners, with much cross referencing of items. As Easy is of limited functionality compared with the other Micropro word processors, I thought it reasonable to expect comparable general screen performance. I even hoped that some of WordStar's annoyances would have been disposed of, but in both these directions I found the program a great disappointment.

UNACCEPTABLE DELAY

There is a real but just about tolerable delay in echoing normal, moderately fast touch-typing, but with cursor movements, the delay becomes unacceptable. The program keeps on scrolling for many seconds after you take your finger off the arrow keys. Single-character deletions are handled slowly and erratically: particularly with unwanted spaces it was difficult to see if the Delete was working at all. When it did work, whole chunks of text would suddenly disappear. The Tab key also seemed not to respond. I'd press it hard again and again, and suddenly the cursor would leap halfway across the line.

There is an automatic reformat, though this functions only after insertions or deletions, and not after margin changes. I found it so erratic that I turned it off, only to find the manual reformat command equally erratic. It was necessary to reformat at least twice in order to get correctly justified margins afer dual margin changes.

The old WordStar problem of tabs and tabbed indents that are altered by justification has become infinitely worse. When my paragraphs were supposed to be indented five spaces, the reformat would leave them indented anything from two to 15 spaces. Another attempt at reformatting would produce another wrong result.

When inserting text, particularly with the left margin set at other than column 1, I sometimes found the text appearing outside the margins. After reformatting, spaces would appear in the middle of words. They didn't go away when I tried to delete them: indeed, they were sometimes expanded by the justification. Ends of paragraphs seemed to gain spaces.

Features like Underline are handled by invisible control codes which can be deleted individually but added, as far as I could tell, only in pairs. I found it very difficult to add to existing underlining, or add non-underlined text as I required. It was equally hard to remove underlining, and I frequently found that the remainder of my text emerged underlined as a result.

These may sound like minor quibbles, but they are the very aspects of a word processor that make one program more usable than another. Many people rarely use the more esoteric capabilities, but failings in the screen handling are an annoyance every time you type or edit a document.

But Easy does have some cheerier features. The program is heavily menu-orientated, with a mixture of introductory menus and pop-down editing menus. Choices can be selected either by highlighting items using the cursor keys, by typing an initial letter, or with a mouse. Command sequences are designed for clarity rather than speed, and on this basis they are well chosen.

The default editing screen allocates four lines at the top to system information, including a rule and a reminder of the three basic function-key allocations for help, menus and back-up menus.

FEW COMMANDS

Commands are fairly basic, but well-chosen on the whole. There is no mail-merging, no windowing, and no indexing or fancy formatting features. There are Move/Copy/Delete block commands, though these work on a maximum of only 750 characters. There is an Undelete feature, and a Find/Replace that is not case sensitive. There is no background printing, no automatic hyphenation, no macro or glossary feature, and poor undenting of numbered paragraphs.

Cursor commands are fairly good in conception, if not in execution. I missed a Delete Word command: the sequence available is five keystrokes long. Miscellaneous extras include support for up to four founts in a single document, and for wide documents up to 240 columns.

The integral spelling checker contains an anglicised 65,000-word dictionary and works well. It automatically suggests alternatives for misspelled words: if the alternative is wrong, you must type the correction in full, but there is scope for setting up user dictionaries.

SPECIFICATION

Description: word-processing package with spelling checker and tutor disc
Hardware required: twin-floppy IBM PC or compatible with 256K RAM; 320K required for PC-DOS 3.0 and 3.1
Price: £165 plus VAT
Publisher: Micropro International Ltd, Haygarth House, 28-31 High Street, London SW19 5BY
Availability: now

EASY

PC VERDICT

	POOR	AVERAGE	GOOD	EXCELLENT
Performance	☐	■	☐	☐
Ease of use	☐	☐	■	☐
Documentation	☐	■	☐	☐
Value for money	☐	■	☐	☐

☐ Wait for Version 2; it might be worth a look

CONCLUSIONS

- Easy's capabilities are limited but well chosen, and the ergonomics are good.
- The screen handling is poor, and a strong argument against choosing it.
- Easy's similarity to WordStar is not so great as to justify choosing it. PC

INTERVIEW

ALAN SUGAR — Founder and Chairman of Amstrad

INTERVIEWED BY GLYN MOODY

Alan Sugar was born in 1947, and founded Amstrad Consumer Electronics in 1968. The name derives from Alan Michael Sugar Trading. Initially the company distributed car accessories and electrical goods. Twelve years later, the company was floated on the Stock Exchange, and by then was selling a range which included hi-fi and televisions. The turnover then was £9 million. In 1984 Amstrad launched the CPC-464, its first computer, and turnover hit £84.9 million with profits of £9 million. That year, Alan Sugar was also named Guardian Young Businessman of the Year. Turnover for 1984-85 was £136 million with profits of £20 million, with overseas sales accounting for 53 percent of the group's activities.

To what extent does the initial specification of a new machine come from you?
IT STARTS off coming from me saying ideally what I would like and then it has to be explained to me what is possible. I'm basically non-technical so I may ask for something which is physically and practically impossible for the kind of price area I want something produced at.

What were the core ingredients of the PCW-8256?
I OBSERVED that possibly 70 percent of IBM PCs are used for word processing. It appeared to me that a lot of the hardware was then redundant. You'd run out and bought a £2,000 or £3,000 piece of kit and perhaps you were only using maybe 10 percent of the potential of the machine. So the brief was we wished to produce a word processor which was very good, which was not complicated and had to have everything integrated. It had to have its disc drive and obviously the printer there. And the printer had to be versatile. Once we outlined the specification it became clear that by-the-by this was a computer you were talking about, not a word processor, and we might as well capitalise and use the other half of it as a computer, and so we stuck in CP/M Plus. So if you want to run Supercalc 2, or dBase II or Ashton-Tate's Friday, or Multiplan or whatever, you can do that. And you can do it faster than some of the famous PCs which are on the market. There was no point producing a piece of kit for £399 if it was going to be a toy and didn't work.

To what extent will the PCW-8256 be the first of a family of machines?
WE BELIEVE that in that particular sector there is no space for improvement because I think we have captured everything that one could conceivably ask a word processor to do. Maybe there will later be enhancements as time goes by and technology advances, or different printers we might be able to package with the thing. But that's it. It sits there in its own right as a kind of epidemic product which we hope is going to emboss its name in the world as the Amstrad, just like you may talk about the Hoover.

To what extent does it represent a change of direction for you?
IT'S a very big change of direction for us. We believe we have created a new concept in computing that's going to be used seriously, and obviously with a massive breakthrough in price.

Who do you see as your main rival?
We haven't got any rivals on that product. People would have to come down in price to compete with us. There are companies out there which make dedicated word processors only which sell for £7,000 to £8,000 without a printer. I think those people have got a bit of a problem on their hands, because they cannot justify the price of their machine; they cannot justify its existence with this product around.

How do you see the serious computing market developing in this country?
I THINK that the problem that will evolve for others is being able to compete with us. With the greatest of respect to the other manufacturers of what we class now as the more serious computing end of the market, I do not know how they can justify the prices that they charge for their products. All I can say is that perhaps they have been out there alone too long. I think that certain other companies will have to change their thinking.

What is your attitude to local area networks?
WITHIN an office environment networking is useful. However, if you are producing a machine at the kind of price level that we are, we find that the market for these machines is for the individual — the executive or typist or whatever — to have it on his or her desk alone, to do their little bit of what their job entails, away from everyone else, away from the DP manager who's never got any bloody time for them. That machine and this type of philosophy of computing is at a price level where that particular executive or person doesn't necessarily have to go to a board meeting to make a decision whether they can buy one or not. It is within his or her capability of buying a £399 piece of kit.

What proportion of Amstrad's turnover do you expect to be from micros in future years?
FOR the next couple of years I think we're going to see 60 percent of the business geared towards computers.

What is your attitude to the U.S. market?
WE'RE being very cautious on that market. We've observed in the past failures from British and European companies who have tried to set up over there, and we don't want to follow that route. We're looking for customers in America, rather than set up our own thing. We'll sell to them as long as their commitment is irrevocably covered by letters of credit and orders.

In what direction would you like Amstrad to develop?
WE'RE in the consumer electronics industry. That must cover computers and things which are allied to it, and that's where we plan to stay. PC

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3  Lotus 123
4  Disk formatting menu
5  Exit to operating system

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POWER WITHOUT THE PRICE

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 amazingly 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 3½ 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 resizeable 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) 3½ inch disk drive, and a 15MB hard disk storage system as well as a mass storage compact disk (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
- ★B/W MONITOR
- ★MOUSE
- ★500K 3.5" DISK DRIVE
- ★GEM
- ★KEYBOARD (95 KEYS)

£749

ATARI 520ST SPECIFICATION

MEMORY
512K RAM (524,288 bytes)
16K ROM expandable to 320K
Port for addnl 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)
640x200 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

ARCHITECTURE
4 custom designed chips
GLUE Chip - MMU Memory Mngmnt Unit
DMA Controller - Graphics Processing Unit
16/32 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/56 instructions
14 addressing modes/5 data types

DATA STORAGE
High speed hard disk interface
Direct memory access 1,33 Mbytes per second
CD (Compact Disc) interface
Built in cartridge access
Dedicated floppy disk controller

DISK DRIVE
500K (unformatted) s/sided 3½" floppy d/drive
349K (formatted) storage capacity

SOUND AND MUSIC
Sound Generator
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
Separate keyboard 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
12" screen - high res monochrome monitor
640x400 monochrome resolution

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 modems capable of input/output
RS232C serial modem/printer interface
VT52 Terminal Emulation Software
Maximum Baud Rate up to 19,200
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 menus
Two button mouse controller
Icons/Pull down menus/Windows
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 CP/M 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: 470mmx240mmx60mm
Replacable external power supplies
Expansion: 3½" floppy disk drives 500K/1,000K (two drives can be connected)
3½" 15Mb hard disk
CD (compact laser disc)
Dot matrix & d/wheel prntrs (black)
Thermal dot matrix (colour)
RGB & monochrome monitors

LANGUAGES
BASIC & LOGO supplied
Many others will soon be available, including: Assembler, BCPL, C, Cobol, Compiled Basic Lisp, Modula-2 and Pascal

Note: Some of the above specifications are pre-release and may therefore be subject to change

MACINTOSH v F1e v 520ST

"Imagine a Fat Mac - the 512K Apple Macintosh - but with a bigger screen, a far bigger keyboard with numeric keypad, cursor and function keys, and colour. That gives you some idea of what the Atari 520ST is like, except for two important things. First the Atari seems faster. Second the Atari system is about one third of the price."
June 1985 - Jack Schofield - PRACTICAL COMPUTING

FEATURES OF BASIC SYSTEM	APPLE MACINTOSH	APRICOT F1e	ATARI 520ST
Price includes B/W Monitor	YES	NO - extra £200	YES
Keyboard size mm (LxDxH)	330x147x50	450x167x28	470x240x80
Keyboard size ins (LxDxH)	13x5¾x2	17½x6½x1	18½x9½x2½
3½" D/Drive (Unformatted)	500K	500K	500K
3½" 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
RS232 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	£595+VAT	£652-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	£652-VAT
PRICE rounded down including VAT	**£2,984**	**£1,362**	**£749**

PRESS COMMENT

"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

"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, I'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 ...If 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 64K 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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ON THE NEW ATARI 520ST COMPUTER

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

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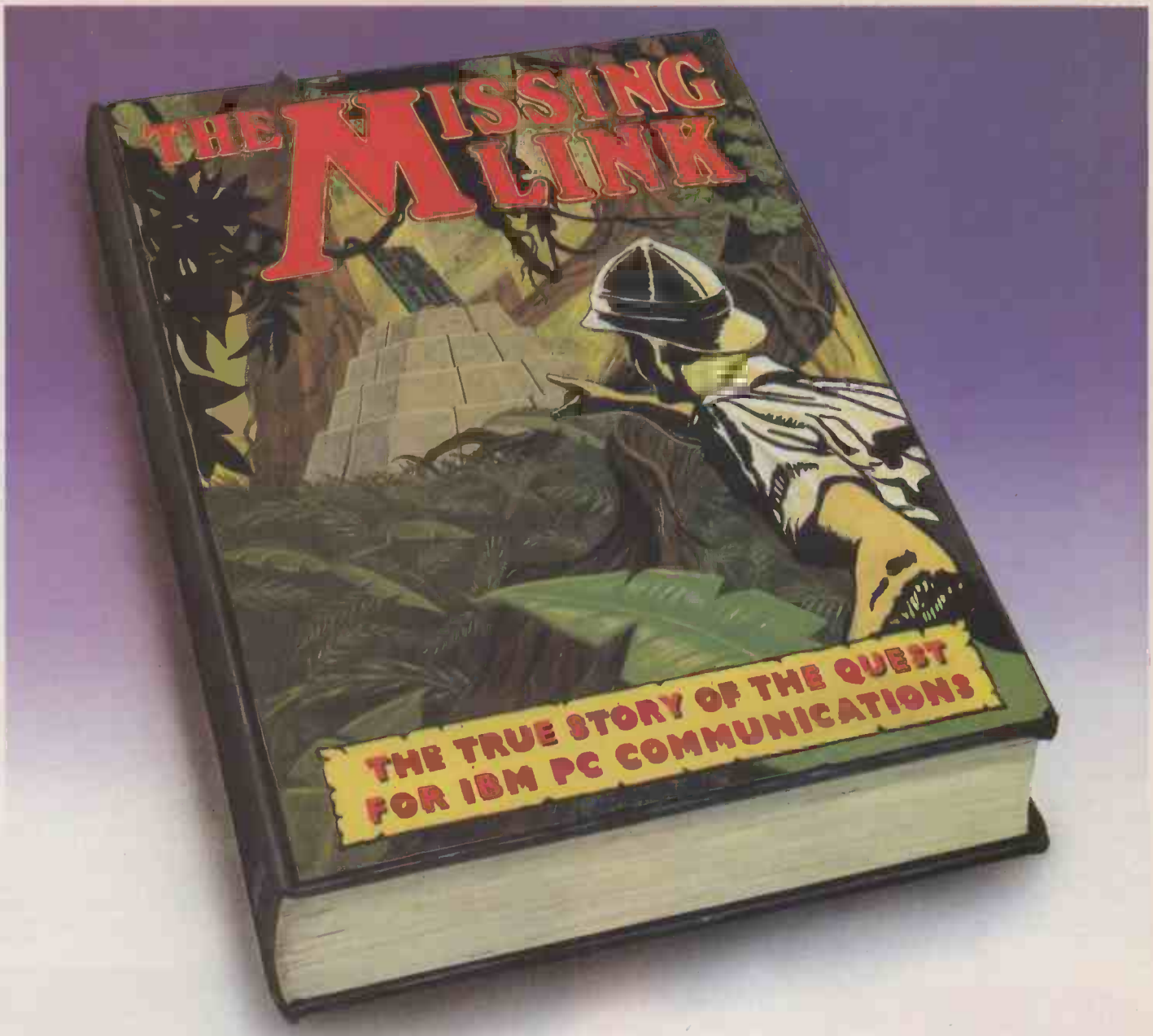

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PRINT WARS

Never has the competition in the printer market been more intense. Ian Stobie assesses what is going on.

This month's top 10 list has an unusually conservative feel to it, and the reason is closely connected with the nature of printers themselves. The point of a printer is to print, so proven reliability matters more than having the very latest feature. Nonetheless, big changes are afoot in the printer market, and in this introduction we consider the most important trends. Our top 10 list makes a good starting point.

Daisywheel and dot-matrix printers are still the dominant types, despite having one massive disadvantage: they make a lot of noise. But a combination of factors keeps these two noisy kinds of printer dominant. Like the internal-combustion engine, impact technology is well understood and reliable, and it is constantly undergoing small but useful refinement. The direct physical approach of banging a set of needles or a daisywheel character through ribbon has the advantage of working with virtually any sort of paper, including multi-part paper for simultaneous copies. But most of all, the daisy/dot duo is kept in business by massive overcapacity on the production side, leading to intense competition and very aggressive pricing.

The assembly and electronics technology involved in manufacturing impact printers is not difficult. Anyone who can produce watches, sewing machines or typewriters in volume probably has the ability to switch over to printers without too much trouble. And despite what some British investors may believe, the computer market still represents a land of golden opportunities to anyone coming from such genuinely stricken industries. Consequently, some major international companies are continuing to enter the dot-matrix and daisywheel printer markets.

All this is excellent for the computer user. The general standard of the printers on offer is high, and pricing is very competitive. To keep prices from hitting absolute rock bottom the watchword in the industry is "added value". Matrix printers are sprouting NLQ mode and IBM graphics capacity; daisywheel printer speeds are inching up from a crawl to a slow stagger. Small improvements are also being made to paper handling.

The number of competing impact printers is so great that manufacturers' strategies are often aimed not directly at the end-user but at dealers. But in this situation price discounting by dealers is widespread. Which machine is the best buy in any particular category varies from month to month.

Selecting 10 printers is obviously difficult with so many good machines around. In our selection we have gone mainly for well-known, established machines from manufacturers with a good reputation. We have machines in widely different price ranges, using a variety of different printing methods, to show what sort of performance you can expect within the limits of proven present-day technology.

The leading challengers to the two impact technologies are ink-jet, thermal transfer and laser printing. These non-impact printing methods all make much less noise and offer other advantages. There are no ink-jet printers in our top 10 because we are not convinced that they have yet overcome one remaining problem — limited paper choice. Manufacturers like to claim that their particular ink-jet will print on any sort of paper, but we have found that on our normal office stationery the results are apt to smear, or look very thin once dry.

Thermal transfer also suffers from paper problems, only this time the printers work best on shiny, smooth paper. On the right stuff, thermal transfer can be very good, delivering excellent print quality in almost complete silence. On page 75 we review the IBM Quietwriter, which seems to have overcome the paper difficulty.

The really big success story among the new printing technologies is the laser. Although for the moment still fairly expensive, laser printers have already established themselves at the top end of the business printer market, and pose a major threat to up-market daisywheel printers.

Best regarded as super-intelligent photocopiers, laser printers print a page at a time. Apart from speed, this gives them much greater flexibility than either daisywheel or dot-matrix printers in the sort of images you can put on a page. Mixed text and graphics, and different typefaces and type sizes, can all go on the same sheet, all printed at very high resolution.

You can use a laser printer to replace a daisywheel, but with the right software you can go further: the term coming into vogue is "personal publishing". Many companies are already able to justify the extra capital cost of a laser printer by bringing jobs like printing forms, letterheads and short-run reports in-house. Current laser printers have quite complex optical systems, and this will stop the price of reliable equipment falling below a certain level. But there are other sorts of page printer around. Machines are already beginning to come on to the market with imaging systems based on CRT, liquid-crystal shutter and magnetic technology, all of which are fundamentally simpler than a laser printer.

TYPES OF PRINTER

DAISYWHEEL
Typewriter-like machine which bangs fully-formed characters through a ribbon to mark the paper.

IMPACT DOT-MATRIX
Like a daisywheel printer, but bangs a set of needles through the ribbon, building up the characters from a rectangular array of dots.

INK-JET
Has a row of tiny nozzles which spit the ink directly on to the paper; there is no ribbon. Again, the characters are made up from dots.

LASER
Basically a photocopier, with the glass plate on top replaced by a laser-imaging system. Prints a whole page at a time.

THERMAL TRANSFER
Uses a row of many tiny heating elements to melt ink on to the paper from a special ribbon. Again, characters are made up from dots, but usually there are too many to see.

THE TECHNOLOGIES COMPARED

	Print quality	Speed	Quietness	Paper choice	Running costs	Price
Daisywheel	Excellent	Poor	Dreadful	Excellent	Excellent	Low
Dot matrix	Average	Good	Poor	Excellent	Excellent	Low
Ink-jet	Good	Good	Good	Poor	Average	Average
Laser	Excellent	Excellent	Good	Good	Good	High
Thermal transfer	Good	Average	Excellent	Poor	Average	Low

SUPPLIERS

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

Brother Brother Computer Peripherals Division, Shepley Street, Audenshaw, Manchester M34 5JD. Telephone: 061-330 6531. Circle no. 362.

Epson Epson (U.K.) Ltd, Dorland House, 388 High Road, Wembley, Middlesex HA9 6UH. Telephone: 01-902 8892. Circle no. 363.

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IBM IBM U.K. Ltd, PO Box 32, Alencon Link, Basingstoke, Hampshire RG21 1EJ. Telephone: 01-578 4399. Circle no. 365.

Juki Micro-Peripherals Ltd, Intec Unit 3, Hassocks Wood, Wade Road, Basingstoke, Hampshire RG24 0NE. Telephone: (0256) 473232. Circle no. 366.

Qume Qume (U.K.) Ltd, Marketing and Sales, Park Way, Newbury, Berkshire RG13 1EE. Telephone: (0635) 31400. Circle no. 367.

NEC NEC Business Systems (Europe) Ltd, 35 Oval Road, London NW1 7EA. Telephone: 01-267 7000. Circle no. 368.

Taxan Data Distributors Ltd, 5 Kingsride Park, Ascot, Berkshire SL5 8BP. Telephone: (0990) 28921. Circle no. 369.

APPLE LASERWRITER £5,995

The Laserwriter is only one step below a typesetting machine in the quality of output that it offers. Printing at a resolution of 300 dots to the inch it comes with two typesetting founts, Helvetica and Times, as well as the Courier typewriter fount. You can mix pictures in with the text and use type sizes from 4 point upwards. Although designed primarily to work with Apple's Macintosh computer, the Laserwriter is equipped with a standard serial port and can be used by other machines to emulate a Diablo 630 daisywheel printer. Printing is on to photocopier paper, overhead film or ordinary A4 headed paper. The Applewriter is quiet and quick, the top speed of eight pages a minute working out as equivalent to 300cps for a full page of text.

FOR Near typeset quality output. Great graphics. Quiet.

AGAINST Price. Mac needed for best results.

BROTHER TWINWRITER 5 £1,295

Brother has a range of conventional dot-matrix and daisywheel printers but the Twinwriter combines both. The machine has a two-part print head incorporating a nine-pin matrix unit and a 96-character daisywheel. The idea is to get round the problem that while daisywheels give the best output, they are slow. The Twinwriter lets you use the dot-matrix head to produce fast drafts at 160cps, and the daisywheel for the final letter-quality output at 40cps. You can mix daisywheel print with NLQ-mode matrix print in the same line, which is very useful for printing characters not on the daisywheel. You can also do things like put daisywheel-printed legends on matrix-printed graphics.

FOR Best of both the daisywheel and dot-matrix worlds.

AGAINST Noisy.

EPSON P-80X £250

Thermal-transfer printers are getting better. The Epson P-80X has a 24-element print head and offers excellent output quality for the price. It is also the only printer in this survey which is completely portable. It weighs under 2.5lb. and is powered by rechargeable batteries. Like most thermal-transfer printers it is a bit fussy about the sort of paper it uses. It works best on smooth papers but it makes a reasonable stab at printing on to ordinary typewriter bond. You can remove the thermal ribbon and print on to thermal roll paper. The P-80X is not particularly fast at 23cps in NLQ mode or 40cps in draft mode, and these figures tend to overstate its speed as it prints in only one direction to give it better registration.

FOR Battery powered. Silent. Good print quality.

AGAINST Not very fast. Fussy about paper.

EPSON FX-80 + £438

Epson makes the computer industry's standard workhorse printers: the FX-80 + and its cheaper sibling, the LX-80. Both are impact dot-matrix printers, about as noisy as the rest of their kind, and capable of printing at 160cps in the case of the FX-80 + , 100cps for the LX-80. The LX-80 is aimed at lower-volume users and costs £255. It will do NLQ printing at 16cps. To get NLQ printing from the FX-80 + you need to buy an optional board. Because they are the standard, few software companies would neglect to support the Epson printers. Other manufacturers have launched copies of them, many of them both excellent and cheaper, but Epson still sells its machines: they have an excellent reputation for reliability and are widely available.

FOR Reliable. The industry standard.

AGAINST Noisy. Rivals often cheaper.

HP LASERJET PLUS £3,518

Hewlett-Packard makes laser printers: the original Laserjet, recently reduced in price to £2,665, and the new Laserjet Plus. Both printers are compatible with the IBM PC and other business micros. They are less ambitious than Apple's virtuoso offering, but probably represent a more cost-effective solution for the average office user. Since HP and Apple both build their machines around the same printing mechanism from Canon, there is little difference in speed, paper handling and running costs. Where the machines differ is in their graphic and typographic features. Neither HP machine can match the Apple Laserwriter, but both offer excellent graphics and forms-drawing ability, along with the capacity to emulate a daisywheel printer more quietly and quickly.

FOR Quick. Quiet. Cheap to run.

AGAINST Nothing much.

IBM QUIETWRITER £1,316

The Quietwriter is the most impressive thermal-transfer printer we have seen, and it largely overcomes the problem of paper pernicketyness. It uses a variation on the usual thermal-transfer technique, having a different sort of ribbon. Heat is generated inside the ribbon itself, leading to a better transfer of the ink, and the Quietwriter produces near-daisywheel quality on most types of paper. At 40cps to 60cps it is of comparable speed to a similarly priced daisywheel, but much quieter. Typefaces are generated by plug-in fount cartridges; four are available at present. You cannot use carbon or multi-part stationery to produce simultaneous copies, but for most people that is a small price to pay for peace and quiet. Reviewed on page 75 of this issue.

FOR Good-quality output. Much less noise.

AGAINST For IBM-compatible machines only.

JUKI 6100 £399

The Juki 6100 is not the very cheapest daisywheel printer on the market, but it has a good reputation for reliability and is widely available. Printing at 20cps, it is not bad value for money. Like most daisywheels the standard model comes with friction feed; you pay more for an add-on tractor feed or multiple-sheet feeder. The Juki uses IBM Selectric ribbons and Triumph Adler daisywheels, both easily obtainable. It accepts Diablo-type control codes, so it is compatible with a wide variety of software packages. The 6100 is available with either parallel or RS-232 serial interfaces; the Juki 6100I is the IBM-compatible version. Juki makes several other printers, including a 30cps daisywheel, the 6200, which prints on to extra-wide paper and costs £499.

FOR Well established. Reliable. Low running costs.

AGAINST Typical daisywheel: noisy and slow.

QUME SPRINT 11/90 £2,398

At 90cps the Qume Sprint 11/90 must be very close to the top speed possible for a daisywheel printer. There is an inherent limit to how fast you can go with this approach, as characters must be rotated into place one at a time to be struck by the print hammer. According to Qume the 11/90 is no noisier than many slower daisywheels, with a claimed noise level of better than 62dB(A). The printer is available in serial, parallel and IBM versions, with a range of different paper-handling options. Qume is one of the best-known names in the daisywheel business, and is particularly strong at the top end of the market. The Sprint 11/40 has a similar spec to the 11/90 but runs at 40cps and costs £1,491. The cheapest Qume offering is the 20cps £595 Letterpro 20.

FOR Quick for a daisywheel. Good-quality output.

AGAINST Laser might be a better bet.

NEC ELF £349

NEC makes a well-established range of daisywheel printers which use a slight variation on the usual technology. They have a different kind of printwheel. Instead of putting the characters on the end of straight stems, to produce the usual daisywheel shape, NEC bends the stems to form what it calls a print thimble. This makes it easier to get more characters on, the NEC thimble having 128 characters as opposed to the 96 characters found on most standard daisywheels. Latest and cheapest in the range is the NEC Elf. This runs at 19cps and is fairly quiet for this sort of impact technology, rated by NEC at 55dB(A). It comes in serial and parallel versions and has optional tractor and sheet feeders like most other daisywheel printers.

FOR Good-quality output. Fairly quiet for daisywheel.

AGAINST New. Still fairly noisy.

TAXAN KP-810 £339

Taxan is known in the U.K. for its range of impact dot-matrix printers and monitors, which are very aggressively priced. The KP-810 is an 80-column matrix printer with a speed of 140cps in normal mode. Its main claim to fame is its slower NLQ mode, unusually good for a printer of this price. Working at 24cps it builds up characters on a 23-by-18 matrix. A variety of different NLQ typefaces are available on optional plug-in ROMs. The KP-810 is equipped with both friction and tractor feed, and is available in serial, parallel and IBM versions. The IBM version, which costs £399, offers the full PC character set, including IBM graphics characters. Wider-carriage models are also available. All models accept Epson control codes.

FOR Good NLQ mode. Cheap for the print quality.

AGAINST Noisy, like most impact printers.

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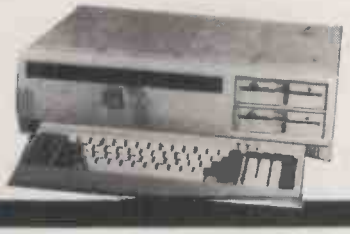
AT2: Same as above but with 20MB Hard Disk **£2,999**



MOTHERBOARDS

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FUJITSU SP320 48 CPS daisy wheel, Centronics **£899**
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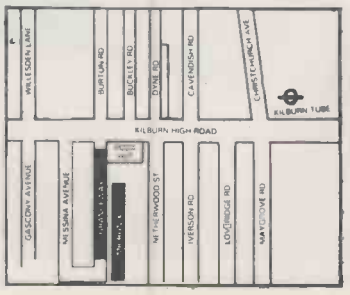


The number of micros in business use has now passed the critical point at which micro-based communications systems become a useful proposition. **Glyn Moody** sets the scene on our survey of the world of micro comms.

GETTING THE MESSAGE ACROSS

The micro revolution has been driven largely by the advantages of distributed computing power. On the one hand, the advent of the desk-top machine freed the corporate user from the tyrannous monopoly of the DP department. On the other, it offered the possibility of computing to hundreds of thousands of professionals who hitherto had baulked at the outlay and reorganisation involved.

In the light of this liberating effect, it is hardly surprising that the spread of business micros throughout large and small companies has proceeded apace. After all, the benefits that accrue from micros are real and well recognised. But today, users want more. They are no longer content to exist as lonely islands of information and processing power. They want to communicate.

STAGE TWO

This second stage in micro-awareness is actually a corollary of the success of the first. While micros remained a rarity there was little point in looking for any others to talk to. Now they can be taken for granted as a widespread business tool, and communication becomes a viable addition to the range of computing options.

At its simplest, communication takes the form of getting information from one micro to another. This is not a trivial task even between identical machines. When you are dealing with incompatible machines with different output ports the problems can assume considerable proportions. The solution may be to use one machine as a terminal to the other. Some commercially available programs are designed to provide the facility: Chit-Chat, reviewed on page 104 of this issue, is one, although this is not its primary function.

Such micro-to-micro comms are becoming less important as the IBM disc format becomes the de facto standard. It is now much simpler to take a floppy disc along the corridor than to invest in entire file-swapping programs and long runs of cable.

The big growth area is in the micro analogue of postal communications: electronic mail. As Jack Schofield reports on page 107, this is really beginning to take off. That it should be attractive to business users is hardly surprising. After all, communication by sending notes and letters lies at the heart of much management activity. The appearance of an automated micro version has, no doubt, helped accelerate the process of integrating desk-top machines into standard office practice.

As electronic mail becomes more of a commonplace, knock-on effects will include lower charges as volume increases, and as more competing firms enter the market. Services will also offer far more in the way of supplementary facilities. Already Telecom Gold is moving in this direction with its bulletin board and Chat facility.

Electronic mail uses minis or mainframes to act as a central node through which users can communicate. The viewdata service Prestel works in exactly the same way, and also offers an electronic mail service, albeit a rudimentary one. This is, however, completely incidental to the main business of information provision, which is another strong growth area of communications. Prestel is described in greater detail on page 105. Other more specialised on-line services were discussed at length in the March issue of *Practical Computing*.

Prestel has been something of the Cinderella among the services available on-line from mainframe computers. When it was originally launched, it was marketed badly and was overpriced. Today, its costs are quite reasonable, but the technology which lies behind it is now very dated, and its facilities and performance are correspondingly limited. Nonetheless, it stands to benefit from the increased number of communicating micro users since Prestel is frequently offered as an added bonus in comms packages. As a result, the range of services is likely to increase.

MICRO TO MAINFRAME

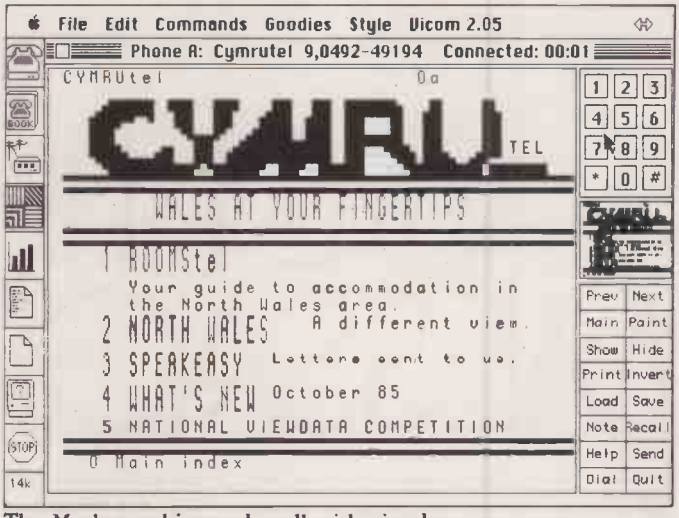
One further area of communications seems set to expand in the future, that of micro-to-mainframe links. Whatever the pattern of corporate micro acquisition, whether co-ordinated or not, there has so far been little dialogue — of words or data — between DP departments and single users. Now that micros are an accepted part of company working practice, attention is turning to looking at how they can be fully integrated with corporate information systems.

As time goes on, this role of intelligent terminal is likely to become increasingly important, even to the extent of usurping some of the more traditional functions of the DP department. There is even some suggestion that such communicating, distributed micros will form the basis of all future corporate computing. Whether this materialises or not, it is certain that you will never be alone with your micro again.

Ian Stobie checks out how far communications products for the Macintosh measure up to the user-friendly standards set by the machine itself.

THE MAC CONNECTION

Vicom's phone book offers a range of default values.



The Mac's graphics work well with viewdata-type pages.

By the standards of the industry, the Macintosh is generally a very easy machine to use; communications, on the other hand, has the reputation of being a difficult application. So when we approached the subject of Mac comms we were interested to see whether it lives up to the standards set in other areas.

To save you the suspense, we found Apple's new autodial modem, Vicom's excellent communications software, and the comms part of Lotus Jazz easy and enjoyable to use. But some of the other items we wanted to look at just would not work, or were unobtainable here. Many software packages listed in U.S.-produced Mac software catalogues are not compatible with the U.K. phone system.

Now that official approval is coming through for direct-connect modems, all our comms problems should be over, at least on the hardware front. Equipment should plug directly into the phone system, and everything should work straightaway.

PROBLEMS SETTING UP

Unfortunately, it may not always be that simple. We had some initial difficulty in getting our Mac setup to work with the phone system. The villain of the piece turned out to be IBM — more particularly our IBM private branch exchange. If you work in a large office building you would be well advised to find out something about your phone system before buying any kit.

Apple's own offering is a direct-connect modem with autodialling ability, called the Apple Modem. It can run fast enough for the standard electronic-mail services like Telecom Gold, and can also support more rapid data transfer at 1,200 bits per second, which allows you to use viewdata systems such as Prestel. Except for very specialised applications you are unlikely to need faster data-transfer speeds.

We were very happy with the Apple Modem, but since it costs nearly £300 plus VAT we thought it worth trying out a cheaper one. We selected the Tandata TM-200, which has a similar spec on paper and costs not much more than half the price. The main technical difference is that the Apple can auto-answer as well as autodial. However, this feature is unlikely to interest you unless you want to receive data with your Mac untended, or do things like run your own bulletin board.

VICOM

PC VERDICT

	POOR	AVERAGE	GOOD	EXCELLENT
Performance	☐	☐	☐	■
Ease of use	☐	☐	☐	■
Documentation	☐	☐	■	☐
Value for money	☐	☐	■	☐

☐Vicom is what a Mac comms package should be: easy to set up and to use. Its very effective use of the Mac's graphics to display Prestel is a useful bonus.

The Apple unit was generally the better designed. Unlike the Tandata it has a socket on the back for your ordinary telephone to go into. This lets you run both voice and modem off the same BT socket, although obviously not at the same time. With the Tandata you have to unplug the modem every time you want to make a phone call.

PART OF THE FURNITURE

Apple's documentation is usually good, and that for its modem is no exception. Once we had sorted out the problem with our IBM exchange, we got the Apple Modem working immediately. It soon became part of the office equipment, like the phone that sits on top of it, working reliably and unobtrusively.

The Tandata documentation was an appalling collection of photocopied sheets, seemingly aimed at the hacker. Two unmarked switches on the back of the unit seemed to be crucial to its operation. We tried all possible settings, spent an hour reading the documentation, then gave up. It had failed the Macintosh test. The Tandata is very popular with BBC Micro owners, and may well be worth trying if you know someone who is already using one successfully, but it clearly belongs to the pre-Mac era as far as ease of use goes.

Having successfully got the Mac connected to the phone system, the next thing to do is find a practical use for it. The simplest thing you should be able to do with an autodial meodem is to use it to dial phone numbers for your voice calls. It would

SPECIFICATIONS

APPLE MODEM

Description: BABT-approved direct-connect modem with autodial and auto-answer facilities
Dialling: pulse dialling, Hayes protocol
Speeds: 300/300 baud, 1,200/1,200 baud, 75/1,200 baud
Price: £295 plus VAT, available now
Supplier: Apple Computer (U.K.) Ltd, Eastman Way, Hemel Hempstead, Hertfordshire HP2 7HQ. Telephone: (0442) 60244.

VICOM

Description: comms software package
Features: simulates Prestel graphics on Mac's mono screen as well as offering standard ASCII mode; release 2 also has VT-100 and VT-52 terminal emulation and printer spooling
Runs on: 512K or 128K Mac; works with most modems
Price: £150 plus VAT; copy protected with key disc mechanism
Publisher: AM Computer Technology Ltd, 11 Cornwall Gardens, London SW7 4AL
Suppliers: P&P, Softsel, First, and most Apple dealers
Available: release 1 available now, release 2 out soon

JAZZ

Description: five-function integrated package with comms as one function; spreadsheet, WP, database and graphics are the others
Comms features: ASCII mode, VT-100 and VT-52 terminal emulation
Price: £495 plus VAT
Supplier: Lotus Development (U.K.) Ltd, Consort House, Victoria Street, Windsor, Berkshire SL4 1EX. Telephone: (0753) 840281

MODEMS AND PABXs

Setting a up modem is a once-and-for-all task like installing a printer. However, many offices now have a private automatic branch exchange (PABX) of some sort, and this can make the initial setting up more complicated.

In our office we have the popular IBM 3750 exchange. With this and similar PABXs the chances are that if you just plug your modem straight into the wall socket it will not work. If this happens, the first thing to do is to tell whoever runs your PABX what you are doing and ask for a data-protected line. With an ordinary line, the PABX will feel free to put other signals down the line at the same time as your call. This does not matter with voice but will probably scramble your data. If your line is data protected the PABX refrains from this behaviour.

A second problem may affect you if you have an autodial modem. Most autodial units such as the Apple and Tandata modems we were trying, generate pulse codes, which is what domestic U.K. phones have traditionally done. Some PABXs, our IBM 3750 among them, expect tone dialling, but it should usually be possible to reset the system to handle pulse dialling on a specific line. If your PABX cannot be made to accept pulse dialling you will need to choose your modem with more care. Tone-dialling models are available, but they are generally more expensive and you need to make sure they will work with your specific exchange.

TYPES OF MODEM

The oldest and still the simplest form of modem is the acoustic coupler. This type works with your existing ordinary telephone: you dial by hand and then push your phone handset into the coupler, where two rubber cups fit over the mouthpiece and earpiece. The modem emits audible bleeps into the telephone's mouthpiece, and convert the bleeps coming out of the earpiece into electrical signals.

The fact that there is no electrical connection between the phone and the computer has advantages: acoustic couplers do not need BT approval. They also work with most phones, as long as the handset is reasonably conventional in shape, and are less affected by the behaviour of PABXs.

But this approach is usually not reliable above about 300 baud, which is equivalent to sending or receiving only about 30 characters a second. This limitation increases your phone bill if you regularly send or receive large files. It also rules out some public-access services, including Prestel, which requires 1,200 baud. Even at these slow speeds, acoustic couplers can have problems coping with office noise.

The direct-connect modem overcomes most of these limitations. It is potentially quicker, less prone to line errors and is capable of supporting features like autodialing and autoanswering. With this type of modem one end goes into the phone jack in your wall, and the other end into the RS-232 port of the computer. This type of modem is likely to become the norm for all but portable computers.

be nice to just open a window from the Mac's desk-accessory menu with the names and numbers of people you regularly phone listed in it, and then click on the person you want to ring. The modem would then dial them for you, handing over to your voice handset when it got through. Several packages which claim to do this are listed in Mac software catalogues. But after checking with various suppliers it seems the autodialling parts of these packages will not work in the U.K.

Fortunately, we had no such problem with electronic mail, for which you need a suitable Mac software package, such as Vicom, the comms part of Jazz or Mac-terminal. Setting up Vicom is very simple: it comes up initially with a blank screen with a set of icons down the side. Clicking the modem icon gives you a list of popular modem brands, and you just select which-ever one you are using. The Apple Modem worked both under its own name and as a Hayes-standard modem, which is what most autodial modems are. The Vicom manual is very helpful and clear, but most of the time it is not required as the program is straight-forward and provides on-screen help if you ask for it.

Clicking on the phone-book icon reveals a list of various electronic-mail services, bulletin boards and databases. Telecom Gold's number is already in the list, but if you are dialling out from a PABX you will probably need to add the dial-out digit to the front of the number, and then a comma to tell the system to expect a pause.

ALTERATIONS EASY

Making such alterations to the phone book or setting up new numbers is easy. The big problem usually with this type of package is knowing what answers to give to all the obscure questions you get asked about data bits, parity, stop bits, and so on, but Vicom overcomes this very neatly.

The Vicom phone book offers a range of default values, presented in a very well thought-out way. Under a box labelled Mode is a Mac-style scroll bar. Clicking on this switches the mode between TTY, Viewdata, VT-100 and VT-52, the most likely types of service. As the mode changes, the other settings such as baud rate, parity, stop bit and data bit change with it.

You can override these settings for a particular service, but we found all the email and bulletin boards we called used the straight-forward TTY or Viewdata values provided by Vicom. If you override any particular value Vicom again works helpfully, with the most likely alternative values coming up as you click on the appropriate scroll bar.

To actually ring through to a service you click on the telephone icon at the side of the screen. Vicom displays the names and numbers currently in the phone book; you select one, and Vicom then dials. You can set up a Vicom macro file to contain any signing-on dialogue required, such as your Telecom Gold ID and password.

Once connected to your chosen service you will most probably communicate directly through the keyboard. A pull-down menu option also lets you transmit a file you have prepared off-line with Vicom's built-in text editor. Vicom gives you a good deal of control over the appearance of text on the screen, offering a variety of founts in sizes up to 12 point.

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Along the top of the screen is a row of function buttons which you can click on or off while you communicate. The most useful are Print, which outputs both sides of the dialogue directly to the printer, and Record, which outputs everything to a file.

The numerous amateur and commercial bulletin board systems offer a variety of different sorts of information and the opportunity to chat and leave messages for other computer users. Some offer software which you can download, but regrettably I did not come across anyone offering Mac software, probably because there is no obvious standard language to use.

Some of these boards use the page-at-a-time viewdata communications standard adopted by Prestel, rather than the line-by-line TTY standard used by Telecom Gold. Bearing in mind that the Mac is a monochrome machine and most viewdata services use colour, Vicom does a good job with viewdata. It displays each page on a single screen, while along the right-hand side there are symbols which resemble the handset of a dedicated Prestel terminal. You click on these with the mouse to invoke Prestel functions such as next page, previous page and so on. You can distinguish the different text colours on the page if you like by assigning to them different Mac type styles such as italic, bold or underline.

MAINFRAME DATABASES

Vicom is also capable of emulating VT-100 and VT-52 terminals. This is most useful for accessing large mainframe databases, or hooking up through an RS-232 cable to another computer. Vicom runs on either 128K or 512K Macs, so on the larger machine it works with Switcher. We found it convenient to have Vicom in memory at the same time as Macwrite, making it possible to switch quickly between doing routine word processing and sending or receiving electronic mail.

The comms part of Jazz is not quite as easy to set up or as convenient to use as Vicom, but it does a good job with Telecom Gold and other ASCII services. Vicom scores by the number of comms functions if offers, its viewdata mode and its ability to run on the 128K machine or in a small Switcher partition along with another application.

CONCLUSIONS

- Vicom and the Apple Modem make a very good combination for communicating on the Mac.
- The Apple Modem is straightforward and reliable. It is not the cheapest Mac-compatible modem, but it is easy to set up and get working.
- Vicom manages to be both capable and easy to use at the same time, something not that common with comms software. Its effective use of the Mac's graphics to display Prestel is a worthwhile bonus.
- If you have an office PABX make sure you understand how it works before buying a modem: it might effect your choice.

Chit-Chat provides everything you need to get on-line except for a micro and a telephone line. **Mike Lewis** finds out if it spells the end of those tricky setting-up problems.

IGNORANCE IS BLISS

With Chit-Chat, Sagesoft has attempted to produce a telecommunications package for people who do not know, and do not particularly want to know, anything about telecommunications. It comes with everything you need: a Thorn EMI auto-dial/auto-answer modem, a serial cable, the Chit-Chat software and a form for registering with Telecom Gold without having to pay the joining fee. You just add the computer and a phone line.

Even the least technical person should have no problem in getting Chit-Chat to work. The software comes ready configured for two dozen of the most popular electronic-mail services and bulletin boards, as well as Prestel. It is only when you want to venture beyond these services that you need to get to grips with the intricacies of baud rates, parity and stop bits.

Until then, you can get on-line by using the software's built-in telephone directory, which serves a role similar to that of a master menu. It shows the names of the various dial-up services alongside their phone numbers. You move a pointer to the number you want, press a function key, and after a few moments you are connected.

In practice, you will probably need to make some adjustments to the directory before you can use it. Being London-based, I had to remove the 01 in front of many of the numbers, but this took only a few moments. Adding new numbers is trickier, because it is here that you need to enter those baud rates and parity settings. You can also record any sign-on sequence or password that you want the software to transmit automatically.

You cannot dial a number manually. If there is a service which you are only likely to access once, you still have to go through the rigmarole of setting up a directory entry for it. The more entries you have, the longer it takes to find the one you want.

Once you are connected, you will find the sort of features that now come as standard with all good communications software. The most important is the ability to capture and transmit data to and from disc, so allowing you to prepare and read messages at your leisure. To help with this, Chit-Chat has its own text editor which, while rudimentary in the extreme, is at least accessible without having to invoke a separate program.

As well as accessing Teletype-like systems, such as Telecom Gold and most bulletin boards, you can also use Chit-Chat with viewdata services like Prestel. These systems use a 40-column display, so Chit-Chat confines the output to the left-hand half of the screen, using the computer's block and line characters for graphics. I cannot comment on other machines, but on my Olivetti M-24 the result was very poor, and graphics-based text was nearly illegible. It is a pity Sagesoft did not use instead the

CHIT-CHAT

PC VERDICT

	POOR	AVERAGE	GOOD	EXCELLENT
Performance	☐	☐	■	☐
Ease of use	☐	☐	■	☐
Documentation	☐	☐	■	☐
Value for money	☐	☐	■	☐

☐ Chit-Chat provides an easy route into comms, provided that your needs are not too sophisticated.

SPECIFICATION

Description: communications software, with optional modem and cable, for use with text and viewdata systems, and for file transfer
Hardware required: versions exist for IBM PC and compatibles, Apricot range, Sharp 5600 and Sanyo 555
Distributor: Sagesoft Ltd, NEI House, Regent Centre, Gosforth, Newcastle upon Tyne NE3 3DS. Telephone: 091-284 7077
Price: complete package £399 plus VAT; software alone, £130 plus VAT
Available: now

40-column screen mode which is available on IBM-compatible computers.

Another feature of Chit-Chat allows you to set up your computer as a host system, to which other machines can be connected as terminals. This works best if both systems are running Chit-Chat, as the software supports the widely used XModem error-checking protocol. I managed to transfer text to and from my Tandy 200 lap-top, which has no file-transfer protocol.

The software has lots more goodies. For example, you can set up command files for automating on-line sessions, tied to the computer's clock. In this way, you could arrange to dial Telecom Gold and copy your incoming mail to disc during off-peak time, even if the system is unattended.

But there are some rough edges too. If you try to connect to a number which is engaged, or if a voice answers, you get a cryptic message issued by the modem, and the program hangs until you disconnect. There is also a tendency for the program to crash when you want to call up a file directory. Sagesoft says that it will correct both these problems in the next version, which should be out soon after this review appears. We are also promised better viewdata access in the new version.

If you already own a modem, the Chit-Chat software might be worth buying on its own. I had no problem using the program with my Interlekt modem, which only supports manual dialling, although you would need to use the directory entries mentioned earlier. Using a different auto-dial modem might be more difficult — Dacom is the only other make directly supported — because the Chit-Chat manual does not tell you how to set up the individual escape sequences needed for automatic dialling.

CONCLUSIONS

■ The Chit-Chat package has everything that the non-technical person needs in order to get on-line with the minimum of fuss.
■ The software has all the facilities that most people are likely to want for electronic mail, dial-up databases, bulletin boards and file transfer, including transfer to and from lap-top portables.
■ Although the package can be used with viewdata systems such as Prestel, the quality is disappointing.

After a difficult few years, BT's Prestel on-line database has matured into a flourishing concern. **Kathryn Custance** reports on the possibilities that it now offers to micro users.

THE UGLY DUCKLING

This year Prestel celebrates five years of public service, and a painful five years it has been. Almost from the word go, Prestel was dubbed "the solution looking for a problem". The Post Office had created a wonderful computer system for mass communications, but the masses didn't want it. Most of the information was either irrelevant to home users or was readily available elsewhere, and the costs were too high.

Prestel then turned its attention to the business community, which also greeted it with a fair amount of scepticism. But, somehow, Prestel kept going despite a series of marketing errors and an extremely unhealthy bank balance, and now it has confounded its critics and proved that the risk was worth taking.

Prestel is now an important service in the BT portfolio and has won international acclaim. It has also won 60,000 subscribers and over 1,200 information providers. So if you still think of Prestel as a service for weather enthusiasts and travel agents, think again.

There are several reasons why Prestel has turned the corner. First, the cost of equipment has fallen dramatically. You no longer need a dedicated viewdata terminal or a converted television set; you can use a micro with an inexpensive viewdata modem, and with a bit of luck you will not need any additional software.

The cost of the service has also fallen. BT has done away with most of the complicated access charges, and at off-peak times there is no access charge at all, just the cost of the telephone call and the quarterly Prestel rental. This stands at £6.50 for residential customers and £18 for business customers. The quality and quantity of information has improved too: the list of information providers now starts with the AA and ends with the Zimbabwe Tourist Board.

But probably the biggest improvement to the service has been the expansion of communications. Viewdata, by definition, is an interactive service, unlike the broadcast teletext information services. In the early days most Prestel users just had a numeric keypad, which limited communications to a sort of multi-choice shopping list. Even when personalised mailboxes were introduced, most people could only send standard messages like "Merry Christmas".

REMOTE SHOPPING

These days, mailboxes with real messages are very much part of Prestel. In addition you can send messages or orders to information providers, making possible services like remote shopping or remote banking. These services are further enhanced by gateways into other computer systems, so information can be easily updated and made more secure.

Using the gateway principle, Prestel users can now send and receive telex messages through their mailboxes. Incoming Telexes are stored free of charge and outgoing Telexes start at 50p plus VAT for a 100-word message within the U.K. This is expensive for frequent users, but for low-volume users it is much cheaper than having a dedicated telex machine.

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These communications capabilities have undoubtedly attracted more information providers, and many of the most popular services are based on this interactivity. Micronet 800 regularly tops the Prestel access charts, and its 17,000 users help to make it one of the main sources of Prestel's growth in the domestic market. Micronet has over 14,000 frames of news, reviews, advice and software. It started as an electronic magazine for home-computer users, but now is more like a giant computer users' club.

This November, Micronet has expanded its services to business users with a new section called Bizznet, starting with 400 pages of information and software for users of business computers. The bulk of the software will be accounting and utility packages, many of them supplied by Micronet users. As with the main Micronet service, the software can be downloaded cheaply or for free.

CHATLINE

The key to Micronet's success is user participation. Its Chatline service alone gets 2.5 million accesses a month from people who either want or offer help, or who just want a public chat. With so many people accessing it the speed of the service has suffered, but Micronet is now increasing its capacity. Another service that has run into popularity problems is the Gallery section, where members can put up their own page of information for 25p. There is now a long waiting list for spare pages.

Micronet also runs a Jobsearch section in conjunction with Reed Employment and *Computer News*. This is aimed at professional computing and accountancy staff, but may soon be extended to school leavers. The Micronet service costs £66 a year, which includes the Prestel rental charge.

There is a lot of travel information on the public part of Prestel, but most of the travel agents' business is conducted in closed user groups. Information providers can book their own private pages, which can only be accessed by members of their group. Some do this because they want to charge an additional subscription fee, while others do it for security reasons. In the case of the travel industry, airlines and travel companies want their bookings to come through authorised agents, so although they might let you look through the availability and cost of services, you cannot usually make the booking yourself.

This is changing gradually. You can now reserve a limited amount of travel, and book some hotels. You can also book your own theatre tickets through Edwards and Edwards Booking Agency pages. Although we hear a lot about teleshopping, this too is still limited. Littlewoods has recently started a national service for a range of consumer goods, and Prestel users can order a few other items like flowers and wine. Grocery shopping is still limited to members of the Club 403 service in the Midlands, run by Viewtel Services.

The education section of Prestel seems to be thriving. It is aimed primarily at teachers, but also has a lot of useful information on adult and further education from a variety of sources. Teachers also have their own user group, School Link, which helps to build up contacts between schools with similar computer installations. Pupils also have their own section, RSVP, which is a sort of pen-pal club.

The part of Prestel that is really hotting up at the moment is the financial side. This is reflected by the growing success of the Cityservice, managed by ICV Information Systems. Cityservice has a direct link with the Stock Exchange computer, so you can get up-to-the-minute share prices through Prestel. You can also buy stocks and shares through several telebroking schemes.

Cityservice is aimed at both private investors and fund managers, and there are different levels of the service to cater for these different needs. There is a section of the service called Portfolio Manager, which allows you to build up your own portfolio of shares and investments on private pages. You can monitor the progress of your particular investments through the Stockwatch section. The service also carries pages of background information and tips on all areas of money management. Some of these pages you have to pay for, but others are included in the subscription fee. The basic level can be accessed by any Prestel user; level 2 costs £18 a quarter, and level 3 costs £90 a quarter.

HOME BANKING

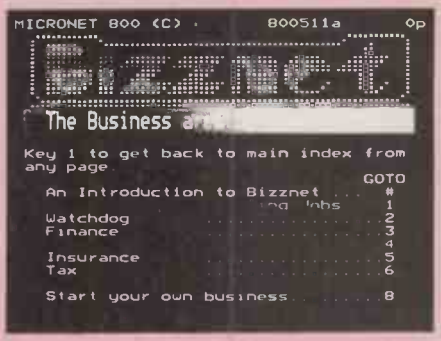
Nearly all the major banks and building societies have pages on Prestel. Most just provide information for customers and potential customers, but there are also two telebanking schemes, Home Banking and Homelink. The Bank of Scotland's widely advertised home-banking service is the nearest you can get to having your bank manager on-line. You can move money between accounts, pay bills and order cheque books.

Homelink offers much the same service for accounts held with the Nottingham Building Society. You can also transfer money from your building society account to your bank account, and there is a limited teleshopping facility. Over the next few years we are going to see an extension of these home-banking schemes. The number of Prestel subscribers is still too low to attract all the major banks and building societies, but they are all studying the progress of Homelink and Home Banking.

Prestel has pages on most areas of home and business finance, from accounting through to insurance, mortgages, car hire and economic forecasting. There is also a growing number of specialist services for particular industries, often set up by professional associations. This, coupled with the increase in gateway services and closed user groups, has made Prestel an important business tool.

PRESTEL DIRECTORY

Prestel subscribers receive a free quarterly Prestel Directory which lists all the services and service providers; for non-Prestel users the annual subscription is £10. The magazine is available from Directel Ltd, 11th Floor, 54 Hagley Road, Edgbaston, Birmingham B16 8PE. Telephone: 021-455 6585. There are over 1,200 information suppliers, most of which can be found through the following Prestel main menu pages.



Bizznet offers 400 pages of information and software for business users.

PRESTEL FACTS

Business terminals	33,000
Home terminals	27,000
Number of information sources	1,200
Number of Prestel pages	325,000
Page accesses per week	7.9 million
Messages exchanged per week	103,000
External computer services	70
Quarterly charges (business)	£18
Quarterly charges (domestic)	£6.50
Time charges	
8.00-18.00 Monday-Friday	6p per min.
8.00-13.00 Saturday	6p per min.
other times	free

These figures relate to the position in September 1985, and were supplied by British Telecom.

Category	Page
Accounting	10191
Adult education	883103
Advertising	1215
Advertising agencies	133001
Agriculture and horticulture	103
Farmlink	801
Air travel	149
Airports	1497
Assaciatians	1071
Bank services	133006
Building societies	133009
Business information	56
Business news	1151
Car hire	1330171
Catering services	133055
Chartered accountants	1667
Chemical industries	133032
Commodities	1013
Computer bureaux	133060
Computer clubs	10149
Computer equipment	133026
Computers	1014
Consultants	1330110
Currency	8813
Current affairs	114
Detective agencies	133028
Direct mail	133042
Directories	133107
Economic forecasts	1965
Economic statistics	190
Education	165
Electrical engineering	133163
Electronic mail	16054
Employment	18
Energy	1605
Engineering	10433
Enterprise zones	16044
Estate agents	133007
European Economic Community	14688
Exhibitions	13450
Exports and imports	1017
Financial services	133029
Cityservice	881
Financial Times Index	88118
Foreign exchange rates	133094
Freight services	13323
Government aid to industry	11583
Government information	58
Government statistics	1921
Holidays	142
Income tax	1019
Industrial and commercial property	1604
Industrial develapment	16047
Industrial training	1653
Infarmatian technalagy	1945
Insurance	1016
Interest rates	88114
Internationol news	11
Investment	1661
Investment management	133084
Jab centres	133044
Legal advice	164
Libraries	191
Local gavernment investment	1661
Local information	3
Mailbox	7
Management consultants	1330112
Management jabs	187
Management studies	888105
Market research	12512
Marketing	1251
Medical infarmatian for professionals	491
Micranet 800	800
Madems	133184
News	11
Newspapers and periadical publishing	133071
Office equipment	133073
Official publicatians	1685
Oil and gas industry	16056
Packaging	10157
Parliament	1081
Pensions	1668
Plant and machinery hire	133075
Parts infarmation	101531
Postal services	
Prestel	197
Prestel user guide	583
Prestel what's new	170
Prestel gateway	19056
Prestel graphics	13888
Prestel infarmation providers	198
Prestel message services	777
Private viewdata systems	19734
Quality cantral	133188
Rail travel	140
Recruitment	133044
Research and development	133087
Response frames	6
Safety at work	1623
Secretarial services	133132
Securities	881
Security services	133091
Shipping information	46
Small firms	1877
Social benefits	1660
Stack markets	881
Tax	1019
Telebooking	157
Telebroking	881190
Telecommunications	16052
Teleshopping	55
Telesoftware	1542
Telex Link	8
Trade fairs	134511
Trade Unians	1894
Training courses	8881
Travel agents	144
Travel information	14
Unit Trusts	16615
Unlisted securities	881183
Videotex	25
Weather	11
Wine	1523

Jack Schofield explains what email is and how and what to join.

ELECTRONIC MAIL

Snail mail works like this: first, you write your letter, using a micro or word processor, then you print it out. You have to buy envelopes and stamps, fold the paper, seal it in an envelope, and take it to a post box or post office. After that it goes through an incredibly complex distribution system where it is moved about, along with thousands of sacks of other letters, via several vans and perhaps a train or a plane. One or more days or weeks later, a postman or woman carries it to the target address and manually inserts it into a letter box. It is a slow, primitive, labour-intensive system that consumes massive amounts of both paper and energy. If it did not already exist, it is doubtful you could persuade anyone to adopt it.

Electronic mail, or email for short, is simpler, quicker, cheaper, consumes little energy and no raw materials. After composing one or a dozen letters you dial up an electronic-mail system, flip the switch to connect your micro to the phone line using a modem, and send the text direct to the recipient's mailbox. The letter can then be read instantly, or whenever the user next logs on to check his or her mail.

The recipient may be anywhere. Using email, you can exchange dozens of letters a day with someone in London, Washington, Israel, Singapore, Hong Kong or on a ship in the middle of the Atlantic. You do not need to know their phone number, physical address or location, time-zone, type of micro or anything else.

Once the text has been transmitted or uploaded to the email system, which is actually a mini or mainframe computer, you can do lots of different things with it. You can send the same letter to five, 50 or 500 people in just a few seconds. You can forward or file a letter, put it through an electronic spelling checker, convert it to upper or lower case, encrypt it, send it to a foreign-language translator or typesetting company, divert it into the telex network, and much else besides.

IS ANYBODY THERE?

There is a catch. Using snail mail you can write to 50 million people in the U.K., and billions worldwide; with email, there are under 100,000 U.K. users, and only a few hundred thousand worldwide. Worse, whereas the postal system is integrated over almost the entire globe, there are several competing email systems even within the U.K., and it is not easy to transmit messages between them.

Email is made viable for many users only by the facility to feed messages into the telex network, which has about 1.6 million members. Telecom Gold, Easylink, Prestel and most other email systems offer a telex link. Telecom Gold also allows you to send telemessages, which are like telegrams except they are delivered by post. One-to-One and The Source will also take your email, print it out and post it. However, all these methods sacrifice most of the speed and flexibility of real email, and greatly increase the cost.

Eventually, everyone will have an electronic mailbox, and the problem will no longer arise. Until then, most email users will belong to large companies, universities, or market sectors where the number of users is high enough to make it convenient. Companies which use a publicly available email service for internal and business communications include Westinghouse, Apricot and British Olivetti, and many others have their own private systems.

Market sectors where email is used tend to be those where people move about a lot, keep odd hours or are otherwise hard to get on the telephone. Examples include farmers, solicitors, pop stars, the film industry, journalists and teachers. The computer industry uses email extensively for one obvious reason: most people already have a micro,

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and many have the modem and telecommunication software needed to access it.

There are three basic kinds of email system, which can be classified as messaging systems, database systems and information systems. Messaging systems simply transmit messages; examples include Easylink and One-to-One. Database systems offer electronic mail along with ancillary services such as databases, utilities and games; examples include Telecom Gold and The Source. Information systems make their money out of providing information, often as a form of electronic publishing, but may offer a limited electronic-mail system as well, as does Prestel. Of all these, database systems are the most versatile type, and the premier example in the U.K. is Telecom Gold. Anyone seriously interested in email should join.

TELECOM GOLD

Telecom Gold is British Telecom's email system, licensed from ITT Dialcom in the U.S. There are about a dozen other licensees in countries such as Germany, Hong Kong, Israel and Singapore. Dutch users are on one of Gold's dozen Prime superminis in the U.K.

All the computers in the network are identified by a number, and all the mailboxes by three letters and from three to five numbers. You can email someone on your own system using just the mailbox number, such as JNL020 on Sys 83. You have to use the system number for people on other computers, such as 81:JET727 for *Practical Computing*, or 88:XYZ001 for someone in Hong Kong.

For ease of use it is best to upload your contacts list as a text file and save it as Mail.Ref. The list should take the form.

ALAN 81:ABC001
BONZO 83:DEF010
DEBBI 72:MAG90009
ZIGGY 88:XYZ100

You can then forget the numbers use the format

MAIL DEBBI SU LETTER

where SU specifies the subject line. The system will then look up the mailbox number for you. Several letters can be sent at once to groups specified in Mail.Ref, such as

SALESMEN ABC001 ABC002 ABC003

where

MAIL SALESMEN SU CONFERENCE

will send the same letter to all three.

Telecom Gold: the most popular U.K. email system.

```
xxxxxxxxxxxTelecom Goldxxxxxxxxxx

Telecom Gold Network: For assistance type
'HELP LOGIN' at the prompt 'PAD>'.
This is Dial-up Pad 1 line 7 speed 300
 PAD>CALL 83
### Call connected
Welcome to Telecom Gold's System 83
 Please Sign On
>ID JNL020
Password:
TELECOM GOLD Automated Office Services
18.4M(83)
On At 21:18 15/10/85 BST
Last On At 2:20 14/10/85 BST

For information on telex changes please
type >AOSNEWS

Mail call (3 Read, 11 Unread, 3 Read
express, 2 Unread express, Total 19)


>DATE

Tuesday, October 15, 1985 9:18:07 PM BST

>MAIL READ UNREAD


    To:  JNL020 (83:JNL020)
  From:  TONY.DENNIS  (MTR007) Posted:
Tue  15-Oct-85  11:51 BST UK BST
(145)
Subject:  Copy on Fi
```

Heavy telex users should look at Easylink.

```
xxxxxxxxxxEasyLinkxxxxxxxxxxxxxxxx

EASYLINK PAD 2

*
EASYLINK
ID?

1599879U 150CT85 21:52 GMT

PTS
/scan
YOUR MAILBOX IS EMPTY
EASYLINK


1599879U 150CT85 21:52 GMT
PTS
/quit


xxxxxxOne-to-one (no joy!)xxxxxxxxx

    WELCOME TO ONE-TO-ONE
 PLEASE ENTER YOUR ACCOUNT/USER
NUMBER A SPACE AND YOUR PASSWORD

16098001 XXXXXXXXXXXXXXXXXXXXXXXX
MMMMMMMMMMMMMMMMMMMMMMMMMMMMMMM
0000
```

Telecom Gold offers you all kinds of extra commands to send mail express, send blind copies, password-protect letters, send back an automatic acknowledgement when the letter is read, request a reply, store and send later, etc. The email commands are very powerful.

In addition, Telecom Gold provides a diary called Tickler, various utilities such as cross-assemblers and statistics routines, an automatic Shakespearean sonnet generator, the Pits adventure and other games. There is a free area called Noticebd, which is a sort of bulletin board system with groups for Comms, Films, Lap-held, To-sell, etc. It is also possible to have a live, private text conversation on-line, with another user, using the Chat facility.

Telecom Gold provides access to other services such as translation and typesetting, a daily computer newsletter called Informatics Daily Bulletin, an agricultural database, etc. All of these cost extra — sometimes a lot extra.

There are several special groups on Telecom Gold, ranging from deaf users to Apricot micro dealers, from Euro-MPs to The Times Network for Schools. One group of interest to casual users is Micro-link, which is run by Database Publications, the publisher of *Acorn User, Atari User, Electron User, Telelink* and other magazines. This group has its own database area, but the main attraction is the different method of pricing. Telecom Gold charges for usage, and has a minimum charge of £10 per month. Microlink charges £3 per month plus usage, which may work out cheaper.

EASYLINK

Easylink is a messaging service owned jointly by Cable and Wireless of the U.K., and the Western Union Telegraph Company of the U.S. It has about 120,000 users, of whom about 3,300 are in the U.K., and the rest in the U.S. There are no gateways to mailboxes in other countries.

Unusually, Easylink publishes a printed directory of Easylink users, and provides subscribers with a U.K. telex directory. An on-line directory as already offered by The Source and Telecom Gold is planned for next year.

Virtually all Easylink users are companies, and most of the U.K. users seem to use the system mainly for sending telexes. With a small micro or lap-portable, it is certainly easier to use, cheaper and more efficient than the average clunking monster telex machine.

In the U.K., Easylink runs on a Tandem TXP mini. The software is terse and not particularly friendly. Its dialogue with the user is limited to expressions like PTS for Proceed to Select, and GA for go ahead.

LLLL and MMMM are used as end-of text markers, and /Quit to sign off.

The system does have a foreign-language translation service, and offers Dial-a-gram, which means you can telephone your message in. Apart from that it has zero entertainment value and offers nothing to keep you hanging around, running up a phone bill. This might be counted an advantage over Telecom Gold for business users.

Easylink does not charge for connect time, for storage, or for the receipt of messages. Once you have paid £40 to sign on, the standing charge is £12.95 per month, and the first 50 messages are free. Telex charges are fairly cheap, and in off-peak hours can be much cheaper than standard telexes to the U.S. In this context, off peak means 5.30a.m. to 11.30a.m. in the U.K.

Easylink does have other advantages for heavy telex users. It has operators who provide an intercept service, whereby they pick up the large number of incorrectly addressed telexes and try to sort them out. It also seems to feed messages into the telex network more quickly than Telecom Gold. This is mainly because Gold goes via a telex agency, whereas Easylink goes straight in. Another factor could be that Easylink's British user base is only 10 percent of Gold's. It remains to be seen whether the speed can be maintained as it grows.

THE SOURCE

Where Easylink is like a bare bones version of Telecom Gold, The Source is Gold with every conceivable knob on. In fact there are so many things on its multitude of minicomputers, you might not even notice the electronic mail service.

The Source, which is owned by Reader's Digest, runs on a network of mainframes in McLean, Virginia. You can join by phoning up with a credit card number; you get a mailbox number and password straight away. However, you also need to join British Telecom's PSS network so that you can phone the U.S. for £6 per hour instead of the £36 per hour charged for a voice line. Telnet and Uninet can also be used to access The Source from the U.K. and 45 other countries, making this the most international of all the email systems.

The software is very easy to use. It works almost exactly like Telecom Gold, except that inexperienced users can have the benefit of numerous menus which allow the different facilities to be accessed — though, of course, this is slower than going direct.

The six main areas of The Source are News, Weather and Sports; Business and Investing; Communications; Personal Computing; Travel Services; Shopping, Games and Leisure; and Files and Features.

The News service includes United Press International, the Associated Press and the *Washington Post*. Obviously all the weather and sports information is American. Business services include Stockcheck and Commodity World News. Travel Services include airline and hotel guides. The main games are the same ones as on Telecom Gold, incuding Adventure and Pits. You can also keep up with what is happening in the soaps by looking under The Arts column in the United Media Features section.

The Source provides an email service almost as good as Telecom Gold, the same on-line Chat facility, a noticeboard called Post, and the ability to send Western Union Mailgrams and E-COM, or Electronic Computer-Originated first-class U.S. Mail. In addition it provides for computer conferencing via the Parti section. Unfortunately, the Parti software is hard to follow and ridiculously inconvenient to use.

Of particular interest to micro users is Newsbytes, a weekly computer newspaper with sections from several parts of the U.S., the U.K. and Japan. Wendy Woods' Silicon Valley section generally contains several items of interest, and these are often picked up by U.K. news media — not always with due credit.

It costs $49.95 to join The Source, then there is a monthly minimum charge of $10. This is cheap if you do a lot of business in the U.S., or need up-to-date information about the American market. However, if you want to send email within the U.K. it is an almost complete waste of time.

PRESTEL

Prestel is a British viewdata service which carries a large amount of information. Kathryn Custance gives full details in the previous article. The major limitation is that Prestel is prearranged into special pages, like a magazine, and very little true interaction is possible. You cannot search on individual words, edit and save files or do anything very computerate, and Prestel does not even use the standard ASCII character set.

What makes Prestel worth considering are the sub-sections called closed user groups (CUGs), which cater quite efficiently for their target audiences. Examples include travel agents services, home banking, city and financial services, and the microcomputing CUG which is called Micronet 800.

Micronet provides an entertaining computer news section, though this is strongly biased towards the Sinclair and Acorn sector of the market. There is relatively little of interest for business micro users.

Prestel provides a mailbox system and a two-way telex link, which can be used for simple messaging. Unfortunately, the messaging facilities are primitive in the extreme. It is an advantage to have messaging as a bonus if you join a CUG, but it would be crazy to join Prestel for its email system.

OTHER SERVICES

The email services described here are the main ones to consider. They all offer something different, and the heavy user of email might even want to join all four. However, each of these services has its own competitors, which may be worth considering.

Electronic mail services include One-to-One, Comet and Quik-Comm. Comet was developed by Istel for British Leyland's internal use. Geisco's Quik-Comm is aimed at multi-national, multi-site corporations, but lacks a telex link. Compuserve is the main American rival to The Source, and offers similar facilities, plus a multi-user chat-line called CB Simulator — for details see *Practical Computing*, April 1985, page 41.

There is no single solution to the problem of electronic mail, which is that whoever you want to talk to has to be on the same system as you. Everyone will benefit if the competitors are either reduced to one or two large systems, or if someone knocks all their heads together and makes them install links.

The ITT Dialcom software, used by Telecom Gold, already has this in place. It is called Netlink, and you are not allowed to use it in the U.K. However, if you are on the Dialcom system in Hong Kong run by Cable and Wireless, you can, for example, log on then use Netlink to access, say, The Source, or virtually any other X25 port on the international network. This facility makes Dialcom/Gold a good bet as the eventual winner of the international scramble for control of email. Whoever wins, one day it will be one of the biggest businesses in the world. PC

The Source has the widest international spread.

```
xxxxxThe Source via PSSxxxxxxxxxxxx

L04\A01-1670040102
N<JACK>
ADD?
A9311030100159

311030100159+COM
Connected to THE SOURCE
> ID BCH456
Password?
BCH456 (user 17) logged in Tuesday, 15
Oct 85 17:11:16.
Welcome, you are connected to THE SOURCE.
Last login Sunday, 13 Oct 85 20:02:08.

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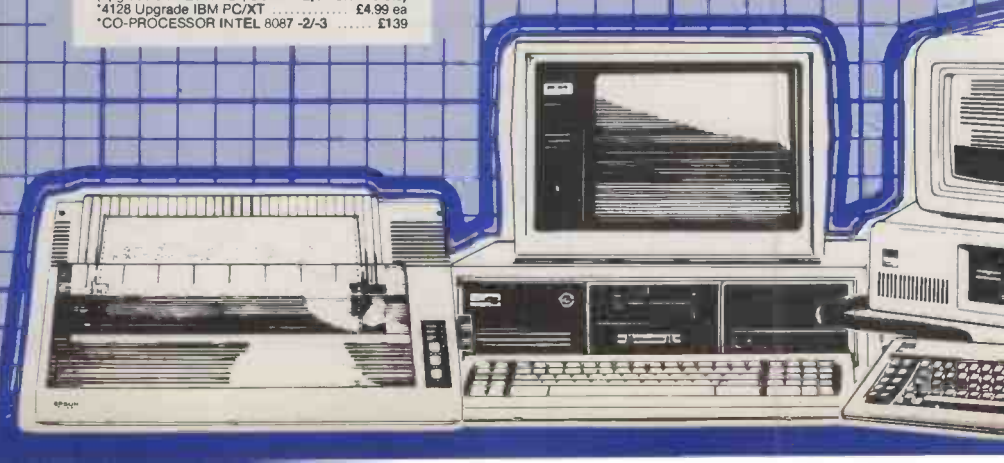

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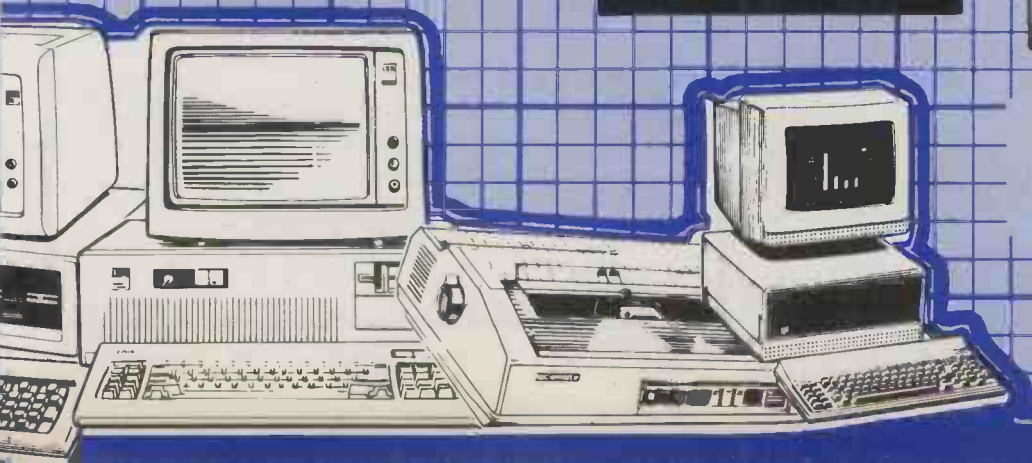

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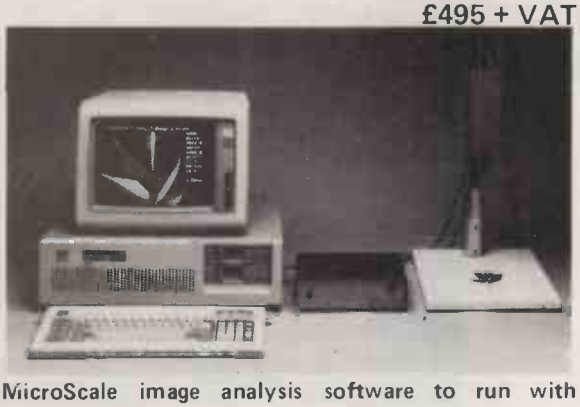

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OPEN FILE

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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.

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FRACTAL GENERATOR

Graham Andrew offers some production rules for generating fractals, with coding for the BBC Micro.

FRACTAL GENERATOR

```
 10 DIM SH(50),FR(50),ST(500)
 20 MODE 0
 30 VDU 29,640;512;
 40 GCOL 0,1
 50 PROCINITILIZE
 60 FOR I = 1 TO NP*2-3 STEP 2
 70    ST(1) = SH(I+3)
 80    ST(2) = SH(I+2)
 90    ST(3) = SH(I+1)
100    ST(4) = SH(I)
110    ST(5) = 0
120    T = 5
130    REPEAT
140       PROCTEST
150    UNTIL T<=0
160    PLOT 5,XO+ST(2)*F,YO+ST(1)*F
170 NEXT I
180 END
190
200 DEF PROCINITILIZE
210    P = 4
220    RESTORE 1000
230    FOR NP = 1 TO 50
240       READ SH(NP)
250       IF SH(NP)=-999 THEN GOTO 270
260    NEXT NP
270    NP = (NP-1)/2
280    RESTORE 2000
290    FOR NF = 1 TO 20
300       READ FR(NF)
310       IF FR(NF)=-999 THEN GOTO 330
320    NEXT NF
330    NF = (NF-1)/2
340    NT = NF*5
350    INPUT "SIZE,XO,YO,DEPTH",F,XO,YO,DP
360 ENDPROC
370
400 DEF PROCTEST
410    REPEAT
420       LV = ST(T)
430       IF (LV-DP)<>0 THEN PROCCALC
440    UNTIL (LV-DP) = 0
450    PROCDRAW
460 ENDPROC
470
500 DEF PROCCALC
510    X1 = ST(T-1)
520    Y1 = ST(T-2)
530    X2 = ST(T-3)
540    Y2 = ST(T-4)
550    T = T - 3
560    XD = X2 - X1
570    YD = Y2 - Y1
580    D = SQR(XD*XD + YD*YD)
590    ST = YD/D
600    CT = XD/D
610    N = -1
620    FOR M = 1 TO NT-4 STEP 5
630       N = N + 2
640       XS = FR(N)
650       YS = D*FR(N+1)
660       ST(T+M) = Y1 + XS*YD + CT*YS
670       ST(T+M+1) = X1 + XS*XD - ST*YS
680       ST(T+M+2) = LV + 1
690       ST(T+M+3) = ST(T+M)
700       ST(T+M+4) = ST(T+M+1)
710    NEXT M
720    ST(T+NT+1) = Y1
730    ST(T+NT+2) = X1
740    ST(T+NT+3) = LV + 1
750    T = T + NT + 3
760 ENDPROC
770
800 DEF PROCDRAW
810    PLOT P,XO+ST(T-1)*F,YO+ST(T-2)*F
820    IF ST(T)=LV THEN T = T - 5
830    P = 5
840 ENDPROC
850
1000 REM TRIANGLE INITIAL SHAPE
1010
1020 DATA 0.0,1.0,        0.866,-0.5
1030 DATA -0.866,-0.5,    0.0,1.0
1040 DATA -999
1050
2000 REM PRODUCTION RULE
2010
2020 DATA 0.67,0.0,    0.5,0.2887
2030 DATA 0.33,0.0,    -999
```

YOU CAN develop your own fractals by defining a production rule and a shape to produce it on. The program presented in this article applies any rule to an initial shape to obtain a further shape. It then continues applying the rule to the resultant shape as many times as required. There are no restrictions on the initial shapes, and no restrictions on the production rules or the depth of iteration.

The data set at line 1000 describes the co-ordinates of the initial shape. If you run the program at depth 0 — that is, with no fractalisation — then the initial shape, in this case a triangle centred on the origin, will be drawn. You can enter your own shape by substituting the co-ordinates at this point. The sentinal code −999 marks the end of the data for the shape.

Figure 2 shows several interesting production rules, defined in terms of a unit line. The data set for a Triadic Koch Curve is encoded from line 2000; the end vertices are implicitly assumed by the program, and it is only necessary to define the remaining vertices. The x co-ordinate of the first vertex, reading from right to left along the shape, is one-third of the way along the unit line, the y-co-ordinate is on the origin and so this vertex is placed at (0.67,0.0). The second vertex is halfway along and has a y co-ordinate of 0.2887 above the axis, which defines the position as (0.5,0.2887). Similarly, the third and final vertex is placed at (0.33,0.0).

With a little practice you will find it easy to develop your own production rules. On the BBC Micro you can save your data sets separately on disc or tape, and append them to your program as and when you require them. In this way you can build up your own library of shapes and rules.

When running the program you will be asked for the size, location and depth of iteration. When developing your own production rules the following responses will be useful. The response

200,0,0,0

will draw the initial shape with no fractalisation. The response

200,0,0,1

will produce the shape with only one iteration of the production rule applied, so that you can see what your production rule looks like. Jumping to line 80 will run the program without erasing what is already on the screen.

All that remains is for you to try your own production rules. The examples in figure 2 include rules that are physically larger than the seed and some that loop or overwrite themselves. Try experimenting with the initial shape; for example, try writing the vertices in reverse order and see what difference that makes.

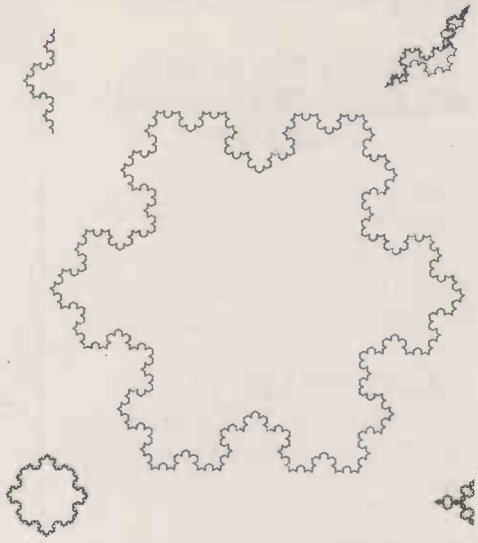


Figure 1. Triadic Koch Curves: the production rule has an overall length of 3 units, but takes four steps to get there. Thus it has a fractal dimension of log4/log3 or 1.26.

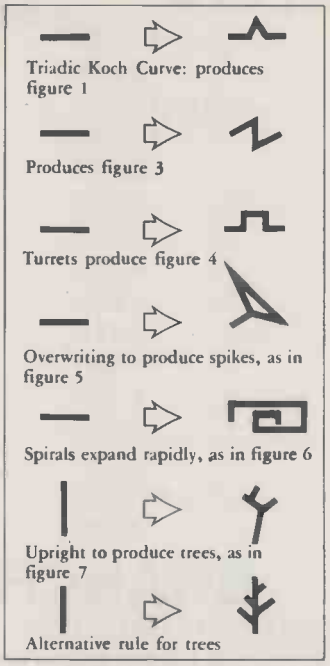


Figure 2. Production rules.

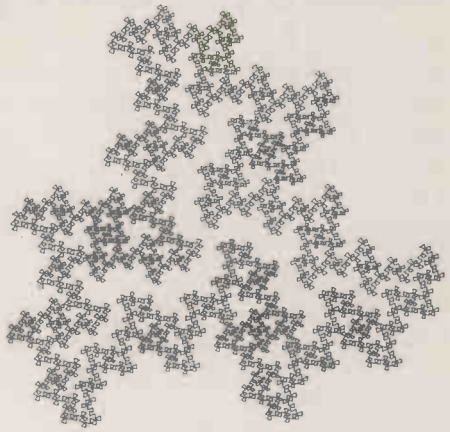
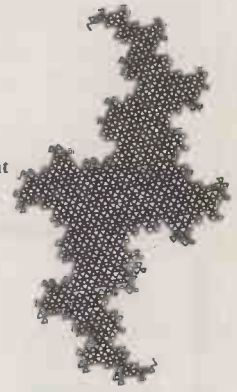


Figure 3. Simple rules can produce dramatic effects: a variety of angles used in the same production rule can produce quite different results. A height of 0.25 above the y-axis gives the figure above, whereas a height of 0.2887 tiles the plan and produces a dramatic "dragon" curve.



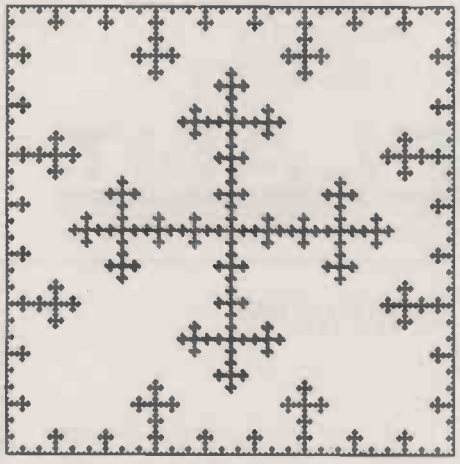


Figure 4. Turrets written on both sides of the line: a production rule reflected in the x-axis generates fundamental differences. Here, two patterns from a turret on either side of the line are overlaid.

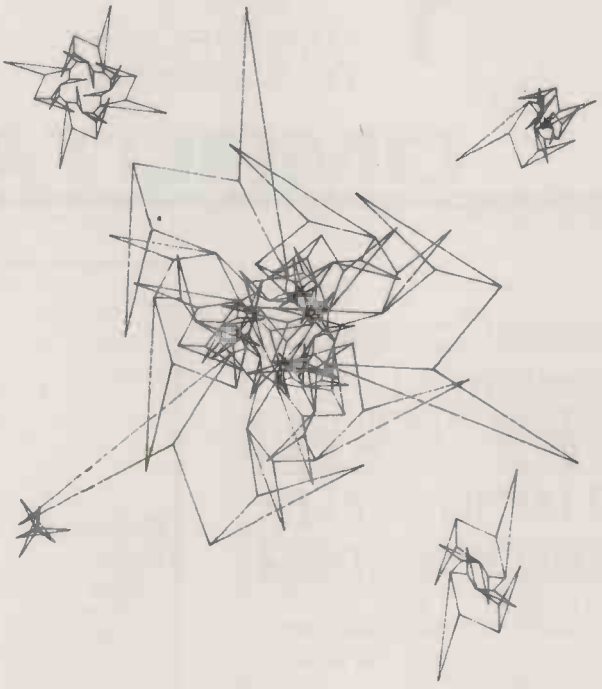


Figure 5: Spiked shapes as an example of over-writing a shape: these spikey curves were originally the result of a typing error. Again, different angles produce different results, and acute angles to a depth of 5 or 6 produce results very much like a spider's web.

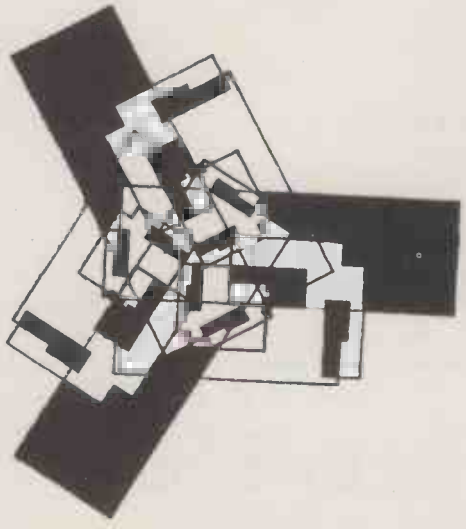


Figure 6. Spirals and similar shapes produced by writing a production rule larger than the seed become very large very quickly, but have interesting results for lower levels of iteration.

Figure 7. Varieties of trees and plants: the description of many natural phenomena was one that eluded mathematics until the advent of fractals. Here, the simulation of various species of trees has been attempted.

PC

CALLING BDOS AND BIOS FROM MBASIC

Keith McMann

demonstrates a technique for finding memory space for machine-code subroutines.

IN THE August issue of *Practical Computing* David Dawe detailed some techniques to link machine-code subroutines to MBasic under CP/M-80. If the machine code is relocatable and not more than 255 bytes long it can be stored in a string variable.

A string can be considered as a one-dimensional byte array, and is therefore a contiguous area of memory. The Varptr function of MBasic can then be used to locate the start of the routine. When using this method you should determine the location of the routine each time it is called, because MBasic may move the string if it has to perform a garbage collection. This should only occur with large programs which perform a lot of string manipulation.

The machine code is saved into the string variable with a series of

CHR$(op code value)

instructions, as in line 30060 of listing 1. Before storing the code into the string it is good practice to set the string to null, as in line 30050. The program then restores the data pointer to the first Data statement containing a series of numbers representing the machine-code instructions. The first number is the number of bytes in the routine.

When the machine-code routine is to be called, a check should be made to determine if the routine exists. This is performed by checking that the string variable is not a null string and then checking the last byte of the string to determine if it is a Ret instruction, as in line 30000 of listing 1. If either of these conditions is not met the routine should be loaded into the string.

When the routine has been proved to exist it should be located. The MBasic function Varptr returns the address of a three-byte vector for a string. The first byte of the vector is the length of the string; the next two bytes are

(continued on next page)

LISTING 1. CALL TO BDOS FUNCTION

```
1 ' CPMFUN.BAS
2 ' PROGRAM TO DEMONSTRATE CALLS TO CP/M FROM MBASIC
3 ' WRITTEN BY  K.N.McMann      20 July 1985
4 '
10 DIM FUNCT$(36) , FUNSAFE%(36) , QUEST$(36) , REPLY$(36)
20 SAFE% = -1 : NOTSAFE% = 0
30 FUNCT$(0) = "System Reset":                FUNSAFE%(0) = NOTSAFE%
31 FUNCT$(1) = "Console Input":               FUNSAFE%(1) = SAFE%
32 FUNCT$(2) = "Console Output":              FUNSAFE%(2) = SAFE%
33 FUNCT$(3) = "Reader Input":                FUNSAFE%(3) = NOTSAFE%
34 FUNCT$(4) = "Punch Output":                FUNSAFE%(4) = NOTSAFE%
35 FUNCT$(5) = "List Output":                 FUNSAFE%(5) = SAFE%
36 FUNCT$(6) = "Direct Console I/O":          FUNSAFE%(6) = SAFE%
37 FUNCT$(7) = "Get I/O byte":                FUNSAFE%(7) = SAFE%
38 FUNCT$(8) = "Set I/O byte":                FUNSAFE%(8) = SAFE%
39 FUNCT$(9) = "Print String":                FUNSAFE%(9) = NOTSAFE%
40 FUNCT$(10) = "Read Console Buffer":        FUNSAFE%(10) = NOTSAFE%
41 FUNCT$(11) = "Get Console Status":         FUNSAFE%(11) = SAFE%
42 FUNCT$(12) = "Return Version Number":      FUNSAFE%(12) = SAFE%
43 FUNCT$(13) = "Reset Disk System":          FUNSAFE%(13) = SAFE%
44 FUNCT$(14) = "Select Disk":                FUNSAFE%(14) = SAFE%
45 FUNCT$(15) = "Open File":                  FUNSAFE%(15) = NOTSAFE%
46 FUNCT$(16) = "Close File":                 FUNSAFE%(16) = NOTSAFE%
47 FUNCT$(17) = "Search for First":           FUNSAFE%(17) = NOTSAFE%
48 FUNCT$(18) = "Search for Next":            FUNSAFE%(18) = NOTSAFE%
49 FUNCT$(19) = "Delete File":                FUNSAFE%(19) = NOTSAFE%
50 FUNCT$(20) = "Read Sequential":            FUNSAFE%(20) = NOTSAFE%
51 FUNCT$(21) = "Write Sequential":           FUNSAFE%(21) = NOTSAFE%
52 FUNCT$(22) = "Make File":                  FUNSAFE%(22) = NOTSAFE%
53 FUNCT$(23) = "Rename File":                FUNSAFE%(23) = NOTSAFE%
54 FUNCT$(24) = "Return Login Vector":        FUNSAFE%(24) = SAFE%
55 FUNCT$(25) = "Return Current Disk":        FUNSAFE%(25) = SAFE%
56 FUNCT$(26) = "Set DMA Address":            FUNSAFE%(26) = NOTSAFE%
57 FUNCT$(27) = "Get Address (Alloc)":        FUNSAFE%(27) = SAFE%
58 FUNCT$(28) = "Write Protect Disk":         FUNSAFE%(28) = SAFE%
59 FUNCT$(29) = "Get Address (R/O Vector)": FUNSAFE%(29) = SAFE%
60 FUNCT$(30) = "Set File Attributes":        FUNSAFE%(30) = NOTSAFE%
61 FUNCT$(31) = "Get Address (Disk Params)":FUNSAFE%(31) = SAFE%
62 FUNCT$(32) = "Set/Get User Code":          FUNSAFE%(32) = SAFE%
63 FUNCT$(33) = "Read Random":                FUNSAFE%(33) = NOTSAFE%
64 FUNCT$(34) = "Write Random":               FUNSAFE%(34) = NOTSAFE%
65 FUNCT$(35) = "Compute File Size":          FUNSAFE%(35) = NOTSAFE%
66 FUNCT$(36) = "Set Random Record":          FUNSAFE%(36) = NOTSAFE%
70 QUEST$(0)=""
71 QUEST$(1)=""
72 QUEST$(2)="ASCII value of character to output"
73 QUEST$(3)=""
74 QUEST$(4)=QUEST$(2)
75 QUEST$(5)=QUEST$(2)
76 QUEST$(6)=QUEST$(2)+" (or 255 to input)"
77 QUEST$(7)=""
78 QUEST$(8)="New value"
79 QUEST$(9)="Starting address of string"
80 QUEST$(10)="Address of console buffer"
81 QUEST$(11)=""
82 QUEST$(12)=""
83 QUEST$(13)=""
84 QUEST$(14)="New disk to log (0 to 1)"
85 QUEST$(15)="Address of FCB"
86 QUEST$(16)=QUEST$(15)
87 QUEST$(17)=QUEST$(15)
88 QUEST$(18)=""
89 QUEST$(19)=QUEST$(15)
90 QUEST$(20)=QUEST$(15)
91 QUEST$(21)=QUEST$(15)
92 QUEST$(22)=QUEST$(15)
93 QUEST$(23)=QUEST$(15)
94 QUEST$(24)=""
95 QUEST$(25)=""
96 QUEST$(26)="DMA Address"
```

(listing continued on next page)

LISTING 1.

(listing continued from previous page)

```
97 QUEST$(27)=""
98 QUEST$(28)=""
99 QUEST$(29)=""
100 QUEST$(30)=QUEST$(15)
101 QUEST$(31)=""
102 QUEST$(32)="New user code or 255 to find current user-code"
103 QUEST$(33)=QUEST$(15)
104 QUEST$(34)=QUEST$(15)
105 QUEST$(35)=QUEST$(15)
106 QUEST$(36)=QUEST$(15)
110 REPLY$(0)=""
111 REPLY$(1)="AASCII value of character"
112 REPLY$(2)=""
113 REPLY$(3)= REPLY$(1)
114 REPLY$(4)=""
115 REPLY$(5)=""
116 REPLY$(6)= REPLY$(1)+" (0 = not ready)"
117 REPLY$(7)="AI/O byte = "
118 REPLY$(8)=""
119 REPLY$(9)=""
120 REPLY$(10)=" You must extract the characters from the buffer"
121 REPLY$(11)="A0 = no character, 255 = character waiting"
122 REPLY$(12)="HVersion number can be calculated from"
123 REPLY$(13)=""
124 REPLY$(14)=""
125 REPLY$(15)="A255 means file not found else OK"
126 REPLY$(16)= REPLY$(15)
127 REPLY$(17)= REPLY$(15)
128 REPLY$(18)= REPLY$(15)
129 REPLY$(19)= REPLY$(15)
130 REPLY$(20)= REPLY$(15)
131 REPLY$(21)= REPLY$(15)
132 REPLY$(22)= REPLY$(15)
133 REPLY$(23)= REPLY$(15)
134 REPLY$(24)="HLogin vector = "
135 REPLY$(25)="ACurrent disk = "
136 REPLY$(26)=""
137 REPLY$(27)="HALLOC address = "
138 REPLY$(28)=""
139 REPLY$(29)="HRead only vector = "
140 REPLY$(30)= REPLY$(15)
141 REPLY$(31)="HDisk parameter block address = "
142 REPLY$(32)="ACurrent User Code = "
143 REPLY$(33)="A0 means successful else error code"
144 REPLY$(34)= REPLY$(15)
145 REPLY$(35)=""
146 REPLY$(36)=""
200 RET$=CHR$(&HC9) : ' Z80 and 8080 RET instruction
999 '======= Display CP/M functions =======
1000 FOR FUNCT% = 0 TO 17
1010    PRINT FUNCT%;" ";FUNCT$(FUNCT%);
1020    PRINT TAB(40);FUNCT%+19;" ";FUNCT$(FUNCT%+19)
1030 NEXT FUNCT% : PRINT " 18  ";FUNCT$(18) : PRINT : FUNCT% = -1
1040 WHILE FUNCT% < 0 OR FUNCT% > 36
1050    PRINT "Enter function to CALL"; : INPUT FUNCT%
1060 WEND
1070 IF FUNSAFE%(FUNCT%) = SAFE% THEN GOSUB 1200 ELSE GOSUB 1100
1080 END
1100 PRINT "This function is not recommended to be used from MBASIC"
1110 PRINT "without a good understanding of the effect of the CALL"
1120 RETURN
1200 DE% = 0 : HL% = 0
1210 IF QUEST$(FUNCT%) <> "" THEN PRINT QUEST$(FUNCT%);:INPUT DE%
1220 GOSUB 30000 : PRINT
1230 IF REPLY$(FUNCT%)<>""THEN PRINT MID$(REPLY$(FUNCT%),2);
1240 IF LEFT$(REPLY$(FUNCT%),1)="A" THEN PRINT DE%,HEX$(DE%);" HEX"
1250 IF LEFT$(REPLY$(FUNCT%),1)="H" THEN PRINT HL%,HEX$(HL%);" HEX"
1260 RETURN
29999 '====== Call machine code routine to CP/M ======
30000 IF CPMFUN$="" OR RIGHT$(CPMFUN$,1)<>RET$ THEN GOSUB 30050
30010 A = VARPTR(CPMFUN$) + 1 : CPMFUN = PEEK(A) + PEEK(A+1) * 256
30020 CALL CPMFUN(FUNCT%,DE%,HL%)
30030 RETURN
30049 '====== Save routine in string ======
30050 CPMFUN$ = "" : RESTORE 30080 : READ FUNLEN%
30060 FOR A% = 1 TO FUNLEN%:READ B%:CPMFUN$=CPMFUN$ + CHR$(B%):NEXT A%
30070 RETURN
30080 DATA 23 , &HE5 , &HD5 , &HC5 , &H4E , &HEB , &H5E , &H23 , &H56
30085 DATA &HCD , &H05 , &H00 , &HE3 , &HC1 , &H71 , &H23 , &H70
30090 DATA &H2B , &H44 , &H4D , &HD1 , &H12 , &HE1 , &HC9
```

(continued from previous page)

the actual address of the string in low byte, high byte order. If the second byte of the vector is added to the third byte multiplied by 256 then the starting address of the string is known.

The first routine listed allows any CP/M BDOS function to be called. Listing 1 is a Basic program which demonstrates the use of this routine. Some of the functions have been disabled by setting the element of the Funsafe%(array) to Notsafe% where these functions need addresses of file-control blocks or optional hardware, such as punch, reader, etc. If you wish to try any of these functions, change the element of the Funsafe%(array) to Safe%, as in lines 30 to 66 of listing 1.

Where the function requires an argument to be passed to it a question is specified in the appropriate element of Quest$(array) for that function. This argument is the value required in register DE by the routine. The value returned by the function, if any, can be in either the A register or the HL register. The presence of a returned value is indicated by the existence of an entry in the Reply$(array). The first letter of the reply is either A or H, to indicate that the result is in the A register or the HL register.

Listing 2 shows the Z-80 version of the machine-code routine, and listing 3 the 8080 version. It first saves the registers so that the results can be put in the correct arguments later. The function number is then put into the C register and the second argument from MBasic is put into the DE register. This is done for all functions, regardless of the need for it, because this makes for shorter and simpler code.

The CP/M BDOS is then Called at location 5, the standard entry point. On return from the BDOS the contents of the A register are put into the second MBasic argument and the contents of the HL register are put into the third MBasic argument. The registers are returned to their original values as they are no longer required. The routine therefore returns to MBasic with all registers holding the value they did when the routine was called.

The second routine allows MBasic to call the CP/M BIOS functions. Listing 4 is the Basic demonstration program, structured in the same manner as listing 1. Some functions are disabled in the same way as some of the functions are disabled in listing 1.

The machine code to call BIOS is more complicated than that required to call BDOS because the

LISTING 2. Z-80 MACHINE CODE FOR BDOS CALL

```
;       CPMFUN.MAC
;
; Routine to call CP/M functions from MBASIC.
;
; Written by K.N.McMann          20th July 1985
;
; Usage:-
;       1) With the MBASIC interpreter
;               reserve space with CLEAR,&HC000
;               or what-ever max memory you wish
;               MBASIC to use.
;       2) With the MBASIC interpreter by reserving
;               memory at invocation time with
;               MBASIC /M:&HC000 or what-ever max
;               memory you wish MBASIC to use.
;       Both the above methods then require the BASIC
;               program to POKE the op-code values into
;               memory starting at the reserved memory
;               location. Assign the variable CPMFUN the
;               value of the memory location of the first
;               byte of the program.
;       3) With the MBASIC interpreter by storing the
;               the routine in a string variable with
;               successive CHR$(op-code value)
;               instructions. Use the VARPTR function to
;               determine the location of the string in
;               memory and store it in variable CPMFUN.
;       4) With the MBASIC compiler ( BASCOM ) you need
;               not reserve memory or poke the routine
;               but assemble it with M80 and link it
;               with the compiled program using L80.
;
;       To call the routine from the BASIC program
;               CALL CPMFUN ( FUNCT% , DE% , HL% )
;       where FUNCT% is the number of the CP/M function
;               DE% is the argument to be passed to the
;               function. DE% contains the value of the
;               A register on return.
;               HL% returns the value of the HL register.
;
; Entry conditions:-
;       MBASIC uses the registers to point to the arguments
;       as follows:-
;               HL points to 1st argument
;               DE points to 2nd argument
;               BC points to 3rd argument
;
; On exit the registers will contain their original values.
;
        .Z80
CPMFUN: PUSH    HL              ; save registers
        PUSH    DE
        PUSH    BC
        LD      C,(HL)          ; put function number
                                ; in C register
        EX      DE,HL           ; make HL point to the
                                ; 2nd argument
        LD      E,(HL)          ; and put the value
        INC     HL              ; into the DE
        LD      D,(HL)          ; register
        CALL    5               ; call CP/M
        EX      (SP),HL         ; save HL on the stack
                                ; and make HL point to
                                ; the 3rd argument
        POP     BC              ; the pull the value off
                                ; the stack
        LD      (HL),C          ; and move it
        INC     HL              ; to the 3rd argument
        LD      (HL),B
        DEC     HL              ; HL points to the low
                                ; byte of the 3rd arg
                                ; (the original value
                                ; of BC)
        LD      B,H             ; and now we restore
        LD      C,L             ; BC to its original
                                ; value
        POP     DE              ; restore DE
        LD      (DE),A          ; and store A in the
                                ; 2nd argument
        POP     HL              ; restore HL to its
                                ; original value
        RET                     ; return to MBASIC

        END
```

LISTING 3. 8080 MACHINE CODE FOR BDOS CALL

```
;       CPMFUNI.ASM
;
; Routine to call CP/M functions from MBASIC.
;
; Written by K.N.McMann          20th July 1985
;
; Usage:-
;       1) With the MBASIC interpreter
;               reserve space with CLEAR,&HC000
;               or what-ever max memory you wish
;               MBASIC to use.
;       2) With the MBASIC interpreter by reserving
;               memory at invocation time with
;               MBASIC /M:&HC000 or what-ever max
;               memory you wish MBASIC to use.
;       Both the above methods then require the BASIC
;               program to POKE the op-code values into
;               memory starting at the reserved memory
;               location. Assign the variable CPMFUN the
;               value of the memory location of the first
;               byte of the program.
;       3) With the MBASIC interpreter by storing the
;               the routine in a string variable with
;               successive CHR$(op-code value)
;               instructions. Use the VARPTR function to
;               determine the location of the string in
;               memory and store it in variable CPMFUN.
;       4) With the MBASIC compiler ( BASCOM ) you need
;               not reserve memory or poke the routine
;               but assemble it with M80 and link it
;               with the compiled program using L80.
;
;       To call the routine from the BASIC program
;               CALL CPMFUN ( FUNCT% , DE% , HL% )
;       where FUNCT% is the number of the CP/M function
;               DE% is the argument to be passed to the
;               function. DE% contains the value of the
;               A register on return.
;               HL% returns the value of the HL register.
;
; Entry conditions:-
;       MBASIC uses the registers to point to the arguments
;       as follows:-
;               HL points to 1st argument
;               DE points to 2nd argument
;               BC points to 3rd argument
;
; On exit the registers will contain their original values.
;
CPMFUNI:PUSH    H               ; save registers
        PUSH    D
        PUSH    B
        MOV     C,M             ; put function number
                                ; in C register
        XCHG                    ; make HL point to the
                                ; 2nd argument
        MOV     E,M             ; and put the value
        INX     H               ; into the DE
        MOV     D,M             ; register
        CALL    5               ; call CP/M
        XTHL                    ; save HL on the stack
                                ; and make HL point to
                                ; the 3rd argument
        POP     B               ; the pull the value off
                                ; the stack
        MOV     M,C             ; and move it
        INX     H               ; to the 3rd argument
        MOV     M,B
        DCX     H               ; HL points to the low
                                ; byte of the 3rd arg
                                ; (the original value
                                ; of BC)
        MOV     B,H             ; and now we restore
        MOV     C,L             ; BC to its original
                                ; value
        POP     D               ; restore DE
        STAX    D               ; and store A in the
                                ; 2nd argument
        POP     H               ; restore HL to its
                                ; original value
        RET                     ; return to MBASIC

        END
```

(listings continued on page 123)

entry point of the routine to execute each function is different. Listing 5 shows the Z-80 code, and listing 6 the 8080 code. The BC and DE registers are loaded with the contents of the second and third arguments respectively.

The next step is to determine the entry point to the correct routine. Memory locations 1 and 2 contain the address of the second entry in the BIOS jump table. To determine the entry point for the routine, first subtract 1 from the function number passed in the call; the HL register points to it. Then multiply this by 3 — because each entry in the jump table is three bytes long — to determine the offset from the BIOS vector.

The next thing to do is get the BIOS address from locations 1 and 2 into the HL register pair and save it on the stack. Now that the original BIOS vector is saved, the offset can be added to HL, and HL can be saved in locations 1 and 2. The BIOS vector is now a vector to the routine which is needed; therefore you can execute a Call 0 to perform the function. When the function returns it is necessary to replace the BIOS vector with its original vector by Popping it from the stack into HL and then saving HL to locations 1 and 2. All that remains now is to transfer the returned values to the MBasic arguments, and then return to MBasic.

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LISTING 4. BASIC DEMO PROGRAM

```
1 ' BIOSFN.BAS
2 ' PROGRAM TO DEMONSTRATE CALLS TO BIOS FROM MBASIC
3 ' WRITTEN BY K.N.McMann       22 July 1985
4 '
10 DIM FUNCT$(16) , FUNSAFE%(16) , QUEST$(16) , REPLY$(16)
20 SAFE% = -1 : NOTSAFE% = 0
30 FUNCT$(0) = "Cold Boot":                      FUNSAFE%(0) = NOTSAFE%
31 FUNCT$(1) = "Warm Boot":                      FUNSAFE%(1) = NOTSAFE%
32 FUNCT$(2) = "Test Console Status":            FUNSAFE%(2) = SAFE%
33 FUNCT$(3) = "Console Input":                  FUNSAFE%(3) = SAFE%
34 FUNCT$(4) = "Console Output":                 FUNSAFE%(4) = SAFE%
35 FUNCT$(5) = "List Device Output":             FUNSAFE%(5) = NOTSAFE%
36 FUNCT$(6) = "Punch Device Output":            FUNSAFE%(6) = NOTSAFE%
37 FUNCT$(7) = "Reader Device Input":            FUNSAFE%(7) = NOTSAFE%
38 FUNCT$(8) = "Home Current Disk":              FUNSAFE%(8) = SAFE%
39 FUNCT$(9) = "Select Disk":                    FUNSAFE%(9) = SAFE%
40 FUNCT$(10) = "Set Track":                     FUNSAFE%(10) = SAFE%
41 FUNCT$(11) = "Set Sector":                    FUNSAFE%(11) = SAFE%
42 FUNCT$(12) = "Set DMA address":               FUNSAFE%(12) = NOTSAFE%
43 FUNCT$(13) = "Read Sector":                   FUNSAFE%(13) = NOTSAFE%
44 FUNCT$(14) = "Write Sector":                  FUNSAFE%(14) = NOTSAFE%
45 FUNCT$(15) = "Get List Device Status":        FUNSAFE%(15) = SAFE%
46 FUNCT$(16) = "Translate Sector":              FUNSAFE%(16) = NOTSAFE%
50 QUEST$(0) = ""
51 QUEST$(1) = ""
52 QUEST$(2) = ""
53 QUEST$(3) = ""
54 QUEST$(4) = "ASCII value of character to output"
55 QUEST$(5) = QUEST$(4)
56 QUEST$(6) = QUEST$(4)
57 QUEST$(7) = ""
58 QUEST$(8) = ""
59 QUEST$(9) = "Enter drive (0 to 1)"
60 QUEST$(10) = "Enter track no."
61 QUEST$(11) = "Enter physical sector no."
62 QUEST$(12) = "Enter address"
63 QUEST$(13) = ""
64 QUEST$(14) = ""
65 QUEST$(15) = ""
66 QUEST$(16) = "Enter Logical Sector no."
70 REPLY$(0) = ""
71 REPLY$(1) = ""
72 REPLY$(2) = "A255 = char waiting, 0 = none waiting"
73 REPLY$(3) = "AASCII value of character is"
74 REPLY$(4) = ""
75 REPLY$(5) = ""
76 REPLY$(6) = ""
77 REPLY$(7) = REPLY$(3)
78 REPLY$(8) = ""
79 REPLY$(9) = ""
80 REPLY$(10) = ""
81 REPLY$(11) = ""
82 REPLY$(12) = ""
83 REPLY$(13) = "A0 = no error, 1 = non-recoverable error"
84 REPLY$(14) = REPLY$(13)
85 REPLY$(15) = "A255 = List device ready, 0 = not ready"
86 REPLY$(16) = "HPhysical sector ="
200 RET$=CHR$(&HC9) : ' Z80 and 8080 RET instruction
999 ' ====== Display BIOS functions ======
1000 FOR FUNCT% = 0 TO 16
1010    PRINT FUNCT%;" ";FUNCT$(FUNCT%)
1020 NEXT FUNCT% : FUNCT% = -1 : PRINT
1030 WHILE FUNCT% < 0 OR FUNCT% > 16
1040    PRINT "Enter BIOS function to CALL"; : INPUT FUNCT%
1050 WEND
1060 IF FUNSAFE%(FUNCT%) = SAFE% THEN GOSUB 1200 ELSE GOSUB 1100
1070 END
1100 PRINT "This function is not recommended to be used from MBASIC"
1110 PRINT "without a good understanding of the effect of the CALL"
1120 RETURN
1200 BA% = 0 : DH% = 0
1210 IF QUEST$(FUNCT%) <> "" THEN PRINT QUEST$(FUNCT%);:INPUT BA%
1220 GOSUB 30100 : PRINT
1230 IF REPLY$(FUNCT%)<>""THEN PRINT MID$(REPLY$(FUNCT%),2);
1240 IF LEFT$(REPLY$(FUNCT%),1)="A" THEN PRINT BA%,HEX$(BA%);" HEX"
1250 IF LEFT$(REPLY$(FUNCT%),1)="H" THEN PRINT DH%,HEX$(DH%);" HEX"
1260 RETURN
30099 '====== Call machine code routine to BIOS ======
30100 IF BIOSFN$="" OR RIGHT$(BIOSFN$,1)<>RET$ THEN GOSUB 30150
30110 A = VARPTR(BIOSFN$) + 1 : BIOSFN = PEEK(A) + PEEK(A+1) * 256
30120 CALL BIOSFN(FUNCT%,BA%,DH%)
30130 RETURN
30149 '====== Save routine in string ======
30150 BIOSFN$ = "" : RESTORE 30180 : READ FUNLEN%
30160 FOR A% = 1 TO FUNLEN%:READ B%:BIOSFN$=BIOSFN$ + CHR$(B%):NEXT A%
30170 RETURN
30180 DATA 60 , &HE5 , &HD5 , &HC5 , &HE5 , &H60 , &H69 , &H4E , &H23
30182 DATA &H46 , &HEB , &H5E , &H23 , &H56 , &HD5 , &HC5 , &HD1
30184 DATA &HC1 , &HE1 , &H35 , &H7E , &H86 , &H86 , &H34 , &H2A
30186 DATA &H01 , &H00 , &HE5 , &HD5 , &H5F , &HAF , &H57 , &H19
30188 DATA &HD1 , &H22 , &H01 , &H00 , &HCD , &H00 , &H00 , &HE3
30190 DATA &H22 , &H01 , &H00 , &HC1 , &HE1 , &H71 , &H23 , &H70
30192 DATA &H2B , &H44 , &H4D , &HE1 , &H77 , &H23 , &HAF , &H77
30194 DATA &H2B , &HEB , &HE1 , &HC9
```

(listings continued on next page)

LISTING 5. Z-80 MACHINE CODE FOR BIOS CALL

```
;       BIOSFN.MAC
;
; Routine to call CP/M BIOS functions from MBASIC.
;
; Written by K.N.McMann          22nd July 1985
;
; Usage:-
;       1) With the MBASIC interpreter
;               reserve space with CLEAR,&HC000
;               or what-ever max memory you wish
;               MBASIC to use.
;       2) With the MBASIC interpreter by reserving
;               memory at invocation time with
;               MBASIC /M:&HC000 or what-ever max
;               memory you wish MBASIC to use.
;       Both the above methods then require the BASIC
;               program to POKE the op-code values into
;               memory starting at the reserved memory
;               location. Assign the variable BIOSFN the
;               value of the memory location of the first
;               byte of the program.
;       3) With the MBASIC interpreter by storing the
;               the routine in a string variable with
;               successive CHR$(op-code value)
;               instructions. Use the VARPTR function to
;               determine the location of the string in
;               memory and store it in variable BIOSFN.
;       4) With the MBASIC compiler ( BASCOM ) you need
;               not reserve memory or poke the routine
;               but assemble it with M80 and link it
;               with the compiled program using L80.
;
;       To call the routine from the BASIC program
;               CALL BIOSFN ( FUNCT% , BA% , DH% )
;       where FUNCT% is the number of the CP/M function
;               BA% is the argument to be passed to the
;               function in the BC or C register.
;               BA% contains the value of the
;               A register on return.
;               DH% is the argument to be passed to the
;               routine in the DE register.
;               DH% returns the value of the HL register.
;
; Entry conditions:-
;       MBASIC uses the registers to point to the arguments
;       as follows:-
;               HL points to 1st argument
;               DE points to 2nd argument
;               BC points to 3rd argument
;
; On exit the registers will contain their original values.
;
        .Z80

BIOSFN: PUSH    HL      ; save registers
PUSH    DE
PUSH    BC
PUSH    HL      ; we need a 2nd copy of HL
LD      H,B     ; make HL point to 3rd
LD      L,C     ; argument
LD      C,(HL)  ; put low byte of 3rd arg
                ; into C
INC     HL      ; HL -> high byte of 3rd arg
LD      B,(HL)  ; high byte into B
EX      DE,HL   ; HL -> 2nd arg
LD      E,(HL)  ; low byte into E
INC     HL      ; HL -> high byte
LD      D,(HL)  ; high byte into D
PUSH    DE      ;;
PUSH    BC      ;; swap DE and BC
POP     DE      ;;
POP     BC      ;;
POP     HL      ; HL -> funct no.
DEC     (HL)    ; subtract 1 because we
                ; get a pointer to 2nd
                ; entry in BIOS jump table
LD      A,(HL)  ;; funct no. -1 to A
ADD     A,(HL)  ;; multiply funct no. by 3
ADD     A,(HL)  ;;
INC     (HL)    ; restore function no. to
                ; original value
LD      HL,(1)  ; get BIOS vector
PUSH    HL      ; and save it
PUSH    DE      ; save 3rd arg
LD      E,A     ; funct offset to E
XOR     A       ; clear A
LD      D,A     ; to clear D
ADD     HL,DE   ; add offset to address
POP     DE      ; restore 3rd arg
LD      (1),HL  ; save the vector we need
CALL    0       ; call the BIOS routine
EX      (SP),HL ; put the returned HL value
                ; on the stack and get original
                ; BIOS vector in HL
LD      (1),HL  ; restore original BIOS vector
POP     BC      ; value to be returned in 3rd arg
POP     HL      ; HL -> 3rd arg
LD      (HL),C  ; return low byte
INC     HL      ; HL -> high byte
LD      (HL),B  ; return high byte
DEC     HL      ; HL -> 3rd arg
LD      B,H     ; restore BC to original
LD      C,L     ; value
POP     HL      ; HL -> 2nd argument
LD      (HL),A  ; A in low byte
INC     HL      ; HL -> high byte
XOR     A       ; clear A
LD      (HL),A  ; and save in high byte
DEC     HL      ; HL -> 2nd arg
EX      DE,HL   ; restore DE to orig value
POP     HL      ; restore HL to orig value
RET             ; return to BASIC

END
```

LISTING 6. 8080 MACHINE CODE FOR BIOS CALL

```
;       BIOSFNI.ASM
;
; Routine to call CP/M BIOS functions from MBASIC.
;
; Written by K.N.McMann          22nd July 1985
;
BIOSFNI:PUSH    H       ; save registers
        PUSH    D
        PUSH    B
        PUSH    H       ; we need a 2nd copy of HL
        MOV     H,B     ; make HL point to 3rd
        MOV     L,C     ; argument
        MOV     C,M     ; put low byte of 3rd arg
                        ; into C
        INX     HL      ; HL -> high byte of 3rd arg
        MOV     B,M     ; high byte into B
        XCHG            ; HL -> 2nd arg
        MOV     E,M     ; low byte into E
        INX     HL      ; HL -> high byte
        MOV     D,M     ; high byte into D
        PUSH    D       ;;
        PUSH    B       ;; swap DE and BC
        POP     D       ;;
        POP     B       ;;
        POP     H       ; HL -> funct no.
        DCR     M       ; subtract 1 because we
                        ; get a pointer to 2nd
                        ; entry in BIOS jump table
        MOV     A,M     ;; funct no. -1 to A
        ADD     A,M     ;; multiply funct no. by 3
        ADD     A,M     ;;
        INR     M       ; restore function no. to
                        ; original value
        LHLD    1       ; get BIOS vector
        PUSH    H       ; and save it
        PUSH    D       ; save 3rd arg
        MOV     E,A     ; funct offset to E
        XRA     A       ; clear A
        MOV     D,A     ; to clear D
        DAD     D       ; add offset to address
        POP     D       ; restore 3rd arg
        SHLD    1       ; save the vector we need
        CALL    0       ; call the BIOS routine
        XTHL            ; put the returned HL value
                        ; on the stack and get original
                        ; BIOS vector in HL
        SHLD    1       ; restore original BIOS vector
        POP     B       ; value to be returned in 3rd arg
        POP     H       ; HL -> 3rd arg
        MOV     M,C     ; return low byte
        INX     H       ; HL -> high byte
        MOV     M,B     ; return high byte
        DCX     H       ; HL -> 3rd arg
        MOV     B,H     ; restore BC to original
        MOV     C,L     ; value
        POP     H       ; HL -> 2nd argument
        MOV     M,A     ; A in low byte
        INX     H       ; HL -> high byte
        XRA     A       ; clear A
        MOV     M,A     ; and save in high byte
        DCX     H       ; HL -> 2nd arg
        XCHG            ; restore DE to orig value
        POP     H       ; restore HL to orig value
        RET             ; return to BASIC
```

PC

UPLOADING FILES INTO WORDSTAR

Mike Lewis has a useful patch in Turbo Pascal to overcome a couple of annoying problems when transferring WP files.

IF YOU HAVE ever tried to use WordStar with files produced by other editors, or if you have transferred WordStar text across a comms link or downloaded it from Telecom Gold, you will have noticed a hard Carriage Return at the end of every line. This of course is the standard ASCII end-of-line marker, but WordStar expects it only where a new line is essential, usually at the end of a paragraph. Elsewhere, a soft Carriage Return is used.

This presents no difficulties if you wish to print the file or work on it as a non-document. But if you want to use it with normal document editing, you will not be able to reformat the text, because WordStar sees each line as a separate paragraph.

PORTABLES

The other problem is a little more obscure but just as irritating. It arises when you upload files into WordStar from certain types of computers, particularly lap portables likes the Olivetti M-10 and Tandy 100. The editors in these machines do not recognise Linefeeds, and while some communications programs obligingly insert them for you, others do not. The result is that WordStar sees the entire text as one long overprint line.

This little filter program, written in Turbo Pascal, will solve both problems. It will "soften" the Carriage Returns in mid-paragraph, and append Linefeeds to all Carriage Returns that do not already have them. It does not alter the text in any other way.

So how does the program know where a paragraph ends? Most people, when they type, insert some form of white space between paragraphs. Some type an extra blank line, others indent the first line of the new paragraph. It is a simple matter for the program to check for this. It is not infallible — it will not work if the entire paragraph is indented, for example — but it will succeed in the vast majority of cases.

WORDSTAR UPLOADER

```
program wsupload;
  {Converts uploaded and other ASCII files to WordStar
  format: makes hard carriage returns soft when in middle
  of paras; inserts linefeeds where necessary.

  Written by Mike Lewis}

type
  filename=string[14];

var
  ch, hardcr, softcr, linefd, tab, space: char;
  ok, endline, endpara: boolean;
  infile, outfile: file of char;
  filespec: filename;

begin
  hardcr:=chr(13); softcr:=chr(141); linefd:=chr(10);
  tab:=chr(9); space:=' ';
  writeln('CONVERSION TO WORDSTAR FORMAT');
  repeat

    {get input filename and open file}
    repeat
      writeln; write('File to be coverted (or RTN to quit): ');
      read(filespec); writeln;
      if length(filespec)=0 then
        halt;
      assign(infile,filespec);
      {$I-  switch on error handling}
      reset(infile);
      {$I+ - make error handling automatic again}
      ok:=(ioresult=0);
      if not ok then
        writeln('Cannot find ',filespec);
    until ok;

    {get output filename and open file}
    write('Output file name (or RTN to quit): ');
    read(filespec); writeln;
    if length(filespec)=0 then
      halt;
    assign(outfile,filespec);
    rewrite(outfile);
    {sequential pass of input file}
    endline:=false; endpara:=false;
    while not eof(infile) do
      begin
        read(infile,ch);
        if ch<>linefd then
          begin
            if endline then
              begin
                if ch in [hardcr,softcr,tab,space] then
                  begin endpara:=true; write(outfile,hardcr,linefd); end
                else
                  if endpara then
                    write(outfile,hardcr,linefd)
                  else
                    write(outfile,softcr,linefd);
              end;
              if (ch=hardcr) or (ch=softcr) then
                endline:=true
              else
                begin
                  write(outfile,ch); endline:=false; endpara:=false;
                end;
          end;
        end;

    {closedown}
    close(infile); close(outfile);
    writeln; writeln('FUNCTION COMPLETE');

  until false;
end.
```

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STRUCTURED INDENT

KICKING OFF this new section of Open File are two useful utilities for dBase programmers, both written in MSBasic. If you have any short programs written in dBase II or III code itself which you think might be of general interest please send them in: we might print them. Details of how to submit programs are at the beginning of Open File on page 113.

Inspired by the MBasic Indent program which appeared in the October issue of *Practical Computing*, Denis Sherman has written a utility that does the same job for dBase II. In addition it checks that all Do loops finish with the appropriate End statement. His listing is fully annotated and should be self-explanatory.

READING FILES INTO BASIC

KEVIN POWIS'S routine is for reading unmodified dBase II files from Basic. One of the problems with dBase II is that it holds your data in a non-standard format. Unless you are prepared to convert the files into ASCII you cannot use them with other programming languages such as Basic.

This routine, which will read any dBase II file and list it out, demonstrates a more convenient technique. A dBase file has a 511-byte header, containing information such as field names and so on. The data itself then follows, held as a continuous string with no markers to signify the end of each record.

The routine overcomes both these problems with Basic's rather neglected Input$ function. Input$ reads an exact number of bytes into a string variable; it therefore differs from Basic's ordinary Input, which expects a Carriage Return/Linefeed to mark the end of the input record.

To use this routine just change the file name in line 50 and the record length in line 60 to match those found in one of your own dBase files.

STRUCTURED INDENT

```
100     REM ================================================================
110     REM     TABDBASE.BAS     By Denis Sherman, Andover, Hants Oct 85
120     REM ================================================================
130     PRINT CHR$(27)+"E":TB$=CHR$(9):T=0:Q=0
140     DIM CHECK$(6):RESTORE 160
150          FOR L=1 TO 6:READ CHECK$(L):NEXT
160     DATA "DO WHILE","DO CASE","IF","ENDDO","ENDCASE","ENDIF"
170     FILES:PRINT:'SHOW FILES ON DISK

180     INPUT "ENTER THE NAME OF THE DBASE2 PROGRAM TO BE TABULATED ";F$
190     IF INSTR(F$,".")>0 THEN F$=LEFT$(F$,INSTR(F$,".")-1)
200     PRINT "THIS IS THE LISTING OF THE TABULATED VERSION OF ";F$+".PRG"
210     PRINT "============================================================"
220     OPEN "I",£1,F$+".PRG"
230     OPEN "O",£2,F$+".NEW":PRINT

240          WHILE NOT EOF(1)
250          LINE INPUT £1,A$
260          'CHECK FOR BLANK LINES AND SCRATCH THEM
270          IF LEN(A$)=0 THEN 240
280          'SWITCH LOWER CASE OUTSIDE QUOTES TO UPPER TO TRAP KEYWORDS
290          QUOTES=0
300               FOR L=1 TO LEN(A$)
310               A=ASC(MID$(A$,L,1))
320               IF A=34 THEN QUOTES=NOT QUOTES
330               IF QUOTES THEN 350.
340               IF A>96 THEN MID$(A$,L,1)=CHR$(A-32)
350               NEXT L
360          'DROP LEADING SPACES AND TABS TO GIVE KNOWN CONDITION
370          B$=LEFT$(A$,1)
380          IF B$<>TB$ AND B$<>" " THEN L$=A$:GOTO 410
390          A$=RIGHT$(A$,LEN(A$)-1):GOTO 370
400          'CHECK FOR LINES CONTAINING KEYWORDS FOR PLUS TABULATIONS
410               FOR L=1 TO 3
420               IF INSTR(A$,CHECK$(L))=1 THEN T=T+1
430               NEXT L
440          'CHECK FOR LINES CONTAINING KEYWORDS FOR MINUS TABULATIONS
450               FOR L=4 TO 6
460               IF INSTR(A$,CHECK$(L))=1 THEN Q=Q+1
470               NEXT L
480               FOR L=1 TO T:L$="    "+L$:NEXT L
490          PRINT L$:PRINT £2,L$
500          T=T-Q:Q=0
510          WEND

520     IF A$="*EOF" THEN 550
530     PRINT £2,"*EOF"
540     PRINT "*** EOF MESSAGE ADDED TO END OF FILE ***"
550     CLOSE:PRINT:PRINT

560     PRINT "SHALL I SAVE THE TABULATED VERSION (Y/N) "
570          ANS=0:WHILE ANS=0:ANS=INSTR("YyNn",INPUT$(1)):WEND
580     ON ANS GOTO 590,590,610,610
590     KILL F$+".PRG":NAME F$+".NEW" AS F$+".PRG":PRINT:PRINT
600     PRINT F$+".PRG";" HAS BEEN SAVED AS THE TABULATED VERSION":GOTO 620
610     KILL F$+".NEW":PRINT "NO UPDATE - FILE REMAINS UNTOUCHED"
620     END
630     'EOF
```

FILE READER

```
50 OPEN "KP1.DBF" FOR INPUT AS £1    'OPEN YOUR dBASEII FILE FOR INPUT
60 RECORDLEN = 108                   'EACH RECORD IN THIS DBF IS 108 BYTES LONG
70 D$=INPUT$(255,£1)                 'MOVE THE BASIC POINTER ALONG...
80 D$=INPUT$(255,£1)                 'A TOTAL OF...
90 D$=INPUT$(11,£1)                  '511 BYTES PAST dBASE'S CONTROL AREA
100 WHILE NOT(EOF(1))                'IN THIS EXAMPLE JUST READ THE RECORDS
110   Z$=INPUT$(RECORDLEN + 1,£1)    'INTO STRING Z$
120   PRINT Z$                       'AND PRINT THEM OUT
130 WEND                             'DBASEII USED STANDARD EOF
140 CLOSE
```

PO

BY BILL HILL

DESIGN YOUR OWN DOS

A USEFUL program for customising the vocabulary of DOS 3.3, DOS 3.2 and Fast DOS has been written by Angus Burnett. The table gives the version for use with Fast DOS, and the short modifications for DOS 3.3 and DOS 3.2 are given in the tables below.

By offering menus and self-explanatory prompts, the program allows the user to change the DOS commands, the DOS error messages, the Disc Volume header, the name of the Hello program, and the file type characters in the catalogue.

The program writes the data straight back to the disc, so you do not need to use Init to initialise a blank disc with the new version. You simply reboot the disc and your new version of DOS will be loaded into memory, ready for you to use.

Most DOS users quickly get tired of having to type Catalog to get a disc directory. One use for this program is to change Catalog to Cat or Dir. Try the program out on a disc which does not have any precious files on it until you get the hang of it.

VARIATIONS FOR DOS 3.2

```
152 T%=1:S1%=9:S2%=10:P%=116
252 T%=1:S1%=8:S2%=9:P%=132
352 T%=1:S%=10:P%=117
452 T%=2:S%=6:P%=176
552 T%=2:S%=6:P%=167
```

VARIATIONS FOR DOS 3.3

```
152 T%=1:S1%=8:S2%=9:P%=116
252 T%=1:S1%=7:S2%=8:P%=132
352 T%=1:S%=9:P%=117
452 T%=2:S%=2:P%=175
552 T%=2:S%=2:P%=167
```

FAST DOS CUSTOMISER

```
0  DIM E$(28)
5  TEXT : HOME :HO$ = "": FOR T = 1 TO 40:SP$ = SP$ + " ":HO$ = HO$ +  CHR$
     (95): NEXT T
10  PRINT HO$: HTAB 14: PRINT "DOS CUSTOMISER"
15  PRINT HO$;: GOSUB 1500
20  PRINT : PRINT
25  PRINT "     1.CHANGE DOS ERROR MESSAGES": PRINT
30  PRINT "     2.CHANGE DOS COMMANDS": PRINT
35  PRINT "     3.CHANGE HELLO PROGRAM NAME": PRINT
40  PRINT "     4.CHANGE CATALOG HEADING": PRINT
45  PRINT "     5.CHANGE FILE CODES": PRINT
50  PRINT "     6.TERMINATE PROGRAM": PRINT : PRINT HO$;
55  PRINT : HTAB 9: PRINT "PLEASE ENTER A NUMBER -> ";
60 X =  PEEK (36):Y =  PEEK (37): PRINT : PRINT HO$;: POKE 36,X: VTAB Y +
     1
65  GET Z$:Z =  VAL (Z$): IF Z < 1 OR Z > 6 THEN 60
70  PRINT Z$
75  IF Z <  > 6 THEN 100
80  FOR T = 1 TO 12: VTAB T: HTAB 1: CALL  - 868: VTAB 25 - T: CALL  - 8
     68
85  FOR N = 1 TO 20: NEXT N,T: VTAB 1: END
100  HOME : ON Z GOTO 150,250,350,450,550
105  END
150  HOME : HTAB 12: PRINT "CHANGE DOS ERRORS": PRINT :ST = 16384
152 T% = 1:S1% = 8:S2% = 9:P% = 116
155  POKE TR,T%: POKE SE,S1%: POKE LO,0: POKE HI,64: POKE CC,1: CALL RW
160  POKE SE,S2%: POKE HI,65: CALL RW:T =  PEEK (49385)
170 ST = ST + P%: FOR T = 1 TO 14:E$(T) = ""
175 E$ =  CHR$ ( PEEK (ST)): IF  ASC (E$) > 127 THEN E$ =  CHR$ ( ASC (E
     $) - 128):E$(T) = E$(T) + E$:ST = ST + 1: NEXT T: GOTO 185
180 E$(T) = E$(T) + E$:ST = ST + 1: GOTO 175
185  VTAB 3:T =  PEEK (49384):ST = 16384:LE = 0
190  FOR T = 1 TO 14: PRINT "ERROR £ "T" :";:FL =  LEN (E$(T)):AN$ = E$(
     T): GOSUB 1000
192 E$(T) =  LEFT$ (AN$ + SP$,FL)
195 E$(T) =  LEFT$ (E$(T), LEN (E$(T)) - 1) +  CHR$ ( ASC ( RIGHT$ (E$(T
     ),1)) + 128 * ( ASC ( RIGHT$ (E$(T),1)) < 128))
200  NEXT T
205 ST = ST + P%: FOR T = 1 TO 14: FOR N = 1 TO  LEN (E$(T)): POKE ST, ASC
     ( MID$ (E$(T),N,1)):ST = ST + 1: NEXT N,T
210  POKE SE,S1%: POKE HI,64: POKE CC,2: CALL RW
215  POKE SE,S2%: POKE HI,65: CALL RW: RUN
250  HOME : HTAB 11: PRINT "CHANGE DOS COMMANDS": PRINT :ST = 16384
252 T% = 1:S1% = 7:S2% = 8:P% = 132
255  POKE TR,T%: POKE SE,S1%: POKE LO,0: POKE HI,64: POKE CC,1: CALL RW
260  POKE SE,S2%: POKE HI,65: CALL RW:T =  PEEK (49385): VTAB 3
270 ST = ST + P%: FOR T = 1 TO 28:E$(T) = ""
275 E$ =  CHR$ ( PEEK (ST)): IF  ASC (E$) > 127 THEN E$ =  CHR$ ( ASC (E
     $) - 128):E$(T) = E$(T) + E$:ST = ST + 1: NEXT T: GOTO 285
280 E$(T) = E$(T) + E$:ST = ST + 1: GOTO 275
285 T =  PEEK (49384):LE = 0
290  FOR T = 1 TO 28: PRINT "COMMAND £ "T" :";:FL = 20:AN$ = E$(T): GOSUB
     1000:E$(T) = AN$
295 LE = LE +  LEN (E$(T)):E$(T) =  LEFT$ (E$(T), LEN (E$(T)) - 1) +  CHR$
```

FAST DOS CUSTOMISER

```
     ( ASC ( RIGHT$ (E$(T),1)) + 128)
300  NEXT T: IF LE > 132 THEN  PRINT : PRINT "SORRY !! TOO MANY CHARACTE
     RS !!": CALL  - 198: FOR T = 1 TO 1500: NEXT T: VTAB 3: CALL  - 958
     :LE = 0: GOTO 250
305 ST = 16384 + P%: FOR T = 1 TO 28: FOR N = 1 TO  LEN (E$(T)): POKE ST
     , ASC ( MID$ (E$(T),N,1)):ST = ST + 1: NEXT N,T
310  POKE SE,S1%: POKE HI,64: POKE CC,2: CALL RW
315  POKE SE,S2%: POKE HI,65: CALL RW: RUN
350  HOME : HTAB 8: PRINT "CHANGE HELLO PROGRAM NAME": PRINT :ST = 16384

352 T% = 1:S% = 9:P% = 117

355  POKE TR,T%: POKE SE,S%: POKE LO,0: POKE HI,64: POKE CC,1: CALL RW
360  PRINT "CURRENT HELLO PROGRAM NAME :": PRINT
365  FOR T = ST + P% TO ST + P% + 60: PRINT  CHR$ ( PEEK (T));: NEXT T:N
     $ = ""
370  FOR T = ST + P% + 59 TO ST + P% STEP  - 1: IF  PEEK (T) = 160 THEN
      NEXT T
375  FOR N = T TO ST + P% STEP  - 1:N$ =  CHR$ ( PEEK (N) - 128 * ( PEEK
     (N) > 127)) + N$: NEXT N
380  PRINT : PRINT "ENTER NEW NAME :";:FL = 60:AN$ = N$: GOSUB 1000:N$ =
     ""
390 ST = 16384 + P%:AN$ =  LEFT$ (AN$ + SP$ + SP$,60)
395  FOR T = 1 TO 60: POKE ST, ASC ( MID$ (AN$,T,1)) + 128:ST = ST + 1: NEXT
     T
400  POKE CC,2: CALL RW
405  RUN
450  HOME : HTAB 10: PRINT "CHANGE CATALOG HEADING": PRINT :ST = 16384
452 T% = 2:S% = 3:P% = 109
465  POKE TR,T%: POKE SE,S%: POKE LO,0: POKE HI,64: POKE CC,1: CALL RW
470 C$ = "": FOR T = ST + P% + 11 TO ST + P% STEP  - 1:C$ = C$ +  CHR$ (
      PEEK (T) - 128): NEXT T
475  PRINT "PRESENT CATALOG HEADING :"C$: PRINT
480  PRINT "NEW HEADING :";:AN$ = C$:FL = 12: GOSUB 1000:C$ = AN$:ST = 1
     6384 + P% + 12
485  IF  LEN (C$) < 12 THEN C$ = C$ + " ": GOTO 485
490  FOR J = 1 TO 12: POKE ST - J,128 +  ASC ( MID$ (C$,J,1)): NEXT J
500  POKE CC,2: CALL RW: RUN
550  HOME : HTAB 12: PRINT "CHANGE FILE CODES": PRINT :ST = 16384
552 T% = 2:S% = 3:P% = 101
555  POKE TR,T%: POKE SE,S%: POKE LO,0: POKE HI,64: POKE CC,1: CALL RW
560  FOR T = 1 TO 6:C$(T) =  CHR$ ( PEEK (ST + P% + T - 1) - 128): NEXT
     T
570  PRINT "OLD CODES :": PRINT
575  PRINT "TEXT - "C$(1): PRINT "INTEGER - "C$(2): PRINT "APPLESOFT - "
     C$(3)
580  PRINT "BINARY - "C$(4): PRINT "S TYPE - "C$(5): PRINT "R TYPE - "C$
     (6): PRINT : INVERSE : PRINT "ENTER NEW ONES": NORMAL
585  FOR T = 1 TO 6: VTAB 4 + T: HTAB 20: PRINT "-> ";:FL = 1:AN$ = C$(T
     ): GOSUB 1000
590 C$(T) =  CHR$ ( ASC (AN$) + 128): POKE ST + P% + T - 1, ASC (C$(T)):
      NEXT T
595  POKE CC,2: CALL RW
600  RUN
999  END
1000  PRINT AN$;
1005  GET Z$: IF Z$ =  CHR$ (13) THEN  PRINT : RETURN
1010  IF Z$ =  CHR$ (27) THEN  POP : RUN
1015  IF Z$ =  CHR$ (8) AND  LEN (AN$) = 0 THEN 1005
1020  IF Z$ =  CHR$ (8) AND  LEN (AN$) = 1 THEN AN$ = "": PRINT  CHR$ (8
     );" ";  CHR$ (8);: GOTO 1005
1025  IF Z$ =  CHR$ (8) THEN AN$ =  LEFT$ (AN$, LEN (AN$) - 1): PRINT  CHR$
     (8);" ";  CHR$ (8);: GOTO 1005
1030  IF Z$ <  CHR$ (31) AND Z$ <  >  CHR$ (7) THEN 1005
1035  IF  LEN (AN$) = FL THEN 1005
1040  PRINT Z$;:AN$ = AN$ + Z$: GOTO 1005
1500  DATA 169,3,160,10,32,217,3,96,0,0,1,96,1,0,0,0,32,3,0,64,0,0,1,0,0
     ,96,1,0,0,0,0,0,0,1,239,216
1505  FOR T = 768 TO 803: READ J: POKE T,J: NEXT T
1510 RW = 768
1515 TR = 782:SE = 783:LO = 786:HI = 787:CC = 790: RETURN
```

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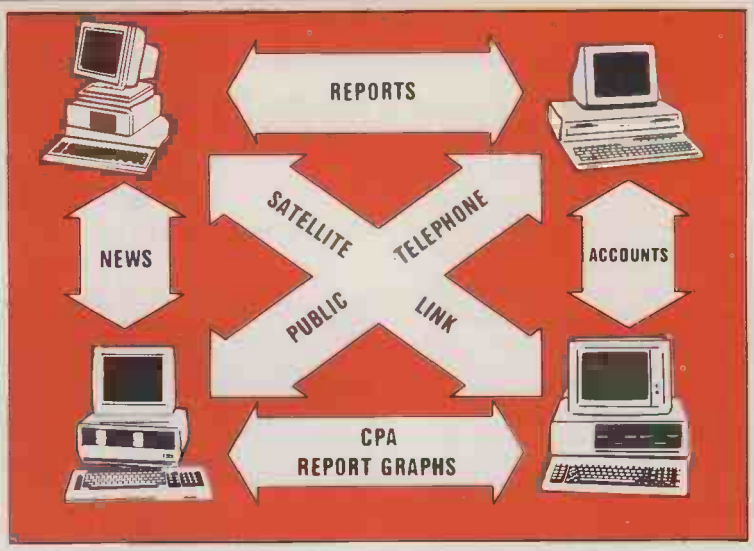

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TO BE HONOURED IN THE BREACH?

The Data Protection Act is now in force. **Neil Laird** is worried about who is going to apply it, and whether it will actually protect anyone at all.

UNTIL recently no one really knew how the Data Protection Act was going to work. However, now the Registrar has made various pronouncements and those in the legal business have expressed opinions on how the Act will be interpreted. The prognosis is not good.

The Act is powerful and wide in scope. It covers anyone who handles personal information. You do not even have to own the computer. It has features such as an absolute offence for non-registration, unlimited fines, a personal liability clause and new liabilities for damages suffered if personal information is lost, improperly disclosed or inaccurate. It introduces new principles and rules about how computer data should be kept — see *PC* September 1985, page 70 for more details.

In the face of this there has been a hive of inactivity. Most people, including most of the popular computer press, have written off the Act as something which hardly affects business and certainly not the home user. This is not the case. It was designed to affect relevant business computers but because it is based on generalities and social philosophy, not working software, it will cover almost all serious users. From my own experience few micro owners realise this.

Even in business most people feel that they are one of the exceptions. However, a knowledge of the software and the data in it indicates that everybody will be caught, even if only for the odd name on their files or an extra piece of information such as a list of the personal telephone numbers of key company personnel. The "distribution", "WP" and even "accounts" exemptions in the Act are therefore meaningless in most cases. Why the distinction between consumer and trade could not have been maintained in the Act is a mystery, as it would have clarified many areas and exempted many more micros.

With less than six months to register and consequently less than six months to find everyone who should be registered, it is a racing certainty that, without realising it, many honest and otherwise law-abiding micro owners will find themselves on the wrong side of the law once the last day for registration has come and gone. A mass publicity campaign is promised, but the large numbers involved make its success impossible. Bearing in mind the seriousness of the offence, a longer period to register and more thorough publicity is needed.

It is ironic that a piece of legislation designed to help and protect ordinary people will turn out to be one which will create confusion and worry for ordinary micro users. This might have been acceptable if the Act achieved its main objective of preventing data abuse. The workings of the Registrar and the Act will prevent it doing so.

The Registrar has made very soothing noises about how he intends to proceed. It will be with great caution and plenty of warnings. Resources dictate that he will act after the event, and that he will rely on reports from data subjects, on whom information is kept, for leads as to where he should investigate. A well-organised company will have plenty of opportunity to correct things long before he arrives.

Fundamentally, the Act fails because the onus is entirely on the data subjects to check up on it. To do this, they will have to establish who holds data on them. This will entail wading through possibly half a million registrations and guessing which may be worth enquiry. Even then database users have plenty of excuses to delay enquiry while they rectify their records. Of course, this should not happen, but it no doubt will. A database user has at least 40 days to reply and can restrict the answer to one Registration entry only, which need not cover the main information sought.

Most people will not bother to make pre-emptive enquiries and so the first they will know something is wrong will be when they suffer because of someone else's mistake. On most occasions that will simply be a nuisance which is not sufficiently damaging or aggravating enough to pursue in law. The only recourse will be to report the matter to the Registrar.

For example, consider trade mailing lists. Most of us are on several such lists as a result of going to trade shows, and we receive much valuable trade mail. I am such a person, and having moved premises some time ago I should like to go receiving it. But despite writing to everyone who has sent me circulars, pleading with them to tell the mail list owners of new address, nothing has happened. Very soon I shall have to stop the mail being forwarded.

If tracing mail lists is not even feasible or economic for those in business, clearly the updating requirements in the Act will be a purely token show, and the right of redress nominal. A specific compulsory update would have been of enormous benefit to everyone except the cowboy sellers of out-of-date lists.

At best this Act is a piece of sabre rattling. At worst it will cause some small businessmen and women, and owners of home micros needless worry. PC

Neil Laird is the owner and manager of two dealerships selling home and small-business micros, and organises and lectures on TOPS courses on microcomputers in business.

Not enough attention has been paid to the Act's effects.

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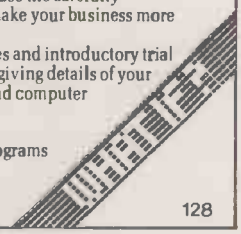

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